

COMPUTERS AND AUTOMATION

CYBERNETICS • ROBOTS • AUTOMATIC CONTROL

Vol. 4
No. 12

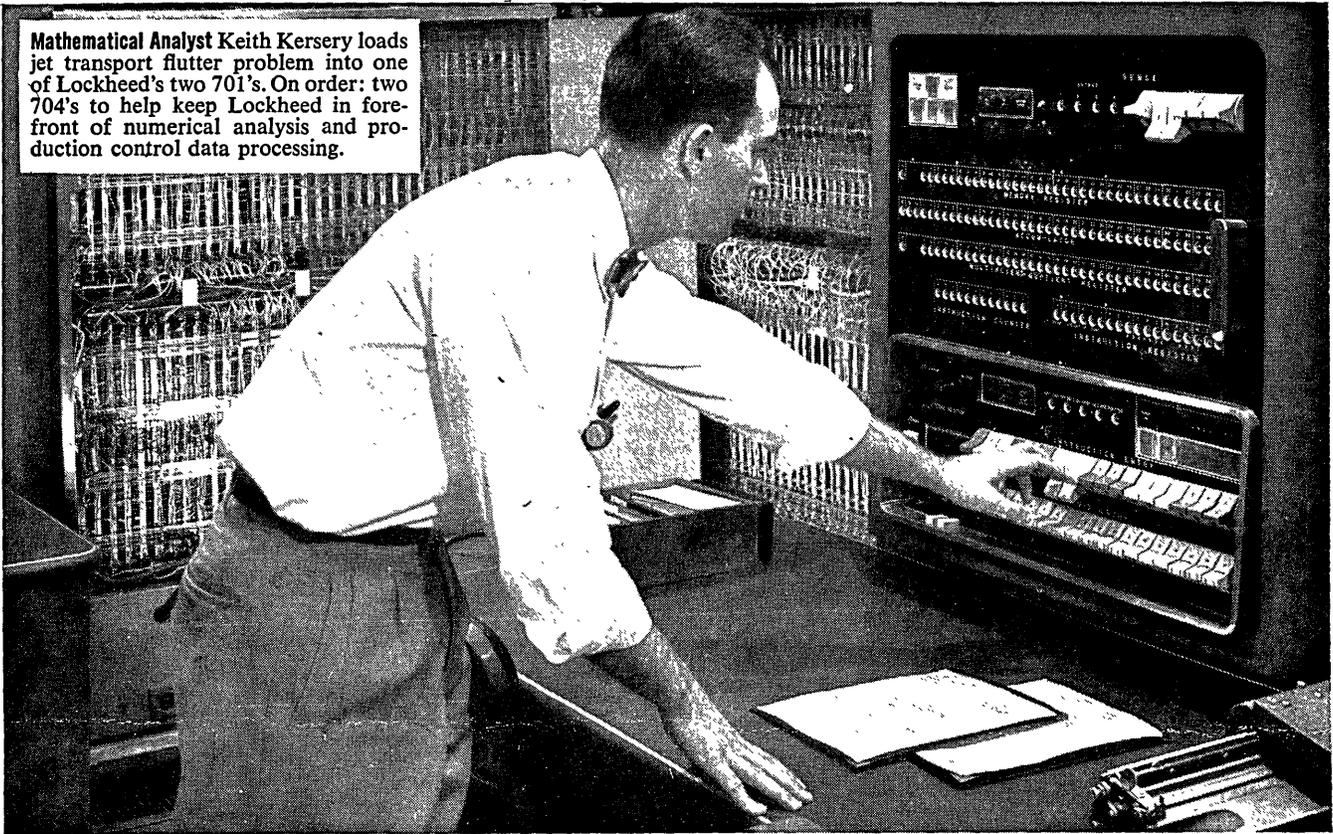
Digital Computers in Eastern Europe
. . . Alston S. Householder

Automatic Airways
. . . Henry T. Simmons

Roster of Organizations in the Computer Field
(cumulative)

Dec.
1955

Mathematical Analyst Keith Kersery loads jet transport flutter problem into one of Lockheed's two 701's. On order: two 704's to help keep Lockheed in forefront of numerical analysis and production control data processing.



704's and 701's speed Lockheed research in numerical analysis

With two 701 digital computers already in operation, Lockheed has ordered two 704's to permit greater application of numerical analysis to complex aeronautical problems now being approached. Scheduled for delivery early next year, the 704's will replace the 701's.

Much of the work scheduled or in progress is classified. However, two significant features are significant to career-minded Mathematical Analysts: 1) the wide variety of assignments created by Lockheed's diversified development program and 2) the advanced nature of the work, which falls largely into unexplored areas of numerical analysis.

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Those interested in advanced work in this field are invited to write E. W. Des Lauriers, Dept. MA-31-12.

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COMPUTERS AND AUTOMATION

CYBERNETICS • ROBOTS • AUTOMATIC CONTROL

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THE EDITOR'S NOTES

FREE USE OF TORONTO'S COMPUTER FOR RESEARCH

At the Eastern Joint Computer Conference in Boston, Dr. C.C. Gotlieb of the Computation Centre at the University of Toronto, and your editor talked about a certain problem that would be a good one to run on a computer. I told him that some time I wanted to work on coding and running Part 2 of the problem of translating English spoken language into properly spelled English words. Part 1 of the problem of course consists of recognizing spoken sounds and noting them down as English "phonemes": the sounds which carry meaning, such as "p" as in "cup", "ng" as in "sing", the "eh" in "very", and the longer "eh" in "vary". This part of the problem, I believe, is still beyond reach for the next few years. But Part 2 of the problem is to take English expressed in phonemes, and translate it using a computer into properly spelled English words. Of course, we would need a translation into machine programming of the rules which a champion speller of English uses (including indications of context so as to distinguish between "him" and "hymn").

Dr. Gotlieb said that they had a policy at the Computation Centre at the University of Toronto of allowing free use of their Ferranti computer Ferut, to a reasonable extent, to any investigator who was not going to profit personally from the research: this in spite of the fact that they regularly charge \$100 an hour for the use of their computer on commercial problems. He invited the putting of this problem on Ferut.

In addition, Dr. Gotlieb said that they were planning to tie in their computer by teletype with many other universities in Canada, so that each could have access to the machine and put its own problems first hand onto the machine. In this way they could make their one machine helpful to the whole of Canada for research and instruction.

READER'S INQUIRIES

We were talking the other day to a brilliant and practical man in an advertising agency, with the object of convincing him that advertising in "Computers and Automation" would be a good idea for his client.

He said to us: "Always work backward. (Don't work forward -- in terms of giving a service to the field.) Ask yourself instead: Who will put \$ into the magazine, and what do they want?" He said: "A magazine is an economic

tool for an advertiser. He wants to get a fair return on his money. He wants to be sure that his ad did some useful work. Your argument needs to be "From your ad in such-and-such issue of our magazine, you received so many inquiries from so many people, and they are important people, and good prospects." And we talked about controlled circulation magazines, that are sent free to their recipients, and the great volume of inquiries that flow out of some of them.

Irrespective of whether all of the philosophy of controlled circulation should apply to "Computers and Automation", and irrespective of whether we should surrender our primary objective, to be as useful as possible to computer people, it is a fact of life for any magazine that it must earn its way. Earnings come from (a) subscriptions and (b) advertising. So in this issue we have put back into "Computers and Automation" a reader's inquiry form (p.54), and we ask all of you, our readers, to take a good look at the ads in each issue, and if they are interesting to you, and refer to products which you might use, to send us inquiries for forwarding to advertisers. If 10% of our subscribers (200 out of 2000) sent us inquiries each month, the effect would be profound. There is no doubt that good evidence of the response to advertisements in our magazine will make a great difference in the reception of "Computers and Automation" among advertisers, and the resulting size, quality, and price of the magazine.

THE WELL-LAID PLANS OF MICE AND MEN...

When we started to put this issue together, which was planned to be an issue full of reference information including an up-to-date "Glossary", we found that there was a very great deal of information to be put into it. The new cumulative "Roster of Organizations in the Computer Field", -- brought up to date from a questionnaire expressly for this issue, -- by itself covered over 16 pages. Also, some important and timely articles appeared: Would it be better to delay them a month, or to delay some of the reference information?

We decided that it would be more to the advantage of computer people and our readers to print the articles promptly -- the news about digital computers in Eastern Europe and the news about automatic airways -- and postpone the balance of the reference information. A good part of this will appear in the January issue of "Computers and Automation".

HIGH-SPEED SEARCHING TECHNIQUES FOR SCANNING
LITERATURE

Theodore C. Hines
Chief, Extension Dept.,
Washington Public Library,
Washington, D.C.

I am enclosing a Who's Who entry form. Please renew my subscription when it expires. I am sorry to see that your rates are rising, but then what isn't? Besides, as you point out, you have become fatter and oftener.

My personal interest in computers is primarily in their application to high-speed searching techniques for scanning the literature of various subjects.

I'm sure you're familiar with such applications, and with the problem of literature searching in general, which ties in so closely with computers and automation. Much has been done, particularly in the field of chemistry, but much more needs doing. Consistent application of such techniques as that developed by Dr. Ralph R. Shaw (the Rapid Selector), or suggested by Dr. V. Bush to meet the Patent Office's search problem, is badly needed.

Since the problem is truly basic, I wish that more space could be devoted to it in the magazine. At any rate, I'm sure that it would be helpful if you could call the attention of your readers to American Documentation, which carries many articles which would be of interest to them. I've ventured to write up an annotation, which follows:

Shera, Jesse H., editor / American Documentation Institute, in cooperation with the School of Library Science, Western Reserve University / quarterly since 1950, photoffset, about 60 pp., \$6.00 per year.

Covers many phases of documentation. Many articles on machine searching of literature, including application of symbolic logic to indexing processes, use of computers to do searching based on the association of ideas, the application of such techniques in specific organizations. Excellent though limited abstracts of pertinent material a regular feature. Both technical and more general articles. Of much more interest to readers of Computers and Automation than title would indicate to those unfamiliar with documentation.

- END -

BIBLIOGRAPHY COMPILATION --
REQUEST FOR ASSISTANCE

Robert R. Seeber, Jr.
Watson Scientific Computing Laboratory
New York, N.Y.

The Watson Laboratory is preparing a new edition of its "Bibliography on the Use of IBM Machines in Science, Statistics, and Education"; this edition is to include references to articles published before January 1956.

We would like to receive before January 20 copies of articles, or references to articles, which might be included in the new edition of the bibliography, which is scheduled to come out at the end of January. We are interested both in articles published in journals, and in articles not published in journals but which are available from the author or his organization.

The articles we are seeking are those which discuss specific problems and their solutions on IBM machines, and which are of a scientific, statistical, or educational nature. We do not include business applications.

We hope the new edition of the bibliography will be as complete as possible in order that it may give maximum assistance to mathematicians, scientists, programmers, and coders. We feel that the circulation that "Computers and Automation" has among people in the computer field would enable us to uncover articles that we might otherwise miss.

We would appreciate it if any reader of "Computers and Automation" would send any references or copies of articles to:

Librarian
International Business Machines Corp.
Watson Scientific Computing Laboratory
612 West 116 St.
New York 27, N.Y.

The bibliography when ready will be available free of charge by writing to the Watson Laboratory.

We shall appreciate very much any assistance you or your readers can give us.

- END -

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CONTENTS

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DIGITAL COMPUTERS IN EASTERN EUROPE

ALSTON S. HOUSEHOLDER
Oak Ridge National Laboratory
Oak Ridge, Tennessee

In Darmstadt, Germany, at the end of October, the outside world generally was first provided with authoritative information on digital computer development behind the Iron Curtain. At the same time promises were given of further exchange of information.

The occasion was the Darmstadt Conference on Electronic Digital Computers and Information Processing, (mentioned in "Computers and Automation", Aug., 1955, p. 4), organized by Professor Alwin Walther and held at the Technische Hochschule in Darmstadt. About 600 persons took part. Advance registration had been requested; in the printed list of participants there were men from the United States, Great Britain, Italy, Switzerland, France, Belgium, Netherlands, Denmark, Sweden, Austria, and even Spain and Finland. A supplementary page gave the names of two Czechs, Svoboda (well known in the U. S.) and Oblonsky, and of two Russians, Lebedev and Basilevsky, whose registrations arrived too late for inclusion in the list proper.

The Conference was scheduled to open on Tuesday, Oct. 25, 1955, to continue Wednesday and Thursday and to be followed on Friday by tours. Svoboda and Oblonsky arrived Tuesday evening but the Russians had not appeared. Eventually a telegram came from Berlin saying they had been unable to obtain American visas to get through Berlin, but that they still hoped to make it. Dramatically, on Thursday evening, after the Conference proper had ended, there appeared the two already named, together with two others, Ktorov and Novikov, who acted as interpreters.

Although many had left and most others were planning to leave, a special session was arranged for Saturday morning at which Lebedev and Basilevsky were invited to speak for the benefit of any who might find it possible to remain. This writer had the good fortune to be among these, as was de Vogelaere of the University of Notre Dame.

The two papers by Lebedev and Basilevsky had been translated into German and were read in this language by the two authors; following them, there was a short question period carried on with the aid of the interpreters since Lebedev and Basilevsky spoke mainly Russian. Generally speaking, the questions were answered

quite freely except in one instance where the question concerned the use of transistors. The reply to this was that the question had no direct bearing upon the paper under discussion.

Since the proceedings of the Conference are to be published in full, no attempt will be made to summarize these or other papers of the Conference in any detail, but only to pick out a few of the salient points.

BESM

The machine discussed by Lebedev is called the BESM (the Russian initials for "high-speed electronic computing machine" would be BEVM and the replacement of the V by S seems to represent a concession to euphony). It compares favorably in speed and capacity with any American or other European machine other than IBM's NORC (Naval Ordnance Research Calculator). BESM was said to have been in operation for about half a year, and about 75% good operation time is claimed for it. It appears, further, that no other machines just like it are planned. Associated with it is a staff of 500 people, but no classification or other characterization of the staff was given.

The machine operates in binary floating point, with 6 digits for the exponent and 33 for the mantissa, inclusive of the sign digits. Cathode ray tubes are used for the fast memory, but they are said to resemble those used in the Whirlwind more than they do the Williams tubes. In this there are 1024 words. There is, in addition, a special memory of 376 words by means of germanium diodes, to which access is in some sense limited and whose function is not clear, but it seems to be used for storing special subroutines in frequent use.

The commands are triple-address. Addition and subtraction require from 77 to 182 microseconds, according to the normalization; multiplication, 270 microseconds; division, 288 microseconds. There is auxiliary storage on a magnetic drum with 5 blocks of 1024 words in each, and on 4 magnetic tapes. On the drum the mean waiting time is 40 microseconds, after which the rate of transfer is 800 words per second, while the rate to or from tape is 400 words per second. On an "important problem"

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which required the use of both drum and tape, the machine operated at an average rate of 7 to 8 operations per millisecond.

In conversation, Professor Lebedev remarked that they consider the use of a triple-address code to double the effective computing speed of a machine. He did not elaborate on this statement.

For commands, the 39 bits are grouped into 11 for each of the three addresses, 5 for the operation, and the remaining one is used in normalization of the result. There are 31 distinct operations possible.

The input and output are by means of punched cards which are said to be grouped into "books", but little else was said about this. The machine has been used for problems in pure science and also for industrial problems (one questioner asked if any problems came from commercial organizations and was told that in Russia such things do not exist).

URAL

The machine reported by Basilevsky is more on the order of an IBM 650; presumably there are more than one, under construction at least. It is called the URAL, or more fully, the "Universal" electronic digital machine, although the short name is apparently not formed from initials of words. It has a magnetic drum memory of 1024 words and an auxiliary tape memory of 40,000 words, each word being of 36 binary digits. It is single-address, fixed point. Somewhat apologetically, it seemed, the speaker excused the use of fixed point calculation by the remark that it was expected that in the majority of cases the machine would be used in the solution of many problems of similar type where the scaling would be fairly standard. It was also pointed out that in any event the machine could be programmed to do its own scaling.

It is said that positive numbers are directly coded and negative numbers "inversely". This seems to mean that negative numbers are represented by their complements with respect to $2-2^{-36}$, or by the "one's" complement. There are a total of 30 distinct operations in the URAL. The arrangement of registers is such that operations such as $\sum a_i b_i$ and continued multiplications $a_1 a_2 a_3 \dots$ can be carried out without the need for storing intermediate results. Each operation requires 10 milliseconds except for division, which requires 40, and a "normalization" operation which requires 20 (I have in my notes that multiplication requires 30, but I cannot find this statement in the original paper).

Transfers between magnetic drum and magnetic tape can take place at the rate of 4500 words per minute. Input and output are on punched paper tape. Input is at the rate of 4500 words per minute, output 300 words per minute.

These seem to be the principal facts revealed. Nothing was said about any other possible developments. It was clear, however, that they were well informed on developments in America, in particular. They were quite fascinated by the NORC. The import of some of their questions was not clear, possibly because of linguistic barriers. Professor Lebedev was much interested in the NORC, and having asked about the cost, and why the same money was not invested in several slower machines instead of the one large one, he next seemed to reverse his point of view, asking if more NORCs would be built (the reply was in the negative, taking the question as phrased, but was probably unfair and not a correct answer to the question intended), and expressing great surprise, saying that surely in America there must be many problems. Fortunately or unfortunately, the conversation was interrupted at this point and never resumed (suggestions from readers are solicited).

Other Developments

In contrast to the Russians, who seemed completely informed on developments here, were the Czechs, who seem to have been almost completely uninformed about developments either here or in Russia. Even Lehmann from East Germany, who reported on a small computer at Dresden, had been given an expense-paid trip to Moscow to see the BESM. Cut off from all outside information, the Czechs had built at Prague a small magnetic drum computer called SAPO. It has storage for 1024 words of 32 binary digits each, and floating point binary representation with 6 digits for the exponent. The first striking feature is the use of 3 units operating in parallel for checking. This has the obvious advantages that in some cases an error is readily corrected by the machine itself without stopping. Another curious feature is the use of a five-address code; the usual three addresses with alternative addresses for the next instruction. This machine has been described in Czech, with an abstract in English, in "Stroje na Zpracování Informací".

A second machine is under construction in Czechoslovakia. It might be mentioned that theoretical work on the synthesis of relay networks has been carried out under Svoboda's direction and results are published in the same publication. It is also of interest that the computer SAPO is being used in the synthesis of the networks to be used in the new computer.

(continued on page 31)

AUTOMATIC AIRWAYS

HENRY T. SIMMONS
Washington, D.C.

(Reprinted with permission from "The Wall Street Journal", Oct. 25, 1955)

Airway traffic police are working up long-range plans to avert traffic jams in the sky.

If the plans work as expected, the airliner of the future will be flown from the ground by a complex mass of long-range radar and electronic brains -- with the pilots hardly lifting a finger.

Jamming the airways will be a dense, fast-moving stream of air traffic, routed with split-second accuracy. There will be even less danger of air collision than now, fewer flight cancellations in bad weather and fewer delays in landing and taking off at any time.

This automation of the airways won't come tomorrow, and probably not until the late 1960's. Meantime, human pilots will operate much as they do today and the air traffic controllers of the Civil Aeronautics Administration will rely on conventional radio navigation aids and on increased, improved use of radar to handle swelling sky traffic.

First All-Radar Airway

Right now they're planning to set up the nation's first all-radar airway on the crowded Norfolk-to-Boston route; when it's completed in two years or so, it will let the traffic controllers keep in touch with planes visually on radar screens, instead of by radio, over the full 500-mile route. The advantages predicted for this radar hookup give a glimpse of the much greater feats expected eventually. Says a C.A.A. expert:

"Today, if we have two planes flying on the same route at the same altitude, they must be at least 10 minutes apart. This could mean a separation of 20 to 100 miles, depending on the speed of the planes. With radar, we could cut this to just five miles. By cutting down on separation, we can move planes off the ground faster, bring them in faster and increase the capacity of the airways."

But more radar won't be enough to handle the growing load. Even now, air traffic jams are such that multimillion-dollar airliners must often queue up on runways to await take-off or stack up over airports for an hour or two to await landing.

Scheduled airlines, along with their trade group, the Air Transport Association, are push-

ing for improved air traffic control. Speaking of the drive for more automatic air control, an American Airlines spokesman says:

"It is one of those things that goes by steps, and it takes a million steps to get to the end of the line. Every day we're trying to improve our air traffic situation and each step is along a well-planned route into the ultimate automatic control set-up. Economically it is essential; otherwise there won't be any airline business. Already we've run out of air space east of the Mississippi."

By 1965, Government men predict, domestic airlines will haul 70 million passengers, more than twice last year's 32 million, and other traffic will zoom upwards by a like speed.

Jet's Impact

The urgency of better traffic control will be vastly increased by the impending advent of jet airliners, flying close to double the 300-miles-an-hour speed of most present transports; the speedy jets must be fitted into the same flight pattern with the slower planes.

With tremendous future traffic in mind, the C.A.A. men have taken the first steps in a program which may bring automation to the airways. They've persuaded the Air Force to give them a peek at the inner workings of its vast, super-secret SAGE project for continental air defense.

SAGE stands for Semi-Automatic Ground Environment. That's the Air Force's title for an enormous network of telephone and microwave radio circuits it's building to link its farflung radar outposts with giant electronic brains located in command centers in potential target areas. Purpose of the \$2.4 billion project is to convert the continent's air defense system from a manual to a largely automatic operation. When completed in the mid-1960's, it will be a deadly weapon for the Air Defense Command in knocking down enemy attackers.

F.C.C. & A.T.& T.

Just last week, the Federal Communications Commission told the American Telephone & Telegraph Co. it could start construction in seven Eastern states on the first of an estimated 25,000 communications circuits to be leased

AUTOMATIC AIRWAYS

to the Air Force for 10 years as part of the SAGE project. A.T. & T. and other companies of the Bell System will finance construction of the new circuits and will be paid up to \$240 million a year when the project is finished.

Details of the closely-guarded SAGE project are meager, but the system will work something like this:

An approaching enemy aircraft will be spotted by a radar station, located possibly in the Arctic, in Canada or on a picket ship or "Texas Tower" off the nation's coasts. The attacker's course and speed will be automatically transmitted to a distant electronic calculator at a ground control center. Jet fighters or guided missiles will be assigned to down the intruder. The electronic brain will take over control of the intercepting weapons and direct them toward the enemy. When the target is in range, the lightning-fast thinking machine will fire the fighter's guns or rockets and pull it away from the target to avoid a collision.

In the case of a guided missile, it will be steered directly into the target.

SAGE wouldn't be used in this way for routine air traffic, of course. But the C.A.A. men figure that if a remote electronic brain can keep track of fast-moving, evasive enemy bombers and knock them down before they can do any damage, it can be modified to direct peaceful air traffic as well.

Just how this might be done is still in the realm of speculation. One official advances this idea: Equip civil aircraft with special "automatic pilots" geared to respond to radio impulses from electronic brains located on the ground. The accurate thinking machines could "see" air traffic for hundreds of miles with their radar "eyes" and mathematically plot the courses of the aircraft under their guidance so that there would be no danger of collision. The mechanical brains would actually fly the aircraft even to the point of take-off and landing.

Just where human pilots would fit in this picture is hard to say. Presumably they'll continue to ride in the cockpits to take a hand in case of unforeseen emergencies. Not even the most dedicated believer in airways automation is quite ready to say pilots will no longer be necessary.

A joint C.A.A.-Military team of experts will give SAGE a thorough study to determine its possibilities for air traffic control. The civilian experts are optimistic that the giant continental defense project can be adapted to peaceful air traffic control while carrying out its military tasks, thus making unnecessary to build a separate control system for civil or routine military flights.

A spokesman for the Air Transport Association in Washington says it has been participating in exploratory meetings with the C.A.A. and the military. "We are very much interested in the SAGE project; it might be capable of coping with the traffic control problem," he states, though he notes some adaptations of the SAGE system would probably be required.

The C.A.A. experts advance several reasons for their optimism that this could be done.

For one thing, they point out that regular air traffic would not have to be directed with the fantastic precision required for interceptors or missiles pursuing enemy bombers. For this reason, they suggest that only a small part of the vast system would have to be devoted to air traffic control.

Another argument they offer is that SAGE, to be fully effective, should control all air traffic instead of just the lethal interceptors and guided missiles to be sent aloft against enemy bombers. Should an attack come, SAGE presumably could clear routine air traffic from danger areas with its left hand while dealing with the enemy with its right hand.

The Cost Argument

But their biggest argument for extending SAGE automation to routine air traffic control is cost. Even if the aviation planners find the principles of SAGE are perfectly geared to civil aviation, and that they can build a similar system of their own, they see little likelihood of talking Congress into appropriating the billions of dollars they would need to set up a peaceful counterpart alongside of SAGE. Such a request would look mountainous when compared with the estimated \$85 million which C.A.A. now has invested in airways navigation aids and communications facilities. For this reason, the civil aviation men are particularly anxious to persuade the Air Force to share the benefits of SAGE with them.

Just how the Air Force will take to the overtures from the civilian agencies across the Potomac from the Pentagon isn't clear, mainly because the fliers are highly secretive about the big project. It's to be expected the airmen will resent any inroads by civilians in their all-military project, but that doesn't mean they will resist proposals to share SAGE. They have worked closely with C.A.A. in the past to provide up-to-date navigation aids and they have a big stake in seeing this program continued since about half of all airplane flights in the U. S. are by military aircraft.

To improve traffic control in the years before automation can reach the airways, C.A.A. planners are pushing ahead with some less glamorous but no less important projects.

AUTOMATIC AIRWAYS

Most significant of these is the plan to set up an all-radar airway on the Norfolk-to-Boston route. It will have stations at Norfolk, Washington, New York and Boston, and possibly at Atlantic City, N. J., and Providence, R. I., as well. Most of the equipment will be provided by the Defense Department at first, but C.A.A. hopes eventually to provide its own equipment.

C.A.A. has been using radar for many years, but present equipment, located at about 30 of the nation's larger airports, is generally limited to a range of about 50 miles and is used principally to direct the final approach of aircraft coming in to land. Present radar installations aren't strung together in any system like that proposed for the Norfolk-to-Boston route.

The C.A.A. men hope to have the first leg of the new airway, between Norfolk and Washington, operating by February, and to get the rest of it into operation within two years. If they get all six stations into operation, they say, traffic controllers will be able to "see" airplanes at any altitude above 2,000 feet along the entire route.

Help for Controllers

The scheme to radarize the airways will give a big lift to C.A.A.'s route controllers. These are the people who follow the course of each aircraft from ground control centers and make sure that a block of air space is reserved for it during flight. For the most part, they now keep in touch with pilots by radio. Since they can't see the planes they are directing, they must provide for a generous separation of aircraft, particularly in bad weather.

With air traffic climbing year by year and the speed of new aircraft increasing, the separation standards presently required for aircraft could be a major obstacle to airline growth.

"Imagine how it would restrict traffic if we had to provide ten-minute separation between jet aircraft -- a block of air space 100 miles long would need to be reserved for each jet," C.A.A. boss F. B. Lee said in a recent speech.

The answer to this threat is "radar, radar and then some more radar," he declared. Playing it by ear will have to go -- vision is the watchword for our future air traffic control. We will have to give the controller an instantaneous picture of the traffic in his sector."

A particular gadget which C.A.A. hopes will lighten the chores of its traffic controllers is the "transponder." This is a special radar transmitter to be built into aircraft

themselves. It will broadcast a positive identification signal much stronger than the returning radar beam now bounced off the airplane from the long-range ground radar devices. It will permit the traffic men to determine which of several planes they want to control without going through the laborious job of instructing pilots to turn this way and that and watching their radar screens to see which plane image moves -- thus determining by trial and error which aircraft they want to instruct.

In addition, C.A.A. is studying devices for transmitting flight clearances automatically to larger aircraft, with the pilot acknowledging the instructions merely by pressing a button. It is looking into electronic memory devices, computers and other specialized equipment with the aim of cutting down human error.

- END -

BULK SUBSCRIPTION RATES

These rates apply to subscriptions coming in together direct to the publisher. For example, if 5 subscriptions come in together, the saving on each one-year subscription will be 24 percent, and on each two-year subscription will be 31 percent. The bulk subscription rates, depending on the number of simultaneous subscriptions received, follow:

Table 1 -- Bulk Subscription Rates
(United States)

Number of Simultaneous Subscriptions	Rate for Each Subscription, and Resulting Saving to Subscriber	
	One Year	Two Year
10 or more	\$3.80, 31%	\$6.60, 37%
5 to 9	4.20, 24	7.25, 31
4	4.60, 16	8.00, 24
3	5.00, 9	8.80, 16
2	5.25, 5	9.55, 9

For Canada, add 50 cents for each year; outside of the United States and Canada, add \$1.00 for each year.

ROSTER OF ORGANIZATIONS IN THE COMPUTER FIELD

(Cumulative, information as of November 10, 1955)

The purpose of this Roster is to report organizations (all that are known to us) in the computer field: organizations making or developing computing machinery or data-processing machinery; organizations supplying computing services or consulting services in the computer field; and organizations supplying components or services used in the computer field if significantly related to the field (for example, magnetic drums would be such a component, while octal sockets would not be).

Entries. Each Roster entry if complete contains: name of the organization, its address / telephone number / description of its main activities, main products in the field, any comments / size (expressed in number of employees), year established, nature of its interest in the computer field, types of activities it engages in. The last four items are reported in abbreviations, which are explained below. In cases where we did not have complete information, we have put down what we have.

Accuracy. We have tried to make each entry accurate to the extent of information in our possession. We shall be grateful for any more information or additions or corrections that anyone is kind enough to send us. Although we have tried to be accurate and complete, we assume no liability for any statements expressed or implied.

Abbreviations

The key to the abbreviations follows:

Size

Ls Large size, over 500 employees
Ms Medium size, 50 to 500 employees
Ss Small size, under 50 employees (no. in parentheses is approx. no. of employees)

When Established

Le Long established organization (1922 or earlier)
Me Organization established a "medium" time ago (1923 to 1941)
Se Organization established a short time ago (1942 or later) (no. in parentheses is year of establishment)

Interest in Computers and Automation

Dc Digital computing machinery
Ac Analog computing machinery
Ic Incidental interests in computing machinery
Sc Servomechanisms
Cc Automatic control machinery
Mc Automatic materials handling machinery

Activities

Ma Manufacturing activity
Sa Selling activity
Ra Research and development

Ca Consulting
Ga Government activity
Pa Problem-solving
Ba Buying activity
, (Used also in combinations, as in RMSa "research, manufacturing and selling activity")

*C This organization has kindly furnished us with information expressly for the purposes of the Roster and therefore our report is likely to be more complete and accurate than otherwise might be the case. (C for Checking)

ROSTER

ACF Electronics, Division of ACF Industries, Inc.,
800 No. Pitt St., Alexandria, Va. / King 8-4440 /

*C

Coders, decoders, servo-systems, display equipment, special instruments. Ms(375)
Se(1954) Ic RMSa

ACF Industries -- SEE ACF Electronics AND Avion Division

Adalia Limited, Castle Bldg., 1410 Stanley St.,
Montreal, P. Q., Canada / Marquette 2281

Research and consulting services in the application, design, and construction of computers. Ss Se(1952) DAC RCa

Addressograph-Multigraph Corp., 1200 Babbitt Rd.,
Cleveland 17, Ohio / Redwood 1-8000 / and elsewhere / *C

Electronic facsimile printers for high-speed copying of typed data contained in unit card records. Addressograph sensing plates, composed automatically from punched tape, which will automatically list and total figures. Data written at speeds up to 30 forty-character lines per second; as a byproduct, codes automatically punched into punchcards. Transfer printers. Ls(2500) Le(1903) Ic RM Sa

Aero Research Instrument Co., Inc., 1040 W. Grand Ave., Chicago 22, Ill. / Taylor 9-6400 / *C

Data reduction and data gathering systems. Ss(30) Se(1953) Dc RMSCa

Aircraft-Marine Products, Inc., 2100 Paxton St.,
Harrisburg, Pa. / Harrisburg 4-0101 / *C

Patchcord programming systems; patchcords, automatic wire terminators, taper pins (single and multiple), capacitors, etc. Ls(1600) Me(1941) Ic RMSa

Alden Electronic and Impulse Recording Equipment Co., Alden Research Center, Westboro, Mass. / Westboro 467 / *C

Facsimile recording equipment and facsimile components. "On-the-Spot Fact Finders", pulse records, automatic curve plotters. Recorder that monitors any machine or action and records automatically. Ms Se Ic RMSa
Alden Products Co., 117 No. Main St., Brockton,

ROSTER OF ORGANIZATIONS

- Mass. / Brockton 160 / *C
 General and specific components for digital and analog computing machinery; plug-in components, sensing and indicating components, magnetic delay line units, magnetic storage cores, etc. Ms(300) Me(1930) Ic RMSa
- Alfax Paper and Engineering Co., Alden Research Center, Westboro, Mass. / Westboro 467 / *C
 Electro-sensitive recording papers. Ms Se (1942) Ic RMSa
- R. C. Allen Business Machines, Inc., 678 Front Av., Grand Rapids 4, Mich. / Glendale 6-8541 / *C
 Adding machines, bookkeeping machines, cash registers, gyro instruments, etc. Ls(1250) Me(1932) DIc RMSa
- Alpha Computing, Inc., 436 S. Sepulveda Blvd., Los Angeles 49, Calif. / Granite 27787 / *C
 Computing service using both medium and large computers for scientific and engineering problems. Ss Se(1955) Dc CPa
- American Automatic Typewriter Co., 2323 No. Pulaski Road, Chicago 39, Ill. / Everglade 4-5151 / *C
 Pneumatically controlled programming and testing devices. Automatic selective typing equipment (Autotypist). Testing machines for typewriters, adding machines, calculating machines. Ms(100) Le(1869) Ic RMSa
- American Electronics, Inc., 2112 Chico Ave., El Monte, Calif. / Cumberland 3-5331 / *C
 Analog and digital computers; servomechanisms; analog computer components, resolvers, synchros, servo motors, etc. Ls(600) Se(1945) DASc RMSa
- American Machine and Foundry, Electronics Division, 1085 Commonwealth Ave., Boston, Mass. / Algonquin 4-4234 / *C
 Magnetic shift register, digital data-handling equipment; data readout and display, servomechanisms to specifications. Digital servo with 2¹⁵ quantum units per revolution (shaft to digital conversion). Ls(800) Se(1948) Dc RMSa
- Amperite Co., Inc., 561 Broadway, New York 12, N.Y. / Canal 6-1446 / *C
 Delay relays and regulators for computers, etc. Ms(75) Me(1923) Ic RMSa
- Ampex Corp., 934 Charter St., Redwood City, Calif. / Emerson 8-1471 / *C
 Magnetic recording of data. Input-output equipment. Digital and analog magnetic storage devices. Ls(800) Se(1944) Ic RMSa
- Andersen Laboratories, Inc., 39-C Talcott Road, West Hartford 10, Conn. / Adams 3-4491 / *C
 Solid ultrasonic delay lines, computer memories, etc., for computer applications. Ss(30) Se(1950) Ic RMSa
- Anelex Corp., Concord, N. H., and 150 Causeway St., Boston 14, Mass. / Richmond 2-3400 / *C
 High-speed printer (1800 characters per second), numerical and alpha-numeric up to 64 characters and line-lengths up to 120 characters. Ms Se(1952) DIc RMSa
- Applied Science Corporation of Princeton, P.O. Box 44, Princeton, N. J. / Plainsboro 3-4141 / *C
 Radio telemetering and automatic data conversion. Devices for automatic and semi-automatic reduction and analysis of telemetering and radar data. Analog read-in and read-out devices. Digital storage and computing elements. MADAM (Multipurpose Automatic Data Analysis Machine). Ms(85) Se(1946) DA c RCPMSa
- Argonne National Laboratory, Box 299, Lemont, Ill. / Lemont 800 / *C
 Maker of Avidac and Oracle automatic digital computers and other computers, for own use and other government agencies. Developing "George", new high speed computer, to be tested January, 1956. Ls(2500) Me(1942) DAIC RGPa
- Arma Corp., Old Country Rd., Garden City, L. I., N. Y. / Garden City 3-2000 / *C
 Electronic fire-control apparatus. Analog computer components including resolvers, induction generators, etc. Basic weapon and control systems, navigational systems, precision remote control systems. Analog computer components. Ls(6000) Le DASc RMSPa
- Armour Research Foundation, Illinois Institute of Technology, 10 West 35 St., Chicago 16, Ill. / Calumet 5-9600 / *C
 Magnetic recording. Digital, analog and data-handling equipment. Automatic control machinery. Servomechanisms. Instrumentation. Computing service: analog, digital; have Goodyear Electronic Digital Differential Analyzers, Two Channel Electronic Function Generator, card programmed calculator. Ls(1200) Me(1936) DASCc RCPa
- The Arnold Engineering Co., Marengo, Ill. / Chicago, Andover 3-6300 / *C
 Magnetic materials for computer components, etc. Ms(425) Me(1936) Ic RMSa
- Askania Regulator Co., 240 E. Ontario St., Chicago, Ill. / Whitehall 4-3700 / *C
 Hydraulic and electronic automatic control equipment. Use analog computers; manufacture servomechanisms and automatic controls. Computing service: analog; Philbrick analog computer. Ms(400) Me(1930) SCc RMSPa
- Atlas Precision Products Co., 3801 Castor Ave., Philadelphia 24, Pa. / Jefferson 5-3700 / *C
 Mechanical analog computers, geared mechanisms, servos, etc. Ms(300) Me(1928) AIC MSA
- Atomic Instrument Co., 84 Mass. Ave., Cambridge 39, Mass. / Eliot 4-4321 / *C
 Analog to digital converters, printers, counter components and controls; shell velocity computation and recording; etc. Ms(100) Se(1947) DACc RMSCa
- Audio Devices, Inc., 444 Madison Ave., New York 22, N. Y. / Plaza 3-0973
 Magnetic tape guaranteed defect-free. ?s ?e Ic RMSa
- Audio Instrument Co., Inc., 133 West 14 St., New York 11, N. Y. / Oregon 5-7820 / *C
 Electronic analog time-delay units from 10 to 10,000 milliseconds; logarithmic amplifiers. Specialized passive computer which corrects for film nonlinearity in photometric work, etc. Ss(10) Se(1949) ASCc RMSCa
- Audio Products Corp., 2265 Westwood Blvd., Los Angeles 64, Calif. / Bradshaw 2-4266 / *C
 Digital plug circuits, i.e., triggers, cathode followers, binary scalars, etc. Ms(125) Se(1948) Ic RMSa
- The Austin Co., Special Devices Division, 76 9th Ave., New York 11, N. Y. / Watkins 4-3630 / *C
 Systems and devices for automatic control in

ROSTER OF ORGANIZATIONS

- commerce and industry; analog, digital, data-handling, servo, electronic, electromechanical. Shaft position indicators and systems; cathode ray indicators and systems. Ls (division, 160; company 25,000) Le (division, 1943; company, 1878) DASCMS RMSa
- Automacit  Appliqu , 10 rue Saulnier, Paris 9e, France
Automatic control apparatus. Cc RMSa
- Automatic Electric Co. 1033 West Van Buren St., Chicago 7, Ill. / Haymarket 1-4300 / *C
Automatic electrical systems, telephone equipment, relays, stepping switches, etc., for computing machinery and communications companies. Automatic control components. Ls (6000) Le (1892) ICc RMSa
- Automatic Signal Division, Eastern Industries, Inc., East Norwalk, Conn. / Temple 8-4791 / *C
Automatic volume-density traffic controllers; digital and analog computers; servomechanisms. Ms (300) Me (1928) Ic MSa
- Automation Consultants, Inc., 1450 Broadway, New York 18, N. Y. / Chickering 4-7800 / *C
Consultants in electronic systems and devices, including automatic information-handling. Ss Se (1953) Dc Ca
- Automation Engineers Co., Division of Associated Industrial Consultants, 246 West State Street, Trenton, N. J. / Export 3-2602 / *C
Consultants in automatic control machinery and automatic materials handling equipment. Ss (20) Me (1942) DACMc Ca
- Autron Engineering, Inc., 1254 West 6th St., Los Angeles 17, Calif. / Mutual 3237, 3331
Engineering design, development, and manufacture of electronic and electromechanical controls and automatic control systems, devices, and instruments. ?s Se (1955) Cc RMSa
- Avion Division of American Car and Foundry Industries, Inc., 299 State Highway No. 17, Paramus, N. J. / Colfax 1-4100 / *C
Analog computing machinery. Magnetic recorders, amplifiers, electronic choppers, test equipment, servomechanisms, automatic control machinery, etc. Ls (600) Se (1946) ASCMc RMSa
- Baird Associates, 33 University Road, Cambridge, 38, Mass. / University 4-0101 / *C
Spectroscopic analysis equipment; scientific instruments; analog devices, servo-mechanisms; transistors. Instrumentation for industrial control. Research in physical optics. Ms (200) Me (1937) AISc RMSa
- Battelle Memorial Inst., 505 King Ave., Columbus 1, Ohio / Ax 9-3191 / *C
Computing service: analog, digital; differential analyzer, card programmed calculator, punch card machines. Many other activities. Ls (2500) Me (1929) Ic RCPa
- Beckman Division, Beckman Instruments, Inc., Fullerton, Calif. / Lambert 5-8241 / *C
Multi-channel digital data-handling systems; 200 channel strain gage recorder. Automatic process control, digital data-handling and recording. Ls (1800) Me (1934) DAIC RMSa
- Beckman Instruments, Inc. -- SEE Beckman Division AND Berkeley Division
- Bell Telephone Laboratories, Murray Hill, N. J. / Summit 6-6000 / and 463 West St., New York 14, N. Y. / Chelsea 3-1000 / *C
Automatic switching. Bell general purpose computers (relay and electronic, digital and analog) for government use and company's own use. Ls Le DAC RGPa
- Bendix Aviation Corporation, Bendix Computer Division, 5630 Arbor Vitae St., Los Angeles 45, Calif. / Oregon 8-2120 / *C
Electronic information processing machines. Small-size low-cost digital differential analyzers and general purpose digital computers; automatic control systems; Decimal Digital Differential Analyzer Model D-12; general purpose digital computers Model G-15A and G-15D; analog to digital conversion equipment. Ms (210) Se (1952, division; 1929 corporation) DACc RMPa
- Bendix Aviation Corp., Pacific Division, North Hollywood, Calif. / *C
Telemetering systems. Digital systems, controls, and components. Ls (2500) Le (1915, company, 1937, this division) Ic RMSa
- Bendix Aviation Corporation, Eclipse-Pioneer Division, Teterboro, N. J. / Hasbrouck Heights 8-2000 / *C
Synchros, low inertia servo motors, pygmy servo motor generators, etc. Ls (7000) Le (1919) SIC MSa
- Bendix Aviation Corporation, Research Laboratories Division, 4855 4th Ave., Detroit 1, Mich. / Temple 2-1300 / *C
Electronic and electromechanical analog computers; numerically controlled machines; data processing equipment; servomechanisms, etc. Ms (400) Me (1942) ASCc Ra
- Benge Associates, McIntyre Bldg., Spruce and College Sts., Asheville, N. C. / Asheville 2-0852 / *C
Management engineers; applications of electronic data processing to office procedures; costs; analysis of clerical routines leading to programming. Ss Me (1939) Cc RCPa
- Benson-Lehner Corp., 11930 W. Olympic Blvd., Los Angeles 64, Calif. / Br 2-3484, GR 9-3723 / *C
Automatic and semi-automatic devices (both analog and digital) for computing, data analyzing, data reduction, optical measuring, guided missile analysis, etc.; and geophysical seismic reader and profile plotter. Oscillogram trace readers, film readers, plotters, etc. Components: potentiometers, remote control key boards, etc. Commercial applications of industrial control devices. Ms (170) Se (1950) DAC RCMSa
- Berkeley Division, Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif. / Landscape 6-7730
EASE computer (Electronic Analog Simulating Equipment) for solving equations, simulating systems, etc. Network of computing facilities over the country. Se Ac RMSa
- Edmund C. Berkeley and Associates, 815 Washington St., Newtonville 60, Mass. / Decatur 2-5453 or 2-3928
Courses by mail in automatic computing machinery and other scientific subjects. Ss (3) Se (1948) Dc Ca Affiliated with Berkeley Enterprises, Inc.
- Berkeley Enterprises, Inc., 36 West 11 St., New York 11, N. Y. / Algonquin 4-7675 / and 815 Washington St., Newtonville 60, Mass. / Decatur 2-5453 or 2-3928 / *C
Small robots, robot show-stoppers, etc. Logical design, applications, marketing, etc. of

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- automatic information handling machinery. Publisher of "Computers and Automation" and other publications. Ss(8) Se(1954) Dc RCMS a Affiliated with Edmund C. Berkeley & Associates. Berkshire Laboratories, 732 Bank Village, Greenville, N. H. / Greenville 111 / *C
Special computer components. Ss Se(1949) IAc RMCa
- Bill Jack Scientific Instrument Co.-SEE under J
Birbeck College, University of London, 21 Torrington Sq., London W.C. 1, England / Langham 1912 / *C
Maker of ARC, APEXC, and SEC digital computers; electronic digital computers. Ss (10 to 20) Se (1946) Dc RCPa
- Boeing Airplane Company, Industrial Products Division, Seattle 14, Wash. / Mohawk 4444 / *C
Boeing Electronic Analog Computer. Associated non-linear equipment. Complete line of auxiliary equipment, including function generator and electronic multiplier. Ls(37,000) Le-(1916) Ac RMSa
- Borg-Warner Corporation, Byron Jackson Division, Electronics Section, 492 E. Union St., Pasadena 1, Calif. / Ryan 1-5166 / *C,
Digital pressure, temperature and flow transducers and special purpose digital computers. Ms (200) Se(1944, section) Dlc RMa
- Bowmar Instrument Corp., 2415 Pennsylvania Street, Fort Wayne 4, Ind. / Anthony 1463 / *C
Mechanical computer components. Ms (55) Sc (1951) Ic RMSa
- Bradley Laboratories, Inc., 168 Columbus Avenue, New Haven, Conn. / Main 4-3123 / *C
Selenium rectifier kits, high temperature rectifiers. Selenium diodes, copper oxide diodes, limiters, modulators. Ms(125) Me(1939) Ic RMSa
- Richard D. Brew and Company, Inc., 90 Airport Rd., Concord, N. H. / Capitol 5-6606 / *C,
Distributed constant, lumped constant and ultrasonic delay lines. Ss(36) Me(1939) Ic RMSa
- Harry P. Bridge Co., 1201 Chestnut St., Phila., 7, Pa. / Locust 80330 / *C,
Marketing, sales, sales promotion, advertising, merchandising, market research, etc., for all products in the computer field. Consultants; advertising agency. Ss(12) Me (1930) Ic RCPSa
- The Bristol Co., Waterbury 20, Conn. / Plaza 64451
Automatic recording, indicating, controlling, and telemetering instruments, and components. CIc RMSa
- British Tabulating Machine Co., Ltd., 17 Park Lane, London W. 1, England / Hyde Park 8155 / *C
Punched card machines. Ls(4500) Le(1908) Dc RCPMSa
- Brush Electronics Co., 3405 Perkins Ave., Cleveland 14, Ohio / *C
Recording analyzers. Magnetic heads and drums. Decades. Tape transports. "Tape Drum", memory storage device. Computer components. Ls(1300) Le(1921) Ic RMSa
- Bull S. A. Compagnie des Machines, 94 Avenue Gambetta, Paris 20e, France / MEN 8158 / *C
Punch card machines. Commercial electronic computers and card-programmed scientific computers. Producing about 10 electronic computers a month; 100 currently in operation. Ls(2500) Me(1931) Dc RMSa
- Bureau of the Census, Washington 25, D.C. / *C
Tabulation of statistical data by special machines designed and built for own use, by commercial punch-card equipment, and by electronic computing system (the Univac). Ls(1100) in Machine Tabulation Division) Le(1890 in punch card field) Dc Ga
- Burlingame Associates, 103 Lafayette St., New York 13, N.Y. / Digby 9-1240 / *C
Analog computers, servo analyzers, servo-control devices, digital voltmeters, etc. Ss(35) Me(1928) Aic CSA
- Burroughs Corporation, 6071 Second Ave., Detroit, Mich. / Triangle 5-2260 / and elsewhere / *C
Automatic electronic digital computers, UDEC, EI01. Adding machines, bookkeeping machines, etc. Electronic digital test computers, assembled from pulse control units. Fast access magnetic core memory. Pulse control components, servo-mechanisms, etc. This company owns Com-Instrument Co. Ls(19,000) Le(1896) DSc RMPa
- Burroughs Corp., Electronic Instruments Div., 1209 Vine St., Philadelphia, Pa. / Locust 7-1401
Electronic computing equipment: large automatic digital computer, UDEC; small automatic digital computer, EI01. ?s ?e Dc MSa
- Burroughs Corporation, Research Center, Paoli, Pa. / Paoli 3500 / *C
Computer research and development. Computing service: digital. Development of data handling equipment and systems for business, industry, government. Ls(1000) Se(1948) Dc RCPa
- Byron Jackson Division -SEE Borg-Warner Corporation
California Computer Products, 3927 West Jefferson Blvd., Los Angeles 16, Calif. /
Digital point plotter (CCP 701) and other equipment. DAc RMSa
- Cambridge Thermionic Corporation, 445 Concord Ave., Cambridge 38, Mass. / Trowbridge 6-2800 / *C
Components for computers. Ms(150) Me(1940) Ic RMSa
- Canning, Sisson and Associates, 914 South Robertson Blvd., Los Angeles 35, Calif. / Bradshaw 2-4904
Consultants in utilization of electronic computers and other automatic data-handling equipment. Publisher of "Data Processing Digest". Ss Se(1954) DACc RCPa
- Cannon Electric Company, 3209 Humboldt Street, Los Angeles 31, Calif. / Capitol 5-1251 / *C,
Multiple circuit connectors for computers, etc. Ls(2200) Le(1915) Ic MSRa
- Carbide and Carbon Chemicals Company-AEC, Numerical Analysis Department, P.O. Box P, Oak Ridge, Tenn. / LD-220, X8671 / *C
Numerical analysis using digital computers. Sa(35) Se(1948) Dc RGa
- CBS-Hytron, Division of Columbia Broadcasting System, Inc., 100 Endicott St., Danvers, Mass. / Danvers 2360 / *C,
Electron tubes and semiconductors for computer and other uses. Ls(6000) Le(1921) Ic Ma
- Cinch Manufacturing Corp., 1026 S. Homan Avenue, Chicago 24, Ill. / - / *C,
Components for computers: tube sockets, connectors, printed wiring boards, terminal boards, etc. Ls(1400) Le(1924) Ic RMSa
- Circuit Engineering, 66 Westland Rd., Weston 93, Mass. / - / *C
Consultants. Transistor, magnetic, electronic, conductive, and other information handling

ROSTER OF ORGANIZATIONS

- circuits. Ss Se(1954) Dc Ca
 C.P.Clare & Co., 3101 Pratt Blvd., Chicago 45, Ill./
 Ambassador 2-7700 / *C
 Relays for computer and other uses. Ls(510)
 Me(1937) Ic RMSa
- Clary Multiplier Corp., 408 Junipero St., San Gab-
 riel, Calif. / Atlantic 7-6111 / *C
 Adding and calculating machines, cash regis-
 ters, electronic computers, analog-digital
 converters, input and output equipment for
 computers, data-reduction systems. Ls(1500)
 Me(1939) DAc RMSa
- Coleman Engineering Co., 6040 West Jefferson Blvd.,
 Los Angeles 16, Calif. / Vermont 9-7549 /
 Digital data handling systems and components;
 "Digitizer", device for converting rotational
 shaft positions into electrical contact set-
 tings; etc. Ms(100) Se(1951) DIc RMSa
- Columbia Broadcasting System, Inc.,--SEE CBS-Hytron
 Division
- Commercial Controls Corp., 1 Leighton Ave., Roch-
 ester 2, N.Y. / Culver 5800 / *C
 "Flexowriter" automatic writing machines;
 "Justowriter" automatic tape-operated com-
 posing machines; auxiliary motorized tape
 punches, tape readers, tape verifiers, tape
 converters, tape transmitters, Mailroom and
 office equipment. Ls Le Ic RMSa
- Commonwealth Scientific and Industrial Organizat-
 ion, Radiophysics Division, Sydney, New South
 Wales, Australia /
 Maker of CSIRO Mark I electronic digital com-
 puter of Inst. for Advanced Study type. DAc
 RCGPa
- Computer Company of America, Division of Bruno-New
 York Industries Corp., 149 Church St., New York
 7, N.Y. / Cortlandt 7-1450 / *C
 Analog computers, differential analyzers,
 specialized computers and accessories. Ms
 (125) Se(1942) DAc RMSPa
- Computer Control Co., 92 Broad St., Wellesley, 57,
 Mass. / Wellesley 506620 / and 10966 Le Conte Ave.,
 Los Angeles, 24, Calif. / *C
 Computers and computer components, digital data-
 handling systems, solid delay-line acoustic
 memory, computer test equipment, dual beam
 conversion kits, specialized systems and in-
 strumentation. Operating and servicing Ray-
 dac at Pt. Mugu, Calif. Ss(70) Se(1952) Dc
 RMSa
- Computer Engineering Associates, Inc., 350 North
 Halstead St., Pasadena 8, Calif. /
 Computer components. Ic RMSa
- Computing Devices of Canada Limited, P.O. Box 508,
 Ottawa, Ontario, Canada / Parkway 8-1761 / *C
 Digital and analog computers, automatic nav-
 igation systems, electronic laboratory test
 equipment, simulators, servomechanisms. Re-
 search and development in instrumentation,
 automatic control. Digital and analog com-
 puting service. Study of business applicat-
 ions. Ms(400) Se(1948) DASCc RCPMSa
- Compuyper Corp.--SEE Friden Calculating Machine Co
- Consolidated Electrodynamics Corp., (formerly Con-
 solidated Engineering Corp.), 300 North Sierra
 Madre Villa, Pasadena 8, Calif. / Sycamore 6-
 0173 / *C
 Digital and analog data-handling and convers-
 ion systems (Sadic, Millisadic, etc.). Auto-
 matic translator magnetic tape to punched card
 Computers now manufactured by their affiliate,
- ElectroData Corp., which see. Ls(1550) Me
 (1937) Dc RMSa
- Control Instrument Co., 67 35th St., Brooklyn, New
 York / Sterling 8-0658 / *C
 Fire-control equipment. 1000-line-a-minute
 tabulator. Digital and analog machines and
 components. Now a subsidiary of Burroughs
 Corporation. Ls(1200) Me(1934) DAc RMSa
- Cook Research Laboratories, Division of Cook Elec-
 tronic Co., 2700 Southport Ave., Chicago 14, Ill.
 (mail address), 8100 Monticello Ave., Skokie,
 Ill. (location) / Keystone 9-2060 and Orchard
 3-9200 / *C
 Magnetic data-recording systems; digital, an-
 analog, and hybrid information-processing sys-
 tems - particularly for aircraft and airborne
 applications. Basic and industrial research
 in servomechanisms, air research, weather re-
 connaissance, guided missiles, etc. Ms (380)
 ?e DAIC RCa
- Cornell-Dubilier Electric Corp., 333 Hamilton Blvd.,
 S. Plainfield, N. J. / Plainfield 6-900 / *C,
 Test equipment. Components, including capac-
 itors, converters, printed circuits, etc. Ls
 Lc(1910) Ic MSa
- Cornell University, Computing Center, Rand Hall,
 Ithaca, N.Y. /
 Computing service: digital; card programmed
 calculator, punch card machines. Dc RCPa
- Coxhead Corp., Ralph C/, 720 Frelinghuysen Ave.,
 Newark 5, N. J. /
 Type composing of display types by photography,
 using a desk machine. Varitypers. Ls ?e
 Ic RMSa
- Curta Calculator Co., 3851 West Madison St., Chi-
 cago 24, Ill. /
 Eight-ounce, hand-powered, rotary "brief-
 case" calculator; adds, subtracts, multiplies,
 divides; totals to 15 decimal places; made
 in Lichtenstein. Ss(10) Se(1952) Dc Sa
- Curtiss-Wright Corporation, Electronics Division,
 Carlstadt, N.J. / - / -,
 Electronic flight simulators used by commer-
 cial airlines for training flight crews. Other
 simulators; duplicators. Ls ?e AIC RMSa
- Daco Machine Co., Brooklyn, N.Y. / Ulster 5-8350
 Computing controls for machine tools. Cc
 RMSa
- Data Processing Associates, Limited, 1313 Welling-
 ton St., Ottawa, Ont., Canada / Ottawa 8-6065
 Digital and analog computers, data reduction
 systems, data processing and data reduction
 services; research and development for scien-
 tific, commercial, industrial fields. Ss(6)
 Se(1954) DACMc RCPMSa
- Datamatic Corporation, 151 Needham St., Newton
 Highlands 61, Mass. / Decatur 2-6960 / *C
 Large High-speed electronic data-processing
 equipment. Magnetic core components; tape
 handling mechanisms; magnetic recording heads
 Computing services, to analyze and process
 problems in operations research, a applied
 mathematics, engineering, and general busi-
 ness accounting, using digital computers.
 (New corporation formed April 1955. Wholly
 owned by Minneapolis-Honeywell Regulator Co.
 and Raytheon; formerly the Computer Dept.
 of Raytheon). Ms(200) Se(1955) Dc RMSa
- The Daven Company, 191 Central Ave., Newark 4, N.
 J. / Mitchell 2-6555 / *C
 Precision resistors, rotary switches and

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- attenuators. Ms(490) Me(1929) Ic RMSa
 Davies Laboratories, Inc., 4705 Queensbury Road,
 Riverdale, Md. / Appleton 7-1133 / *C
 Automatic data-reduction and conversion equip-
 ment. Magnetic tape data recorders. Magnetic
 recording and reproducing heads. Ms(110)
 Se(1946) Ac RMSCa
- The de Florez Co., 116 East 30 St., New York 16,
 N. Y. / Murray Hill 6-5730 / *C
 Register controls, servomechanisms, control
 systems, mechanical design. Research and
 development. Synthetic training devices .
 Ss(25) Se(1948) DACIc RCPa
- Dennison Manufacturing Co., Framingham, Mass. /
 TR 3-3511 / *C
 Development, production and sale of "Print-
 Punch" marking machine for automatic dat a
 processing. Ls(2700) Le(1844) Ic RMSa
- Dian Laboratories, Inc., 611 Broadway, New York
 12, N. Y. / Spring 7-4016 / *C
 Computing and consulting services. Analog
 computing center. Design of simulators,
 trainers and special-purpose computers. As-
 sociated with Mid-Century Instrumatic Corp.
 Ss Se(1955) Ac RCPa
- John Diebold and Associates, Inc., 430 Park Ave.,
 New York 22, N. Y. / Plaza 3-3748 / *C
 Consulting management engineers, specializing
 in automation and computers. Ss Se DAICc
 RMCPa
- Digital Control Systems, Inc. -- SEE Litton Indus-
 tries
- Doelcam Corp., a division of Minneapolis-Honeywell
 Regulator Co., 1400 Soldiers Field Rd., Boston
 35, Mass. / Algonquin 4-5200 / *C
 Rate, free and integrating gyroscopes, D-C
 amplifiers and null indicators, synchros and
 servo motors. Ls(700) Me SIc RMSa
- Donner Scientific Co., 2829 7th St., Berkeley 10,
 Calif. / Thornwall 5-3150 / *C
 Design and manufacture of complete analog
 computers, function multipliers, function
 generators, computing components, accessories,
 servomechanical transducers, electronic test
 equipment and control instrumentation. Design
 services in analog and digital computing in-
 strumentation and applications. Ms(50) Se
 (1953) DASCC RMSCa
- ESC Corporation, 534 Bergen Blvd., Palisades Park,
 N. J. / Windsor 7-0400 / *C
 Pulse networks, delay lines, filters, preci-
 sion assemblies, etc. Ic RMSa
- Eagle Signal Corp., 202 20th St., Moline, Ill. /
 Moline 2-5571 / *C
 Timers and counters for automatic control of
 machines and processes. Ls(510) Le(1920)
 Cc MSa
- Eastern Industries, Inc. -- SEE Automatic Signal
 Division
- Ebasco Services, Inc., 2 Rector St., New York 6,
 N. Y. / Digby 4-4400 / *C
 Management advisory services. Applications
 of data processing equipment in business; etc.
 Ls(1600) Le(1905) DIC CPa
- Eckert-Mauchly Division -- SEE Remington Rand
 Univac Division, Philadelphia
- Eclipse-Pioneer Division -- SEE Bendix Aviation
 Corporation
- Edgar, Wesley B., 206 Palmetto State Life Bldg.,
 1310 Lady St., Columbia 1, S. C. / Columbia 3-
 7563 / *C
- Consulting service on application of automated
 procedures to small business operations. Ss
 (4) Me(1930) Ic Ca
- Thomas A. Edison, Inc., Instrument Division, 22
 Lakeside Ave., West Orange, N. J. / Orange 3-
 6800 / *C
 Automatic control components, time delay relays.
 Thermal devices. Ms(360 in division; 4000
 in company) Me(1940 division; 1888 company)
 Ic MSa
- Eeco Production Co., 827 South Vermont, Los Angel-
 es, Calif. / Dunkirk 5-3026
 Electronic components for computers and other
 equipment. Squaring circuits. Subsidiary
 of Electronic Engineering Co. of Calif. Ic
 RMSa
- Electrical and Physical Instrument Corp., 42-19
 27th St., Long Island City, N. Y. / Stillwell 4-
 6389 / *C
 Flip-flop and other counters in decade and
 binary; digitizers (high speed); automatic
 control machinery. Ss Se DCc RMCa
- Electro Data Corporation (Consolidated Electro-
 dynamics Corporation affiliate), 460 Sierra Madre
 Villa, Pasadena 6, Calif. / Ryan 1-8193 / *C
 Datatron electronic data processing machines
 and digital computer components; Cardatron
 alpha-numeric card input-output system; mag-
 netic tape units; punched card conversion
 equipment. Computing service: digital. Ms
 (325) Se(1950); parent company 1937) Dc RMSCP a
- Electronic Associates, Inc., Long Branch, N. J. /
 Long Branch 6-1100 / *C
 General purpose precision analog computers,
 special purpose analog computers, analog
 computer components, digital-to-analog con-
 verter, digital plotting system (Dataplotter).
 Automatic control of all machine tools. Ms
 (360) Se(1945) DACc RMSa
- Electronic Control Systems, Inc., 2136 Westwood
 Blvd., Los Angeles 25, Calif. / Granite 8-4266
 and Bradshaw 2-0845 / *C
 Special purpose data-handling systems for
 military and industrial use; automatic con-
 tinuity tester, statistical analyzer, machine
 tool control systems. Ms(85) Se(1953) DACc
 RMSa
- Electronic Computer Div. of Underwood Corp., 35-10
 36th Ave., Long Island City 6, N. Y. / Exeter
 2-3400 / *C
 Construction: two types of electronic digital
 computers (Elecom 120-A, 125); an electronic
 sorter-collator; and an electronic accounting
 machine, Elecom 50. Delay lines, decade de-
 lay lines, pulse transformers, magnetic re-
 cording heads, magnetic drums, D.C. plug-in
 amplifiers. Ms(200) Se(1949) Dc RMSa
- Electronic Engineering Co., 180 South Alvarado St.,
 Los Angeles 57, Calif. / Dunkirk 2-7353
 Design, development, and fabricati o n of
 specialized electronic equipment. Analog
 computing machinery. Analog-to-digital-to-
 analog converters. Polar-to-rectangular-to-
 polar converters. Servomechanisms. Ms(180)
 Se(1947) DAC RMSa
- Electronic Corp. of America, 77 Broadway, Cam-
 bridge 42, Mass. / Trowbridge 6-9100 / *C
 Electronic and photoelectronic controls,
 "photoswitches", etc. Automatic control and
 data processing machinery. See next entry
 Business Machines Div. Ls(1500) Me(1937)
 DACc RMSa

ROSTER OF ORGANIZATIONS

- Electronics Corp. of America, Business Machines Div., 10 Potter St., Cambridge 42, Mass. / Trowbridge 6-8190 / *C
Automatic inventory machines and point of sale recorders. "Magnefiles". Data processing and digital computing machinery. Digital computers for business use. Analog-digital converters. Automatic control instrumentation and systems. SEE also preceding entry for Electronics Corp. of America. Ls(1500 company) Me(1954, this division; 1937, company) DACc RMSa
- Elliott Addressing Machine Co., 143 Albany Street, Cambridge 39, Mass. / Trowbridge 6-2020 / *C
Addressing stencils, with selection controlled by punched holes in cardboard margin. Ls(1000) Se(1900) Ic RMSa
- Elliott Bros. (London) Ltd., Century-Works, Lewisham, London, S.E. 13, England, and Computing Machine Division, Elstree Way, Borehamwood, Herts., England / Tideway 3232, Elstree 2040/*C
Servomechanisms; Elliott 402, 403 electronic digital computers. GPAC (General purpose analog computer). Computing services; components, instrumentation and control for process industries. Ls(3500) Le(1800) DASCc RMSCP a
- Engineering Research Associates -- SEE Remington Rand
- Engineers Northwest, 2835 Nicollet Ave., Minneapolis 8, Minn. / Re-5541 / *C
Test-scoring machines and equipment. Ss(20) Se(1945) DAC RCMa
- English Electric Co., Stafford, England. / *C
Manufacturers of fully engineered versions of ACE (see National Physical Laboratory). Ls Se DIC RMSa
- Epsco, Inc., 588 Commonwealth Ave., Boston 15, Mass. / Commonwealth 6-3228 / *C
Magnetic shift registers, transistors, delay lines, and other components for computers, systems, automatic control, etc. Datrac reversible data reduction systems and translators: to digitize the output from an analog computer, and to "analog-ize" the input to an analog computer. Ms(100) Se(1954) DIC RMSCa
- E-Z Sort Systems, Ltd., 45 Second St., San Francisco 5, Calif. / Garfield 1-8005 / *C
Edge-punched cards for filing and sorting data. Special cards for correlation of facts. Ms(267) Me(1935) Ic RMSa
- Fabrica Addizionatrice Italiana S.S., Viale Umbria 36, Milan, Italy
Desk calculators to add, subtract, multiply, divide, print. Dc RMSa
- Facit, Inc., 404 4th Ave., New York 36, N.Y. (subsidiary). Stockholm, Sweden (headquarters), and elsewhere / *C
Touch calculators; adding machines; Odhner adding machine with multiplying features; typewriters, etc. (In 1930 A.D., copper mining). Ls(4000) Le(1390 A.D.) Dc RMSa
- Fairbanks Associates, 248 Greenwich Ave., Greenwich, Conn. / Greenwich 8-8155 / *C
Consultants in application and installation of electronic systems in clerical methods and procedures; evaluation of proposed savings; operations research. Ss(7) Se(1952) DIC RCPa
- Farrand Optical Co., Bronx Blvd. and 238 St., New York 70, N. Y. / Fairbanks 4-220 / *C
Gunfire control apparatus, rangefinders, optical and electronic sighting equipment, automatic trackers, infrared search and scanning systems, analog-digital converters, analog computers, etc. Ls(800) Le(1918) DASCc RMSCa
- Federal Telephone and Radio Co., Division of Int'l Tel. and Tel., 100 Kingsley Rd., Clifton, N. J. / Nutley 2-3600 / *C
Vacuum tubes, selenium rectifiers, germanium diodes, contact protectors, coaxial cables, magnetic amplifiers; radio and telephone systems, microwave systems, and associated components. Ls(6500) Me(1941) ISCC RMSPa
- Felt and Tarrant Mfg. Co., Comptometer Div., 1735 No. Paulina St., Chicago 22, Ill. / Brunswick 8-5000 / *C
Adding-calculating machines, key-driven, electric and non-electric. Comptometer. Electronic dictation-transcription machines. Ls(1700) Le(1886) Dc RMSa
- Ferranti Electric, Inc., 30 Rockefeller Plaza, New York 20, N. Y. / Circle 7-0911 / agent for Ferranti Electric Ltd., Moston, England, and Mount Dennis, Toronto, Canada / *C
General purpose electronic computers "Pegasus" and "Mercury". High speed tape readers; tape spoolers; magnetic drums. Numerical machine tool controls, etc. Ls(13,000) Le(1896) Dc RMSa
- Ferranti Limited, Computer Centre, 21 Portland Pl., London W 1, England / Langham 9211
Computer, and information-handling laboratory. Ms(100) Se(1953) DACc RCPa
- Ferroxcube Corporation of America, East Bridge St., Saugerties, N. Y. (a joint subsidiary of Sprague Electric Co. and Philips Industries) / Saugerties 1000 / *C
Ferrite core materials, including pot cores, cup cores, recording heads, and microminature toroids with square hysteresis loop. Ms(150) Se(1950) Ic RMSa
- Financial Publishing Co., Mathematical Tables Div., 82 Brookline Ave., Boston 15, Mass.
Computing service: digital; card programmed calculators, punch card. Ms(100) ?e Ic RCPa
- Fischer and Porter Company, 330 Warminster Road, Hatboro, Pa. / Osborne 5-6000 / *C
Automatic instrumentation, including: measurement of a variable at the point of process; transmission of data, central collection, and display; data reduction systems using a mechanical digital converter (Digi-Coder), tabulated digital data output, etc. Automatic multiple readout systems, converters, computers. Ls(10,000) Me(1937) DACc RMSa
- The de Florez Co. -- SEE under letter D
- Ford Instrument Co., Div. of Sperry Rand Corporation, 31-10 Thomson Ave., Long Island City 1, N. Y. / Stillwell 4-9000 / *C
Gunfire control apparatus. Analog computers and components, magnetic amplifiers, servo motors, differential and integrator elements. Instruments for shipborne and airborne armament and navigational control. Computers, systems, drives, and precision components for industry and government. Ls(3800) Le(1915) ASCc RMPCSa
- The Foxboro Company, Foxboro, Mass. / Foxboro

ROSTER OF ORGANIZATIONS

- 312 / *C
- Industrial instrumentation and analog computers for measuring and controlling process variables. Ls(2000) Le(1908) ACc RMSa
- The Franklin Institute Laboratories for Research and Development, 20th St. & Benjamin Franklin Parkway, Philadelphia 3, Pa. / Locust 4-3600/*C
Computing service: analog; network analyzer, AC. Fire-control equipment. Special purpose analog computers, large and small scale. Digital computer components. Prototype construction. Ms(325) Se(1946) DAC Ra
- Friden Calculating Machine Co., Inc., San Leandro, Calif. / Sweetwood 0700 / *C
Desk calculating machines. Computer. Add-Punch machine. Automatic typing-computing. Ls(2500) Me(1934) Dc RMSCa
- The Frohman Manufacturing Co., Inc. -- Subsidiary of Norden-Ketay Corporation, which SEE.
- H. S. Gellman and Company, 199 College St., Toronto, Ontario, Canada / Walnut 3-4484 / *C
Consultants in electronic computer applications; selection, installation and operation of computer systems; system analysis and synthesis; programming for digital computers. Complete computing service. ?s Se(1955) Dc CPa
- General Ceramics Corporation, Keasbey, N. J. (near Perth Amboy) / Valley 6-5100 / *C
Magnetic cores and ferrites for computer components; toroidal ferrite cores as memory devices for computers; technical ceramics, insulators, etc. Ls(500) Le(1906) Ic RMSa
- General Controls, 801 Allen Ave., Glendale 1, Calif. / Victoria 92181 / *C
Automatic controls (pressure, temperature, level, flow). Ls(2000) Me(1930) Cc RMSa
- General Cybernetics Corp., affiliate of The Angle Computer Co., Inc., 1751 No. Coronado St., Los Angeles 26, Calif. / Normandy 3-1300 / *C
Linear motion transducer reporting 1/10,000 of an inch position change; high-speed converter of punched cards to tape; industrial automation, electronic gages for automation processes, etc. Successor of General Cybernetics Associates. Ss(18) Se(1953) DAICc RCMSa
- General Electric Co., Schenectady, N. Y.
Computing service: analog; network analyzer AC and DC, differential analyzer; for anyone. Ic RCPa
- General Electric Co., Tube Department, One River Road, Schenectady, N. Y.; and elsewhere / Schenectady 4-2211, X1031 / *C
Electronic tubes, including many specifically for computer purposes. Twin-triode and heptode types for counters, amplifiers, coincidence-gating, and frequency-divider circuits. Ls(15,000+) Le(1878) Ic RMSPa
- General Electronics Laboratories, 18 Ames Street, Cambridge 42, Mass. / University 4-9730
Ms(60) Se(1950) DACc RMSa
- General Kinetics Inc., 555 23rd St. South, Arlington 2, Va. / Otis 4-7555 / *C
Research, development and design services in automation, computer programming, data-handling and processing, instrumentation, etc. Se(10) Se(1955) DCc RCPa
- General Precision Laboratory, 63 Bedford Road, Pleasantville, N. Y. / Pleasantville 2-2000 / *C
Rapid electronic analysis of punch card data, etc. Ls(1200) Se(1945) DIc RMSa
- General Research Co., 603 Jackson St., Falls Church, Va. / Je 4-7622
Consulting services: applications of data processing equipment; operation of computer installations. Ss Se Dc RCPa
- Genisco, Inc., 2233 Federal Ave., West Los Angeles, Calif. / Arizona 8-1276, Bradshaw 2-9749 / *C
Computer components of electro-mechanical type, transducers, analog-to-digital converters, accelerometers, pressure transducers, x-y digital output film reader, components for automation and automatic control; etc. Ms(100) Se(1947) ICc RMSa
- Georgia Institute of Technology, Rich Electronic Center, Engineering Experiment Station, Atlanta 13, Ga. / Atwood 6331 / *C
Computing service: ERA 1101 computer and CRC 102D. Ss(16) Se(1955) DIc RCPa
- The Gerber Scientific Instrument Co., 162 State St., Hartford, Conn. / Chapel 6-8539
Graphical-numerical computers. Relays, motors, plastisols, metals. Ss Se(1948) Ic RMSa
- Goodyear Aircraft Corp., Dept. 931, Akron 15, Ohio / Republic 3-6361 / *C
Goodyear electronic differential analyzers, (GEDA line of analog computing equipment). Ls Me Ac RMSa
- Graney, Edward P., Municipal Court Bldg., 104 West Huron St., Ann Arbor, Mich. / Normandy 2-4031
Programming scientific, engineering and accounting problems on digital computers; advice re data processing equipment. Ss Se(1955) Dc RCPa
- Guardian Electric Manufacturing Company, 1621 W. Walnut St., Chicago 12, Ill. / Chesapeake 3-1100 / *C
Components; relays, solenoids, switches, stepping relays, hermetically sealed controls, complete control assemblies. Ls(850) Me(1932) ICc RMCa
- Gudeman Co. of Calif., 9200 Exposition Blvd., Los Angeles 34, Calif. / Texas 0-7317
Delay lines, pulse transformers, filter networks. Ic RMSa
- Haller, Raymond, and Brown, Inc., State College, Pa. / Ad 7-7611 / *C
Electronic digital computer for solution of up to 1200 simultaneous equations, using magnetic drum and tape. Research and development on computer components, analog computers, electronic and electromechanical systems. Engineering analysis, operations research, electronic development. Ms(200) Se(1947) Dc Ra
- Hamann Calculating Machine Co., 2118 Land Title Bldg., Philadelphia 10, Pa.
Adding, subtracting, multiplying desk calculators. Dc MSa
- Hammarlund Mfg. Co., Inc., 460 West 34 St., New York 1, N. Y. / Longacre 5-1300 / *C
Remote supervisory control and automatic control equipment. Ls(600) Le(1910) ICc MSa
- Harvard University, Harvard Computation Laboratory, Cambridge 38, Mass. / *C
Builder of Harvard Mark I, II, III, IV calculators for Navy, Air Force, and own use. Computing service: digital; Harvard Mark I and IV machines. Ms Se Dc RCPMa
- Hastings, Jr., Cecil, 136 Kuuala St., Lanikai,

ROSTER OF ORGANIZATIONS

- Hawaii / Kai 250274 / *C
Approximations for digital computers. Ss (2)
Se(1954) Dc RCPa
- Hathaway Instrument Co. (subsidiary of Hamilton Watch Co.), 1315 So. Clarkson St., Denver 10, Colo. / Spruce 7-2696 / *C
Transducers, analog and digital recorders, oscillographs, circuit analysis, etc. Ms (80) Me(1939) Ic RCMSa
- Helipot Corporation, 916 Meridian Ave., South Pasadena, Calif. / PY 1-2164 / *C
Precision potentiometers, single-and-multi-turn, linear and non-linear; turns-counting dials. Ls(600) Se(1943) Ic RMSa
- Hillyer Instrument Co., 54 Lafayette St., New York 13, N. Y. / Digby 9-4485 / *C
Simulators, servomechanisms, sensing, computing, and actuating systems. Automatic machine controls. Ms(100) Se(1945) DAICc RMSa
- Hogan Laboratories, 155 Perry St., New York 14, N. Y. / Chelsea 2-7855 / *C
"Circle" computer. Digital high-speed printers. Facsimile and graphic recording. Ms (60) Me(1929) Dc RMSCa
- Hughes Research and Development Laboratories, Hughes Aircraft Co., Culver City, Calif. / Texas 0-7111 / *C
Automatic data-handling systems for commercial and military applications. Industrial control systems. Small, automatic electronic digital and analog computers for airborne use. Fire-control equipment. Aircraft control. Guided missiles. Ls(15,000 company; 4,000 Res. and Devt. Labs; 400 computers) Me(1937) DAC RMSa
- Imperial College, Mathematics Dept., Computer Section, Huxley Bldg., Exhibition Road, South Kensington, London, England
Automatic digital relay computer constructed and in operation; constructing a second computer with neon tube storage. Ss Le(1922) Dc RMa
- Industrial Control Co., Wyandanch, L. I., N. Y. / Midland 3-7548
Servo amplifiers, servo multipliers, dynamic analyzing tester, etc. Ic RMSa
- Institut Blaise Pascal, Laboratoire de Calcul Mécanique, 25, Avenue de la Division Le Clerc, Chatillon-sous-Bagneux (Seine), France / *C
Constructing a digital calculator. Ss(9) Me(1939) Dc RPa
- Institute for Advanced Study, Electronic Computer Project, Princeton, N. J. / *C
High speed general purpose (scientific) digital computers for own use. Ss(35) Se(1946) Dc RPa
- Intelligent Machines Research Corp., 1101 Lee Highway, Arlington, Va. / Jackson 5-6400 / *C
Devices for reading characters on paper, etc. Pattern interpretation equipment. Sensing mechanisms. Digital computer elements. Ss (28) Se(1951) Dc RCMSa
- International Business Machines Corp., 590 Madison Ave., New York 22, N. Y. / Plaza 3-1900 / and elsewhere / *C
Punch card machines. IBM 650, Magnetic Drum Calculator. IBM Electronic Data Processing Machines; IBM 704 and 705 (magnetic tape, magnetic drum, magnetic core storage, etc.) Card Programmed Calculator. Electronic calculating punch IBM 604 and 607. Data processing equipment. Automatic Source Recording Equipment. Computing service: digital; IBM 701, 702, 605, 604, etc. Card programmed calculator, punch card machines; over 115 IBM Service Bureaus all over country plus 4 electronic data processing centers. Ls(42,000) Le(1911) Dc RMSa
- International Rectifier Corp., 1521 East Grand Av., El Segundo, Calif. / Oregon 8-6281 / *C
Manufacturer of germanium diodes, selenium diodes, selenium photocells, selenium rectifiers. Ms(390) Se(1947) Ic RMSa
- International Resistance Co., 401 North Broad St., Philadelphia 8, Pa. / Walnut 2-2166 / *C
Fixed and variable resistors, rectifiers, chokes, molded printed electronic circuits. Ls(2200) Me(1924) Ic RMSa
- International Telemeter Corp., 2000 Stoner Avenue, Los Angeles 25, Calif. / Arizona 8-7751 / *C
Systems and devices for clerical and control applications. Automatic document handling machinery. High-capacity rapid-access ferrite core memories. High-density photographic information storage. Ferrite storage and switch cores. Community TV system equipment; pay-as-you-see TV. Ms(200) Se(1951) DCC RMSa
- International Telephone and Telegraph Corp., 67 Broad St., New York 4, N. Y. / Bowling Green 9-3800 / *C
Equipment for automatic control of repetitive processes, clerical or industrial work, such as inventories. Fully automatic pneumatic tube system, by dialing. Ls(96,000) Le DASCMc RMSCPa
- Bill Jack Scientific Instrument Co., 143 Cedros Ave., Solana Beach, Calif. / Skyline 5-1551 / *C
Airborne analog computers for "Recon" systems, aerial cameras; recording cameras; etc. Ms (450) Se(1949) DIc RMSa
- Byron Jackson Division -- SEE Borg-Warner Corporation
- Jacobs Instrument Co., 4718 Bethesda Ave., Bethesda 14, Md. / *C
High-speed small, compact digital computers (Jaincomp A,B,B1,B2,C). Pulse transformers, delay lines, magnetic storage systems. Input and output devices. Complete instrument systems. Ss(30?) Se(1948) DASCc RMSa
- Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena 3, Calif. / *C
Analog, digital, and data-handling systems. Research and development in jet propulsion and missile guidance. Ls(1,200; about 50 on computers) Me(1942) DAC RCPa
- K C S Data Control, Ltd., Box 38, Postal Station J, 740 Bay St., Toronto 6, Ont., Canada / *C
Consulting, engineering, and programming in the digital computer field. Se(3) Se(1954) Dc RCPa
- Kaiser Metal Products, Inc., Briston, Pa. / Stillwell 8-3361 / *C
Digital delay generators for accurate measurement and generation of time intervals, etc. Automatic electronic controls for industrial applications. Ls(3,500) Le(1920) Ic RMSa
- Kearfott Co., Inc., Clifton, N. J. / Gregory 2-1000 / *C
Analog-digital converter; digital-analog converter; servo motors, synchros, resolvers,

ROSTER OF ORGANIZATIONS

- integrating tachometer generators; analog and digital computers. Ls(3000) Le(1916) ISc RMSa
- Ketay Manufacturing Co.--SEE Norden-Ketay Corp.
- A. Kimball Co., 307 West Broadway, New York 13, N.Y. / Canal 6-2300 / *C
Machine for printing and punching garment tags and specific type tickets. Input mechanisms. Ms(200) Le(1876) Ic RMSPa
- The Kybernetes Corp., Division of Self-Winding ClockCo., 9 East 40 St., New York 16, N. Y. / Murray Hill 3-6030 / *C
Automatic logging and digital printout and digital indicator systems. High and low speed electronic scanning systems; mechanical scanning systems; annunciators. Ms(150) Le(1885, parent company) ICc RMSa
- Laboratory for Electronics, 75 Pitts St., Boston 14, Mass. / Richmond 2-3200 / *C
Analog and digital computers, special computers to suit customer requirements, delay lines (mercury, quartz), plug-in packages for computer applications, etc. Ls(800) Se(1946) DAC RMSa
- Lanston Monotype Machine Co., Barrett Adding Machine Div., 24th & Locust Sts., Phila. 3, Pa. / Locust 7-4614 / *C
Adding, subtracting, and printing desk calculators. Ms(330) Le(1892) Dc MSA
- Leeds and Northrup, 4901 Stenton Ave., Phila. 44, Pa. / Michigan 4-4900 / *C
Automatic recorders and controls. Ls(3150) Le(1899) Cc RMSa
- Librascope, Inc., 808 Western Ave., Glendale, Calif. / Ch 5-2677 / *C
Mechanical and electrical computers, Computing and controlling equipment for military applications and for banks, department stores, inventory and production control, etc. Airborne digital computers. General purpose computer under construction. All phases of data-handling. Ls(1200; approximately 350 on digital computers) Me(1937) DASc RMSa
- Librascope, Inc.--SEE also Minnesota Electronics Corporation
- Arthur D. Little, Inc., 30 Memorial Drive, Cambridge 42, Mass. / University 4-9370 / *C
Analog digital converter, "Automatic Digital Recorder of Analog Data" (ADRAD). Conversion and input devices. Consultation concerning electronic equipment requirements for handling data; mathematical analysis and programming for digital computers. Ls(800) Le(1886) Ic RCa
- Liton Industries, 336 N. Foothill Rd., Beverly Hills, Calif. / Cr 4-7411; Br 2-0661 / *C
Purchaser of Digital Control Systems, Inc. Radar systems with monopulse techniques; countermeasures, inertial navigation, automatic flight control, telemetering devices, communications equipment, instrumentation and test equipment, servomechanisms. New digital differential Analyzer. Ls(1100) Se(1953) DAIC RMSa
- Log Abax S.A., 146, Champs Elysées, Paris 8, France / Elysées 61-24 / *C
Collaborating with Institut Blaise Pascal on computing devices. 198 register automatic accounting machine. Analysis of punched tapes and connection with punch card or calculating machines. Ms(700) Se(1949) Dc RMSa
- Logistics Research, Inc., 141 So. Pacific Avenue, Redondo Beach, Calif. / Oregon 8-7108 / *C
General purpose digital computers and computing systems (ALWAC). Punched card converters, magnetic tape auxiliary storage. Data-reduction and data-handling systems, input and output equipment; automatic graph-plotters; magnetic heads; automatic curve followers. Ms(112) Se(1952) DIC RMSa
- W. S. Macdonald & Co.--SEE Electronics Corporation of America, Business Machines Division
- Machine Statistics Co., 27 Thames St., New York 6, N.Y. / Cortlandt 7-3165
Computing service: IBM 604, punch card machines, IBM 650 expected. Ss(35) Se(1951) Dc CPa
- Magnetics, Inc., Box 230, Butler, Pa. / Butler 7-1745 / *C
Tape wound cores of ultra-thin high-permeability materials, for computers, etc. Ms(275) Se(1949) Ic RMSa
- Magnetics Research, Inc., 142 King St., Chappaqua, N.Y. / Chappaqua 1-0052 / *C
Magnetic components for analog and digital systems and computers; miniature magnetic shift registers; etc. Ss(15) Se(1952) DAIC RCMSa
- Marchant Calculators, Inc., Oakland 8, Calif. / *C
Automatic electric calculators (desk type). Marchant-Raytheon Binary-Octal Calculator (desk type). Marchant "Miniac" electronic digital computer. Computer components. Data processing equipment. (See also Marchant Research Inc.) Ls(2500) Le(1910) Dc RMSa
- Marchant Research, Inc., 1475 Powell St., Oakland 8, Calif. (subsidiary of Marchant Calculators, Inc.) / Olympic 2-6500 / *C
Electronic digital computers (including Miniac). Magnetic storage systems, magnetic heads, data processing equipment including input-output devices; computer components. Ss(55 this division) Se(1950 this division) Dc RMSCa
- Massachusetts Institute of Technology: Digital Computer Laboratory, 211 Mass. Ave., Cambridge 39, Mass. / Eliot 4-3311
"Whirlwind" electronic digital computer. Ms(300+) Se(1945?) DAC RCPa
- Massachusetts Institute of Technology, Office of Statistical Services, Cambridge 39, Mass. / Univ. 4-6900 /
Computing service: digital; IBM 604, card programmed calculator, punch card machines. Ss Se DIc RCPa
- Mathematisch Centrum. 2e Boerhaavesstraat 49, Amsterdam, Netherlands. / *C
Relay computer in use; electronic computer under construction. Ms(60) Se(1946) Dc RCPa
- The W. L. Maxson Corp., 460 West 34 St., New York 1, N.Y. / Longacre 5-1900 / and elsewhere
Servomechanisms, analog computers, and digital computers for fire control, navigation, etc. Automatic control machinery. Ls(3000) Me(1935) DASCc RMSa
- Mellon Institute of Industrial Research, Multiple Fellowship on Computer Components, University of Pittsburgh, Pittsburgh 13, Pa. / Ma 1-1100 X378 / *C
High temperature printed circuit components; electro-optical storage devices. Ss(5)

ROSTER OF ORGANIZATIONS

4040

- Se(1950) Dc RCa
 Mico Instrument Company, 80 Trowbridge St., Cambridge 38, Mass. / Kirkland 7-8660 / *C
 Toroid transformers, toroid inductors; ferrite core units for computers, etc. Ss(20) Me (1934) Ic MSa
- Mid-Century Instrumatic Corp., 611 Broadway, New York 12, N.Y. / Spring 7-4016 / *C
 Analog computers; six-channel recorders; electronic function generators; electronic recorders. Ms(50) Se(1950) Ac RMSa
- William Miller Instruments, Inc., 325 No. Halstead Ave., Pasadena 8, Calif.
 Milac analog computer. Electronic instruments for precision testing and measurement. Ac RMSa
- Minneapolis-Honeywell Regulator Co., Industrial Division, 4580 Wayne Ave., Philadelphia 44, Pa. / Michigan 4-8300 / *C
 Automatic controllers. Brown Instruments. Servo components used in computers. Recording and indicating instruments and control equipment, etc. Amplifiers, converters, balancing motors, potentiometers, etc. Ls(3200) Le(1859) ACc RMSa
- Minneapolis-Honeywell Regulator Co.—SEE also Data-matic Corp. and Doelcam
- Minnesota Electronics Corp., 133 Santa Anita Ave., Burbank, Calif. / *C
 Digital and analog computers. Magnetic components, magnetic decision elements. Data reduction systems, telemetering. Subsidiary of Librascope Inc. Ss(35) Se(1946) DAic RMSa
- Monrobot Corp., Morris Plains, N.J. / Morristown 4-7200 / *C
 Monrobot automatic electronic digital computers; accounting machines. Subsidiary of Monroe Calculating Machine Co. Ms(100) Se(1949) Dc RMSa
- Monroe Calculating Machine Company, Orange, N.J./ Orange 3-6600 / and elsewhere / *C
 Desk calculating machinery for adding, calculating, and bookkeeping. See also Monrobot Corp. Ls(4000) Le(1912) Dc RMSa
- Moore School of Electrical Engineering, Univ. of Pennsylvania, 200 South 33 St., Phila., 4, Pa.
 Computing service: analog, digital; differential analyzer, card programmed calculator, punch card machines. Ms(80) Me(1923) DAC RCPa
- F. L. Moseley Co., 409 No. Fair Oaks, Pasadena, Calif. / Ryan 1-8998 / *C
 Two-coordinate X-Y recorder, point plotter, digital voltmeters, curve follower, etc. Ss(45) Se(1951) Ic MSa
- Mountain Systems, Inc., 864 Franklin Ave., Thornwood, N.Y. / Pleasantville 2-3330 / *C
 Electronic data processing systems (Modac); special purpose digital computing systems for business and scientific applications, magnetic drums. Ss(16) Se Dc RMSCa
- National Bureau of Standards, Applied Mathematics Division, Washington 25, D.C. / Emerson 2-4040 / *C
 Computing service; Seac, Dyseac, and punch card machines; for government and government contractors only. Ms(50) Se(1947) DIc RCPa
- National Bureau of Standards, Data Processing Systems Division, Washington 25, D.C. / Emerson 2-Digital and analog computers, data processing and control systems, input-output devices, storage elements, transistors, diodes, delay lines, etc. Designed, assembled, and maintain Seac; designed and assembled Dyseac; designed several special purpose machines. Ms(80) Se(1945) DAC RMBGa
- National Bureau of Standards, Institute for Numerical Analysis—SEE University of California at Los Angeles, Department of Mathematics, Numerical Analysis Research
- The National Cash Register Co., South Main and K Sts., Dayton 9, Ohio / Adams 6-111 / *C
 Digital computers, data processing machines, input-output devices, computing systems. CRC 102-A and 102-D general purpose computers and other computers. Building new unit at Hawthorne, Calif. which will house electronic research activity; manufacturing will continue at Dayton. Ls(13,000 at Dayton) Le(1884) Dc RCMSa
- National Co., Inc., 61 Sherman St., Malden, Mass. / Malden 2-7954
 Communications receivers; some computing equipment. Ls(700) ?e Ic RMSa
- National Union Electric Corp., 350 Scotland Rd., Orange, N.J. / Orange 2-6600 / *C
 Electron tubes, semi-conductor diodes, and transistors for computers, etc. Ms(150) Me(1929) Ic RMa
- National Physical Laboratory, Control Mechanisms and Electronics Division, Teddington, Middlesex, England. / *C
 Digital computers, electronic simulators, data recording. Designer and builder of the Pilot Model of ACE (Automatic Computing Engine). Collaborates with English Electric Co. Ls(1000; this division, 40) Le(1900) DIc RCPMa
- The Newton Co., 55 Elm St., Manchester, Conn. / Mitchell 3-5104 / *C
 Data processing equipment. Analog to digital converters; simulators; automatic typewriters. Ms(150) Se(1947) DIc RMSa
- Norden-Ketay Corporation, 99 Park Ave., New York 16, N.Y. / Murray Hill 7-0498 / and elsewhere/ *C
 Automatic control systems, computers, fire control systems, bomb sights, navigational systems, digital converters, synchros, servo motors, resolvers, servo amplifiers, resolver amplifiers, airborne instruments. Subsidiaries are Vari-Ohm Corporation, Sunrise Highway, Amityville, L.I., N.Y.; Nuclear Science and Engineering Corp., Box 10901, Pittsburgh 36, Pa.; Scientific Specialties Corp., Snow and Union Sts., Boston, Mass.; The Frohman Manufacturing Co., Inc., Miami, Florida. Ls(3000) Se(1955) DACSc RMSa
- North American Aviation, Inc., 12214 Lakewood Blvd., Downey, Calif. / Logan 5-8651 / *C
 General purpose computers, differential analyzers. Special purpose analog computers for algebraic and differential equations. Ls(1200 in computer work) Se(1946) ADc RMSa
- North American Philips Co., Inc., Research & Control Instruments Div., 750 So. Fulton Ave., Mt. Vernon, N.Y. / Mount Vernon 4-4500 / *C
 Analog computers. Ratemeters. Semi-automatic X-ray machine that determines percent of

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- 12 different elements in a specimen, etc. Ms (250) Se(1942) AIo RMSa
- Northrop Aircraft Co., Hawthorne, Calif. / *C
Computing center; develops, maintains, operates own computing equipment. Computing service: analog, digital. Digital plotter. Data reduction and analysis. Development of computing systems on order. Ms(70 this project) Se(1950 this project) DAc RCPa
- Notifier Manufacturing Co., 239 South 11 St., Lincoln 8, Nebraska / Lincoln 5-2946 / *C
Automatic control machinery for fire alarms. Automatic control circuits, computer circuits, switching circuits. Memory and pulse storing devices, transistor devices. Two small laboratory type computers under development. Ss (35) Se(1949) CIc RMSCa
- Nuclear Development Corporation of America, 5 New St., White Plains, N.Y. / White Plains 8-5800 / *C
Selection, design, and building of special purpose data-handling systems. Programming. Operate own "Datatron" providing computing services. Also work with machine builders on automatic control machinery and automatic materials handling machinery. Ms(178) Se(1948) DCMc RMSCa
- Nuclear Science and Engineering Corp.-Subsidiary of Norden-Ketay Corporation, which see.
- Numerical Analysis Research-SEE University of California at Los Angeles
- Olivetti Corp. of America, 580 Fifth Ave., New York, 36, N.Y. / Judson 2-0637 / and Ing. C. Olivetti & Co., S.P.A., Ivrea, Italy / *C
Desk adding, calculating, and printing machines. Fully automatic printing calculators. Ls(6000) Le(1908) Dc RMSa
- Ortho Filter Corp., 196 Albion Ave., Paterson 2, N.J. / Mulberry 4-5858 / *C
Pluggable units for computers, cathode ray amplifiers, power supplies, wiring of complete racks, toroids, etc. Ms(75) Se(1946) Ic RMSa
- John Oster Mfg. Co., Avionic Div., Racine, Wisc. / Fast response magnetic resolvers, etc. Ac RMSa
- Panellit, Inc., 7401 No. Hamlin Ave., Skokie, Ill. / Orchard 5-2500 / *C
Equipment for automatic control: coordinated and graphic control panels for process variables; multiple-point scanning systems, annunciator systems. Ms(375) Se ISCMc RCMSPa
- Pennsylvania State University, X-Ray and Crystal Structure Lab., Dept. of Physics, University Park, Pa. / Adams 8-8441 X2125 / *C
X-RAC computer for crystal electron density functions. S-FAC for structure factor calculations. Ms(55) Se(1946) DAc RPa
- Phebeco, Inc., 3640 Woodland Ave., Baltimore 15, Md. / Mohawk 4-2350 / *C
Analog-to-digital converter; digital computers. Ms(55) Se(1952) Dc RMSa
- George A. Philbrick Researches, Inc., 230 Congress St., Boston 10, Mass. / Liberty 2-5464 / *C
Philbrick electronic analog computing equipment and components. Computing service: analog; Philbrick equipment. Ss(5) Se(1946) Ac RCMSa
- Phillips Control Corp., Joliet, Ill. / Joliet 3-3431 / *C
Relays for computers, etc. Ms(350) Se(1946)
- Ic RMSa
Photon, Inc., 58 Charles St., Cambridge 38, Mass. / Trowbridge 6-1177 / *C
Machinery for composing type by photographs. First photographically-composed book has been published. Ms(100) Me(1940) DIc RCMSa
- Pi-Square Engineering Co., Inc., 230 Congress St., Boston 10, Mass. / Hubbard 2-3225 / *C
Analysis and solution of engineering problems. Computing services. Analog computing equipment available. Ss Se(1954) ASCc RCPa
- Pitney-Bowes, Inc., Stamford, Conn. / *C
Postage meters. Tax-stamping meters. "Tickometer" counting and/or imprinting machines. Ls(3000) Le(1918) Ic MSa
- Potter and Brumfield Mfg. Co., Inc., Princeton, Indiana / 1596 / *C
Electric relays and stepping switches for computers, etc. Ls(850) Me(1931) Ic RMSa
- Potter Instrument Co., 115 Cutter Mill Rd., Great Neck, N.Y. / Great Neck 2-9532 / *C
Electronic counters. Magnetic and perforated paper tape handlers; digital printer. Shift registers. Magnetic core memory. Random access memory. High-speed printer ("Flying Typewriter"): 6½ lines of characters printed per second. Analog-to-digital converter. Ms(115) Se(1942) Dc RMSa
- Powers-Samas Accounting Machines, Ltd., England / Punch card tabulating equipment using small, medium, and standard cards. Agency is Underwood Corp., which SEE. Ls(6000) Le(1916) DIc RMSa
- Price Waterhouse & Co., Management Advisory Services, 56 Pine St., New York 5, N.Y. / Whitehall 3-5900 /
Applications of systems and equipment to data processing in business, etc. Ls Le(1895) DIc RCPa
- Productions Electroniques, 8, rue Laugier, Paris 17, France /
Collaborating with Institut Blaise Pascal on magnetic recording devices. Ic RMSa
- Purdue Univ., Statistical Laboratory, West Lafayette, Indiana / Lafayette 92-2542 / *C
Computing service: digital; Datatron digital computer; punch card machines. Ss(15) Se(1951) DIc RCPa ^{01277A C}
- Radio Corporation of America, RCA-Victor Division, Camden, N. J.
Digital computers and data processing systems for business applications. Bizmac. Ls Le Dc RMSa
- Radio Corporation of America, Tube Division, 415 South 5th St., Harrison, N. J. / Humboldt 5-3900 / *C
Tubes, transistors for computers. Ls Le Ic RMSa
- Radio Development & Research Corp. (Germanium Products, a subsidiary), 26 Cornelison Avenue, Jersey City, N. J. / Rector 2-2337((New York City) / *C
Transistors, diodes, rectifiers, for computers. Ms(100) Me(1938) Ic RMSCa
- Ramo-Wooldridge Corp., Computer Systems Division, 5740 Arbor Vitae, Los Angeles 45, Calif. / Oregon 8-0311 / *C
Airborne digital computer systems and data processing systems. Ls(1,000) Se(1953) DIc RMCa
- The Rand Corporation, 1700 Main St., Santa Monica,

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- Calif. / and in Lexington, Mass. (digital computer programming group) / *C
 Large digital computers for scientific and business uses; analog computers for scientific computations. Ls(1,000) Se(1946) DAIC RPGa
- Raymond Rosen Engineering Products, Inc., 32 Walnut St., Philadelphia 4, Pa. / Evergreen 2-5015 / *C
 Computers used as end item in information transmittal systems, telemetering systems. Ms(365) Me(1943) Ic RMa
- Raytheon Manufacturing Co., Waltham, Mass. / Twinbrook 3-5860 (effective 12/5/55) / *C
 Radar, sonar, communications, fire control, microwave and telemetering equipment, power and receiving tubes, diodes, transistors, electro-hydraulic servo controls, automatic machine-tool duplicators. Computer work transferred to Datamatic Corporation, which see. Ls(20,000) Me(1925) DAC RMSa
- Raytheon Manufacturing Co., Division: Receiving and Cathode Ray Tube Operations, 55 Chapel St., Newton 58, Mass. / Bigelow 4-7500 / *C
 Semiconductor diodes, transistors, electron tubes, for computers. Ls Le(1923) Ic RMSa
- J. B. Rea Co., 1723 Cloverfield Blvd., Santa Monica, Calif. / Exbrook 3-7201 / *C
 Automatic control systems, general and special purpose digital computers, flight control systems for helicopters, automatic cruise control for aircraft, torpedo tracking systems, automatic data handling systems, aerodynamic systems analysis, simulation, nonlinear servo systems. Magnetic drums, magnetic heads, analog-to-digital converters, etc. Computing service: analog, digital, simulation; Electronic Associates' analog computer, card programmed calculator. Ms(80) Se(1951) DASCc RMSCa
- Reeves Instrument Co., 215 East 91 St., New York 28, N. Y. / Trafalgar 6-6000
 Fire-control equipment. "REAC" electronic analog computers. Computing service: analog; Reac. Ls Me Ac RMSa
- Remington Rand Univac Division of Sperry Rand Corporation, 315 4th Ave., New York 10, N. Y. / Spring 7-8000 / and elsewhere / *C
 Digital computers (Univac System, Univac Scientific, Univac File-Computer, Univac 120 and Univac 60 Punched-Card Electronic Computers). Analog computers; special purpose computers. Converters: card to tape, tape to card, punched paper tape to magnetic tape, and magnetic tape to punched paper tape. High speed printers, servomechanisms, magnetic drum storage systems, input and output devices. Punched-card tabulating equipment. Ls(over 6,000; 2,500 on computers) Le DIC RCPa
- Remington Rand Univac Division of Sperry Rand Corporation, Univac Computing Center, 314 4th Ave., New York 10, N. Y. / Spring 7-8000
 Computing service; digital; Univac, punched-card equipment, etc. Ms Se(1954) Dc RCPa
- Remington Rand Univac Division of Sperry Rand Corporation (formerly Eckert-Mauchly Division), 2300 W. Allegheny Ave., Philadelphia, Pa. / Baldwin 3-7300 / *C
 All purpose digital computers. Univac Fac-tronic System. Ls(600) Se(1946) Dc RCMa
- Remington Rand Division of Sperry Rand Corporation, Engineering Research Associates Division, 1902 W. Minnehaha Ave., St. Paul, Minn. / Nest-or 9601 / *C
 Development of digital computers, automatic data-handling and control systems, mechanisms, and weapons. Pulse circuits, magnetic cores, magnetic drums, transistors, printed wiring, miniaturization, and precise mechanisms used in the design of these systems. Automatic digital computers ERA 1101, 1102, 1103; Speed Tally; CAA Flight Plan Storage Systems; the Logistics Computers. Ls(1,050) Se(1946) Dc RMCPa
- Remington Rand Division of Sperry Rand Corporation, Engineering Research Associates Division, 510 18th St. South, Arlington, Va.
 Computing service: digital; ERA 1103 type. Ls (Se(1946) Dc RCPa
- Rensselaer Polytechnic Institute, Computer Laboratory, 110 8th St., Troy, N. Y. / Ashley 2-3000, X240 / *C
 Computing service: analog; Reac, precision magnetic tape recorders for analog computing applications. Ss(8) Se(1952) Ac RCPa
- Resistance Products Company, 914 S. 13th St., Harrisburg, Pa. / CE 6-9006 / *C
 Resistors — high voltage, high resistance, standard types, encapsulated, hermetically sealed, subminiature, etc., for computer and other uses. ?s ?e Ic RMSa
- Rich Electronic Computer Center -- SEE Georgia Institute of Technology
- Richardson Camera Company, Inc., 171 W. Magnolia Blvd., Burbank, Calif. / Thornwall 2-0234 / *C
 Theodolite cameras, pulse-data cameras, film readers, film assessors, electronic counters. Ss(18) Me(1934) Ic RMSCa
- Robotyper Corporation, 125 Allen St., Hendersonville, N. C. / Hendersonville 4246
 Automatic typing equipment that can be associated with any electric typewriter, using a record roll pneumatically operated. Ic RMSa
- Rutherford Electronics Company, 3707 S. Robertson Blvd., Culver City, Calif. / Texas 0-4362 / *C
 Pulse instruments, time measuring systems, time delay generators. Ss(15) Se(1950) Ic RMSa
- Saunders & Co., 66 Westland Rd., Weston 93, Mass. / *C
 Digital computing machinery; information-handling devices; related devices. Ss Se Ic Sa
- Scientific Computing Service, 23 Bedford Square, London W C 1, England / Museum 0808 / *C
 Problem solving, consulting. Computing service: digital. Ss(15) Me(1937) DIC RCPa
- Scientific Specialties Corp -- Subsidiary of Norden-Ketay Corporation, which see.
- Servo Corporation of America, 2020 Jericho Turnpike, New Hyde Park, N. Y. / Fieldstone 7-2180 / *C
 Servomechanisms. Automatic controls. Analysis and synthesis for controls manufacturers. Temperature controls by infra-red radiation. Industrial controls. Servo components and test equipment. Analog and digital computers. Ms(350) Se(1946) DASCc RMSa
- Servomechanisms, Inc., Post & Stewart Ave., Westbury, L. I., N. Y., / Edgewood 4-2700 / also 12500 Aviation Blvd, Hawthorne, Calif. / Osborne 5-7111 / *C
 Automatic electronic and electro-mechanical

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- control systems and components, analog computers, instrumentation. Airborne digital computers, digital transducers. Ls(800) Se(1946) ASICc RMSa
- Shallcross Mfg. Company, Jackson & Pusey Avenues, Collingdale, Pa. / Farragut 9-5100 / *C
Wirewound resistors, switches, delay lines, for computer and other uses. Ms(25) Me(1929) Ic RMSa
- Shepard Laboratories, Summit, N. J.
High-speed typer (up to 1800 characters per second). Ss Se(1950) Dlc RMSa
- Société d'Electronique et d'Automatisme, 138 Blvd de Verdun, Courbevoie, Seine, France / Défense 41-20 / *C
Analog and digital computers and components. Servomechanisms; electronic equipment for machine tools; electronic recorders. Analog computer OME-L2. General purpose digital computer CAB 2.022. Ms(320) Se(1948) DASc RSMa
- Société des Servomechanismes Electroniques, 1 rue Chané, Paris 16e, France
Sc RMSa
- Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill. / Bishop 2-1414 / *C
Constant voltage transformers, DC power supplies, etc., for computer and other uses. Ms(250) Me(1930) Ic RMSa
- Sorensen & Co., Inc., 375 Fairfield Ave., Stamford, Conn. / Fireside 8-5311 / *C
Computer power supplies. Ms(300) Me(1943) Ic RMSa
- Soroban Engineering, Inc., Box 117, Melbourne, Fla.
Electronic digital computers of the FLAC and SEAC type; computer auxiliary equipment such as high-speed paper tape perforators (240 characters per second), coded automatic keyboards. Devices for converting electric typewriters to control by punched paper tape. Paper tape readers; computer "do-it-yourself" kits; automatic format tabulators and report-writing machines; computer consulting services; etc. Ss Se(1953) Dc RMSa
- Southern Electronics Corporation, 239 West Orange Grove Ave., Burbank, Calif. / Victoria 9-3193 / *C
Precision polystyrene capacitors. Ss(55) Se(1951) Ic RMSa
- Specialties, Inc., Syosset, N.Y., and Charlottesville, Va. / Syosset, Walnut 1-2345; Charlottesville, 3-5131 / *C
Precision potentiometers, servos, magnetic amplifiers, transformers, sensing elements, etc. for computer and other uses. Ms(300) Se(1941) Ic RMSa
- Sperry Rand Corporation, Sperry Gyroscope Division, Great Neck, N.Y. / Fieldstone 7-3600 / *C
Ordnance; fire-control equipment. Automatic controls. Navigation equipment, sea and air Radar, Loran, gyrocompasses, precision instruments. Ls(18,000) Le(1910) Ac RMSa
- Sperry Rand Corporation—also SEE Remington Rand Divisions
- Sprague Electric Co., 377 Marshall Street, North Adams, Mass. / Mohawk 3-5311 / *C
Capacitors; miniature, and low dielectric hysteresis loss, for computer applications. Standard capacitors; precision and power type resistors; pulse transformers; radio interference filters; shift registers; printed circuits. Ls(6000) Le(1926) Ic RMSa
- The Standard Register Co., Dayton 1, Ohio / Adams 6181
Electronic equipment (called "Stanomatic"), capable of sensing or reading printed codes on business documents and translating them into digital pulses which will actuate office machinery such as card punches, tape perforators, computers, etc. Ls Le Dlc RMSa
- Stanford Computation Center, Stanford University, Stanford, California / *C
Computing service; one CPC ?s ?e Dc RPCa
- Stereotronics, 66 Westland Rd., Weston 93, Mass. / *C
Solid-state information-handling devices: transistor, magnetic, diode, ferro-electric, gas tubes, etc. Ss Se Dlc RMSa
- Stromberg-Carlson (West Coast), Charactron & Special Products Laboratories, 3235 Hancock Street, San Diego 10, Calif. / Cypress 8-7701 / *C
The Charactron, a computer output device for "debugging", tactical display, etc., converting coded information into tabular or graphic alphanumeric information on a cathode-ray-tube screen, Analog-to-digital conversion units. Ms(115) Se(1950) Ic RMSa
- Swedish Board for Computing Machinery, Drottninggatan 95A, (P.O. Box 6131), Stockholm 6, Sweden / Stockholm 23 55 90 / *C
State central institution for research, development, and computation service on large-scale machines. Operates two automatic digital computers, BARK and BESK, designed and built by the Board, Research on numerical analysis; development of new computers. Computing service (digital) using BARK and BESK. Ss(30) Se(1949) Dc RMCPa
- Sylvania Electric Products, Inc., Electronic Systems Division, 100 First St., Waltham, Mass. / Twinbrook 3-9200 / *C
Special purpose digital computer equipment, Ls Le(1901) Dc RMSa
- Sylvania Electric Products, Inc., Radio and Television Div., 70 Forsyth St., Boston 15, Mass. / Kenmore 6-8900 / *C
Electronic digital computers using printed circuit techniques. Subassemblies of diodes and triodes. Computer components. Ls(comp any 25,000; this division 190) Le(1901); this division 1949) Dac RMSa
- Sylvania Electric Products, Inc., Woburn Division, 100 Sylvan Rd., Woburn, Mass. / Woburn 2-3500
Semiconductor components, crystal diodes, transistors, and tubes for computer and other uses. Ls Le Ic RMA
- Systematics, Inc., 103 Lyndon St., Hermosa Beach, Calif. / Frontier 2-7811
Computer components. Ss Se(1955) Dc RMSa
- Taller and Cooper, 75 Front St., Brooklyn, N.Y. / Ulster 8-0500 / *C
Data recording and conversion system, printers, perforators, analog to digital converters. Function generators, computers. Mechanical function generator control of machine tools and allied mechanisms. Toll equipment for bridges, highways, turnpikes. Ms(350) Me(1926) Dlc RMSa
- Tally Register Corp., 5300 14th Ave., N.W., Seattle 7, Wash. / Dexter 5500 / *C
Special purpose business machines; electromagnetic pulse counters and pulsed relays;

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- high-speed data reduction systems for telemetering applications; digital-input, multiple-symbol X-Y plotter with continuous grid printing and numeric abscissa. Ss(25) Se(198) DICMc RMSCa
- Taylor Instrument Co., Rochester, N.Y.
Automatic controllers. Ls Le Cc RMSa
- Technitrol Engineering Co., 2751 North 4 Street, Philadelphia 33, Pa. / Garfield 6-9105 / *C
Computing and control equipment. Complete digital systems. Components, pulse transformers. Electrical and acoustic delay lines. High-speed memories. Digital computer "blocks". Ms(105) Se(1947) DAC RMSa
- Technology Instrument Corporation, 531 Main Street, Acton, Mass. / Colonial 3-7711 / *C
Potentiometers: linear and non-linear; single turn and multiturn; for computer and other uses. Ms(355) Se(1946) Ic Ma
- Telecomputing Corp., 12838 Saticoy St., No. Hollywood, Calif. / Po 5-8160 and St 7-8181 / *C
Automatic data reading, recording, and plotting equipment. Automatic business data accumulation and analysis equipment; multiple access storage systems. Computing service; analog and digital; card programmed calculators, automatic graph readers, digital plotters, punch card machines. Ms(250) Se(1947) DCMc RMSPa
- Telemetric Corp., 80 Broad St., New York 4, N.Y. and Sea Cliff, N.Y. / Whitehall 3-7028 and Glen Cove 4-2990 / *C
Inexpensive equipment ("code stacks") for attaching to an electric typewriter, adding machine, cash register, calculator, etc., so that it may control a tape perforator and punch paper tape simultaneously with typing. Ss Se Dic RMSa
- Teleregister Corporation, 445 Fairfield Avenue, Stamford, Conn. / Fireside 8-4291, and (New York City wire) Ludlow 5-8900 / *C
Digital special purpose computers. Data processing systems for special applications: inventory control, invoicing, travel reservations, flight data, stock market quotations, etc. Electro-mechanical digital display systems. Magnetronic Reservisor, in use at American Airlines reservations center. Magnetronic stock quotation system in use in Toronto Stock Exchange. Ls(550) Me(1928) Dic RMSa
- Teletypesetter Corporation, 2752 Clybourn Avenue, Chicago 14, Ill. / Graceland 7-5250 / and elsewhere / *C
Tape perforators and operating units for local or distant automatic control of Linotypes and Intertypes. Ms(60) Me(1929) Ic RMSa
- Texas Instruments, Inc., 6000 Lemmon Ave., Dallas 9, Texas / Dixon 1781 / and elsewhere / *C,
Germanium and silicon transistors and diodes, precision resistors for computer and other uses. Ls(3000) Me(1930) Ic RMSa
- Tobe Deutschmann Corporation, 921 Providence Highway, Norwood, Mass. / Norwood 7-2620 / *C
Capacitors for computers, etc.; electronic noise suppression products (interference filters). Ms(400) Le(1922) Ic RMSCPa
- Transistor Products, Inc., 241 Crescent St., Waltham 54, Mass. / Waltham 5-9330 / *C
Transistors, diodes. Ms(150) Se(1952) Ic RMSa
- Tung-Sol Electric Inc., 95 8th Ave., Newark 4, N. J. / Humboldt 2-4200 / *C
Electron tubes, transistors, for computer and other uses. Ls(6000) Le(1904) Ic RMa
- Ultrasonic Corp., 640 Memorial Drive, Cambridge, Mass. / University 4-6800 / *C
Analog computers, digital techniques, servo-mechanisms, machine tool controls, etc. Ms(475) Se(1945) DASc RMSa
- Underwood Corp., One Park Ave., New York 16, N.Y. / Lexington 2-7000 / General Research Lab., 56 Arbor St., Hartford 6, Conn.; and elsewhere / *C
Accounting machines, adding machines, typewriters. Elliott-Fisher and Sundstrand Machines. Underwood Samas punched card accounting machines and systems. Underwood electric typewriters, used in Harvard Mark II calculator. ELECOM electronic computers. SEE also Electronic Computer Division of Underwood Corporation. Ls(company 13,000; laboratory, 100) Le(1894) Dic RMSa
- Union Switch and Signal Co., Division of Westinghouse Airbrake, Pittsburgh 18, and Swissvale, Pa. Railroad signaling and control systems. Aircraft flight simulators; mobile test rack for testing analog computers including simulators. Ls(4000) Le Ic RMSa
- U.S. Air Force, Aeronautical Research Laboratory, System Dynamics Branch, Wright Air Development Center, Wright-Patterson Air Force Base, Ohio / KE 7111, X28235 / *C
Has Oarac, CPC, ERA 1103; is acquiring I B M 704, Reeves DSS. Ms(62) Se(1948) DAC RCGPa
- U.S. Air Force, Cambridge Research Center, 230 Albany St., Cambridge 39, Mass. / University 4-4720
Developed the ABC (Automatic Binary Computer). Has a Computer Research Corp-102. Ms Me Dic Ga
- U.S. Air Force, Computation Research Sec., Wright Air Development Center, Wright-Patterson Air Force Base, Dayton, Ohio
Computing service, analog and digital: Card programmed calculators, Reacs, punch card; for government only. Se DAIC RCPa
- U.S. Air Force, Inst. of Technology, Wright-Patterson Air Force Base, Dayton, Ohio / *C
Electronic strategy machine, conceived by L.I. Davis. Philbrick Reac and GEDA equipment on hand. Ms(300) Se(1946) DAIC Ga
- U.S. Air Force, Rome Air Development Center, Statistical Services Division, Griffiss Air Force Base, Rome, N.Y.
Elecom 120, Bendix Digital Differential Analyzer D 12, Reeves Electronic Analog Computer, Benson-Lehner data reduction equipment, considerable IBM data processing equipment. Computing service: analog, digital; for government only. Se DIC RCPa
- U.S. Army, Ballistic Research Laboratories, Aberdeen Proving Ground, Aberdeen, Md. / *C
Has Bell, Edvac, Eniac, Ordvac computers and others. Developing supplementary and modernizing components. Computing service (digital) using these machines; for government and government contractors only. Ms Le DAC Ga
- U.S. Navy, Naval Proving Ground, Computation and Exterior Ballistics Laboratory, Dahlgren, Va. / X627 / *C
Has three digital computers - Harvard Aiken Relay (Mark II), Aiken Dahlgren Electronic

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- (Mark III), and Naval Ordnance Research Calculator (NORC). Computing service using these machines; for government and government contractors only. Ms(145) Se(1942) Dc RCPGa
- U.S. Navy, Naval Research Laboratory, Washington 25, D.C. / *C
NAREC digital computer. Analog computers, servo mechanisms and data reduction. Ls (3200) Le(1923) DAsc RCGPa
- U.S. Navy, Office of Naval Research, Special Devices Center, Port Washington, New York / Port Washington 7-3800 / *C
Training devices using analog and digital computers. Ls(500) Se(1943) DASMc RMCGBa
- University of California, Department of Mathematics, Numerical Analysis Research, Los Angeles 24, Calif. / Granite 3-0971 and Bradshaw 2-61 61 / *C
Research and teaching in use of digital computers for scientific computation. Operates SWAC on loan from the Office of Naval Research. Also maintain and operate machines, library and other equipment owned up to 1954 by the now inactive National Bureau of Standards Institute for Numerical Analysis. Ss(32) Se (1954-date of transfer from National Bureau of Standards) Dc RPCa
- Univ. of California, Berkeley, Calif. / *C
CALDIC, California Digital Computer. Ss(10) Se(1947) Dac RPa
- University of Cambridge, University Mathematical Laboratory, Free School Lane, Cambridge, England
Built Edsac. Computing service (digital) for University. ?s Me Dc RCPa
- University of Illinois, Urbana, Ill.
Built electronic digital computer Ordvac for Ballistic Research Laboratory, Aberdeen. Has finished computer Illiac on same design, but with faster input-output using a photoelectric reader. Dc RCPa
- University of Manchester, Mathematical Laboratory, Manchester, England / *C
Has automatic electronic digital computer built by Ferranti Electric, Ltd. This laboratory developed much of the design. Ss(8) Se(1947) Dc RPa
- University of Michigan, Willow Run Laboratories, Willow Run Airport, Ypsilanti, Mich. / Ypsilanti 5110 / *C
Digital and analog computers, including electronic and electromagnetic computers and simulators; both special and general purpose. Including MIDAC, IBM equipment, desk calculators, data processing systems. Computing services, including analysis and computation using all types of computers. Instruction in components of and the use of electronic computers of all types, e.g. programming, coding, numerical methods, etc. Ls(600) Se (1946) Dac RCPa
- University of Pittsburgh-SEE Mellon Institute
- University of Sydney, Dept. of Electrical Engrg., Section of Mathematical Instruments, Sydney, New South Wales, Australia
Analog computers. Ac Ra
- University of Toronto, Computation Centre, Toronto, Canada / Walnut 3-1327 / *C
Digital, electronic computers. Now operating: a Ferranti Electric automatic computer; punch card machines. Computing service (digital) using the Ferranti computer. Ss(15) Se(1947) Dc RCPa
- University of Wisconsin, Numerical Analysis Laboratory, B-9 Bascom Hall, Madison 6, Wisconsin / Alpine 5-3311, X2137 / *C
Computing service: analog, digital; Philbrick computer, card programmed calculator, IBM 650, punch card machines. Ss(12) Se DAIC RCPa
- Vari-Ohm Corp.-Subsidiary of Norden-Ketay Corp., which see.
- Vaucanson, 11 rue de Surmelin, Paris 20e, France
Calculating machines. Dc RMSa
- Vectron, Inc., 400 Main St., Waltham 54, Mass. / Waltham 5-8700
Special computers for accounting applications, military applications, etc. Precision potentiometers, precision gear assemblies, etc. Ms(200) Se(1949) DIc RMSa
- Victor Adding Machine Co., 3900 No. Rockwell St., Chicago 18, Ill. / *C
Adding machines, etc. Ls(1600) Le(1918) Dc RMSa
- VISirecord, Inc., 54 Railroad Ave., Copiague, L.I., N.Y. / Amityville 4-4900 / *C
Filing systems for all types of common language tapes in computers. Business control on edge-punched cards in conjunction with mechanical and electronic business machines. Ms(300) Ic RMSa
- The Walkirt Co., 145 West Hazel St., Inglewood, 3, Calif. / Oregon 8-2873, Oregon 1-0212 / *C
Unitized circuit packages, plug-in units, including binary scalars, linear ternary scalars; other digital computing activities. Ss(20) Se(1948) Dc RMSa
- Wang Laboratories, 37 Hurley St., Cambridge 39, Mass. / Trowbridge 6-1925
Magnetic delay-line memory units. Digital signal generators. Multiple scalars. Static magnetic memory systems and other devices. Wedilog computers, shaft digitizing coders. Ss(8) Se(1951) Dc RCMSa
- Waters Manufacturing, Inc., 4 Gordon St., Waltham, Mass. / Waltham 5-9020 / *C
Potentiometers for servomechanisms, computers, and other uses. Ms(80) Se(1951) Ic RMa
- The George Washington Univ., Logistics Research Project, 707 22nd St., Washington 7, D.C. / Sterling 3-4539 / *C
ONR relay computer with magnetic drum memory. Data-handling machines. ONR electronic digital computer with magnetic drum memory. Computing service (digital) using these machines. Ms(50) Se(1950) Dc RCPa
- Watson Scientific Computing Laboratory, 612 West 116 St., New York, N.Y. / Monument 6-9600 / *C
The pure science department of International Business Machines Corp. Simultaneous linear equation solver. Astronomical plate measuring machine. IBM punch card machines. Research and instruction. Maker of Naval Ordnance Research Calculator (NORC). Ms(100) Se(1945) Dac RCPa
- Wayne University Computation Laboratory, Cass Ave., Detroit 1, Mich. / Temple 1-1450 / *C
5300-word magnetic drum computer built of Burroughs pulse control equipment. Digital differential analyzer and electronic analog equipment. Computing service: analog, digital. Instruction and training. Ss(30)

(continued on page 35)

Components of Automatic Computing Machinery —

List of Types

(Edition 2, cumulative, information as of November 3, 1955)

The purpose of this list is to report types of components of automatic machinery for computing or data processing. We shall be grateful for any comments, corrections, and proposed additions or deletions, which any reader may send us.

LIST

1. Storage mediums, for both internal and external storage:
 - Punch cards
 - Punched paper tape
 - Magnetic tape
 - Magnetic wire
 - Metal plates
 - Plugboards, i.e., panels of patch cords
 - All these physical forms express machine language; when inserted into a machine, they give the machine information and instruction; when left in a filing cabinet, they hold information and instructions in reserve for later use. Sometimes it is the whole area or volume of the storage medium which is used, as in the ordinary punched card. Sometimes it is only the edge which is used, as in edge-punched cards or edge-slotted metal plates.
2. Storage mediums, internal only:
 - Magnetic drums
 - Magnetic tape units
 - Magnetic cores, arranged either one-dimensionally as in a magnetic shift register or in two or three dimensions as a magnetic core matrix memory; they may be made of special iron alloys, iron oxide ceramics called ferrites, etc.
 - Electrostatic storage tubes, in particular cathode ray storage tubes
 - Delay lines, of mercury, quartz, nickel, etc.
 - Relays, in relay registers, and stepping switches
 - Electronic tubes, in registers of flip-flops, counting rings, etc.
 - Switches: toggle switches and dial switches
 - Buttons and keyboards
 - Rotation shafts
 - Voltages
3. Calculating and controlling devices:
 - Mechanical computing elements: latches, gears, levers, ratchets, "program bars", cams, etc.
 - Relay and stepping switch circuits
 - Electronic tube circuits
 - Rectifier circuits, using diodes: electronic tube, germanium, selenium, silicon
 - Transistor circuits
 - Auxiliary circuit elements: amplifiers, pulse transformers, voltage regulators, etc.
 - Analog computing elements: resolvers, synchros, integrators, adders, etc.
 - Automatic process controllers as such, pneumatic, electronic, hydraulic, etc.
4. Input devices:
 - Buttons
 - Switches
 - Paper tape readers: mechanical, electrical, photoelectric
 - Punch card readers: mechanical, electrical, photoelectric
 - Magnetic tape readers
 - Automatic curve followers: photoelectric
 - Scanners: electric, photoelectric
 - Sensing instruments of all kinds
 - The category "sensing instruments" verges into the science of instrumentation, where humidity, temperature, pressure, volume, flow, liquid level, etc., and many other physical variables can be measured and reported to a machine in machine language.
5. Output devices:
 - Visual displays, such as lights, dials, oscilloscope screen, etc.
 - Electric typewriter, or other electrically operated office machine
 - Line-at-a-time printer
 - Matrix printer, that forms each character by a pattern of dots
 - Automatic plotter, which will trace or plot a curve according to information delivered by the machine
 - Facsimile printer
 - Photographic recording
 - Paper tape punch
 - Magnetic tape recorder
 - Punch card punch

(continued on page 35)

AUTOMATIC COMPUTING SERVICES — ROSTER

(Cumulative, information as of November 3, 1955)

The purpose of this Roster is to report organizations (all that are known to us) offering automatic computing services and having at least one automatic computer, either analog or digital. Each Roster entry contains: name of the organization, its address / analog or digital computation provided / notes on equipment / any restrictions as to clients.

We shall be grateful for any additions or corrections that any reader is able to send us.

Some of the abbreviations are as follows:

A	analog
anal	analyzer
CPC	IBM card programmed calculator
D	digital
diff	differential
govtO	available to government agencies contractors only
unres	unrestricted

ROSTER

Alpha Computing, Inc., 436 S. Sepulveda Blvd., Los Angeles 49, Calif. / - / "medium and large computers" / unres

Armour Research Foundation of Illinois Inst. of Tech., 10 West 35 St., Chicago 16, Ill. / A, D / Goodyear Electronic Differential Analyzers, Two Channel Electronic Function Generator, CPC / unres

Askania Regulator Co., 240 East Ontario St., Chicago 11, Ill. / A / Philbrick / unres

Battelle Memorial Inst., 505 King Ave., Columbus 1, Ohio / A, D / diff anal, CPC, punch card / unres

Burroughs Corporation, Electronic Instrument Div., 1209 Vine St., Philadelphia, Pa. / D / digital computer UDEC II / unres

Burroughs Corporation Research Center, Paoli, Pa. / D / Burroughs Laboratory Computer / unres

Cambridge University, University Mathematical Laboratory, Free School Lane, Cambridge, England / D / Edsac / unres

Cornell Computing Center, Rand Hall, Cornell University, Ithaca, N. Y. / D / CPC, punch card / unres

Datamatic Corp., Computing Services Section, Needham St., Newton Highlands, Mass. (formerly Raytheon) / D / automatic electronic digital computer, etc. / unres

Dian Laboratories, Inc., 611 Broadway, New York, N.Y. / A / - / unres

Electro-Data Corporation, 717 North Lake Ave., Pasadena 6, Calif. / D / Datatron, 30-201, etc. / unres

Electronic Associates, Inc., Princeton Computation Center, Princeton, N. J. / A / Electronic Associates' analog computer / unres

Engineering Research Associates, Division of Remington Rand, 555 23rd St. South, Arlington 2, Va. / D / ERA 1103 / unres

Ferranti Limited, Computer Centre, 21 Portland Pl., London W 1, England / D / Ferranti / unres

Financial Publishing Co., Mathematical Tables Div., 82 Brookline Ave., Boston 15, Mass. / D / CPC's, punch card / unres

The Franklin Inst. Laboratories for Research and Development, 20 St. and Benj. Franklin Pkwy, Philadelphia 3, Pa. / A / A.C. network analyzer / unres

General Electric Co., Schenectady, N.Y. / A / network anal AC and DC, diff anal / unres

The George Washington University, Logistics Research Project, 707 22nd St., Washington, D.C. / D / ONR automatic relay computer / unres

Georgia Institute of Technology, Rich Data Processing Center, Atlanta, Ga. / D / ERA 1101 computer and other machines / unres

Harvard Computation Laboratory, Harvard University, Cambridge 38, Mass. / D / Harvard IBM Mark I, Harvard Mark IV / unres

International Business Machines Corp., 590 Madison Ave., New York, N.Y. / D / IBM 701, 702, 650, 604 CPC, punch card, etc. / unres

Machine Statistics Co., 27 Thames St., New York 6, N.Y. / D / IBM 604, punch card / unres

Mass. Inst. of Technology, Office of Statistical Services, Cambridge 39, Mass. / D / IBM 604, CPC, punch card / unres

Moore School of Electrical Engineering, Univ. of Pennsylvania, 200 South 33 St., Phila., 4, Pa. / A, D / MSAC, diff anal, CPC, punch card / unres

National Bureau of Standards, Applied Mathematics Laboratory, Washington, D.C. / D / Seac, Dyseac, punch card / govtO

National Bureau of Standards, Institute for Numerical Analysis, See Univ. of California at Los Angeles, Dept. of Mathematics, Numer-

AUTOMATIC COMPUTING SERVICES

- ical Analysis Research
National Cash Register Company, Electronics Division, (formerly Computer Research Corp.), 3348 West El Segundo Boulevard, Hawthorne, Calif. / D / Cadac 102A, etc. / unres
- Northrop Aircraft, Inc., Director of Computing, Hawthorne, Calif. / A, D / CPC's, Maddida, Binac, punch card, etc. / unres
- G A Philbrick Researches, Inc., 230 Congress St., Boston 10, Mass. / A / Philbrick / unres
- Pi-Squared Engineering Co., Inc., 230 Congress St., Boston 10, Mass. / A / Philbrick / unres
- Purdue Univ., Dept. of Mathematics, Lafayette, Ind. / D / CPC, punch card / unres
- Raytheon Mfg. Co., Computing Services Section / See Datamatic Corp., Computing Services Section
- J B Rea Co., Inc., 1723 Cloverfield Blvd., Santa Monica, Calif. / A, D, simulation / Electronic Associates analog computer, Beckman EASE analog computer, CPC / unres
- Reeves Instrument Co., 215 East 91 St., New York, N.Y. / A / Reac / unres
- Remington Rand, Inc., 315 4th Ave., New York, N.Y. and 2601 Wilshire Blvd., Los Angeles, Calif. / D / Univac, punch card, etc. / unres
- Rensselaer Polytechnic Institute, Computer Laboratory, Troy, N.Y. / A / Reeves Electronic Analog Computer, precision magnetic tape recorders for analog computing applications / unres
- Rome Air Development Center, Computer Facilities Section, Griffiss Air Force Base, Rome, N.Y. / A, D / Elecom 120, Bendix Digital Differential Analyzer D 12, Reeves Electronic Analog Computer, Benson-Lehner data reduction equipment, etc. / govt0
- Scientific Computing Service, Ltd., 23 Bedford Sq., London W.C. 1, England / D / - / unres
- Swedish Board for Computing Machines, Drottningatan 95A, Stockholm, Sweden / D / Bark, Besk / unres
- Telecomputing Corp., 133 East Santa Anita Ave., Burbank, Calif. / A, D / IBM punch card, CPC's automatic graph readers, digital plotters / unres
- U S Air Force, Computation Research Section, Wright Air Development Center, Wright Patterson Air Force Base, Dayton, Ohio / A, D / CPC's, Reac's, punch card / govt0
- U S Army, Ballistic Research Laboratories, Aberdeen, Md. / D / Ordvac, Edvac, Eniac, Bell Model V, CPC, punch card / govt0
- U S Navy, Naval Proving Ground, Dahlgren, Va. / D / Norc, Harvard Mark II, Harvard Mark III, punch card / govt0
- University of California, Dept. of Mathematics, Numerical Analysis Research, 405 Hilgard Ave., Los Angeles 24, Calif. / (formerly National Bureau of Standards Inst. of Numerical Analysis) / D / Swac, etc. / unres
- University of Michigan, Willow Run Research Center, Ypsilanti, Mich. / D / Midac, Midsac, etc. / unres
- Univ. of Toronto, Computation Centre, Toronto, Ontario, Canada / D / Ferut (Ferranti Univ. of Toronto computer) / unres
- Univ. of Wisconsin, 306 North Hall, Madison 6, Wisc. / A, D / Philbrick, CPC, punch card / unres
- Wayne University, Computation Laboratory, Detroit 1, Mich. / A, D / diff anal, Burroughs Unitized Digital Electronic Computer, etc. / unres
- Westinghouse Electric Corp., Industry Engineering Dept. East Pittsburgh, Pa. / A, D / Anacom network anal AC and DC, punch card / unres

- END -

* _____ * _____ *

DIGITAL COMPUTERS

(continued from page 9)

It is reported that a machine is being constructed at Warsaw; but no Poles were present at Darmstadt and details were not secured.

Some brief observations on other reports at the Conference may also be in order. In Spain only a differential analyzer is being planned for the immediate future. In all other countries represented, and also in Norway, digital computers either exist or are being planned. In Germany, in particular, many machines are under development. Nevertheless, these are generally quite modest by American and British standards. The BESK, at Stockholm, remains preeminent among existing machines of West European (Continental) construction. Among machines reported on, special mention should be made of one being constructed at Göttingen, using magnetic cores and micro-programming. Of interest in another direction is the machine at Vienna said to have been built at a cost on the order of \$100. Between these two extremes is a machine being built commercially by a British firm but said to have been developed by van der Poel and others of the Dutch PTT (Rbts, telephones, and telegraphs).

The number of European countries represented at the Conference and the number of people in attendance, both suggest that rapid developments are certain to take place in the near future.

- END -

AUTOMATIC COMPUTING MACHINERY — LIST OF TYPES

(Edition 2, cumulative, information as of November 3, 1955)

The purpose of this list is to report types of machinery that may well be considered automatic computing machinery, that is, automatic machinery for handling information or data, reasonably. We shall be grateful for any comments, corrections, and proposed additions or deletions which any reader may be able to send us.

Accounting-bookkeeping machines, which take in numbers through a keyboard, and print the m on a ledger sheet, but are controlled by "program bars", which, according to the column in which the number belongs, cause the number to enter positively or negatively in any one of several totaling counters, which can be optionally printed or cleared.

Addressing machines, programmable, which take in names and addresses, either on metal plates or punch cards, and print the names and addresses on envelopes, wrappers, etc., and which may be controlled for selection and in other ways, by notches, punched holes, and other signals, on the plates or cards.

Air traffic control equipment (including ground control approach equipment), which takes in information about the location of aircraft in flight and gives out information or control signals for the guidance of the flight of the aircraft.

Analog computers, which take in numerical information in the form of measurements of physical variables, perform arithmetical operations, are controlled by a program, and give out numerical answers.

Analog-to-digital converters, which take in analog measurements and give out digital numbers.

Astronomical telescope aiming equipment, which adjusts the direction of a telescope in an observatory so that it remains pointed at the spot in the heavens which an astronomer intends to study.

Automobile traffic light controllers, that take in indications of the presence of motor cars from the operation of treadles in the pavement or in other ways, and give out signals, according to a program of response to the volume and density of traffic.

Card-to-tape converters, which will take in information on punched cards, and put out corresponding or edited information on punched paper tape or on magnetic tape.

Control systems for handling connected or flowing materials, which will take in indications of flow, temperature, pressure, volume, liquid level, etc., and give out the settings of valves, rollers, tension arms, etc., depending on the program of control.

Control systems for handling separate materials, which will move heavy blocks, long rods, or other pieces of material to or from stations and in or out of machines, while taking in indications furnished by the locations of previous pieces of materials, the availability of the machines, etc., all depending on the program of control.

Data sampling systems, which will take in a continuous voltage or other physical variables and give out samples, perhaps once a second or perhaps a thousand times a second; this machine may be combined with an analog-to-digital converter, so that the report on the sample is digital not analog.

Digital computers, which take in numerical, alphabetic, or other information in the form of characters or patterns of yes-noes, etc., perform arithmetical and logical operations, are controlled by a program, and put out information in any form.

Digital-to-analog converters, which take in digital numbers and give out analog measurements.

Facsimile copying equipment, which scans a document or picture with a phototube line by line and reproduces it by making little dots with a moving stylus or with an electric current through electrosensitive paper.

File-searching machines, which will take in an abstract in code, and search for and find the reference or references alluded to.

Fire control equipment, that takes in indications of targets from optical or radar perception and puts out directions of bearing and elevation for aiming and time of firing for guns, according to a program that calculates motion of target, motion of the firing vehicle, properties of the air, etc.

Flight simulators, which will take in simulated conditions of flight in airplanes, and the actions of airplane crew members, and show the necessary results, all for purposes of training airplane crews.

Game-playing machines, in which the machine will play a game with a human being, either a simple game such as tit-tat-toe or nim (which have been built into special machines) or a more complicated game such as checkers, chess, or billiards (which have been programmed on large automatic digital computers).

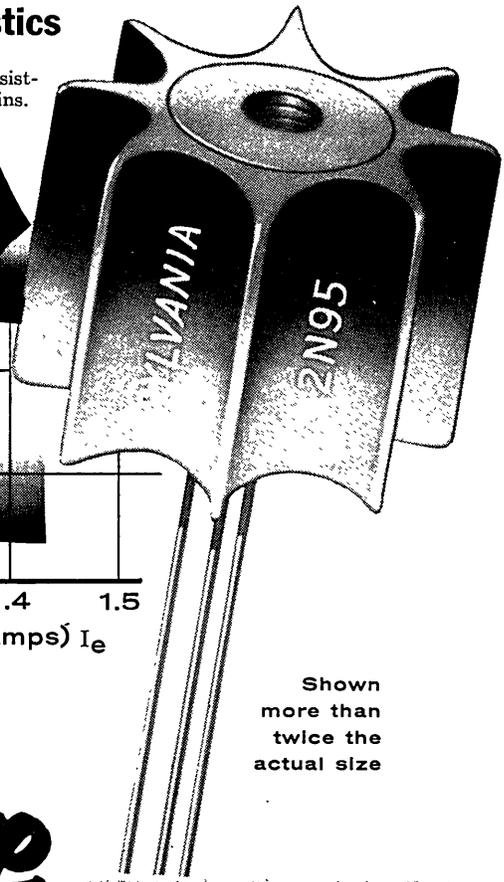
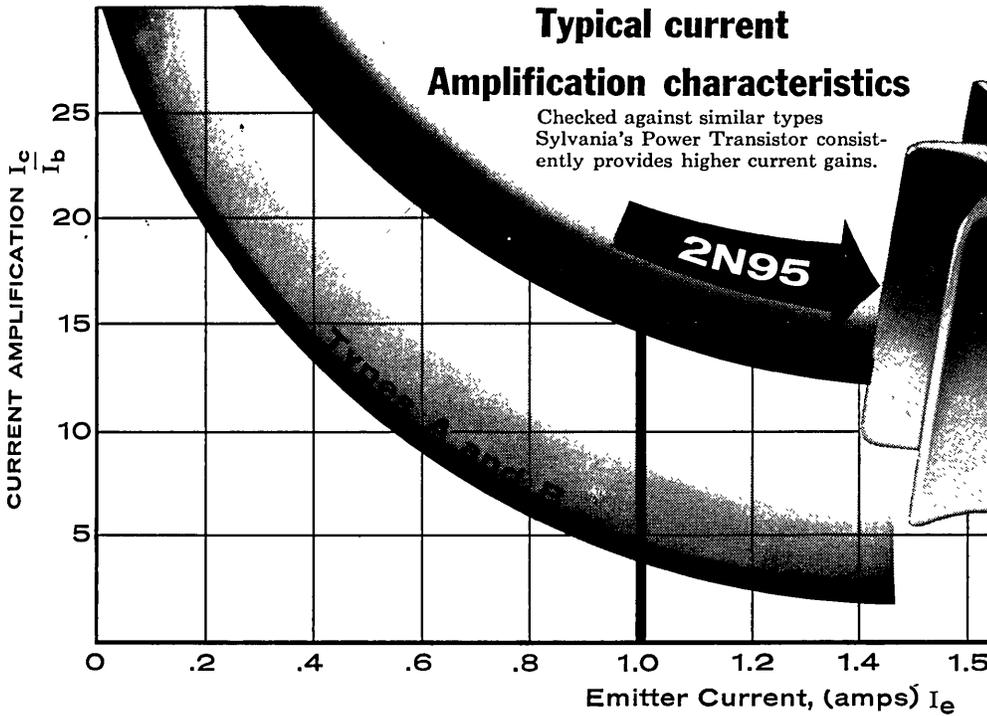
Inventory machines, which will store as many as ten thousand totals in an equal number of registers, and will add into, subtract from, clear, and report the contents of any called-for register (these machines apply to stock control, to railroad and airline reservations, etc.).

(continued on page 34)

Typical current

Amplification characteristics

Checked against similar types
Sylvania's Power Transistor consistently provides higher current gains.



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more than
twice the
actual size

Sylvania NPN Power Transistor 2N95 Exhibits

$3\frac{1}{2}$ times more gain

Operated at 1.0 amp emitter-current, the Sylvania 2N95 Transistor typically provides a current gain of 17... $3\frac{1}{2}$ times that of comparable types A and B. Even at 1.5 amp emitter current the 2N95 typically exhibits a high gain of 13... in fact, as the curve shows, the Sylvania 2N95 provides the highest gain over the widest range of operating current conditions.

In addition, Sylvania's 2N95 com-

bines all the important features you want in a power transistor, whatever your application. If, for example, yours is a switching application, the 2N95 offers high gain at high currents.

Designed for low thermal resistance, the Sylvania 2N95 Transistor provides dissipation up to $2\frac{1}{2}$ watts without an external heat sink and up to 4 or more watts with a suitable heat sink. This insures stable operation in high ambient temperatures.

You compare

Check the Sylvania 2N95 against similar Transistor types yourself—for current gain as well as all of these important power Transistor features.

Does the Sylvania 2N95 offer—	answer
1. lower cost	yes ✓
2. low input impedance	yes ✓
3. low thermal resistance	yes ✓
4. high current switching	yes ✓
5. high current gain	yes ✓
6. mounting for air cool or heat sink	yes ✓
7. hermetic seal	yes ✓

A smaller version for heat sink mounting, the Sylvania 2N102 is also available with the above features.

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Types 2N95 and 2N68 |
| <input type="checkbox"/> High frequency
Types 2N94 and 2N94A | <input type="checkbox"/> Types 2N101 and 2N102 |

Dept. H20R
Sylvania Electric, 1740 Broadway, New York 19, N.Y.

Name _____

Company _____

Address _____

AUTOMATIC COMPUTING MACHINERY

(continued from page 32)

Machine tool control equipment, which takes in a program of instructions equivalent to a blueprint, or a small size model, or the pattern of operations of an expert machinist, and controls a machine tool so that a piece of material is shaped exactly in accordance with the program.

Navigating and piloting systems, which will take in star positions, time, radio beam signals, motion of the air, etc., and deliver steering directions.

Network analyzers, which take in analog information about the resistances, inductances, and capacitances of an electric powerplant's network of electrical lines and loads, and enable the behavior of the system to be calculated, and the system to be appropriately designed and rendered safe and economical.

Printing devices of high speed, which will take in punched cards or magnetic tape and put out printed information at rates from 600 to 2000 characters per second.

Punch card machines, which will sort, classify, list, total, copy, print, and do many other kinds of office work.

Railway signaling equipment, which for example enables a large railroad terminal to schedule trains in and out every 20 seconds during rush hours with no accidents and almost no delays.

Reading and recognizing machines, which scan a printed digit or letter, observe a pattern of spots, route the pattern through classifying circuits, recognize the digit or letter, and activate output devices accordingly.

Sale recorders, also called point-of-sale recorders, which take in the amount, the type, and other information about sales of goods, and produce records in machine language, which can later be automatically analyzed and summarized by control punch card or computing equipment.

Spectroscopic analyzers, which will vaporize a small sample of material, analyze its spectrum, and report the presence and the relative quantities of chemical elements and compounds in it.

Strategy machines, which enable military officers in training to play war games and test strategies, in which electronic devices automatically apply attrition rates to the fighting forces being used in the game, growth rates to the industrial potential of the two sides, etc.

Tape-to-card converters, which will take in information on punched paper tape or on magnetic tape, and put out corresponding or edited information on punched cards.

Telemetering transmitting and receiving devices, which enable a weather balloon or a guided missile to transmit information detected by instruments within it as it moves; the information is recorded usually on magnetic tape in such fashion that it can later be used for computing purposes.

Telephone equipment including switching, which enables a subscriber to dial another subscriber and get connected automatically.

Telephone message accounting systems, which record local and long distance telephone calls, assign them to the proper subscriber's account, and compute and print the telephone bills.

Test-scoring machines, which will take in a test paper completed with a pencil making electrically conductive marks, and will give out the score.

Toll recording equipment, which will record, check, and summarize tolls for bridges, highways and turnpikes.

Training simulators, which will take in simulated conditions affecting the training of one or more persons in a job, and their responses under these simulated conditions, and show the results, all for the purpose of teaching them; SEE also flight simulators.

Typing machines, programmable, which will store paragraphs and other information, and combine them according to instructions into correspondence, form letters, orders, etc., stopping and waiting for manual "fill-ins" if so instructed.

Vending machines, which will take in various coins and designations of choices, and then give out appropriate change, coffee, soft drinks, sandwiches, candy, stockings, and a host of other articles, or else allow somebody to play a game for a certain number of plays, etc.

- END -

SPECIAL ISSUES OF "COMPUTERS AND AUTOMATION"

The issue of "Computers and Automation" in June, 1955, was a special issue: "The Computer Directory, 1955", 164 pages, containing: Part 1, Who's Who in the Computer Field; Part 2, Roster of Organizations in the Computer Field; and Part 3, The Computer Field: Products and Services for Sale. It is expected that the next Computer Directory issue will be June, 1956.

The next special issue will be January, 1956. It will be mainly devoted to useful information for people who have newly entered the computer field: an introduction to computers (and to "Computers and Automation"), and reprints and revisions of some of the more introductory articles and papers that "Computers and Automation" has published.

ROSTER OF ORGANIZATIONS

(continued from page 28)

Se(1950) DAc Ra

Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4,
Mich. / Webster 3-8010 / *C

Conveyor engineering and manufacturing. Ser-
vomechanisms, automatic control machinery,
automatic materials handling machinery. Ls
(600) Le(1919) SCMc RMSa

Weems Sstem of Navigation, 227 Prince George St.,
Annapolis, Md.

Automatic navigation systems. Me Ic RCPM
Sa

Westinghouse Electric Corp., Analytical Depart-
ment, East Pittsburgh, Pa./Express 1-2800/ *C

Electronic and passive element analog comput-
ers; analog-to-digital conversion equipment;
automatic control devices. DC and AC calcula-
ting boards (network analyzers); ANA COM
computer. Installing IBM Type 704 EDPM. Dy-
namic analyses of physical systems, including
transient phenomena in mechanical and electri-
cal systems; servomechanisms, and regulat-
ing systems; nuclear reactor calculations;
field mapping; operations research. Comput-
ing service; digital and analog. Ls (corpor-
ation, 100000; dept., 50) Se(dept., 1952)
DASc RMSCPa

Wharf Engineering Labs., Fenny Compton, Warwick-
shire, England / Fenny Compton 30 / *C

Magnetic drums, recording heads, transform-
ers. Ss(15) Se(1949) Ic RMSa

Wiancko Engineering Co., 255 No. Halstead Avenue,
Pasadena, Calif.

Digital ballistics analyzer computer, comput-
er components, etc. ?s ?e DAic RMSa

Zator Co., 79 Milk St., Boston 9, Mass. / Liberty
2-4624 / *C

Digital equipment and systems for coding, fil-
ing, and finding information (Zato coding sys-
tems). High-speed selectors for notched
cards. Methods for use of digital computing
machines to recover information. Ss Se(947)
Ic RCSa

Zeuthen & Aagaard Ltd., 6 Esplanaden, Copenhagen,
Denmark / Central 3795 / *C

Portable adding machine (Contex); dictating
machine (Rex-Recorder) with magnetic record-
ing on plastic disc using impregnated part-
icles and permitting more than 10,000 reuses;
duplicating machines, etc. Ls Le Ic RMSa

Konrad Zuse, Kreis Hünfeld No. 69, Neukirche n,
Germany

Electronic digital computers. Has made Zuse
Model IV and V computers. Ss(90) Se(1949)
Dc RMSa

- END -

COMPONENTS

(continued from page 29)

Microphones, telephones, loud speakers,
alarms, etc.

Article delivery mechanisms as in vend-
ing machines

Positioning devices, that may operate
a valve, roller, tension arm, etc.,
resulting in control of a manufacturing
operation or process, the aiming of a
gun, etc.

- END -

2 ENGINEERS

ME or EE

DIGITAL COMPUTER DEVELOPMENT

Excellent opportunity to join an ex-
panding, stable company, with an
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gineer able to assume responsibility
for the development of complete
systems for fire control and guid-
ance, or major portions of such sys-
tems. Work will include research and
development in the field of complex
analog or digital computers.

A degree in electrical or mechanical
engineering is required or the equi-
valent in experience.

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imagination and friendly professional
give-and-take with top men in the
field of electro-mechanical precision
equipment.

You will perform studies related to
airborne weapons control and guid-
ance systems with the object of de-
termining requirements, feasibility,
performance and specifications of
computers and overall systems.

A degree in physics, ME or EE — or
the equivalent in experience — is
required. Must be able to handle
problems in such diversified fields
as digital computers, digital data
transmission systems, logic counting
and conversion circuits, high-prec-
ision gyro and gimbal structures,
dynamic behavior of missiles, align-
ment of inertial platforms for guid-
ance systems and fight evaluation of
guidance systems and instrumenta-
tion. Send resume in confidence to

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I N D E X

This index covers information published in the twelve issues of COMPUTERS AND AUTOMATION, vol. 3, no. 10, Dec. 1954, to vol. 4, no. 11, Nov. 1955. In order not to delay the current issue, Dec. 1955, it has not been included in the index. The last part of each entry in the index gives: volume / number (month of issue), page number.

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M A N U S C R I P T S

We are interested in articles, papers, reference information, science fiction, and discussion relating to computers and automation. To be considered for any particular issue, the manuscript should be in our hands by the fifth of the preceding month.

Articles. We desire to publish articles that are factual, useful, understandable, and interesting to many kinds of people engaged in one part or another of the field of computers and automation. In this audience are many people who have expert knowledge of some part of the field, but who are laymen in other parts of it. Consequently a writer should seek to explain his subject, and show its context and significance. He should define unfamiliar terms, or use them in a way that makes their meaning unmistakable. He should identify unfamiliar persons with a few words. He should use examples, details, comparisons, analogies, etc., whenever they may help readers to understand a difficult point. He should give data supporting his argument and evidence for his assertions. We look particularly for articles that explore ideas in the field of computers and automation, and their applications and impli-

cations. An article may certainly be controversial if the subject is discussed reasonably. Ordinarily, the length should be 1000 to 4000 words. A suggestion for an article should be submitted to us before too much work is done.

Technical Papers. Many of the foregoing requirements for articles do not necessarily apply to technical papers. Undefined technical terms, unfamiliar assumptions, mathematics, circuit diagrams, etc., may be entirely appropriate. Topics interesting probably to only a few people are acceptable.

Reference Information. We desire to print or reprint reference information: lists, rosters, abstracts, bibliographies, etc., of use to computer people. We are interested in making arrangements for systematic publication from time to time of such information, with other people besides our own staff. Anyone who would like to take the responsibility for a type of reference information should write us.

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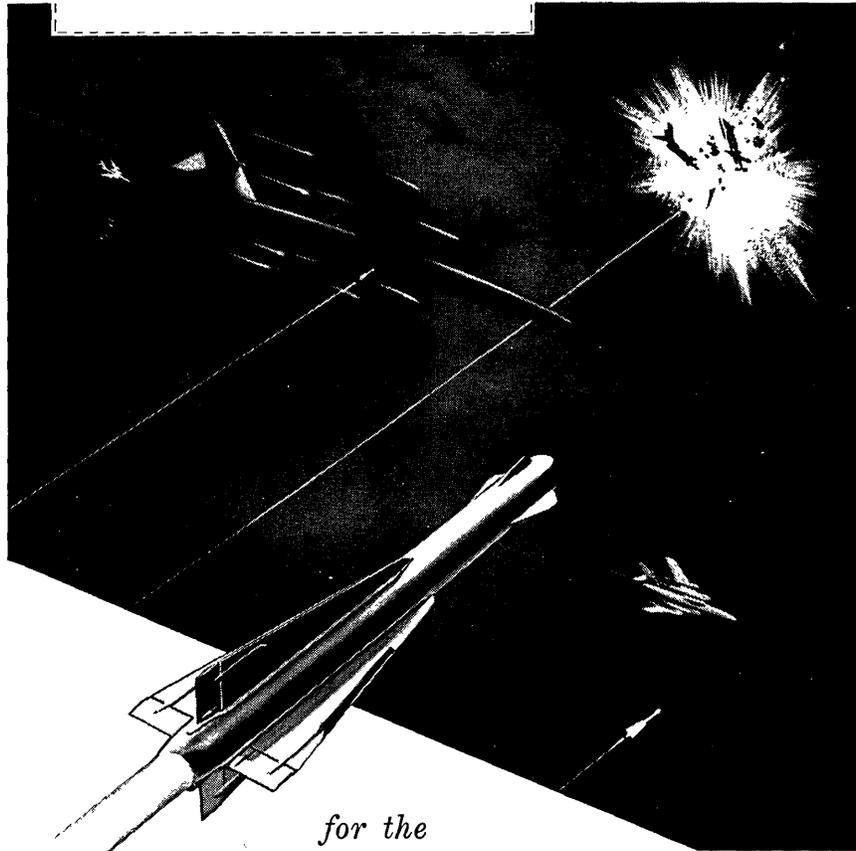
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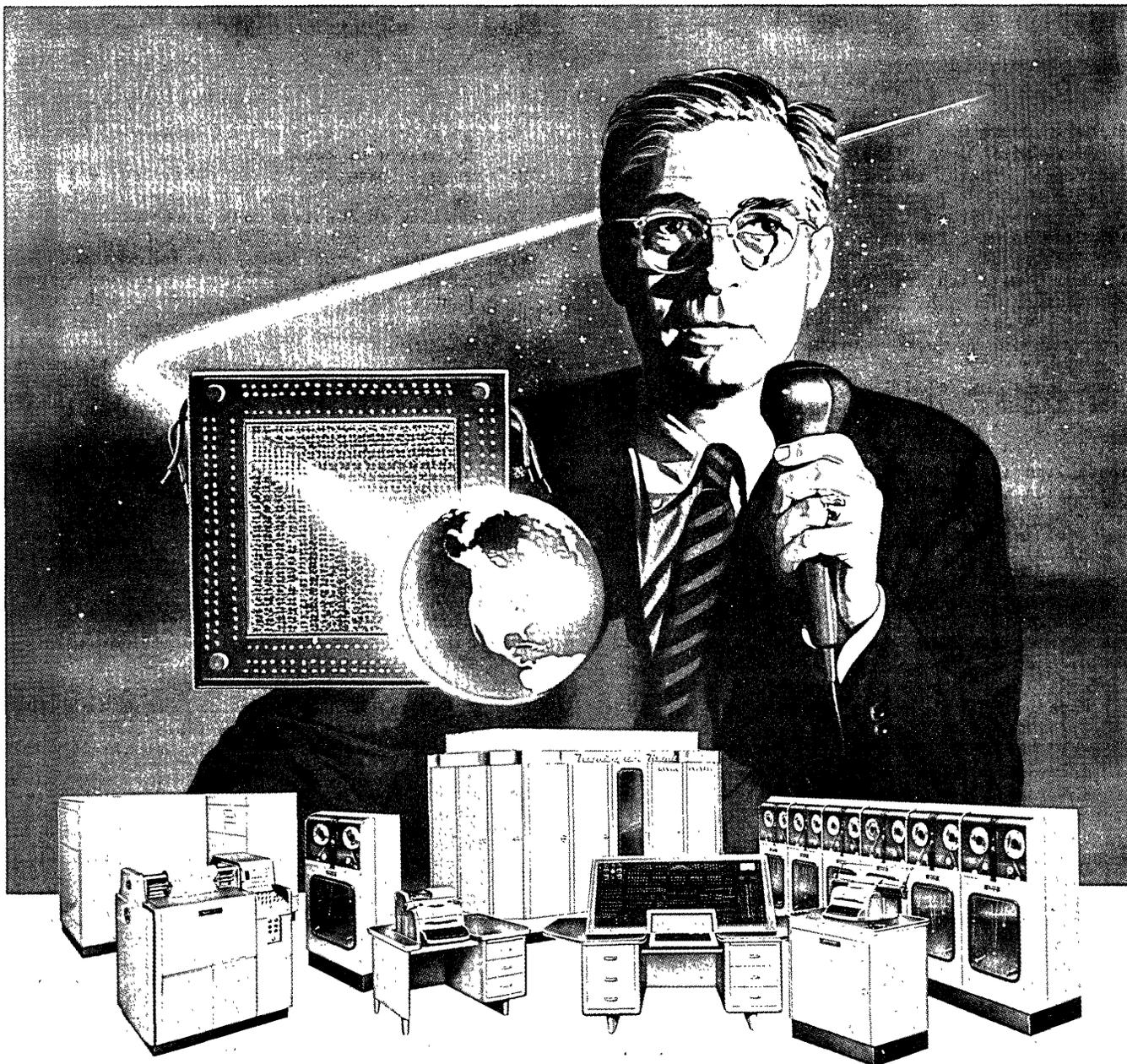
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- "A Small High-Speed Magnetic Drum" by M. K. Taylor, 4/1 (Jan.), 18
- "Some Curiosities of Binary Arithmetic Useful in Testing Binary Computers" by Andrew D. Booth, 4/8 (Aug.), 33
- Spenser, Gordon, "Random Numbers and Their Generation", 4/3 (March), 10
- Spenser, Gordon, "Statistics and Automatic Computers", 4/1 (Jan.), 6
- Spoken sounds, recognition by a computer, 4/2 (Feb.), 9
- "Statistics and Automatic Computers" by Gordon Spenser, 4/1 (Jan.), 6
- Stoller, Milton, "Eastern Joint Computer Conference, Philadelphia, Dec. 1954", 4/1 (Jan.), 14
- Students of computers, problems for, 4/2 (Feb.), 6
- Symposium—SEE Conference

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NEW PATENTS

Raymond R. Skolnick, Reg. Patent Agent
Ford Instrument Co., Div. of Sperry Rand Corp.,
Long Island City, N.Y.

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.

July 5, 1955: 2,712,269 / Robert F. Garbarini, Woodside, Lisle L. Wheeler, Garden City, and John R. Ericson, Westbury, N.Y. / The Sperry Corp. / Computing apparatus for a dive-bomb-sight.

2,712,415 / Raymond G. Piety, Bartlesville, Okla. / Phillips Petroleum Co. / Optical computer for multiplying algebraically two functions.

July 12, 1955: 2,713,135 / F. Sutherland Macklem, Freeport, N.Y. / Servo Corp. of America, New Hyde Park, N.Y. / An interpolation servo-mechanism.

2,713,143 / Charles Dickens Bock, New York, N.Y. / American Bosch Arma Corp. / An electro-mechanical resolver.

July 19, 1955: 2,713,456 / Eugene E. Reynolds, Richmond, Calif. / Marchant Calculators, Inc. / A machine for translating binary values to decimal values.

2,713,457 / Frank W. Bubb, Webster Groves, Mo. / Phillips Petroleum Co. / A computing system.

2,713,674 / William F. Schmitt, Philadelphia, Pa. / Remington Rand, Inc., Philadelphia, Pa. / A flip-flop circuit using a single core.

2,713,675 / William F. Schmitt, Philadelphia, Pa. / Remington Rand, Inc., Philadelphia, Pa. / A single core binary counter.

2,713,680 / Erik Ackewrlind, Redondo Beach, Calif. / Northrop Aircraft, Inc., Hawthorne, Calif. / A device for connecting rotational motion of an object to significant electrical potentials.

July 26, 1955: 2,714,180 / John C. Manley, Barrington, R.I. / Reconstruction Finance Corp., Boston, Mass. / An electronic impulse counting device.

2,714,202 / James R. Downing, Chicago, Ill. / Cook Electric Co., Chicago, Ill. / A recording system utilizing a single control signal capable of controlling two characteristics of the signal.

2,714,204 / Bernard Lippel and Joseph A. Buegler, Red Bank, N.J. / United States of

America / Apparatus for parallel translation of digital code group signals from cyclic binary to standard binary code.

August 2, 1955: 2,714,658 / Alexander Greenfield, Detroit, Mich. / Bendix Aviation Corp., Detroit, Mich. / A pulse source for providing a plurality of pulses in a given sequence.

2,714,693 / Christiann J. Van Eyk, Byram, Conn. / - / Electric servo control circuit.

2,714,701 / Edward Joseph Henley, Chicago, Ill. / American Telephone and Telegraph Co. / Voltage regulation circuit.

2,714,704 / Wendell C. Morrison, Princeton, N. J. / Radio Corp. of America / Quantizing modulation circuit arrangement.

2,714,705 / Philip Eckert Volz, Florham Park, N. J. / Radio Corp. of America / Electronic phase shifting system.

2,714,708 / Glenn N. Howatt and Abraham I. Dranetz, Metuchen, N. J. / Gulton Mfg. Corp., Metuchen, N. J. / Delay lines.

August 9, 1955: 2,714,901 / Louis Casper, Richmond Hill, N. Y. / Electrotex Corp., New York, N. Y. / Electrical control system and apparatus.

2,714,947 / Roman J. Dolude, Los Angeles, Calif. / Summers Gyroscope Co., Santa Monica, Calif. / Servo mechanism (mechanical).

2,715,182 / Amasa S. Bishop, Cambridge, Mass. / United States of America / Variable rate sweep voltage generator.

2,715,188 / Donald F. Jameson, Rochester, N.Y. / Stromberg-Carlson Co. / Pulse generator.

* MANUSCRIPTS *

(continued from page 37)
netics, automation, etc., and their implications, and which at the same time is a good story. Ordinarily, the length should be 1000 to 4000 words.

Discussion. We desire to print in "Forum" brief discussions, arguments, announcements, news, letters, descriptions of remarkable new developments, etc., anything likely to be of interest to computer people.

Payments. In many cases, we make small token payments for articles, papers, and fiction, if the author wishes to be paid. The rate is ½c or 1c a word, the maximum is \$20 or \$40, and both depend on length in words, whether printed before, whether article or paper, etc.

- END -

MAGAZINES RELATED TO COMPUTERS AUTOMATION — ROSTER

(Edition 2, Cumulative, information as of November 3, 1955)

The purpose of this Roster is to report magazines having some relation to the field of computers and automation: computing machinery, computing systems, data-handling equipment, automatic control, automatic materials handling, etc.

Each Roster entry when complete contains: name of the magazine / frequency / publisher and address / emphasis / audience and availability / circulation / advertising / some notes and comments. We shall be grateful for any additions or corrections that any reader is able to send us. Although we have tried to make this Roster complete and accurate, we assume no liability for any statements expressed or implied.

For more information about any of these magazines, inquiry should be addressed to the publisher of the magazine.

American Business / monthly / Dartnell Publications, 4660 Ravenswood Ave., Chicago 40, Illinois / emphasis: management, office administration, office methods, finance / annual subscription rate, \$4.00 / - / contains advertising.

Occasional articles on computers.

Automatic Control / monthly / Reinhold Publishing Co., 430 Park Ave., New York 22, N. Y. / emphasis: aid management in making more and better use of automatic control in every possible way / free to management men in the control field; \$10.00 annual subscription to others / about 30,000, controlled / contains advertising.

Articles on computers in each issue.

Usually one or more.

Automation / monthly / Penton Publishing Company, Penton Bldg., Cleveland 13, Ohio / emphasis: management, supervision, and engineering phases of automation in their broadest sense / free to selected prospective buyers or specifiers of components, machines, or equipment involved in automatic operations; \$10.00 annual subscription to others / about 25,000, controlled / contains advertising.

Ordinarily an article on computers in each issue.

Computers and Automation / monthly / Berkeley Enterprises, Inc., 36 West 11 St., New York 11, N. Y. / emphasis: articles, papers, reference information and some science fiction on computers and their implications and applications, including automation / directed to persons interested in automatic computers and their implications and applications; paid-for; annual subscription rate \$5.50 / about 2000 / contains advertising.

Devoted to computers and their implications and applications.

Control Engineering / monthly / McGraw Hill Publishing Co., 330 West 42 St., New York 36, N.Y.

/ emphasis: use of a small amount of power to control a large amount; instrumentation; automatic control systems / directed to design and process engineers and technically trained management men; annual subscription rate \$3.00 / about 28,000 / contains advertising.

Several articles on computers in each issue.

Data Processing Digest / monthly / Canning, Sisson and Associates, 914 South Robertson Blvd., Los Angeles 35, Calif. / emphasis: digests of computer articles; information, applications, equipment, etc. / directed to management; paid-for/ annual subscription \$24.00 / no advertising.

A collection of abstracts or excerpts from articles originally appearing in a wide variety of publications. Material is selected from these publications for condensation when it is "meaningful in the field of data processing".

Digital Computer Newsletter / quarterly / Office of Naval Research, U. S. Navy Dept., Washington 25, D.C. / emphasis: news of digital computers and data-processing / available free to government agencies and government contractors only; reprinted in the "Journal of the Association for Computing Machinery", which see / est. 1000 / no advertising.

Electronic Design / monthly / Hayden Publishing Co., 127 East 55 St., New York 22, N. Y. / emphasis: electronic design / circulation only to electronic design engineers / 24,000; controlled / contains advertising.

Its relation to computers is the design of electronic gear that may be used in them. Vol. 3, No. 10, October, 1955, included articles on components and building blocks needed for analog and digital computers, and ideas for computer designs.

Electronics / monthly / McGraw-Hill Publishing Co., 330 West 42 St., New York 36, N.Y. / emphasis: electronic equipment, its design, specifications, uses, production techniques / circulation only to persons engaged in theory, research, design production, maintenance and use of electronic and industrial control equipment; \$6.00 annual subscription / - / contains advertising.

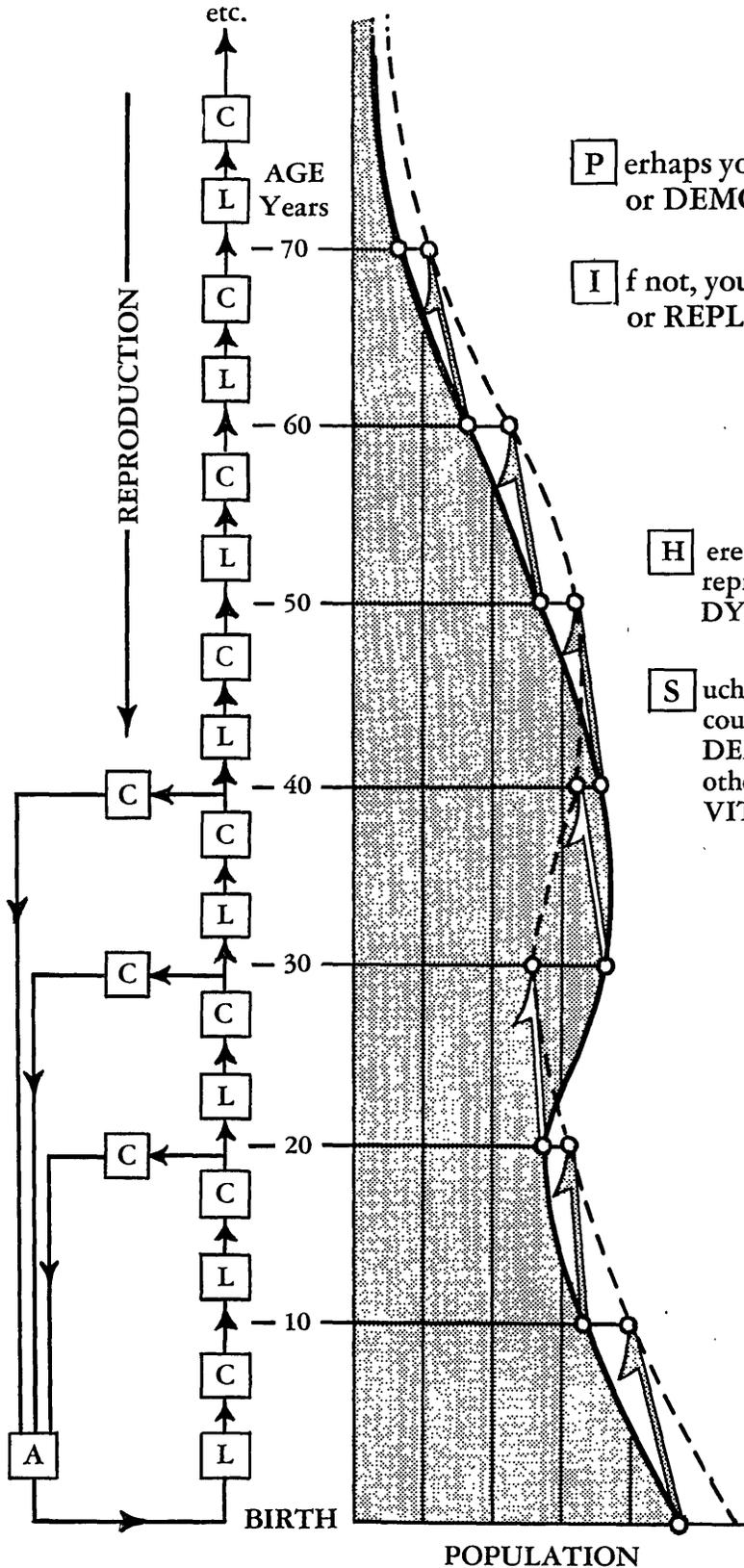
Its relation to computers is the design of electronic equipment that may be used in them.

Industrial Laboratories / Industrial Laboratories Publishing Co., 201 North Wells St., Chicago 6, Ill. / monthly / emphasis: reporting significant developments to scientists and engineers interested in technological progress / free to persons holding responsible positions in industrial research; to others, annual subscription \$10.00 / contains advertising.

Occasional articles deal with computing machinery and its uses. Computing mach-

(continued on page 46)

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MAGAZINES

(continued from page 44)

ines and components are mentioned in the New Products section.

Instruments and Automation / monthly / Instruments Publishing Co., 845 Ridge Ave., Pittsburgh 1, Pa. / emphasis: instruments, instrumentation, and automatic control / directed to management and engineers primarily responsible for the specification, purchase, and installation of instruments and automatic controls; paid-for; annual subscription rate \$4.00 / about 18,000 / contains advertising.

Occasional articles on computers.

IRE Transactions on Electronic Computers / quarterly / Professional Group on Electronic Computers, Institute of Radio Engineers, One East 79 St., New York 21, N.Y. / emphasis: the entire field of electronic computers / annual subscription for nonmembers, \$17.00 / - / no advertising.

Issue of June 1955 contains a survey of analog computer installations.

ISA Journal / monthly / Instrument Society of America, 1319 Allegheny Ave., Pittsburgh 33, Pa. / emphasis: instruments and instrumentation, and news and information for members / directed to members of the society; paid-for; annual subscription rate \$5.00 / about 8000 / contains advertising.

Occasional articles on computers.

The Journal of Computing Systems / at intervals / The Institute of Applied Logic, 3101 East 42 St., Minneapolis 6, Minn. / emphasis: a "common meeting ground" for the fields of logical and mathematical systems and computing machinery / \$5.00 annual subscription / - / no advertising.

Papers on logical and mathematical systems in the field and topics of computing machinery.

Journal of the Association for Computing Machinery, 2 East 63 St., New York 21, N. Y. / emphasis; technical papers on automatic computing machinery submitted by members / directed to members of the association; annual subscription rate \$6.00 (includes dues) / est. 1800 / no advertising.

Journal of the Society for Industrial and Applied Mathematics / quarterly / Society for Industrial and Applied Mathematics, P.O. Box 7541, Philadelphia 1, Pa. / emphasis: mathematical techniques and methods and their applications / directed to mathematicians and other technical and scientific personnel; annual subscription \$8.00 / - / contains advertising.

Has included a series of articles on automatic digital computers in industrial research.

Mathematical Tables and Other Aids to Computation / quarterly / National Research Council, Washington, D.C. / emphasis: mathematical tables, numerical analysis, some developments in computing machinery / directed to mathematicians, computer men, etc; paid-for; annual subscription rate \$5.00 / est. 1500 / no advertising.

Mechanical Translation / - / Dept. of Modern Languages and Research Laboratory of Electronics, Mass. Inst. of Technology, Cambridge, Mass. / emphasis: exclusively on the translation of languages with the aid of machines / annual subscription \$1.00 / - / no advertising.

Proceedings of the IRE / monthly / Institute of Radio Engineers, One East 79 St., New York 21,

N.Y. / emphasis: technical developments in radio, electronics, television, communication, etc. / directed to members of the IRE, radio engineers, etc.; paid-for; annual subscription rate about \$13.00 (includes dues) / about 38,000 / contains advertising.

Most technical papers on electronic aspects of computers, submitted by members, are published in the "IRE Transactions on Electronic Computers" (see above)

Scientific American / monthly / Scientific American, Inc., 2 West 45 St., New York 36, N. Y. / emphasis: ideas and developments in all phases of science, reported for educated men in other specialties / directed to technical management; paid-for; annual subscription \$5.00 / about 120,000 / contains advertising.

Occasional articles on computers and automation.

Systems / bi-monthly / Systems Magazine, Remington Rand, Inc., 315 Fourth Ave., New York 10, N.Y. / emphasis: interchange of ideas on business operation by management / free to many management men; 35¢ single copy price / - / contains Remington Rand advertising.

Many articles on computer applications, especially Univac.

- END -

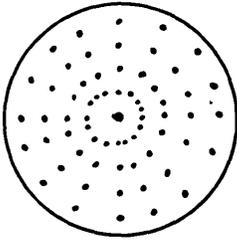
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- Taylor, M. K., "A Small High-Speed Magnetic Drum", 4/1 (Jan.), 18
- Telemetering: National Telemetering Conference, 4/1 (Jan.), 4
- "Thinking Machines and Human Personality" by Elliot L. Gruenberg, 4/4 (April), 6
- "Truer Input Functions in Electronic Analog Computers" by T. J. Keefe, Jr., 4/1 (Jan.), 27
- U: UAW-CIO, "Automation: A Report to the UAW-CIO Economic and Collective Bargaining Conference", 4/5 (May), 14
- Unions' drive for annual wage, effect of automation on, 4/5 (May), 27
- "University of Michigan Summer Session Notes on Computers and Data Processors" by John W. Carr, (in Forum), 4/11 (Nov.), 9
- University of Wisconsin Conference, August, 1955, 4/1 (Jan.), 4
- V: "Variation in Intelligence" (in The Editor's Notes), 4/10 (Oct.), 4
- W: Wallace, Richard W., "Mister Andrew Lloyd", 4/11 (Nov.), 14
- Weather prediction, 4/3 (March), 8
- Weber, F. Palmer, "The Advance of Automation" (in Forum), 4/11 (Nov.), 31
- "Western Computer Conference and Exhibit, Los Angeles; March, 1955: Titles of Papers and Abstracts", 4/4 (April), 38
- Western Joint Computer Conference, notice, 4/1 (Jan.), 4
- "Who Are Manning the New Computers?" by John M. Breen, 4/10 (Oct.), 28
- "Who's Who in the Computer Field", cumulative, 4/6 (June), 6; supplement 1, 4/6 (June), 148; supplement 2, 4/10 (Oct.), 29
- Worsley, Beatrice H., "Numerical Representation in Fixed-Point Computers". 4/5 (May), 10

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ROSTER ENTRY FORMS

"Computers and Automation" publishes from time to time reference information of the following three types: (1) a who's who or roster of individuals interested in the computer field; (2) a roster of organizations active in the computer field; and (3) a classified directory or roster of products and services offered in the computer field. The last cumulative editions of rosters (1) and (3) appeared in "The Computer Directory, 1955". The last cumulative roster (2) appears in this issue. If you are interested in sending information to us for these rosters and their supplements, following is the form of entry for each of these three rosters. To avoid tearing the magazine, the form may be copied on any sheet of paper.

(1) Who's Who Entry Form

1. Name (please print) _____
2. Your Address? _____
3. Your Organization? _____
4. Its Address? _____
5. Your Title? _____
6. YOUR MAIN COMPUTER INTERESTS?

<input type="checkbox"/> Applications	<input type="checkbox"/> Mathematics
<input type="checkbox"/> Business	<input type="checkbox"/> Programming
<input type="checkbox"/> Construction	<input type="checkbox"/> Sales
<input type="checkbox"/> Design	<input type="checkbox"/> Other (specify): _____
<input type="checkbox"/> Electronics	_____
<input type="checkbox"/> Logic	_____
7. Year of birth? _____
8. College or last school? _____
9. Year entered the computer field? _____
10. Occupation? _____
11. Anything else? (publications, distinctions, etc.) _____

(2) Organization Entry Form

1. Your organization's name? _____
2. Address? _____
3. Telephone number? _____
4. Types of computing machinery or components, or computer-field products and services that you are interested in?

5. Types of activity that you engage in:
 research other (please explain):
 manufacturing
 selling _____
 consulting _____
6. Approximate number of your employees? _____
7. Year when you were established? _____
8. Any comments? _____

Filled in by _____

Title _____ Date _____

* _____ *

(3) Product Entry Form

1. Name or identification of product (or service)? _____
2. Brief description (20 to 40 words)? _____

3. How is it used? _____

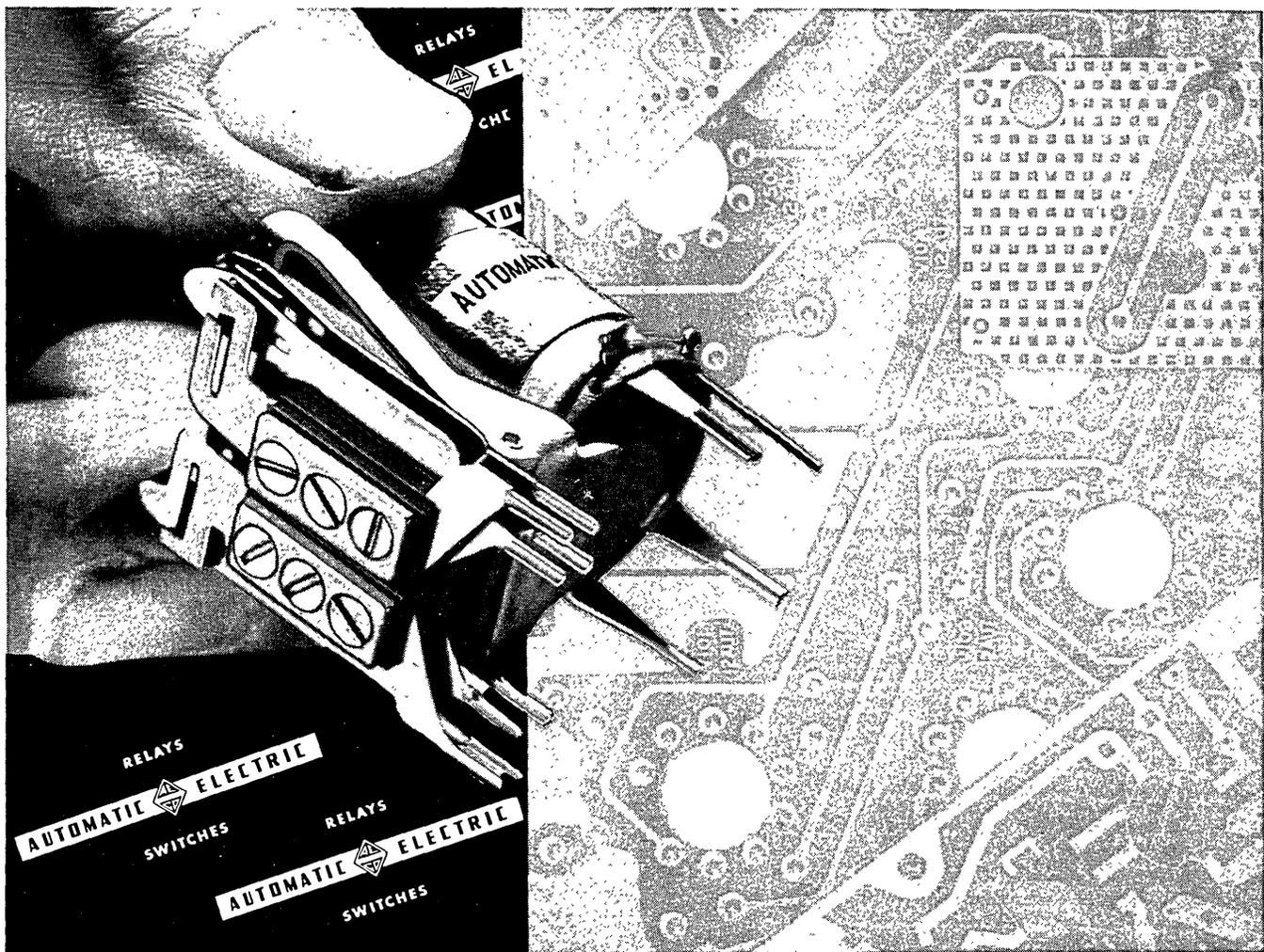
4. What is the price range? _____
5. Under what headings should it be listed?

6. Your organization's name? _____

7. Address? _____

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Economies in Design of Incomplete Selection Circuits with Diode Elements -- Arnold I. Dumey

January, 1955: Statistics and Automatic Computers -- Gordon Spenser

Eastern Joint Computer Conference, Philadelphia, Dec. 8-10, 1954 -- Milton Stoller

The Digital Differential Analyzer -- George F. Forbes

A Small High-Speed Magnetic Drum -- M. K. Taylor

An Inside-Out Magnetic Drum -- Neil Macdonald

February: Problems for Students of Computers -- John W. Carr, III

Recognizing Spoken Sounds by Means of a Computer -- Andrew D. Booth

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The Skills of the American Labor Force -- James P. Mitchell

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The Monkey Wrench -- Gordon R. Dickson

June: THE COMPUTER DIRECTORY, 1955 (164 pages):

Part 1: Who's Who in the Computer Field

Part 2: Roster of Organizations in the Computer Field

Part 3: The Computer Field: Products and Services for Sale

July: Mathematics, the Schools, and the Oracle -- Alston S. Householder

The Application of Automatic Computing Equipment to Savings Bank Operations -- R. Hunt Brown

The Book Reviewer -- Rose Orente

Linear Programming and Computers, Part I -- Chandler Davis

August: The Automation of Bank Check Processing -- R. Hunt Brown

Linear Programming and Computers, Part II -- Chandler Davis

Justifying the Use of an Automatic Computer -- Ned Chapin

Charting on Automatic Data Processing Systems -- Harry Eisenpress, James L. McPherson, and Julius Shiskin

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Automatic Coding for Digital Computers -- G. M. Hopper

Automatic Programming: The A-2 Compiler System -- Part 1

October: The Brain and Learned Behavior -- Dr. Harry F. Harlow

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Who Are Manning the New Computers? -- John M. Breen

November: Automatic Answering of Inquiries -- L. E. Griffith

Found -- A "Lost" Moon -- Dr. Paul Herget
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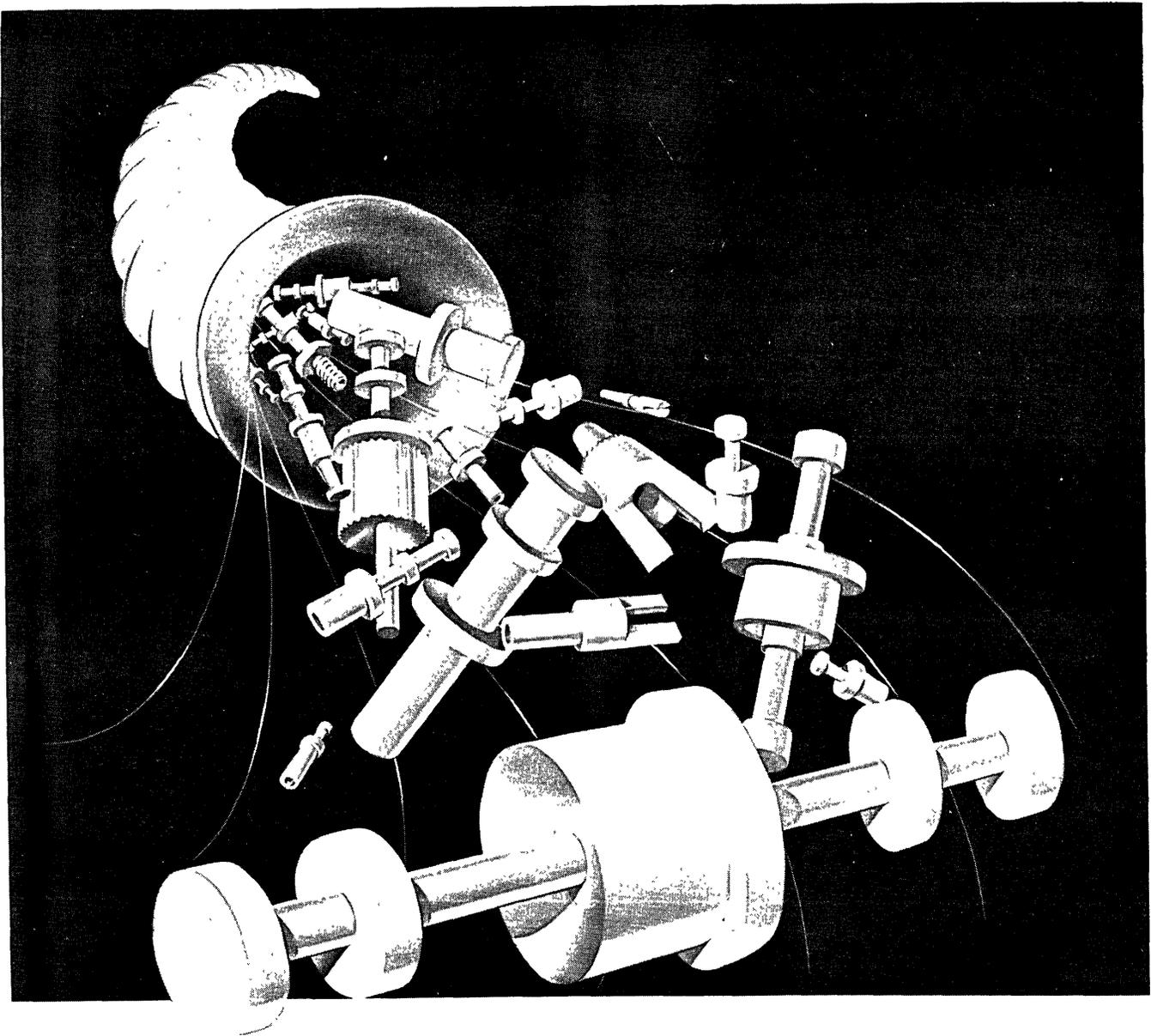
Roster of Organizations in the Computer Field / Roster of Automatic Computing Services / Roster of Magazines Related to Computers and Automation / Automatic Computers: List / Automatic Computers: Estimated Commercial Population / Automatic Computing Machinery: List of Types / Components of Automatic Computing Machinery: List of Types / Products and Services in the Computer Field / Who's Who in the Computer Field / Automation: List of Outstanding Examples / Books and Other Publications / Glossary / Patents

BACK COPIES: Price, if available, \$1.25 each, except June, 1955, \$6.00. Vol. 1, no. 1, Sept. 1951, to vol. 1, no. 3, July, 1952: out of print. Vol. 1, no. 4, Oct. 1952: in print. Vol. 2, no. 1, Jan. 1953, to vol. 2, no. 9, Dec. 1953: in print except March, no. 2, and May, no. 4. Vol. 3, no. 1, Jan. 1954, to vol. 3, no. 10, Dec. 1954: in print. Vol. 4, 1955: in print.

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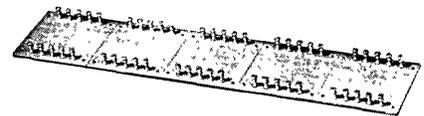
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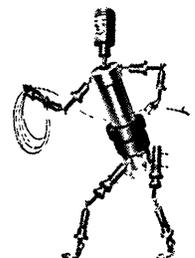
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Publisher of COMPUTERS AND AUTOMATION
36 West 11 St., New York 11, N.Y.

1. What is "COMPUTERS AND AUTOMATION"? It is a monthly magazine containing articles, papers, and reference information related to computing machinery, robots, automatic control, cybernetics, automation, etc. One important piece of reference information published is the "Roster of Organizations in the Field of Computers and Automation". The basic subscription rate is \$5.50 a year in the United States. Single copies are \$1.25, except June, 1955, "The Computer Directory" (164 pages, \$6.00). For the titles of articles and papers in recent issues of the magazine, see the "Back Copies" page in this issue.

2. What is the circulation? The circulation includes 1900 subscribers (as of Nov. 10): over 300 purchasers of individual back copies; and an estimated 2500 nonsubscribing readers. The logical readers of COMPUTERS AND AUTOMATION are people concerned with the field of computers and automation. These include a great number of people who will make recommendations to their organizations about purchasing computing machinery, similar machinery, and components, and whose decisions may involve very substantial figures. The print order for the Dec. issue was 2400 copies. The overrun is largely held for eventual sale as back copies, and in the case of several issues the overrun has been exhausted through such sale.

3. What type of advertising does COMPUTERS AND AUTOMATION take? The purpose of the magazine is to be factual and to the point. For this purpose the kind of advertising wanted is the kind that answers questions factually. We recommend for the audience that we reach, that advertising be factual, useful, interesting, understandable, and new from issue to issue. We reserve the right not to accept advertising that does not meet our standards.

4. What are the specifications and cost of advertising? COMPUTERS AND AUTOMATION is published on pages 8½" x 11" (ad size, 7" x 10") and produced by photooffset, except that printed sheet advertising may be inserted and bound in with the magazine in most cases. The closing date for any issue is approximately the 10th of the month preceding. If possible, the company advertising should produce final copy. For photooffset, the copy should be exactly as desired, actual size, and assembled, and may include typing, writing, line drawing, printing, screened half tones, and any other

copy that may be put under the photooffset camera without further preparation. Unscreened photographic prints and any other copy requiring additional preparation for photooffset should be furnished separately; it will be prepared, finished, and charged to the advertiser at small additional costs. In the case of printed inserts, a sufficient quantity for the issue should be shipped to our printer, address on request.

Display advertising is sold in units of a full page (ad size 7" x 10", basic rate, \$190), two-thirds page (basic rate, \$145), and half page (basic rate, \$97); back cover, \$370; inside front or back cover, \$230. Extra for color red (full pages only and only in certain positions), 35%. Two-page printed insert (one sheet), \$320; four-page printed insert (two sheets), \$590. Classified advertising is sold by the word (60 cents a word) with a minimum of 20 words.

5. Who are our advertisers? Our advertisers in recent issues have included the following companies, among others:

The Austin Co.
Automatic Electric Co.
Cambridge Thermionic Corp.
Federal Telephone and Radio Co.
Ferranti Electric Co.
Ferroxcube Corp. of America
General Electric Co.
Hughes Research and Development Lab.
International Business Machines Corp.
Lockheed Aircraft Corp.
Logistics Research, Inc.
Monrobot Corp.
Norden-Ketay Corp.
George A. Philbrick Researches, Inc.
Potter Instrument Co.
Raytheon Mfg. Co.
Reeves Instrument Co.
Remington Rand, Inc.
Sprague Electric Co.
Sylvania Electric Products, Inc.

MISSILE SYSTEMS MATHEMATICS

The technology of guided missiles is literally a new domain. No field of science offers greater scope for creative achievement.

The increasingly complex problems associated with missile systems research and development are creating new positions in the following areas for Mathematicians possessing exceptional ability:

- Guided Missile Systems
- Nuclear Physics
- Computer Research and Development
- Engineering Management Problems

Inquiries are invited from those interested in personal development in an appropriate scientific environment.

**AMERICAN
MATHEMATICAL
SOCIETY
MEETING**

Houston, Dec. 27-30

Senior members of our technical staff will be available for consultation at the meeting. If you plan to attend, please contact our research and engineering staff for interview.

Lockheed

MISSILE SYSTEMS DIVISION

research and engineering staff

LOCKHEED AIRCRAFT CORPORATION

VAN NUYS, CALIFORNIA

ADVERTISING INDEX

The purpose of COMPUTERS AND AUTOMATION is to be factual, useful, and understandable. For this purpose, the kind of advertising we desire to publish is the kind that answers questions, such as: What are your products? What are your services? And for each product, what is it called? What does it do? How well does it work? What are its main specifications? We reserve the right not to accept advertising that does not meet our standards.

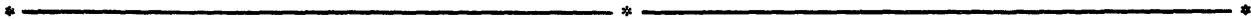
Following is the index and a summary of advertisements. Each item contains: Name and address of the advertiser / subject of the advertisement / page number where it appears / CA number in case of inquiry (see note below).

- Arma Division American Bosch Arma Corp., Roosevelt Field, Garden City, L. I., New York / Engineering Opportunities / page 35 / CA No. 50
- Automatic Electric Company, 1033 W. Van Buren St., Chicago, Ill. / Circuits / page 49 / CA No. 51
- Bendix Aviation Corp., Research Lab. Div., Detroit 1, Mich. / Analog Computer Engineers / page 7 / CA No. 52
- Berkeley Enterprises, Inc., 36 West 11 St., New York 11, N. Y. / Geniacs / page 47 / CA No. 53
- Cambridge Thermionic Corp., 447 Concord Ave., Cambridge 38, Mass. / Terminals / page 51 / CA No. 54
- Computers and Automation, 36 West 11 St., New York 11, N. Y. / Roster Entry Forms; Back Copies; Advertising / pages 48, 50, 52 / CA No. 55
- Epsco, Inc., 588 Commonwealth Ave., Boston 15, Mass. / Delay Lines / page 7 / CA No. 56

- Ferroxcube Corp., East Bridge St., Saugerties, N. Y. / Magnetic Core Materials / page 37 / CA No. 57
- General Electric Co., Electronics Div., Tube Dept., Schenectady, N. Y. / Computer Tubes / page 55 / CA No. 58
- George A. Philbrick Researches, Inc., 230 Congress St., Boston 10, Mass. / Electronic Analog Computing Components / page 45 / CA No. 59
- Hughes Aircraft Co., Culver City, Calif. / Help Wanted / page 39 / CA No. 60
- Lockheed Aircraft Corp., California Div., Burbank, Calif. / Career Opportunities / page 53 / CA No. 61
- Lockheed Missile Systems Div., 7701 Woodley Ave., Van Nuys, Calif. / Missile Systems Mathematics / page 2 / CA No. 62
- Remington Rand, Inc., 315 4th Ave., New York 10, N. Y. / Univac / page 41 / CA No. 63
- Sprague Electric Company, 377 Marshall St., North Adams, Mass. / Pulse Transformer Kit / page 56 (back cover) / CA No. 64
- Sylvania Electric Products, Inc., 1740 Broadway, New York 19, N. Y. / Power Transistor / page 33 / CA No. 65

READER'S INQUIRY

If you wish more information about any products or services mentioned in one or more of these advertisements, you may circle the appropriate CA Nos. on the Reader's Inquiry Form below and send that form to us (we pay postage; see the instructions). We shall then forward your inquiries, and you will hear from the advertisers direct. If you do not wish to tear the magazine, just drop us a line on a postcard.



READER'S INQUIRY FORM

Paste label on envelope: ↓

Enclose form in envelope: ↓

4¢ Postage Will Be Paid By ---

BERKELEY ENTERPRISES, INC.

36 West 11th Street
New York 11, N. Y.

BUSINESS REPLY LABEL

NO POSTAGE STAMP NECESSARY IF MAILED IN U.S.A.

FIRST CLASS
PERMIT NO 1680
Sec. 349, P. L. & R.
NEW YORK, N. Y.

READER'S INQUIRY FORM

Name (please print)

Your Address?

Your Organization?

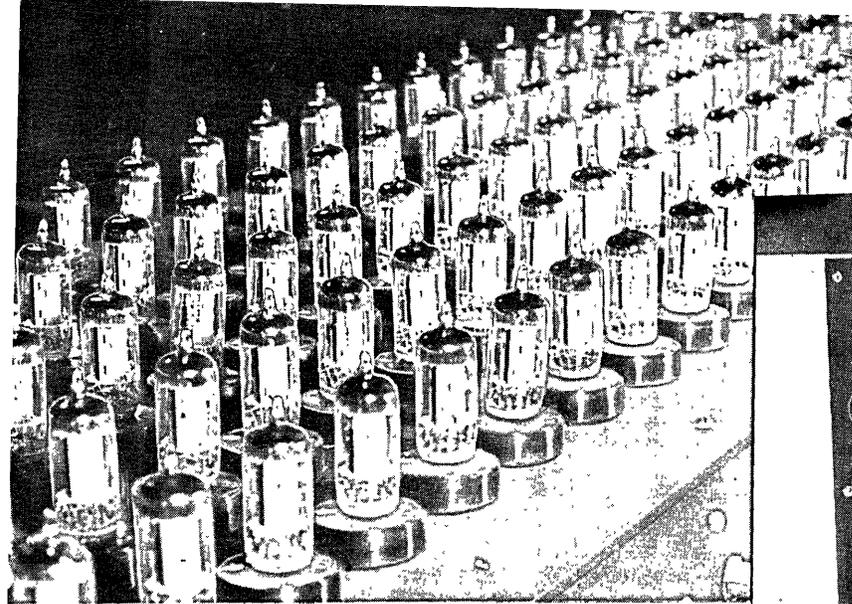
Its Address?

Your Title?

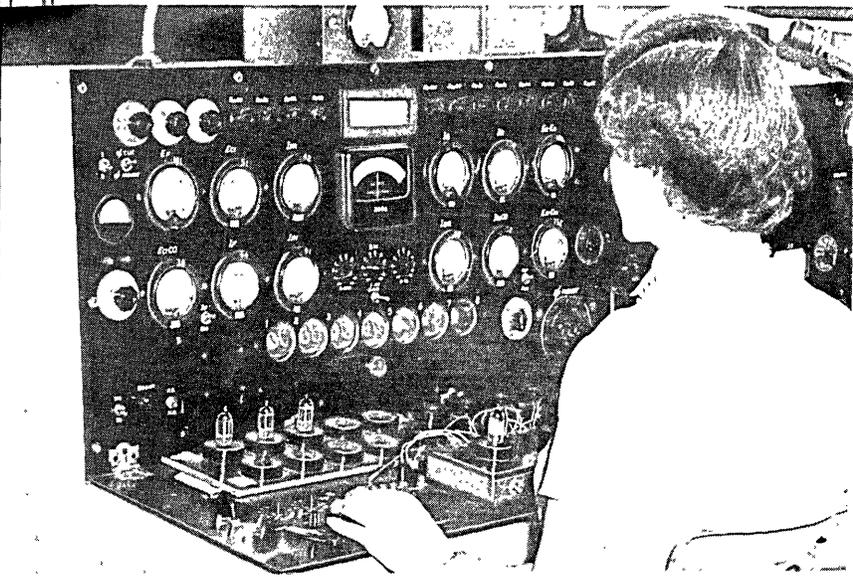
READER'S INQUIRY FORM

Please send me additional information on the following subjects for which I have circled the CA number:

1	2	3	4	5	26	27	28	29	30	51	52	53	54	55	76	77	78	79	80	101	102	103	104	105	126	127	128	129	130
6	7	8	9	10	31	32	33	34	35	56	57	58	59	60	81	82	83	84	85	106	107	108	109	110	131	132	133	134	135
11	12	13	14	15	36	37	38	39	40	61	62	63	64	65	86	87	88	89	90	111	112	113	114	115	136	137	138	139	140
16	17	18	19	20	41	42	43	44	45	66	67	68	69	70	91	92	93	94	95	116	117	118	119	120	141	142	143	144	145
21	22	23	24	25	46	47	48	49	50	71	72	73	74	75	96	97	98	99	100	121	122	123	124	125	146	147	148	149	150



◀ LEFT: G-E computer tubes undergo a cut-off life test. The tubes are operated for long intervals with their grids biased to cut-off. Periodically the tubes are given a cathode interface check, to make sure no "sleeping sickness", or failure to respond to changed grid voltage, has developed during inactivity.



RIGHT: extensive instrumentation is used to test tube electrical qualities that closely affect operation in computer circuits. Zero-bias plate current; cut-off performance; any difference in cut-off between twin-triode sections—these are three of many characteristics checked. ▶

G-E Computer Tubes are specially tested for qualities that safeguard computer reliability!

General Electric pioneered special tubes for computers . . . also developed tests such as those above, which assure that G-E tubes in your computer circuit can be relied on to meet designers' aims in all respects.

The tests are specific in purpose. Each covers one or more tube characteristics important in computer use, and which closely influence the accuracy and reliability of the equipment.

There is no substitute for G-E computer-tube quality, which starts with special tube design—extends through precision manufacture—concludes with exhaustive tube tests that relate directly to computer service.

Also . . . there is no counterpart to G.E.'s range of special computer tubes *now in production*. You have a choice of proved G-E types

available for your present circuit needs, with new tubes constantly being added.

Ask for "G-E Computer Tubes And Their Applications" (ETD-1140). 54 pages—just off the press. A book every designer and builder will find useful! *Tube Department, General Electric Company, Schenectady 5, New York.*

* * *

● G-E computer-tube development is a continuing process, with new types being added regularly for faster, more advanced equipment, or to meet special customer requirements where volume warrants. Five types—proved, popular—already are in full production:

- | | |
|----------|---------|
| GL-5844 | GL-6211 |
| | GL-5965 |
| GL-5915A | GL-6463 |

Progress Is Our Most Important Product

GENERAL  ELECTRIC

162-101

Sprague Pulse Transformer Kit Simplifies Circuit Design

HERE'S THE IDEAL TOOL FOR
ENGINEERING DEVELOPMENT
OF CIRCUITS USING
PULSE TRANSFORMERS

CHARACTERISTICS OF KIT TRANSFORMERS

Type	Induct. Pri. (μ H)	Leakage (μ H)	Dist. Cap. of Pri. (μ F)	Max. Nom. P.W. Range (μ Sec)	Avail. Ratios
4122	0.5	2.5	5	0.5	1:1
		4.0			2:1
		4.5			3:1
		7.0			5:1
4123	5.0	13	15	6	1:1
		15			2:1
		25			3:1
		30			5:1
2027	10	20	12	12	1:1
		40			8:1
2028	20	50	15	25	1:1
		150			8:1
		210			8:8:1
2029	50	150	20	50	same as 2027
		150			same as 2027
		210			same as 2027

Sprague on request will provide you with complete application engineering service for optimum results in the use of pulse transformers.



Sprague's new Type 100Z1 Pulse Transformer Kit contains five multiple winding transformers, each chosen for its wide range of practical application.

Complete technical data on each of the transformers is included in the instruction card in each kit so that the circuit designer may readily select the required windings to give transformer characteristics best suited for his applications . . . whether it be push-pull driver, blocking oscillator, pulse gating, pulse amplifier, or impedance matching. The electrical characteristics of the transformers in the kit have been designed so that they may be matched by standard Sprague subminiature hermetically-sealed pulse transformers shown in engineering bulletin 502B.

For complete information on this kit, as well as the extensive line of Sprague pulse transformers, write to the Technical Literature Section, Sprague Electric Company, 377 Marshall Street, North Adams, Massachusetts.

SPRAGUE®

the mark of reliability