

December, 1966

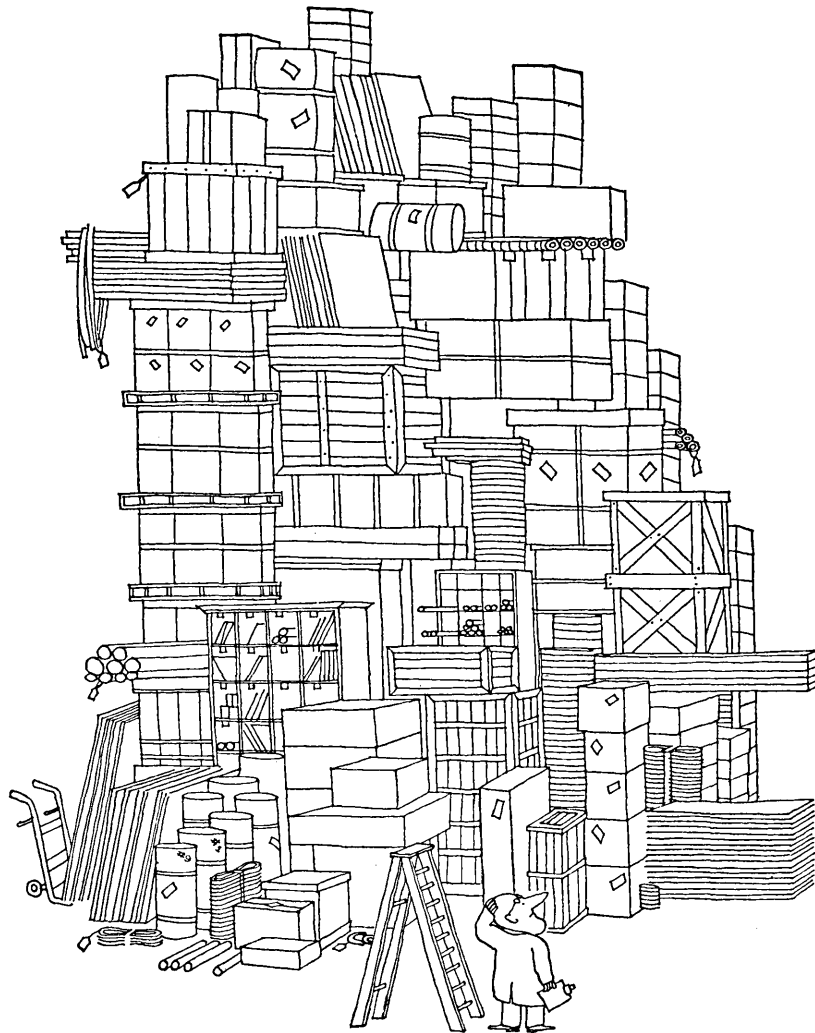
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computers and automation

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The front cover shows an experimental instruction system designed for an educational research classroom in Stanford University, Calif. For more information, see page 42.



computers and automation

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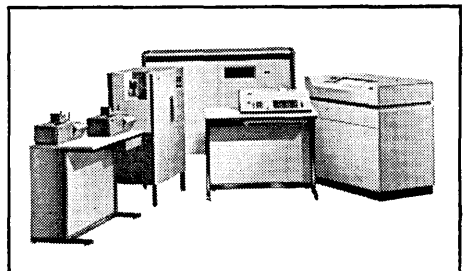
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Honey From Numbers

In the Mainichi Daily News, Osaka, Japan, on May 21, 1966, appeared an article "Numbers" by André Maurois, member of the Académie Française. Here is some of it:

Yesterday, a foreign friend of mine said to me: "This summer I shall come to see you in Dordogne. I do not know Périgord and I have heard marvelous things about it. I want to see those castles which I have heard so much about, those rivers with such pretty names: the Isle, the Vézère, the Loue, . . ."

I listened to him with pleasure, but could not help thinking: "How will he express his enthusiasm in a few years when the deadly habit of designating the departments by numbers will be so strongly implanted that it will have eliminated the familiar names? Will one say that one is dying to see 24, then to go from there to 46, . . . ?"

"What does it matter?", my Consoler will say. "Consider the case of Paris. Previously, the city was divided into quarters with picturesque names; today, there are only arrondissements. Numbered, if you please. Now, you can see that these numbers have taken on the character of words and that they have even acquired a certain poetry. Everyone knows that the Sixteenth evokes wealth, luxury, and sometimes snobbishness, that the Fifth is scholarly, slightly untidy, teeming with young people. Have confidence in the human spirit. It will make its honey from everything — and even from figures."

The Consoler has not convinced me. Twenty arrondissements is little, and it is true that we have become used to them. Ninety-five departments is another story. Tell me what is the special poetry about 64 or 95, and I shall be a little reassured.

But I defy you to do it.

There are several answers to the plea of André Maurois and the plea, I am sure, of thousands, perhaps millions, of other human beings.

The first answer is already alluded to by Maurois above — the human spirit is getting used to numbers and so is putting honey into them.

64 of course is a very fine number; it is 2 to the sixth power, 4 cubed, and 8 squared. Over and over again in our work with computers, we encounter 64 and its relatives 32 and 128 and 256, foundation stones of the octal and binary numbering systems. And of course, there is the "\$64 question."

95 is another fine number. It has an aura of high speed, if we think of 95 miles per hour. It is also one of the numbers being used for the new Federal express highways here and there in the United States. "I used Interstate 95 to get here, and it was a breeze." Also 95 percent of deviations in a normal distribution are within two standard deviations of the mean.

In my own life for more than 40 years, I have used numbers for denoting files for subjects that I have been interested in. In my indigenous system, 1 stands for philosophy, and 9

for classifications. 4 and its relatives stand for mathematics and its branches. Many years ago 4-11 in my system stood for Boolean algebra, but nowadays 411 is the number for Boolean algebra. 52 is the "largest" of all numbers in our office, for it labels "Computers and Automation"; 52E is editorial, 52A is advertising, 52S is subscriptions, and so on. For almost every number between 1 and 450 I have associations, and could report them on request.

The great English mathematician G. H. Hardy once went to visit the young Hindu mathematician S. Ramanujan lying ill in a hospital. Hardy had ridden in taxicab No. 1729, and remarked that the number seemed rather a dull one, and he hoped it was not an unfavorable omen. "No," said Ramanujan, "it is a very interesting number; it is the smallest number expressible as a sum of two cubes in two different ways."¹

Second, numbers — and the computers that want them and use them — are here to stay, and to spread, and in a sense to engulf our society, willy nilly. Like some other conditions, when inevitable, we may as well relax and enjoy same. Already, many arguments and discussions are being translated from words and phrases into numbers and mathematical relations. In such a form the answer can be calculated. The armchair as an instrument for making decisions is falling rapidly into disuse. Let us enjoy this change. Shall we regret the passing of the old, and the arrival of the new? Yes, of course! Shall we give a Bronx cheer to the old, and welcome the new with horns and rattles? Yes, of course!

Third, we can program our computers to take their numbers back where they came from, and translate answers for us into words. It is easy to tell a computer to take back zip code 02160 and output it as "Newtonville, Massachusetts."

Finally, those of us who like words can rest assured that so long as human beings are still on the earth, and not liquidated — I should say evaporated — by nuclear weapons or entirely displaced by computers, words will be spoken. The richness of the 40 phonemes for speaking English will never be displaced by the syllabary of 10 number words "one, two, three, four, five, six, seven, eight, nine, oh" — with the admonition that you should pronounce "nine" to rhyme with "lion."

A great many of us will reach the happy state where we can enjoy both the honey of words like the Isle, the Vézère, and the Loue — and the honey of numbers like 64, 1729, and 142857.²

Edmund C. Berkeley
 EDITOR

1. 1000 plus 729, and 1728 plus 1.
 2. Try adding 142857 to itself, and to the successive results.



MULTI-ACCESS FORUM

COMPUTER POLICEMAN DECREASING BAD CHECKS

Ellis Charles
Lawndale, Calif.

One of California's best policemen never leaves the office, doesn't walk a beat, never makes an arrest nor even wears a badge, but he's decreasing the passing of bad checks 8 to 10 per cent.

The policeman is Telecredit, a four-year-old computer system for automatically verifying checks by telephone. Telecredit, in Los Angeles, uses a person's driver's license to inform a subscriber to the service whether a check is good or bad, before the subscriber cashes it.

Many department stores, restaurants, grocery stores, and service stations in California are taking advantage of the service, and saving themselves thousands of dollars each year. During 1965, the computer turned down 20,000 bad checks with a total face value of \$2.5 million, while it cleared 1,475,000 bona fide checks worth in excess of \$50 million.

With this computer system, a clerk uses a private telephone line directly to the Los Angeles office. When the validity of a check is needed, the clerk calls the office, gives the answering operator specific information from the customer's driver's license, and within 18 seconds the clerk knows whether the check will be cashed by the firm or bank on which it's written.

Although mechanically complicated, the process is relatively simple. When the answering operator receives a call, she writes the color of eyes, date of birth, and license number. As she does this, a closed circuit television camera photographs the information and feeds it into the computer. If the check is bad, or if the person writing the check has a history of passing bad checks, the information is flashed onto a screen in front of the operator, who relays the information back to the clerk. All of this in 18 seconds.

If the writer of the check is wanted for similar crimes or an entirely different offense, the computer also will reveal this. In doing so, the incoming call is automatically switched to the Telecredit security office. The security officers notify local police and within minutes authorities can

be at the scene to make the arrest.

On the national level, passing bad checks has increased 385 per cent in the past ten years, and is the leading felony crime. However, in California the rate is declining. More than 2,600 arrests were made in 1965 due to the computer policeman. The operation can handle 32 calls simultaneously, and usually receives 16,000 to 20,000 calls each day. This is even more impressive when it is considered that a \$25 loss to a medium-sized supermarket is equivalent to losing as much as \$2,500 in grocery sales.

In order to provide efficient service, the firm stores credit records dating back at least three years. This data was collected from banks, finance companies and credit houses.

In addition, the check cashing records of more than 11 million persons, dating back as far as 10 years in some cases, are stored in the computer system.

The process was developed by Ronald A. Katz, a business administration graduate of the University of California at Los Angeles (UCLA), and Robert Goldman, an electronics research engineer. Together they secured the services of two of the top authorities in California on bad checks, Capt. Chester A. Welsh and Donald R. Cressey. Captain Welsh is a chief special agent of the Los Angeles Police Department and was formerly in the forgery division. He has worked on the investigation of forgeries and bad checks for more than 20 years; he calls the new computer system "the most exciting development that has come to my attention during my career."

Cressey is an advisor to the board of the firm. He is a professor of criminology at UCLA, and Visiting Fellow, Institute of Criminology, Cambridge University, England.

In California alone, \$218 billion worth of checks will be written this year, 17 per cent more than in 1965. While it's nearly impossible to arrest everyone who passes a bad check, one of every four arrested in the state will be the accomplishment of the computer policeman sitting in a Los Angeles office.

INTERNATIONAL FEDERATION FOR INFORMATION PROCESSING — NEWS

IFIP Public Information Committee, IFIP Congress 68
c/o British Computer Society
23 Dorset Sq.
London, N. W. 1, England

The General Assembly and Council of the International Federation for Information Processing (IFIP) are holding their annual meeting in Jerusalem, November 15-18, 1966. IFIP Technical Committee 3 on Education is also meeting at the same time. The British Organizing Committee will submit a report to the Council on the preliminary arrangements for the IFIP Congress 68, which is to be held in Edinburgh from August 5th to August 10th, 1968.

The organization of the Edinburgh Congress is in the hands of a committee formed by the British Computer Society and representing a wide cross-section of professional societies, Government departments, and people concerned with computers and information systems.

The administrative headquarters of IFIP are now situated in London, at the offices of the British Computer Society 23, Dorset Square, London, N. W. 1.

KIBERNETIKA

Bakhtiyar Vagabzade
from the magazine DRUZHBA NARODOV
published in the U.S.S.R.

The MACHINE reads books,
It computes excellently,
Multiplies and subtracts
Kilometers and tons,
Thousands and millions.
Since it is so clever,
It has a memory,
And an intellect, and the gift of speech,
And something nearly human.
This means that it certainly
Will replace people?!
And — most interesting of all —
It is learning to write songs . . .
But it is difficult to say what sort —
Good or poor.
Only by looking at the zenith can I
See to what
Heights it has risen.
But who invented the machine?
You, man!

Bear the proud glory
That is yours by right!
Soon it will not be necessary
For man to breathe with strain
Or to sweat heavily
While working.
And he trains the machine,
Entrusts his heavy labor to it,
And even his zeal — let it multiply!
And what shall we do with love?
Oh no! We will not yield it to the machine!
When I see you, man,
I am every time carried away
By your mind and your hands,
But who would sow grain on stones?
Who would allow soulless machines —
Their pointers, bolts and screws —
To measure love?
Who would dare to trust love to them?

V A C A N C Y

The INTERNATIONAL COMPUTATION CENTRE (Rome), established on the initiative of UNESCO by an intergovernmental agreement, announces the following vacancy:

DIRECTOR (Grade DI)

Qualification requirements:

The candidate for this post should have high scientific and educational qualifications in the computation field so that he will be able to conduct actively the research and education work of the Centre. Preference will be given to candidates having a good administrative experience, especially in the field of international organizations.

Assignment:

The Director shall conduct the work of the Centre in accordance with the programme and directives laid down by the Executive Council. He shall represent the Centre for legal and all other purposes. He shall be appointed for a period of four years, and shall be eligible for re-appointment.

Salary:

The salary will correspond to Grade D, step 1 (\$ 12,684) of the ICC salary scale, plus family indemnities, etc. and is exempt from tax.

Applications:

Applicants should send their curriculum vitae before 31 December 1966 to the Secretariat of the ICC, Palazzo degli Uffici, Viale della Civiltà del Lavoro, 23, Zona dell'EUR, Rome, Italy, indicating:

Name, address, date and place of birth, nationality, family status (married or not, number and age of children), education, degrees, publications, positions held previously, linguistic ability, the date at which he shall be free to take up his functions in Rome (after 1st January 1967).

COPYRIGHT LAW REVISION:

A RECENT AMENDMENT FAVORS INFORMATION STORAGE AND RETRIEVAL —

A Report to the Data Processing Community

John F. Banzhaf, III President Computer Program Library 509 Fifth Ave. New York, N.Y. 10017

I. Letter to the Editor

I recently learned that a position I had advanced as "the sole and very unofficial representative of the data processing community" before a House Subcommittee considering a bill to revise the copyright law has been adopted. Because the bill may have an important effect on computer users, and because I attempted to vocalize their interest to Congress, I feel that I have a duty to keep them informed of developments. Furthermore, whenever I mentioned the bill as an A.C.M. lecturer during the past year, the listeners never

II. Short Article

A recent amendment to a bill designed to revise the United States copyright law would liberalize it to permit a computer to scan and make use of a copyrighted work without the authorization of the copyright holder, if no non-transitory copy of the work were made. (Under the bill as originally introduced, any use by a computer of a copyrighted work would have constituted an infringement.) In amending the bill, the House Committee on the Judiciary rejected requests to allow data processors even greater freedom to use copyrighted works in information storage and retrieval systems but accepted a compromise suggestion made by the author.

For several years the U.S. Copyright Office has been working, at the request of Congress, to develop a revised copyright law which would be acceptable to the major interest groups affected. Towards this end, the Office held numerous meetings and invited suggestions and ideas from the interested public, but for one reason or another the data processing community, remained largely silent. What little discussion took place about the impact of copyright law on data processing seems to have been by representatives of other interests who were ignorant of many facets of computer technology.

From this background a bill emerged (H.R. 4347, S. 1006) which provided that "copies" of a copyrighted work could not legally be made without the copyright owner's consent. "Copies" were defined as "material objects . . . in which a work is fixed by any method now known or later developed, and from which the work can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device." A literal interpretation would have made it an infringement to: (1) have a substantial portion of a copyrighted work appear in a computer output; (2) prepare a substantial portion of a copyrighted work in a computer input format or medium (e.g. punch cards); (3) cause a computer to scan and store, even temporarily within its memory, a substantial portion of the work, regardless of the input, form, or use to which the work was to be put.

Representatives of copyright holders, particularly publishers, argued that this extensive protection was necessary to protect their interests, presumably against the day when electronic storage and retrieval would begin to make serious inroads on printed books.

There was general agreement that (1) was a reasonable and necessary protection.

In a letter to the House Subcommittee considering the bill, Reed C. Lawlor, a Los Angeles attorney active in computer matters, challenged the wisdom of the other protections:

When the Copyright Law is revised, the copyright owner

failed to express real interest and in many cases a deep concern.

I am enclosing a copy of a very short article written to explain this development. Because the subject involves the expression of legal opinions, I felt that it could not be properly treated as an ordinary information release. However, because of the importance of the subject and its value as a news item, I felt that coverage in only one publication would also be inappropriate. I am therefore sending a copy of this article to several leading publications serving the data processing community.

should continue to have the right to prevent the use of his copyrighted work in the printed output of the computer beyond the bounds of fair use, but he should not have the right to prevent the feeding of the work into a computer, since normally the output will be of a kind which would be fair use if no computer were used.

The Electronic Industries Association expressed a similar position.

In June 1965 the author appeared before a House subcommittee as "the sole and very unofficial representative of the data processing community." (See "Computers and Automation," Sept. and Oct., 1965.) He urged that the subcommittee give serious consideration to these positions. However, recognizing the power of the opposing interests, he suggested as a compromise that at least the definition of "copies" be modified to exclude strictly transient reproductions as in the memory of a computer. This would allow computers to store copyrighted works temporarily in memory (for searching, indexing, etc.) without infringement if the original copy could be lawfully obtained in an input format suitable for the machine (e.g., direct machine reading of printed text or microfilm). Although the legislators were not prepared to go as far as Attorney Lawlor had suggested, they have adopted the latter compromise suggestion.

The bill favorably reported by the House Committee on the Judiciary now contains the following definition: "a work is 'fixed' in a tangible medium of expression when its embodiment in a copy . . . is sufficiently permanent or stable to permit it to be perceived, reproduced, or otherwise communicated for a period of more than transitory duration." Thus it appears that at least (3) would no longer constitute an infringement. The Committee also noted:

Recognizing the profound impact that information storage and retrieval devices seem destined to have on authorship, communications, and human life itself, the committee is also aware of the dangers of legislation prematurely in this area of exploding technology. . . . The committee expresses the hope that the interests involved will work together toward an ultimate solution to this problem in the light of experience. Toward this end the Register of Copyrights may find it appropriate to hold further meetings on this subject after passage of the new law. (H.R. Rep. No. 2237, 89th Cong., 2d Sess. at 53-54 (1965))

No change was made in the provision which seems to ratify the Copyright Office's earlier decision that computer programs are copyrightable. In fact, the Committee noted: "computer programs . . . could be regarded as an extension

of copyrightable subject matter Congress had already intended to protect, and were thus considered copyrightable from the outset without the need of new legislation." (Id. at 43.)

The bill as it now stands has been reported favorably to the House by the appropriate committee but still awaits committee approval on the Senate side. Readers interested in expressing an individual opinion may wish to write to their representative or senators. Readers expressing the opinion of an organized computer organization may wish to write directly to Rep. Emanuel Celler (N.Y.), Chairman, House Committee on the Judiciary; Senator John L. McClellan (Ark.), Chairman of the Subcommittee of Patents, Trademarks, and Copyrights; or Senator James O. Eastland

(Miss.), Chairman of the Committee on the Judiciary.

The author would be interested in and would appreciate receiving any comments on this matter as he intends to keep an eye on the bill as it makes its way through Congress.

John F. Banzhaf, III

(A member of the Bars of New York State and the District of Columbia, Mr. Banzhaf has served as Visiting Lecturer for the A.C.M. for the 1965-66 year and has written a number of articles on topics related to law and computers.)

SEARCHING FOR AND RECOGNIZING LIFE ON MARS

(Based on a report by Roger K. Field, in "Electronic Design," for October 25, 1966)

Even though a soft-landing on Mars may not be achieved until 1977, proposals for a probe of that planet are now being evaluated. One proposal to be made by a group of scientists at MIT would send a self-propelled probe, or robot, with highly advanced electronic visual-sensing and decision-making capabilities.

Such a robot would roll along or walk along the surface of Mars, and react when it sees something interesting. If the object that caught its interest moved, the robot could possibly follow it. If the object were a formidable barrier, the robot could back up and move around it. In any case, the robot would send back to earth only the information that described the interesting topographical features and distinctive sounds of Mars and, hopefully, any encounters with moving objects.

Since nothing is known about the nature of possible life on Mars, the best tests are those that make fewest assumptions about such life. The proposed visual tests are based on assumptions that are very nearly independent of the biochemistry of Mars.

For the past three years Dr. Warren McCulloch, a neurophysiologist, and Louis Sutro, electrical engineer, have studied at MIT the role to be played by artificial visual perception in the exploration of Mars. McCulloch believes that the studies of the frog's eye, presently underway, will be useful in understanding the operations of any eyes in nature.

A team including physicist Dr. Roberto Moreno-Diaz, Richard Warren, and Louis Sutro have been collaborating for months to duplicate the frog's eye with available electronic components. Moreno-Diaz has arrived at a model of the eye, that might be implemented with electronics. Some time ago, Warren demonstrated feasibility by simulating part of an eye and its logic on one of the Institute's computers along with a simulated "scene."

The decision-making equipment will be a series of small

integrated-circuit computers. They will evaluate all information coming from the camera and select one of a number of possible courses of action of the robot such as:

- Advance to _____.
- Turn right.
- Turn left.
- Right itself (after overturn).
- Perform experiment 1.
- Perform experiment 2.
- Maintenance cycle.
- Communicate mode 1.
- Communicate mode 2.

The small computers in the robot that issue these commands would check each other and continuously "vote" on the order of importance of all possible commands. The computers would either be interconnected, or they would actually time-share one complex computer.

Certain over-all modes of operation would have priority, like "righting after overturn," and certain problems could be referred to earth for decisions by either a giant computer or by men.

The particular part of the frog's eye they simulated is the bug-detecting ganglion cell. Four sets of ganglion cells actually detect these patterns: edges, over-all dimming, any time-varying visual event, and movement of a dark convex edge (bugs). This bug-detecting ganglion has a rather complex response. It responds to an object that moves into the field of the retina provided that the object is relatively small, is darker than the background, and has a sharp leading edge and is approaching the center.

The bug-detecting ganglion cell does not respond to a moving straight edge, changes in level of illumination, changes in the speed of an object, amount of contrast, or light-colored moving convex edges.

"PERSPECTIVE" — COMMENTS

**I. From R. L. Lansche
Chief, Technical Liaison Office
Department of the Army
Tulsa District, Corps of Engineers
Tulsa, Oklahoma 74102**

We are holding a computer usage seminar soon, and would like to add Edmund Berkeley's splendid editorial, "Perspective," in the April 1966 issue, to the information materials being distributed.

With your permission we will distribute copies to 25 Corps of Engineers employees.

II. From the Editor

Thank you for your letter. We give you permission to reprint the editorial. We are glad that you liked it.

"THE THIRST FOR COMPUTER KNOWLEDGE" — COMMENTS

**I. From H. C. Price Consultant Chest Physician Fulham Chest Clinic, Western Hospital
Seagrave Road, S. W. 6 London, England**

I was very interested in the editorial "The Thirst for Computer Knowledge" in the July issue of "Computers and Automation."

I have first-hand experience of the great difficulty from which most of us suffer in obtaining information when and where we require it. The interest in computer techniques

in the Health Services in Britain is increasing, and we are not an isolated example, if one may judge by the interest shown at the Conference in Elsinore last April/May which I attended and which you mention in your article.

I sincerely hope there is a good response to your remarks and perhaps you will keep me in contact with any further developments.

II. From the Editor

We appreciate your response to the ideas we put forward in that editorial.

One good way to acquire information about computers is through participation in computer societies in various coun-

tries and districts. In the annual computer directory issue of "Computers and Automation," on page 106 to 109 of the June, 1966 issue, are some rosters of associations in the computer field. We shall be very glad to publish the names and addresses of all new associations.

AUTOMATION OF POPULATION REGISTER SYSTEMS —

International Symposium, Jerusalem, Israel, Sept. 25-28, 1967

CALL FOR PAPERS

**International Symposium on Automation of Population Register Systems
Information Processing Association of Israel
P. O. Box 3009
Jerusalem, Israel**

An International Symposium on Automation of Population Register Systems will be held in Jerusalem, Israel, from 25 to 28 September, 1967. The Symposium is being organized by the Information Processing Association of Israel (IPA), and is sponsored by the International Computation Centre (ICC) and the International Federation for Information Processing (IFIP).

The Symposium will include the following subjects:

- (1) ADP and Manual Population Register systems — critical descriptions.
- (2) ADP system design problems of population registers, including:
 - (a) Personal and Family records.
 - (b) Historical records and updating.
 - (c) Integration between population registers of different agencies.
- (3) Applications:

Social Security personal records and accounts and other applications of Population Registers, in connection with elections, social welfare and national assistance, education, health, employment, taxes, drivers' licenses, army, police and trade unions.
- (4) Technical aspects, such as:
 - (a) Personal identification number systems, including the use of check digits.

- (b) Soundex coding of names.
 - (c) Random access and batch processing.
 - (d) File organization and random access equipment.
 - (e) Updating and search procedures for alphabetical files.
 - (f) Telecommunication with field offices for input, inquiry and output.
 - (g) Time Sharing.
- (5) Economic aspects of ADP Population Register Systems and their evaluation.
 - (6) Statistical applications — derivation of vital statistics and population estimates from population registers and their use for sample surveys. Matching of population registers with population censuses. Simulation of demographic models.

Experts in ADP and in Population Register administration are invited to submit papers. The time for the presentation of a paper will be 20 minutes. Papers should relate to one of the above subjects or other topics connected with the automation of population register systems.

A summary, not exceeding one page, should be submitted to the address above not later than 31 December 1966. It should contain the title of the paper and the name and full address of the author.

The Program Committee will notify the authors of those papers which have been approved.

Final papers should be submitted, not later than 30 April 1967, typewritten, doubled-spaced, in four copies.

COMPUTER PERSONNEL RESEARCH GROUP CONFERENCE — CALL FOR PAPERS

Dr. Charles D. Lothridge
General Electric Company
579 Lexington Ave.
New York, N.Y. 10022

Technical papers are invited for presentation at the Computer Personnel Research Group's Fifth Annual Conference, June 26-27, 1967, at the University of Maryland, College Park, Maryland.

Reports of research in the following major areas are sought:

1. Identification and selection of computer personnel with emphasis on development and validation of selection instruments;
2. Training and development of computer personnel with emphasis on new or revised techniques;
3. Current and anticipated changes in knowledge and skills needed by computer personnel;
4. Problems and skills involved in management of computer personnel.

Authors are requested to submit to me by February 1, 1967, a 300-word summary outlining the problem, procedure, results, and conclusions of their research to me. Authors will be notified of selection by March 1, 1967.

COLLECTED ALGORITHMS — SERVICE

"Communications of the ACM"
Association for Computing Machinery
211 East 43rd St.
New York, N.Y.

Beginning in June 1966, the Association for Computing Machinery inaugurated a loose-leaf service called "Collected Algorithms" with regular supplements. The purpose is to keep reports on algorithms comprehensive and up to date. All algorithms published in the "Communications of the ACM" from 1960 through June 1966, and also every "Remark" and "Certification" that has been published, have been collected and collated together, and published in a form to fit a three-ring binder, as a ready reference manual. Supplementary "Collected Algorithms" along with newly published "Remarks" and "Certifications" will be sent every two months to subscribers to this service. For prices, inquire of the ACM.

An algorithm is an effective computing procedure, such as the usual procedure taught in arithmetic for finding the greatest common divisor of two whole numbers.

COMPUTER ART — COPYRIGHT NOTICE — CORRECTION

The computer art submitted by Maughan S. Mason and published on page 9 of the August, 1966, issue of "Computers and Automation" should have borne the notice:

Copyright© 1966 by Maughan S. Mason.



COMPUTER CENSUS TAKERS

EDP Industry and Market Report is compiling a National Computer Installation Census. The computer installation descriptions in the Census are compiled each six months.

EDP I & M Report is seeking alert men and women with their knowledge of computer equipment and its applications to conduct this census on a regular basis. The census is conducted by telephone and/or personal visits. Each census taker will work within 50 to 100 miles of his home. Computer census taking is a part-time project. The hours are quite flexible. Compensation is good. An excellent way to become acquainted with computer installations in your area.

For further details, clip the coupon below and return it with an outline of your computer experience and the days and/or hours you would be available for computer census taking activities.

**EDP I & M REPORT/CENSUS DEPARTMENT,
355 Walnut Street, Newtonville, Massachusetts 02160**

I am interested. Please send me further information on participating in the EDP Industry and Market Report National Computer Census. Attached to this coupon is an outline of my experience in the computer field, and the times I have available to do telephone/field interviewing work in my area.

NAME _____

ADDRESS _____

CITY _____ STATE _____

THE COMPUTER'S ROLE IN MANUFACTURING INDUSTRY

Booz, Allen, and Hamilton, Inc.
Chicago, Ill. 60603

"By 1970 it is predicted that these companies will devote an average of 30 per cent only of their computer effort to finance and administration — and the remainder to the operating area and other areas."

An analysis of the current and future use of computers by 33 successful manufacturing firms in the United States has been made by a study team of our organization. This year-long study provides a composite view of the computer's role in United States manufacturing industry.

A total of 189 in-depth interviews were conducted with top, operating, and computer management in the 33 companies participating in the study. Annual sales range from under \$100 million to several with more than \$1 billion. The companies are not identified by name in this study, but have been selected from each major industrial classification on the basis of past growth and profitability.

The most significant finding in the study is this:

The computer has become an integral and increasingly important part of the management function.

RELATIONSHIP OF SIZE OF COMPANY AND LEVEL OF COMPUTER EXPENDITURES

Annual Sales	Per Cent of Sales	
	RANGE	MEDIAN
\$ 50- 99 Million	0.28-1.33%	0.71%
\$ 100-199 Million	0.13-1.26%	0.49%
\$200-999 Million	0.14-1.01%	0.46%
\$1 Billion and up	0.22-1.20%	0.58%

Major Points Found in the Study

- The computer is considered by the companies as an important tool in competing successfully with other firms in the industry.
- Firms with the most successful computer operations are those in which the top management is vitally interested and participates actively in the operation.
- Companies plan to increase the use of the computer in operating areas such as marketing, distribution, production, and research, development and engineering. They plan to place less relative emphasis on applications in finance and administration, which have been the initial and the heaviest areas of computer use.
- Computer operations which are considered superior are managed by men who are experienced in the company's general operations as well as in computer operations and who are knowledgeable about what is required to make the business profitable.
- The effectiveness of computer applications within many of the companies varies significantly from one application to another and among the firm's operating units.
- Planning most effectively for future computer applications is a major problem for management.
- The concept of a "computerized command center" operating out of the president's office is closer to science fiction than to fact, although most firms are moving to more integrated computer systems.

The Companies Included in the Study

The Companies in the study represent three basic areas of manufacturing. They are:

- Continuous process-produced consumer products such as food processing and clothing manufacturing. These

firms utilize process-flow manufacturing to produce finished products for marketing and distribution to the ultimate user.

- Fabricated and assembled products such as heavy industrial equipment. These firms are fundamentally oriented to producing and/or assembling component parts into a finished product either for industrial or consumer use.
- Continuous process-produced industrial products such as chemicals or steel which are used in the manufacture of finished items. These firms are oriented to the process-flow production of materials and products for further fabrication by others into finished products.

Of the 33 firms in the study, 25 per cent are in the consumer field; 45 per cent, fabricated and assembled products; and 30 per cent, industrial products.

As mentioned above, annual sales of the 33 firms range from under \$100 million to several with more than \$1 billion.

In each firm, interviews were conducted with the top and operating management as well as computer management.

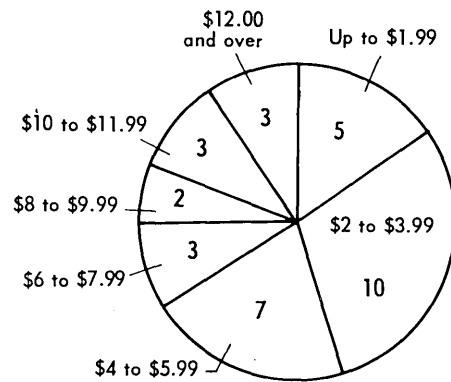
the companies in the survey is .22 per cent of sales, and the average is .54 per cent of sales.

The 33 firms in the study have a wide range of computer experience, extending from 1 to 12 years, with a median of 9 years.

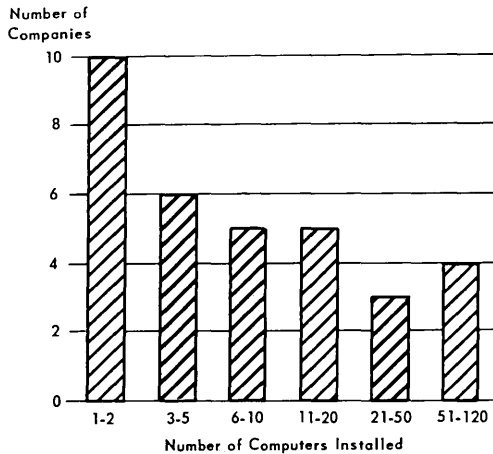
The total computer costs — machines, systems and planning and all other operating costs — vary from \$1.27 to \$13.30 per thousand dollars of sales. Actual dollar expenditures range from \$128,000 per year to \$50,000,000 per year. The median company spends \$1,186,000 annually, or \$5.40 per thousand dollars of sales.

The median firm spends 37 per cent on equipment, primarily for machine rental; 19 per cent on systems and planning activities, including new applications design and programming, and the remaining 44 per cent on other operating costs such as salaries, supplies, maintenance programming and cost of space.

TOTAL COMPUTER COSTS PER THOUSAND DOLLARS OF SALES
Number of Companies



COMPUTER INSTALLATIONS PER COMPANY



Computer Use

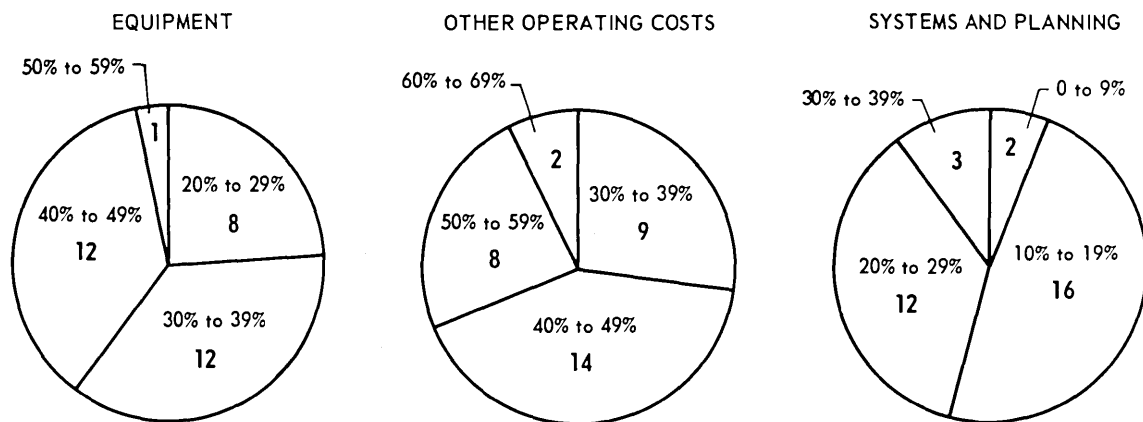
The survey found that the 33 firms are heavy users of computers. The median firm has six computers at two locations. The value of installed computers in the companies ranges from \$47,000 to \$16,000,000. Computer value ranges from .05 per cent of sales up to .59 per cent of sales, or from \$5 to \$59 per thousand dollars of sales. The median for

Computer equipment costs, as a percentage of total computer activity expenditure, range from 25 per cent to 50 per cent. Systems and planning costs range from 7 per cent to 31 per cent, and other operating costs vary from 31 per cent to 65 per cent.

Actual dollar computer equipment costs range from \$60,000 to \$20,000,000 per year; systems cost from \$20,000 to \$14,000,000 per year; and other operating costs from \$47,000 to \$16,000,000.

The firms rated highest by the study team in computer effectiveness spend a higher percentage of annual sales on computers, ranging from 1.0 per cent for highest rated effectiveness, to an average of only 0.13 per cent for firms in the

COMPUTER ACTIVITY COSTS AS PERCENT OF TOTAL COMPUTER COSTS
Number of Companies



lowest range of computer usage effectiveness.

Firms which have been using the computer for a long time tend to spend more money on their computers than companies which are relatively new in the field. For example, companies which have been computer users for more than 10 years spend an average of 0.68 per cent of sales on computers while those with less than five years experience spend 0.31 per cent of sales. Or, put another way: A firm with annual sales of \$100 million with five years of computer experience can expect its computer costs to increase from about \$310,000 a year to \$680,000 over the next five years, if it follows the pattern of the more experienced companies in this survey.

Rating of Effective Computer Usage

The study team rated each of the 33 firms in two areas of effectiveness in their use of the computer:

1. Overall relative effectiveness in relating the computer to the particular operating needs of the company and its business requirements.
2. Relative effectiveness of current applications in each of six areas of the business.

These six areas are:

- Financial and administrative — financial reporting and analysis, accounting, payroll, invoicing and billing.
- Management planning and control — capital investment analysis, and resource allocation, mathematical model simulation.
- Marketing operations — sales forecasting, sales analysis and control, market research, and sales order processing.
- Distribution operations — warehouse operations, shipment order processing, traffic, and in-the-field inventory control.
- Factory operations — materials controls, production scheduling, quality control, and in-plant inventory control.
- Research, development and engineering — product testing, product design and evaluation.

In over-all effectiveness in use of the computer, one firm ranked in the highest group; eight rated in the second group; 14 in the middle; eight in the fourth; and two in the lowest.

In the effectiveness of computer use in the six basic areas of applications, the firms in total rated highest in the areas of finance and administration, followed by planning and control, marketing, distribution, factory operations, and research and development and engineering, in that order.

The computer effort in each of the six areas of applications represented the following usage percentage:

- Finance and administration: average of 47 per cent, with a range of 20 to 70 per cent.
- Production: average of 16 per cent with a range of 5 to 40 per cent.
- Distribution: average of 11 per cent, ranging from 5 to 40 per cent.
- Marketing: average of 12 per cent, ranging from 5 to 25 per cent.
- Research, development and engineering: average of 8 per cent with a range of 0 to 50 per cent.
- Planning and control: average of 6 per cent, with no firm using more than 10 per cent of its computer effort in this area.

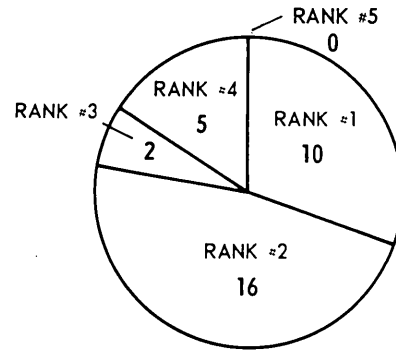
Continuous-process industrial-product firms tend to be more effective users of computers than the other two types of companies.

Fabricated-and-assembled-product companies tend to follow the same general pattern as all companies combined.

Continuous-process-consumer-product firms, as a group, are

FUTURE EFFECTIVENESS RATING

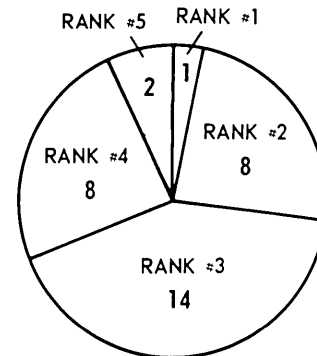
Number of Companies



(RANK #1: HIGHEST
RANK #5: LOWEST)

CURRENT EFFECTIVENESS RATING

Number of Companies



(RANK #1: HIGHEST
RANK #5: LOWEST)

the least effective users of computers among the 33 surveyed companies.

The study emphasized that nearly all of the companies surveyed are, in fact, doing an effective job of using their computers, based on our experience with computer usage in manufacturing firms other than the 33 in the survey.

The survey team found that the companies that ranked in the lowest effectiveness group in this survey are really not below average in computer usage, compared to all manufacturing firms. The lower-rated firms in the study are simply not as effective users of computers as others in the survey.

The Computer as a Major Management Tool

Presidents and other top managers of the 33 firms in the study, repeatedly emphasized to the study team that the computer was becoming increasingly important in their management operations throughout the spectrum of the firms' operations.

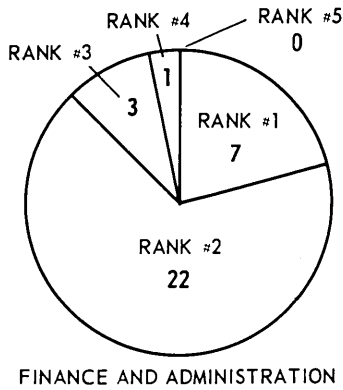
Among the comments made by the top managers of these firms are the following:

"Computers are already essential in our business in order processing, billing, inventory control, sales analyses, and accounting. But the real pay-offs will show up during the next decade in automated production, refined sales forecasting and analyses, and reduced production/delivery cycle time."

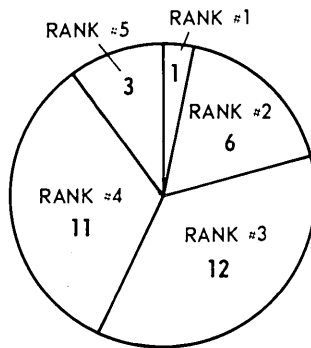
"Our future efforts will be largely in improving management reporting, greatly extending our computer use in our operations, particularly in forecasting, inventory control,

EFFECTIVENESS RATING BY APPLICATION

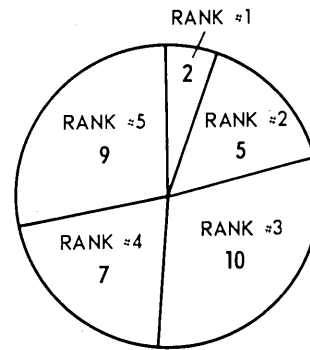
Number of Companies



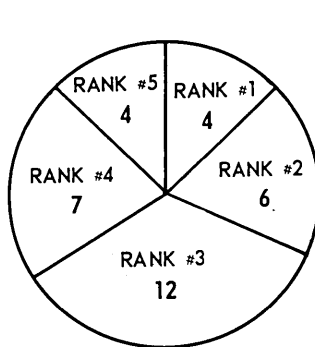
FINANCE AND ADMINISTRATION



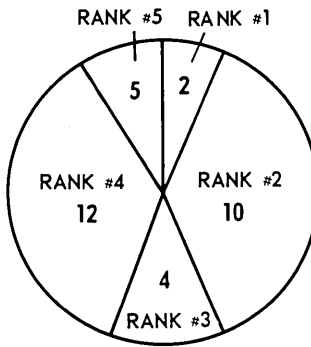
MARKETING



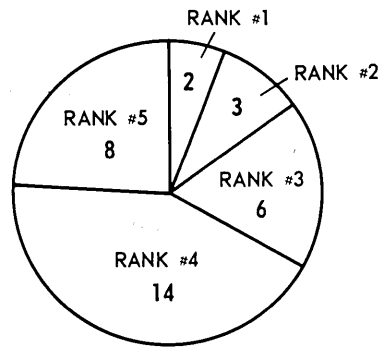
PRODUCTION



PLANNING AND CONTROL



PHYSICAL DISTRIBUTION



RESEARCH, DEVELOPMENT AND ENGINEERING

(RANK #1: HIGHEST
RANK #5: LOWEST)

and scheduling, and in using simulation to analyze new production technology, new products and potential acquisitions."

"Our computer activities grew up in accounting and distribution. In the past few years, top management has paid more attention to re-focusing our computer efforts. We have now started to see real benefits in the areas of marketing, reduced product cost, and improved customer services."

"To date our computer activity has paid for itself through reduced credit floats. We have just started to use our computers in operating areas where the eventual benefits are obviously much larger."

The Computer as a Competitive Tool

The study team found that a major reason for aggressive computer application was to beat the competition.

As one executive said:

"Our real goal is to make sure that we achieve more benefits from computers than our competitors do."

And, in the words of another executive, a president:

"Clearly, in our industry, computers have become essential to survival. We've reduced our clerical and administrative costs. We're turning over our inventory of raw materials close to 20 times a year and our finished goods inventory about 10 times a year. We've leveled out many of the swings and oscillations in our manufacturing operations. And, as far as I can see, we've about stayed even with our competitors."

Management Attitudes

The study found that of the 33 firms, the top management of 21 have a "very favorable" attitude toward computers while those of seven firms have a "favorable" attitude and those of five firms feel "indifferent, uneasy or unconcerned" about computers. All of these companies feel that their computer is making a contribution to the operation of their businesses. In no company did top management have a negative attitude about the computer.

In those firms where the top management has a "very favorable" attitude about the value of the computer, the team found that the firm's president expressed enthusiasm about the computer's advantages, urged his managers to learn the uses of the computer, and believed the increased cost of computers was a justifiable expense.

Where the top management had a "favorable" attitude toward the use of the computer, the study team found that the president had the same general feeling of enthusiasm but tempered it with some skepticism.

As one member of the study team said:

"The presidents in this second group were probably less willing to make major changes in organization and personnel to take advantage of the computer's value than the men in the 'very favorable' group. Although none of the five presidents in the 'indifferent, uneasy, unconcerned' group were hostile in their attitudes toward the computer, by and large, they don't have a high confidence in computer people. These five firms also had the shortest computer experience. The reason why these firms had the shortest experience with the use of the computer may be the unconvinced attitude of their top managers, which delayed their installing a computer in the first place."

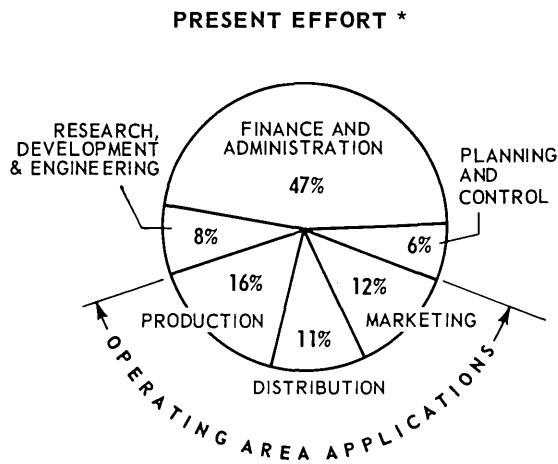
The study found that as the computer becomes established as just another activity area of the business, top management tends to exert the same influence over computer activities as it does over other equally important company matters.

Changes in Computer Use

At present, an average of 47 per cent of the computer's time among the 33 firms in the study is used for finance and administration, "traditional" areas of computer activity.

The rest of the computer effort — 53 per cent — is spent in the operating areas — production, distribution, marketing — and in planning and control, and research and development and engineering.

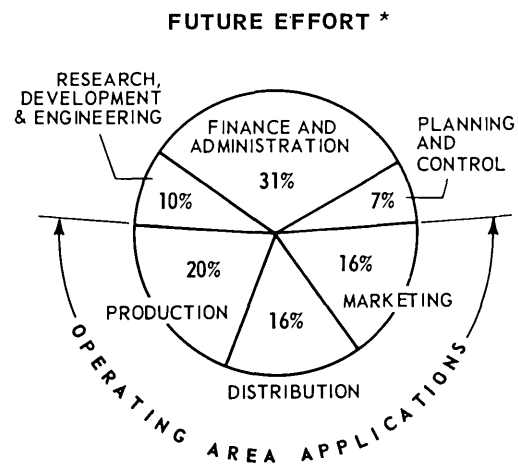
By 1970, it is predicted that these companies will devote only an average of 31 per cent of their computer effort to finance and administration and the remainder to the operating and other areas. The finance and administration applications will continue to expand but at a rate much slower than that of the operating applications.



As one study team member said:

"When most firms begin to computerize, the first place is in administration and finance. It is in this area where the clerical savings are most likely to be made. But as the period of natural evolution proceeds, the company begins to use the computer more and more for operating activities with fewer new applications in finance and administration. You might say that most companies need a digestive period — a time during which they learn to live with the computer. During this period of evolution and digestion, the company becomes aware that its competition is getting more advantages by using the computer for operating functions. It is exposed to the capabilities of the computers and, in the process of bringing into the firm new men who have had computer experience elsewhere, becomes increasingly conscious of various other uses to which the computer can be applied."

Firms with more than ten years experience have placed more emphasis on applications in marketing, distribution, and research and development and engineering activities.



A major trend in these companies is a balancing of total computer effort across all basic application areas. Most are well established in applications directly related to the operating areas characteristic of the orientation of their particular type of business.

At present, the continuous-process industrial-product firms tend to put a greater emphasis on research and development and engineering applications. By 1970, these firms plan to significantly increase computer effort in production, distribution and marketing applications.

Fabricated-and-assembled-product firms are now putting most of their efforts into production applications. By 1970, these firms plan greatest relative increases in applications to be in research and development and engineering, and distribution.

Consumer-product firms now emphasize marketing and distribution in their computer operations. By 1970, these firms plan to increase their computer use in production, and research and development and engineering applications.

The study found that firms with less than five years experience with computers tend to be more oriented to finance and accounting or administration applications than those with more experience. The companies with five to ten years of experience place slightly less emphasis on these applications than the less experienced group, but significantly more than the group with more than ten years experience. The group with five to ten years experience also devotes more computer effort to production than the less experienced group.

Significantly, all three groups place the same relatively limited emphasis on top management planning and control applications. Presumably this is because of a slower evolution of the development of mathematical and other decision assisting techniques which enable the computer to be most effective in this area. However, there is high interest in applications of operations research and computers for management planning and assistance in control decisions.

Virtually all of the firms said they intended to gradually undertake more sub-systems integration. All are in the process of coordinating logically related specific computer systems into larger units. For example, 11 of the firms have made considerable progress in integrating systems in the distribution function.

In the next four years, another 13 of the companies plan to have their distribution systems fairly well integrated. Only five firms have made much progress in integrating factory systems, but by 1970, 21 additional firms expect to have integrated computer systems in their factory operations.

Personnel Assignment

The study revealed an increasing tendency to assign management of computer operations to men who were experienced in the company's operations as well as in computer management and knowledgeable about what is required to make the business profitable.

In the 33 firms, 23 had assigned the key computer management positions to men with significant experience in their

firm's operations. Only four had staffed these positions with men having only experience in data processing and systems planning and design. The remaining six top computer managers had general accounting background.

Variation in Quality of Computer Management

The study found variation in the computer usage within the 33 companies. And, of course, the research team found variation in computer usage among industries and among individual firms in the same industry.

In 26 of the 33 firms in the study, the research team found significant variations in the effectiveness of computer applications among management levels, in the effectiveness of different applications in single operating units, and in the same applications across the various divisions. Variations in effectiveness of inventory control or production operations among divisions is a representative example of this. No pattern was discerned in the variations, but the variations do indicate a continuing need for coordination and control to achieve computer goals.

Controlling the Computer

Coordinated applications planning — the determination of what additional activities of the firm will be computerized, what existing computer activities will be improved and how this is to be accomplished and in what sequence — is a major area of concentration for most of the companies. There was general recognition of the need for coordinated short and long range plans for computer activities.

Twenty of the firms listed applications planning as a major computer management problem.

The primary criteria for management evaluation, of both proposed applications and of results achieved by applications, are of three principal types.

Cost reduction resulting from improved efficiency in performing existing non-automated activities is still the principal evaluation basis used by 13 companies.

Analyses of return on investment are conducted formally by 12 firms. Informal evaluations of operating improvements, either in terms of better performance in meeting company needs or customer or supplier needs, are conducted by four companies.

The 12 firms using the formal-return-on-investment analysis include three of the top four firms rated highest in computer usage effectiveness.

Of the 13 firms using cost reduction as a basis for applications approval and evaluation, only three were rated in the top third, four were in the middle group and six were in the lowest group.

The study team reported that the use of cost reduction as the applications approval and evaluation basis in the lower rated firms is a reflection of the types of applications implemented when cost reduction is the primary objective.

Of the four firms using operating improvement as a basis for applications approval and evaluation, three were in the highest group for effective computer usage and one was in the middle group.

The study clearly shows that the firms which are rated higher in usage effectiveness favor the operating improvement evaluation. These firms have moved into broader applications that more directly contribute to company operations and that are not necessarily justifiable by cost reduction.

Top management looks to the corporate computer staff for initiation of new computer applications, although one third of the firms rely either on operating management alone or in combination with the corporate staff.

A direct influence on the effectiveness of computer applications is the degree to which top management or operating management participates in the planning process. Plans for future usage of the computer tend to be more specifically

defined in those firms which place at least some responsibility for applications planning on operating management.

Much has been written about the advantages of centralization vis-à-vis decentralization of computer activities. There is no evidence of correlation in this sample between the computer usage effectiveness of companies using decentralized or centralized approaches. Both approaches seem to be able to concentrate the computer effort where it is needed. This study shows that in companies where the normal management structure is highly centralized, a basically centralized computer system works best. Likewise, in decentralized companies, decentralized computer activities appear to work best. Management, wisely, structures the computer function in the same manner as they do other key operations of the business. However, all or nearly all successful users have provided strong central coordination and planning.

Command Center in President's Office?

The so-called "total integrated management information system," the "board room computer," or the total "command and control center" in the president's office is a great deal closer to science fiction than to fact.

Not one of the companies in the study regard the "total" system as a near-term goal. However, it is frequently discussed and considered a distinct possibility for "sometime in the future" in most companies. As such, it does affect current planning. Most firms are establishing plans for central direction and policy control to assure that standards and practices are not conflicting within the company as a requisite to modular and possibly, ultimately, totally integrated computer systems.

The firms which are closest to integrated systems are those which are highly centralized, have relatively short product lines and marked geographic concentration.

All of the 33 firms have either generally defined an ultimate total system concept for their business or are in the process of so doing.

Of the 27 firms which already have a defined ultimate concept, all are envisioning some form of close integration of applications, if not in a totally integrated system, at least in integrated modular units.

Most of the firms see a pattern for the future which may be called an "integrated-decentralized system." This means that the various computer units in the firm would be centrally coordinated and controlled to assure compatible systems design, but operating units would still plan, manage and control their own computer usage and operations.

Auditing the Computer

A significant finding of the study was the wide acceptance of the use of a regular audit as a means for controlling and evaluating computer usage.

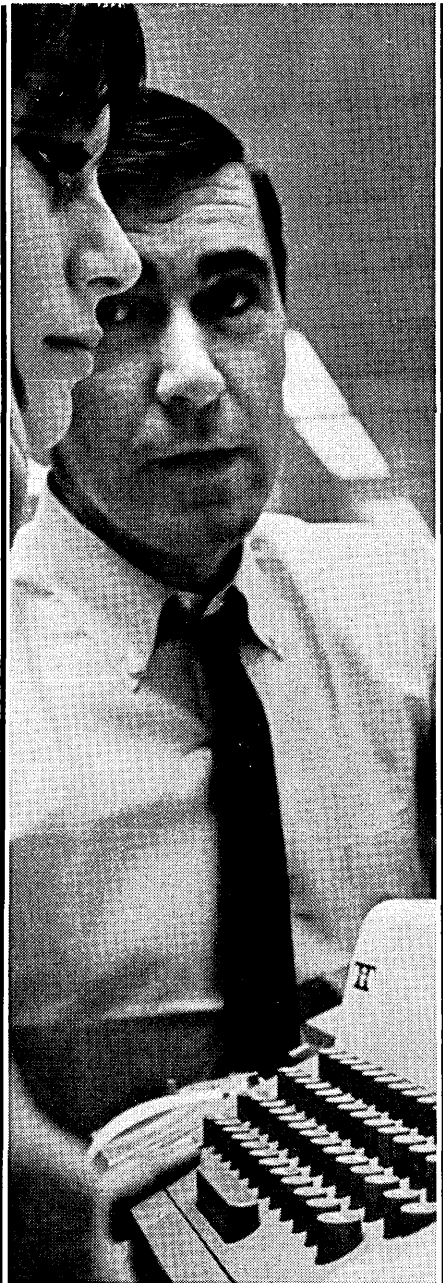
All but two of the firms employ a regular evaluation audit, usually on an annual basis. The two firms not making regular audits were rated 29th and 31st out of the 33 firms in usage effectiveness.

The survey team found a definite pattern of relationship between high top general management influence and impact on computer activities and total applications coverage in regular evaluation audits.

In most of the 31 companies which make a regular evaluation audit, top management tends to look more to the computer staff than to operating management for primary responsibility. This responsibility for the audit is assigned to the computer staff in 20 of the companies and to operating management in the other 11. But, six of these 11 firms rated highest in usage effectiveness. In these six firms, the survey team found an apparent tendency toward balancing planning responsibility and audit responsibility against operating management and computer staff.



HOW RELIABLE CAN DATA COMMUNICATIONS BE!



Reliability is becoming an increasingly important factor in the growing sophistication of data communications and processing systems. In a real-time system, data has to be available quickly if accurate, timely decisions are to be made. Thus, any equipment breakdown can cause serious delays in the movement of raw or processed data. This is why Teletype sets — the simplest and most versatile terminal equipment — are built to last with little maintenance required.

In fact, you can find Teletype machines still operating daily that were built over twenty-five years ago. Today, this same reliability is still part of Teletype data communications equipment. Modern Teletype sets will stand up continually under all kinds of rugged conditions—regard-

less of whether they are used in a steamy jungle, out in space, on ships at sea, in offices or data processing centers.

The following examples point out how Teletype equipment reliability improves the efficient operation of any data system.

Speeds flow of data "Use of (punched) paper tape as our exchange medium has permitted ever-increasing volumes of data to flow between company points at no appreciable increase in cost." That's the way the communications service manager of a midwest automotive parts manufacturer described the results of the company's data processing system.

requesting transmission of the prepared tape. As the tape is received at the data processing center, it is fed directly into the computer. In only a few hours after a transaction is made, management has an up-to-date report to assure inventory control and accurate production scheduling.

Since the operation is automatic, no attendant is needed at night. If there were a breakdown, no one would be present to correct it and see that the data is transmitted. That's why Teletype equipment reliability is so vital to this system's operation.

Assures reliable turbine operation
An electric generating plant uses

Another serves as an alarm, displaying "off-normal" and "return to normal" conditions. The third Teletype machine is used as a demand point log for digital trending, group review of preselected variables, and turbine startup and information log. Thus, without the reliable performance of Teletype equipment, the accurate operation of this electric generating plant would be seriously jeopardized.

Most widely used terminal equipment Their reliability as well as versatility and other capabilities point out why Teletype machines are the most widely used for transmitting data from where it originates to where it must go to be of value.



As finished goods are produced at any of the firm's several plants, shipped to one of the distribution centers, or transferred between locations, data on these transactions is recorded onto a continuous roll of punched paper tape. This is done by the local operator of a Teletype Model 33 ASR (automatic send-receive) set. Periodically the prepared tape is loaded into a Telespeed 1050 high-speed tape-to-tape sending set, which operates at 105 characters per second (1050 words per minute).

This is where reliability becomes an important factor in this data system. Six times during the day and night the company's data processing center automatically polls each of the Telespeed sets at the eight distant plants and distribution outlets, re-

computers and Teletype page printers to provide quick and accurate performance information to assure reliable operation and prevent turbine damage. The system's operator control center has three Teletype printers. One is used to provide periodic logging of variable station operations.

And, that is why this Teletype equipment is made for the Bell System and others who require reliable communications at the lowest possible cost.

Additional uses of Teletype equipment in aiding data communications and processing systems within a number of businesses and industries are explained in our brochure, "WHAT DATA COMMUNICATIONS CAN DO FOR YOU." For your copy contact: Teletype Corporation, Dept. 88M, 5555 Touhy Avenue, Skokie, Illinois 60076.

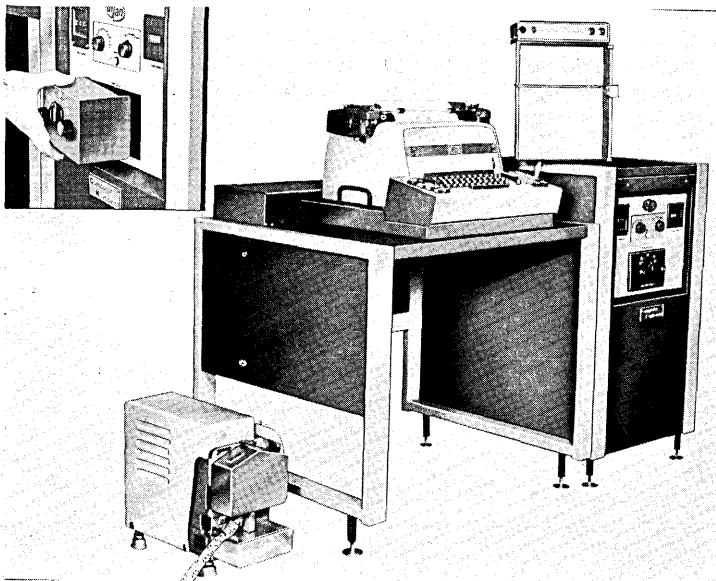


Annual Pictorial Report

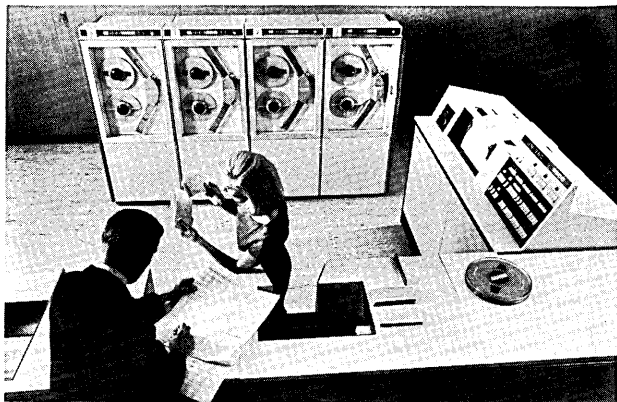
DIGITAL COMPUTERS



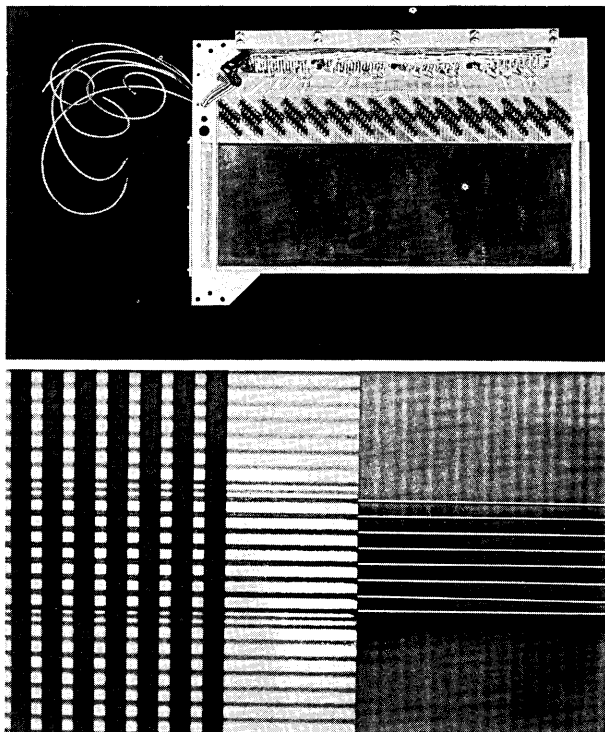
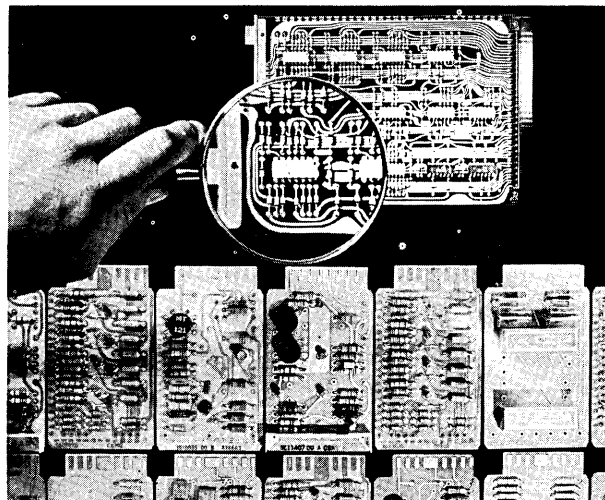
A COMPUTER HISTORY / IBM Corporation — Three generations of IBM computers work side-by-side at the Aetna Life & Casualty Insurance Co., Hartford, Conn. From the oldest to the newest computers — a span of less than ten years — processing speeds rose as much as 400 times and memory capacities grew from 140,000 bits of information to more than 2 million bits, while their storage areas shrank to half-size. The first, the IBM 705 (left), uses vacuum tube circuits. The second, the IBM 7074 (center), uses transistorized circuits. The newest generation, installed this year, the IBM System/360 Model 65, uses micro-miniaturized circuits — with components the size of typewritten periods. To multiply 10-digit numbers 100,000 times, took the IBM 705 four minutes; the IBM 7074 does it in six seconds; and the System/360 in six-tenths of a second. The three computers are used by Aetna for applications ranging from the maintenance of all life and casualty policy records to premium and loss accounting and the compilation of management statistics.



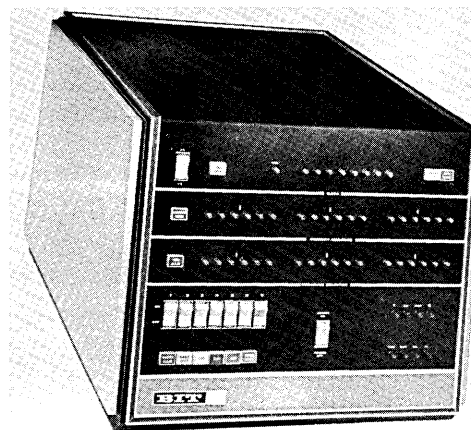
COMPUTER KEYBOARD TYPESETTING SYSTEM / Di/An Controls, Inc. — This special purpose system, shown at the left, combines an entirely new keyboard and computer, and is built specifically for typesetting. It converts copy into accurate linecaster/photocomposing tape — from keyboard to machine ready tape in one step. The keyboard allows the operator to keyboard into a computer memory and not directly to the punch. Only when a line is completely justified is it sent out of the computer memory into the punch. The 110 character per second BPRE punch (lower left) may be located up to 250 feet from the computer console (right). Complete control setting for the computer unit is located in front panel. Font selection plug (just below control settings) is easily removed for quick change of font cards (see insert at upper left of photo). Production rates of 700 newspaper lines (11 pica-8 ft) per hour are not unusual. (For more information, designate #43 on the Readers Service Card.)

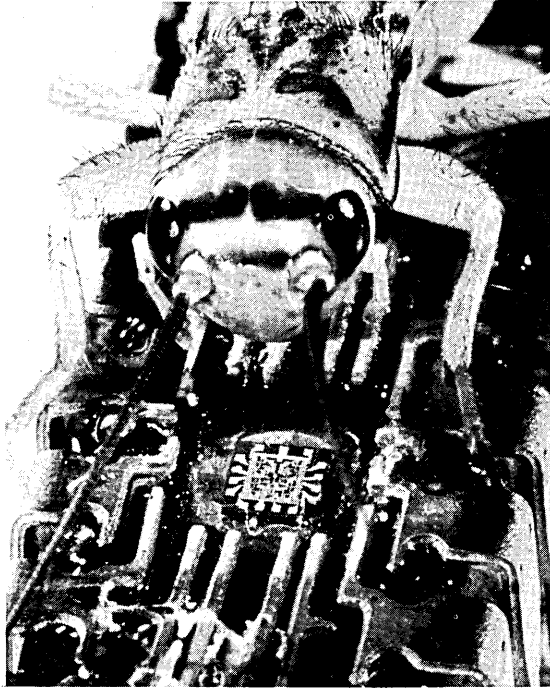


UNIVAC 9000 SERIES / Sperry Rand Corp., Univac Division — The UNIVAC 9300 data processing system (shown above) is a low cost, high performance punched card and magnetic tape system. This member of the 9000 series, featuring a plated-wire memory and monolithic integrated circuitry, has a memory cycle time of 600 nano-seconds (billionth of a second). The plated-wire memory in the 9000 Series, in addition to exhibiting the advantages of speed, small size and low power requirement, are significantly easier to fabricate, thereby reducing over-all manufacturing costs. Plated-wire memory panel (shown to the right) has a capacity of storing 4096 bytes of information on each side. In lower portion of the photo is a closeup of the plated wires each of which is five-thousandths of an inch in diameter. Monolithic integrated circuits in the new series are built on single silicon chips. These tiny circuits increase processor speed by shortening electronic paths. One chip, as magnified in the photo at the upper right performs the same functions as one of the large conventional printed circuit boards. The monolithic integrated circuit board, shown, is the equivalent of fourteen of the conventional boards. (For more information, designate #45 on the Readers Service Card.)

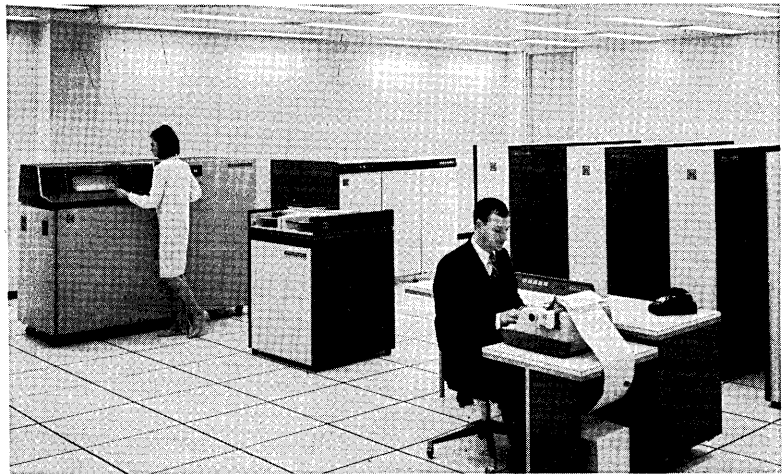
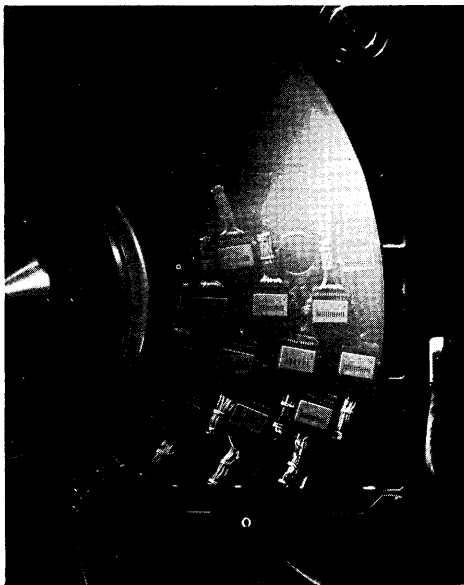
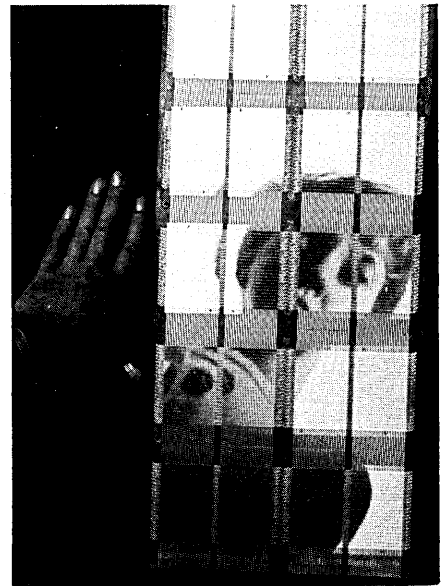
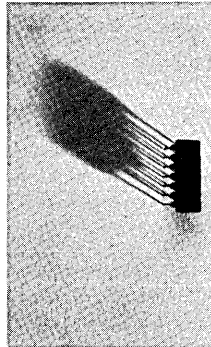
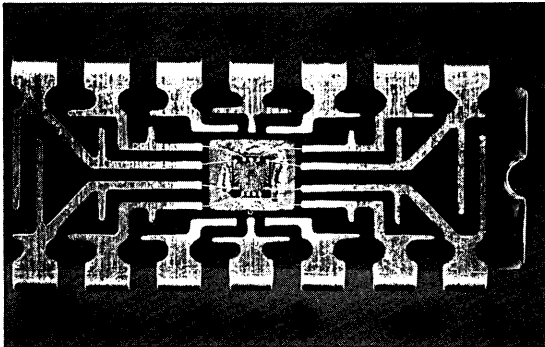


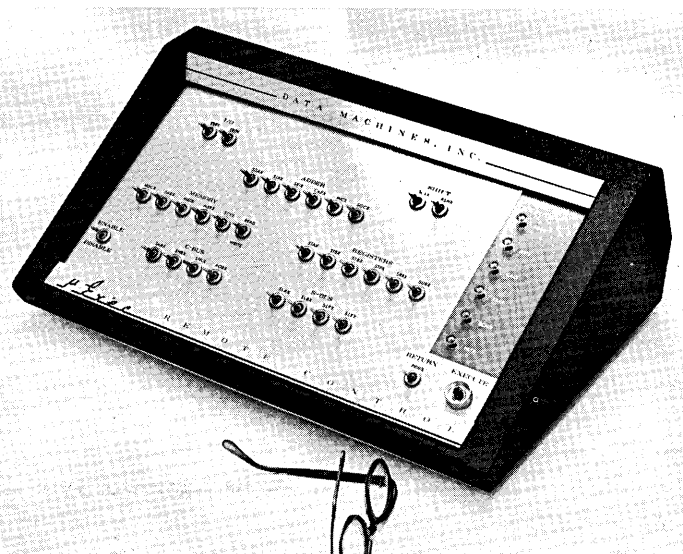
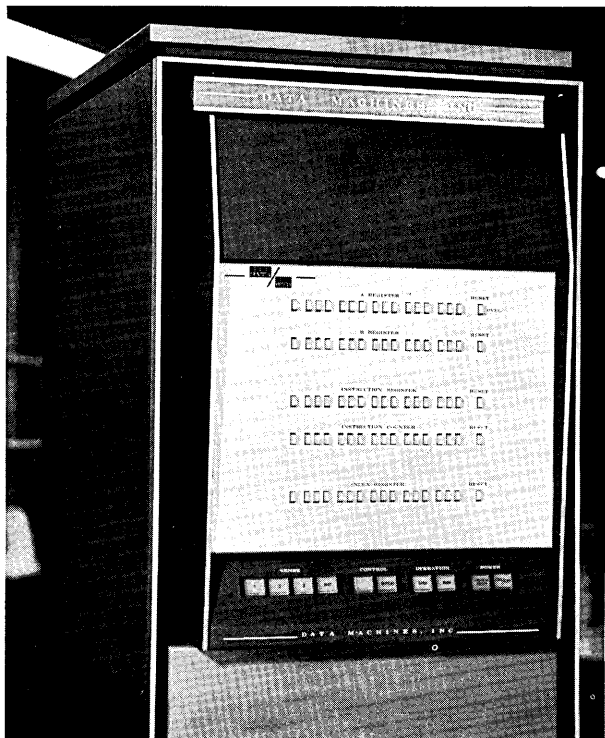
MODEL 480 GENERAL PURPOSE DESK-TOP COMPUTER / Business Information Technology, Inc. (BIT) — The BIT 480 processor features variable word length, up to 4 data channels (3 with simultaneous compute ability), 8 μ sec core memory, is Byte-oriented, and provides binary and decimal arithmetic. The 480 can be used in a wide range of business, scientific and industrial applications as a data-communication terminal, as an industrial process controller, as a data acquisition link, or as a scientific processor. (For more information, designate #46 on the Readers Service Card.)





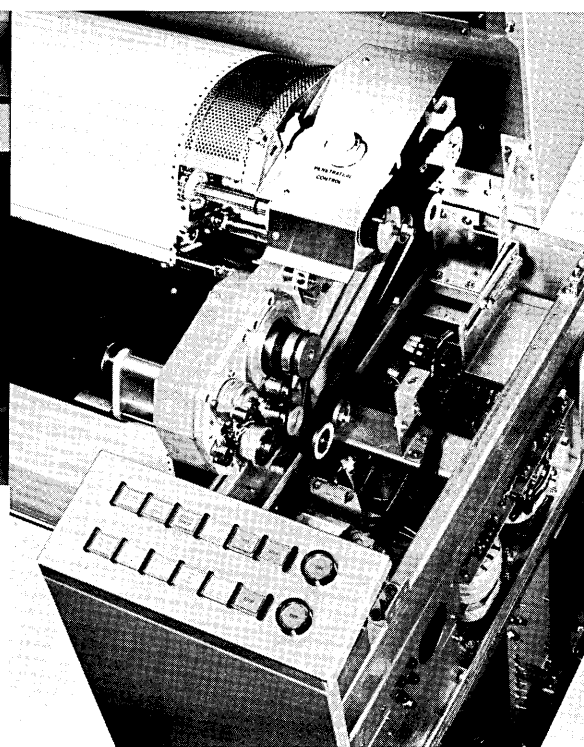
B6500 COMPUTER / Burroughs Corporation — This third generation electronic data processing system (lower right) is equipped for multiprocessing, parallel processing, and real-time and time-sharing operations. The central processor utilizes monolithic and integrated circuits throughout. At the left, the fun photo shows a monolithic integrated circuit as viewed by an ordinary cricket that can be found in any basement. For comparison of the circuit's mounting see the pictures below it — actual size of the component is 3/4" long. The ultra-fast thin film main computer memory has a cycle time of 600 nanoseconds and is expandable from 16,384 words up to 106,496. Word length is 48 information bits plus two special purpose bits. The planar thin film memory surfaces are only 1/1000th as thick as a human hair. Each contains 3072 storage spots on which information bits are deposited. Below, to the right, is a view of thin film memory grouping used in the B6500 system. Adjuncts for the new computer include a large capacity, high-speed, "head-per-track" disk file secondary memory system and a wide range of data communications capabilities. The photograph at the lower left shows the head-per-track design of Burroughs disk files. (For more information, designate #44 on the Readers Service Card.)





DATA/620 SYSTEM COMPUTER / Data Machines, Inc., Division of Decision Control, Inc. — The DATA/620 is reported to be one-third the size with one-half the number of components as other machines in its

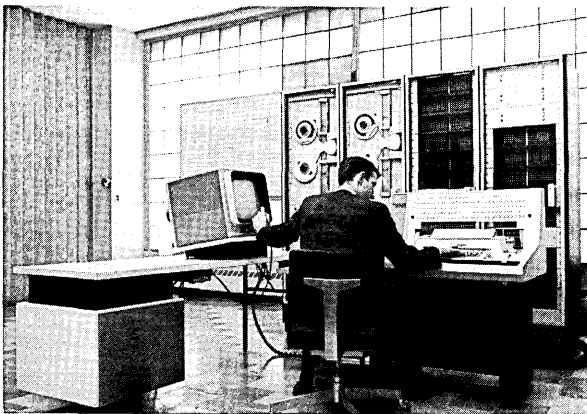
price range; yet it has two times the instruction repertoire. It is a 4096-word machine requiring 26.5 inches of standard rack space. Standard word length is 16 bits, but this is modifiable through bit-oriented logic to 18 bits. Control of memory, registers, bus connections, input/output, adder and shift logic is available externally to the processor through μ -EXEC (shown at left). μ -EXEC is the technique of using the computer's micro-functions to form complex macro-functions. (For more information, designate #50 on the Readers Service Card.)



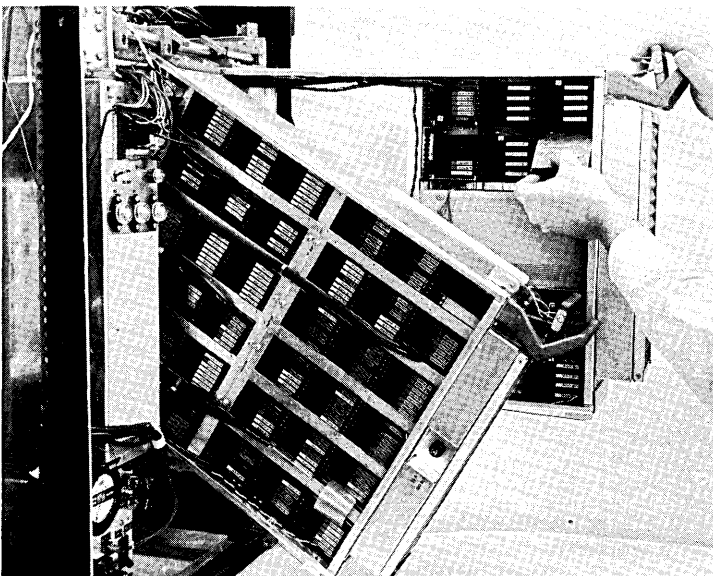
EAI 640 DIGITAL SYSTEM / Electronic Associates, Inc. — EAI's second purely digital system offers the input-output flexibility and software for use both as a stand-alone system and for integration into hybrid and special computer-based systems. Options include expansions for teletype equipment, a direct memory-access channel, and memory expansions from the basic 4K words to 8K, 16K or 32K. The 640/610 Line Printer (right rear in system photo) is shown at the right with cover lifted. (For more information, designate #51 on the Readers Service Card.)



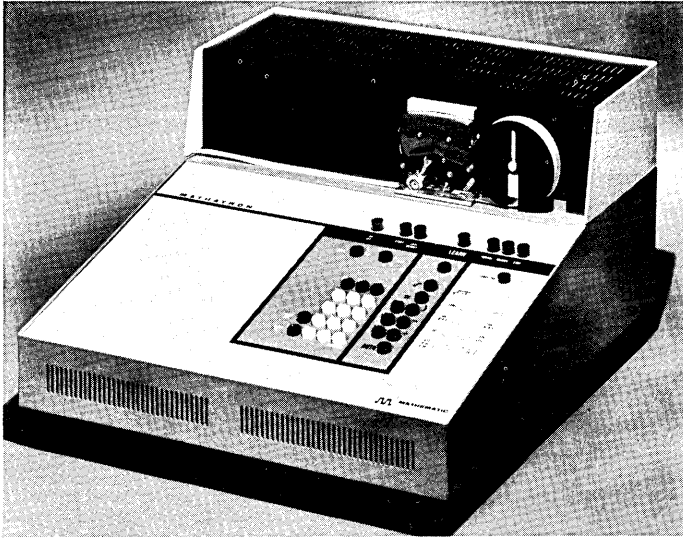
BURROUGHS E1400 / Burroughs Corp. — Electronic circuit designs adapted from big computers now are being used in compact business machines like this new Burroughs E1400. This one can read, write, memorize facts, do arithmetic, and print business reports, at only a fraction of the cost of the large electronic computer systems. (For more information, designate #47 on the Readers Service Card.)



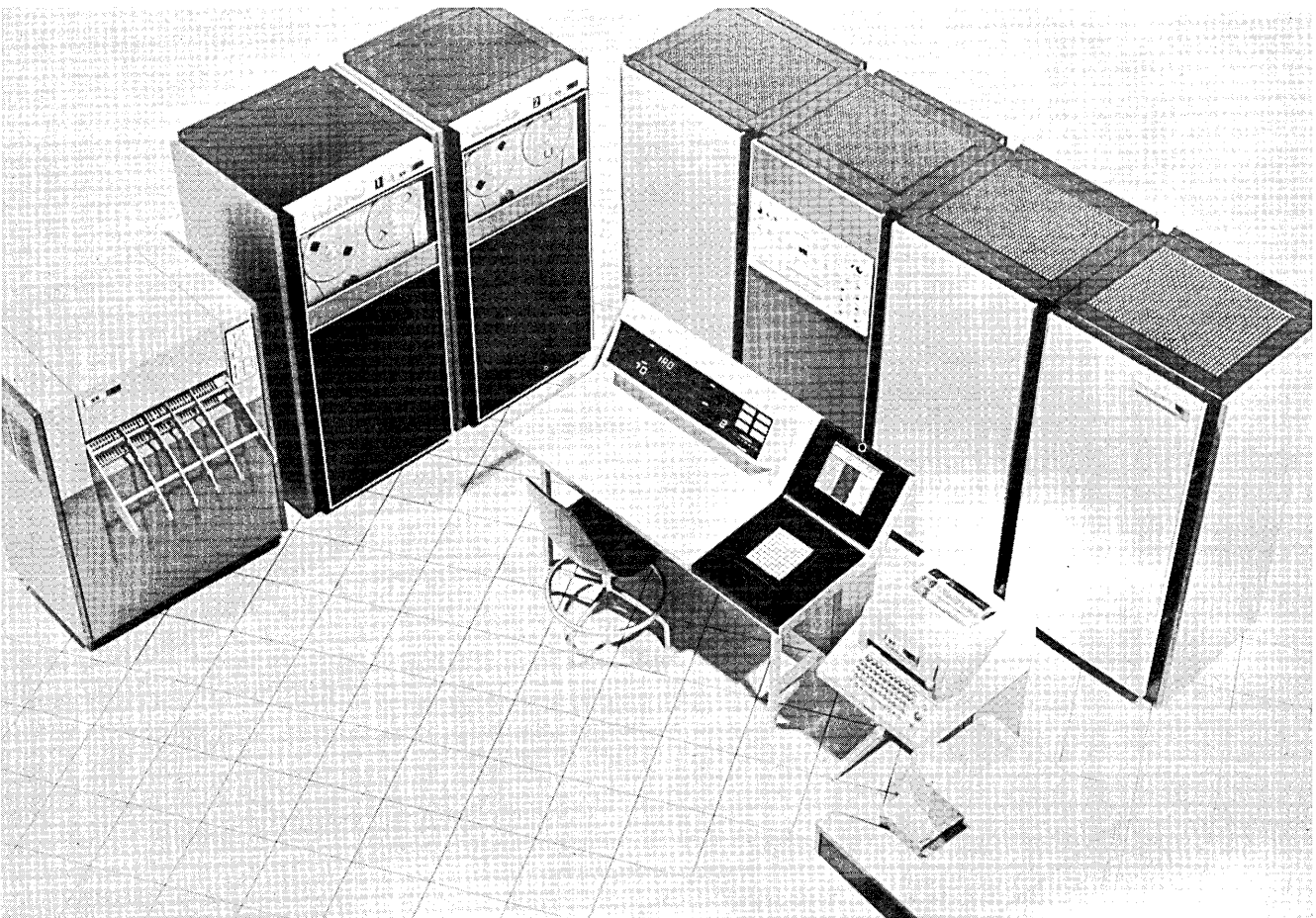
AMBILOG 200 COMPUTER / Adage Inc. — The Ambilog 200 is a general-purpose digital computer with hybrid arithmetic capabilities for direct handling and parallel processing of both analog and digital information. That is, it can evaluate in one machine operation expressions involving both analog and digital data. The video display with light-pen control, shown in photo, encourages a rare degree of direct user involvement in signal processing. The user can "program" the Ambilog to perform data acquisition, display, editing, and analysis. The Ambilog 200's capabilities are fundamental to a broad spectrum of scientific and industrial research applications: simulation, biomedicine, seismology, oceanography, dynamic-test instrumentation, communications, and telemetry. (For more information, designate #48 on the Readers Service Card.)



μ -COMP DDP-516 COMPUTER / Honeywell, Computer Control Division — The DDP-516 has been designed for a variety of real-time on-line applications such as physics research, railroad control, data reduction and process control. More than 250 software programs are immediately available. This third generation integrated circuit computer features 960 nanosecond cycle time, expandable memory to 32,768 words and MTBF in excess of 4000 hours. The compact 16-bit machine is built with I/C μ -PAC logic modules and an I/C μ -STORE ICM core memory. The picture shows three vertical leaved units which contain the system power supply, left, central processor and options, and core memory. The tilt out units provide easy access to both the logic modules and interwiring. (For more information, designate #49 on the Readers Service Card.)

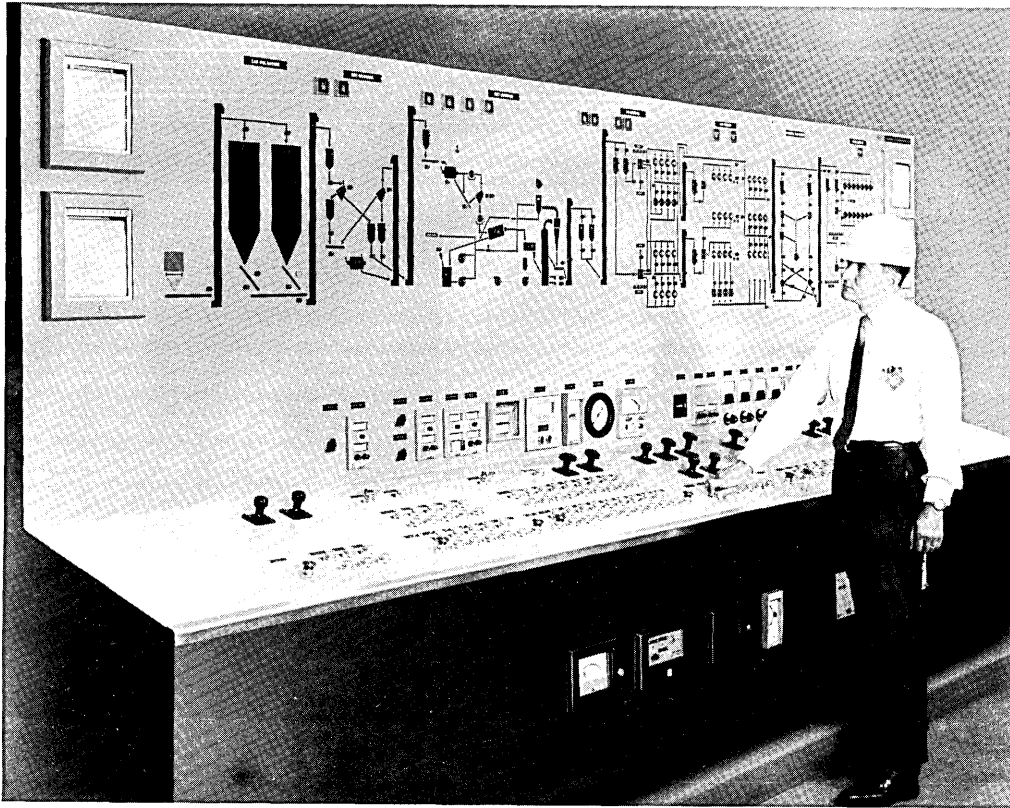


MATHATRON MOD II / Mathatronics, Inc. — This desktop digital computer/calculator has a set of simple pushbuttons indicating decimal numbers, arithmetic operations, and algebraic functions. Inside, it is a solid state electronic computer, with core memory for program and data storage and your own special formulas wired in. Unique among desktop computers is Mathatron's new $1/2$ power (square root) function which mathematically closes parentheses and computes power to the $1/2$ of either a single quantity or the computation enclosed. Also a digit retention feature allows the operator to enter numbers of unlimited length, the device automatically preserves the nine most significant digits and adds all additional entries to the exponent. Modular construction permits expansion into a wide range of peripheral equipment and accessories as computational needs grow. (For more information, designate #52 on the Readers Service Card.)

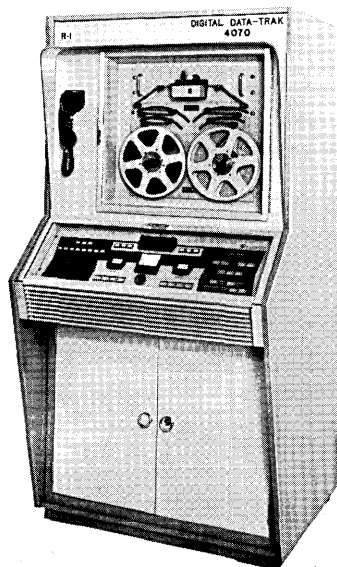
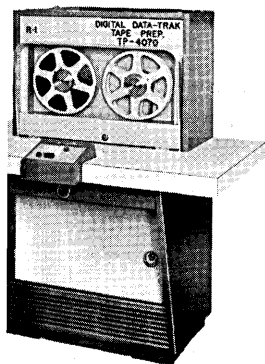


SIGMA 7 / Scientific Data Systems — Sigma 7 configuration which provides real-time, multiprogramming, multiprocessing, and time sharing, includes (left to right): line printer, magnetic tape systems, central processor unit, operator's console, Teletype, and card reader and punch. The central processor of conventional computers frequently remains idle when peripheral equipment is in use. With Sigma, special Input/Output Processors (IOP's) operate independently of the central processor so that 32 peripheral devices can be operated simultaneously. Since being announced in March, memory speed has increased thirty percent from a memory cycle time of $1.2 \mu\text{sec}$ to its present 850 nanoseconds. (For more information, designate #53 on the Readers Service Card.)

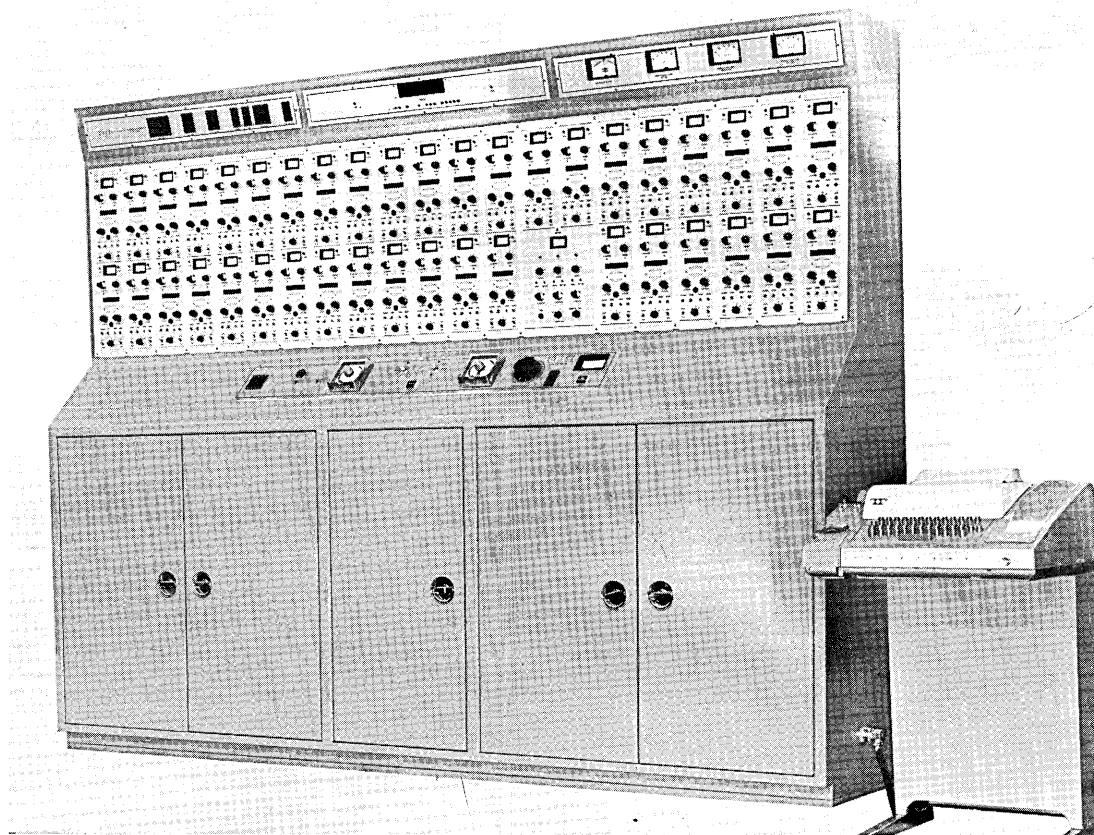
ANALOG COMPUTERS



ANALOG BLENDING SYSTEM / Leeds & Northrup Company — Under the geodesic dome of Carborundum Company's new plant at Niagara Falls, there will be an automatic control system for processing silicon carbide material from railroad sidcar unloading through grinding, sizing, blending, and storage. Leeds & Northrup will supply this system with controlled loss of weight blending, at a cost of approximately \$102,000 for the Carborundum's Electro Minerals Division's new plant. (For more information, designate #54 on the Readers Service Card.)

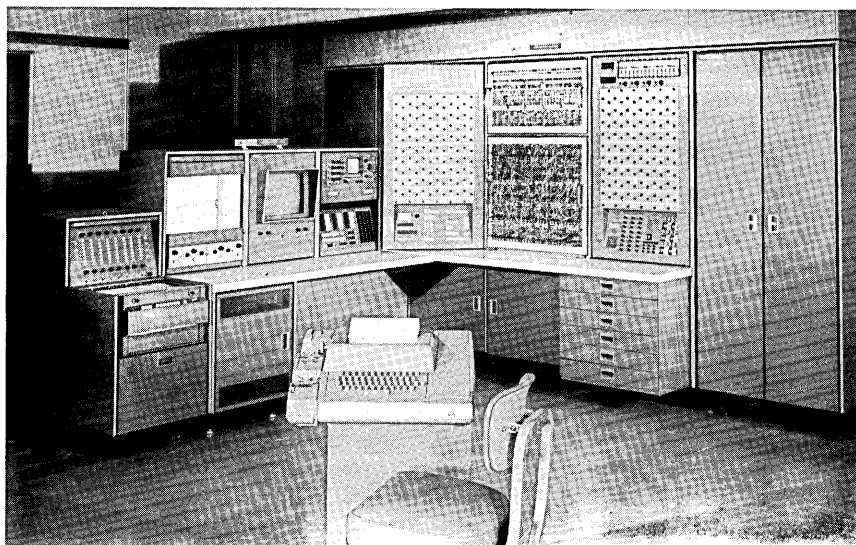


DIGITAL DATA-TRAK NO. 4070 / Research, Inc., R-I Controls Division — This device has been developed for synchronous programming of multi-channel analog control systems. The standard model will program 30 control channels and is expandable to 150 channels by adding plug-in circuits. A typical application is in multi-point temperature control during environmental testing. The programmer operates by setting and updating the control points of the various channels according to instructions punched on standard paper or mylar tape. It is capable of updating individual channels at the rate of one every .003 seconds. As many as 90,000 control point settings can be programmed on one 10-inch reel of tape. Program tapes may be prepared by standard computer equipment or by a Tape Preparation Station that accompanies the programmer (left in photo). For more information, designate #55 on the Readers Service Card.)

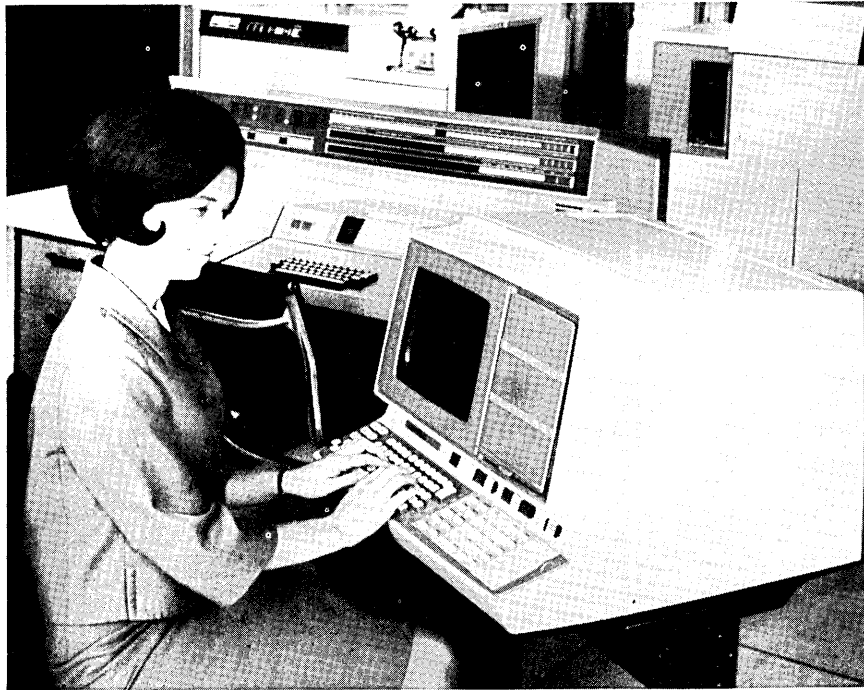


ODEX COMPUTER CONTROL SYSTEM / Odex Engineering Company — This new solid-state computer system, operating in the Gulf of Mexico, completely controls, monitors and logs 40 offshore gas wells to assure a constant supply of dry gas for distribution while simultaneously recovering the maximum amount of profitable condensate. Designed to be compatible with existing field equipment, savings effected by the system are expected to pay off the initial computer costs within 9 to 12 months. The system, housed in a fiberglass house, is situated offshore on the production platform. It was designed to become a "slave" of a master control system and, ultimately, entire production operations for an oil company could be run from an Odex master control panel situated in the home office. The human equivalent of this computer system would be a time-shared executive who would carry on 40 telephone conversations and would operate 40 computers simultaneously. (For more information, designate #56 on the Readers Service Card.)

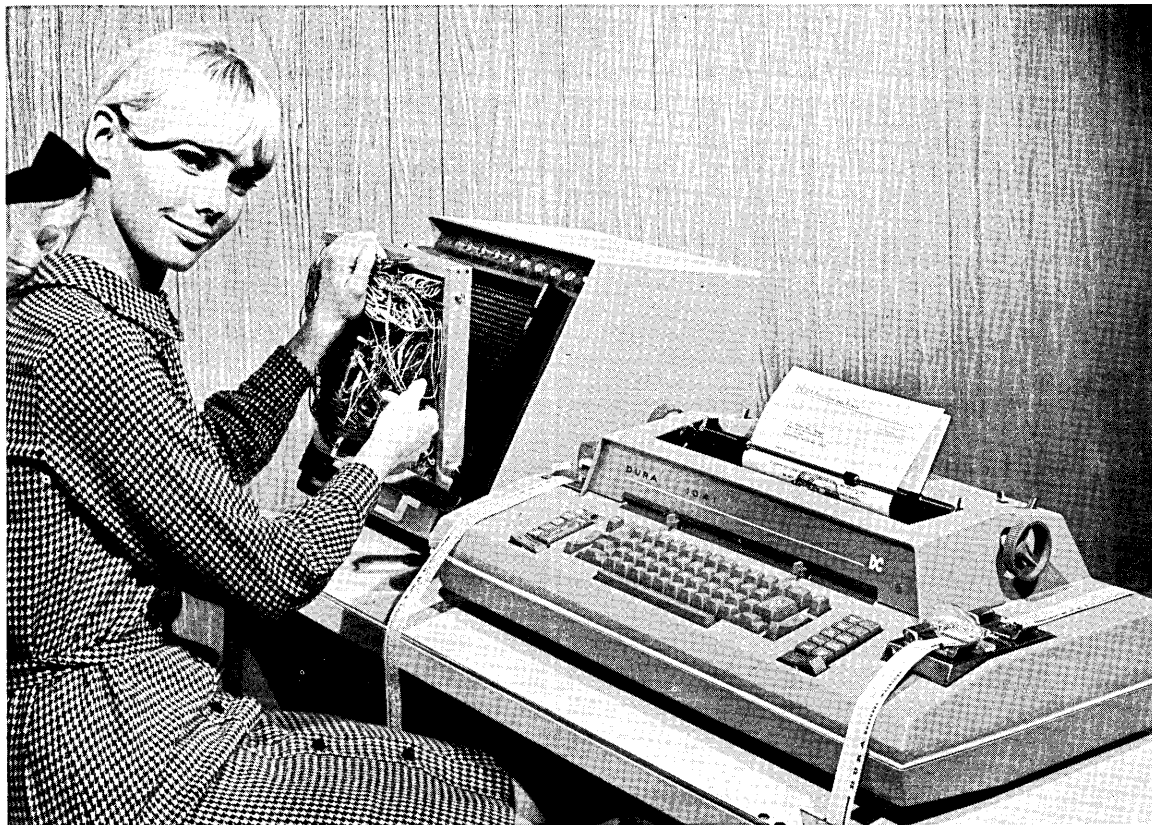
EAI 8800 ANALOG/HYBRID COMPUTING SYSTEM / Electronic Associates, Inc. — A view of the 8800 with accessory input/output equipment. (For more information, designate #57 on the Readers Service Card.)



DATA TRANSMITTERS AND CONVERTERS

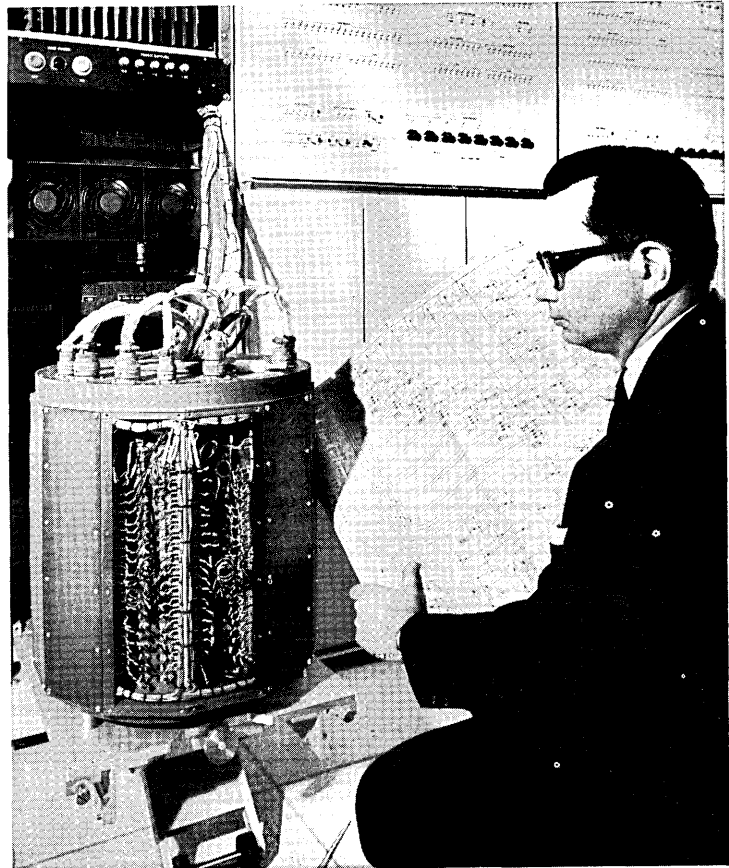


ELECTRONIC AGENT SET / Sperry Rand Corp., Univac Division — United Air Lines agent operates simulated mockup of the airline's push-button reservations set, representing a new \$39 million computerized electronic information system being built by Univac Division of Sperry Rand. New system will process information in 17 different categories. System will be installed at United's executive headquarters near Chicago in 1968.



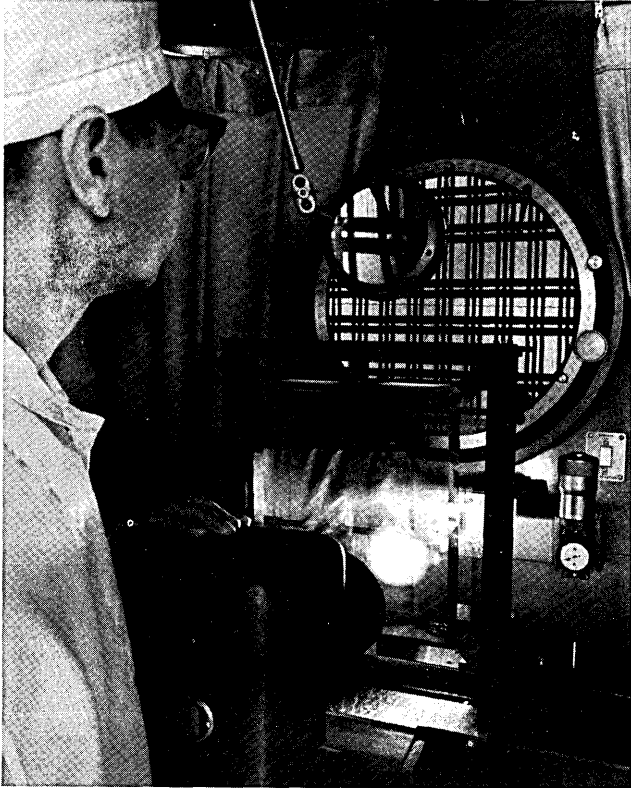
DURA® 1041/61 / Dura Business Machines — This system introduces solid state circuitry combined with advanced punch and reader design in an automatic typewriter, with a code converting device, cable connected. An interchangeable program board is utilized to convert any 5, 6, 7 or 8 channel code to any other code including ASCII, and simultaneously produce hard copy. This board is individually programmed to suit particular needs. Tape programming possibilities are said to be almost limitless. When not used as a tape-to-tape converter, the 1041/61 can be used for processing data, repetitive letter writing and other systems functions. When the Dura 1041 unit of the system is not in use as an automatic typewriter, it functions as a conventional electric typewriter. (For more information, designate #66 on the Readers Service Card.)

AUTOMATIC RE-TRANSMISSION EXCHANGE (ARX) / ITT World Communications, Inc. — A magnetic drum which stores messages and releases them on demand from an electronic "brain" for distribution to overseas points is a vital part of the new Automatic Re-Transmission Exchange (ARX) System developed by ITT World Communications Inc., the subsidiary of International Telephone and Telegraph Corp. Ramon Owins, computer operations and maintenance supervisor, is shown studying the intricate circuits of the ARX system, in which priority messages automatically "bump" those of a less urgent nature. Introduction of ARX represents a major step in ITT's planned development of automated information systems for international use. The tariff permitting commercial users to link their privately-leased communication circuits through a central computer is the first authorized by the FCC. (For more information, designate #67 on the Readers Service Card.)

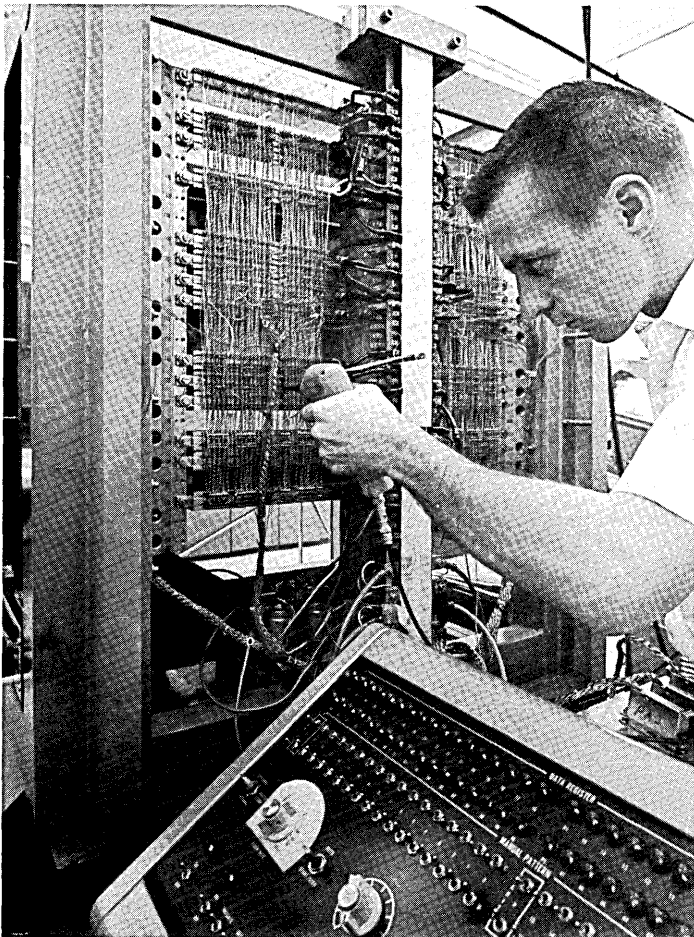


UNIVAC DCT-2000 DATA COMMUNICATIONS TERMINAL / Sperry Rand Corp., Univac Division — This new line of data communications equipment is a combination card punch, high-speed printer and card reader, control unit and operator's console which can send and receive information via voice-grade telephone lines at speeds of 300 characters per second. The printer (at left) can be ordered separately should printed output alone be required. (For more information, designate #68 on the Readers Service Card.)

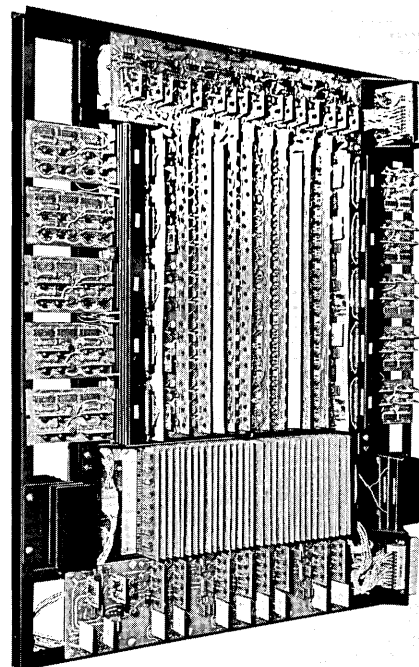
MEMORIES



ASSEMBLY PHASES OF NIKE-X PROCESSOR / Sperry Rand Corporation's UNIVAC Defense Systems Division — The fabricating process for the advanced film memories and data processors for the Army's Nike-X anti-missile missile system, features such new techniques as laminar flow clean rooms, infrared soldering of interconnections, multi-layer circuit boards and use of integrated circuits throughout the memory. The memory section of a Nike-X computer consists of hundreds of thousands of magnetic metal dots vacuum deposited on wafer-thin glass substrates. Electronic circuits used to sense and drive (read and write) information to and from these magnetic dots, each of which represents one bit of information-storage capacity, are etched onto 12-inch square copper-Mylar laminates using a sophisticated photo-etching process. One circuit package, consisting of two separate circuits insulated from each other by a sheet of Mylar, is no thicker than a human hair. The "optical comparator" being operated by quality control supervisor Ray Eklund (upper left photograph) enables inspectors to visually examine each circuit assembly (or "overlay") by projecting a part of it onto a ground glass screen at 50 times magnification. Etching defects show up plainly on the screen. In the picture to the left, UNIVAC technician John Thompson uses an air-operated "gun" to wire wrap connections on a memory module for the Nike-X computer. In eight years as a Nike-X team member, under contract with Bell Telephone Laboratories, Whippany, N.J., UNIVAC has delivered nine computers to Whippany, the Army's White Sands, N.M., missile test range, and Kwajalein Island in the South Pacific.



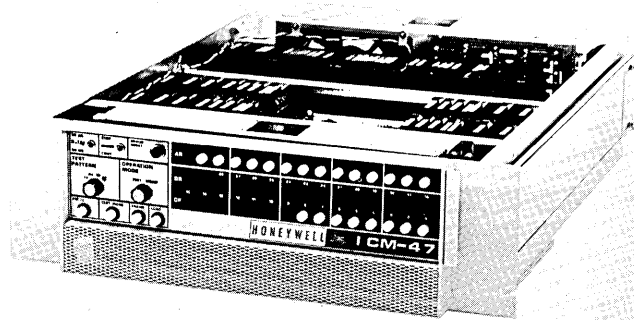
CORE MEMORY SYSTEMS / Burroughs Corporation Electronic Components Division — This newest product line of core memory systems will cover the cycle time range of 0.6 μ sec. to 1.0 μ sec. The basic modular building block in the memory is 8192 words by 20 bits using 20 mil ferrite cores in a 2 $\frac{1}{2}$ D organization. Monolithic integrated circuits are used for all the logic and information and address registers. The line drivers and sense amplifiers use Burroughs hybrid microcircuits. Overall power consumption for 8192 word by 20 bit module is only 295 W (for the 0.6 μ sec. system). (For more information, designate #58 on the Readers Service Card.)



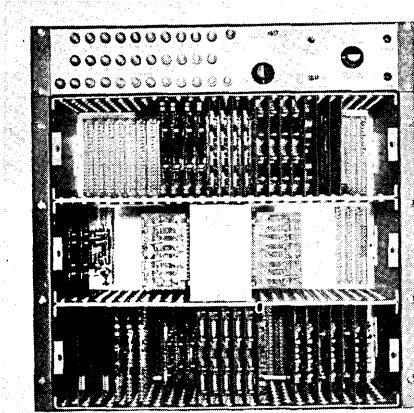
353-5 CRAM (CARD RANDOM ACCESS MEMORY) UNIT / The National Cash Register Co. — NCR's new 353-5 CRAM for its 315 family of computers can store 62 million characters of information and access items in less than a sixth of a second. The device uses changeable "decks" of plastic magnetic cards shown in the model's hand. Up to 16 of the new CRAM units can be used in a single computer system, providing a maximum capacity for random access of 992 million characters. (For more information, designate #59 on the Readers Service Card.)



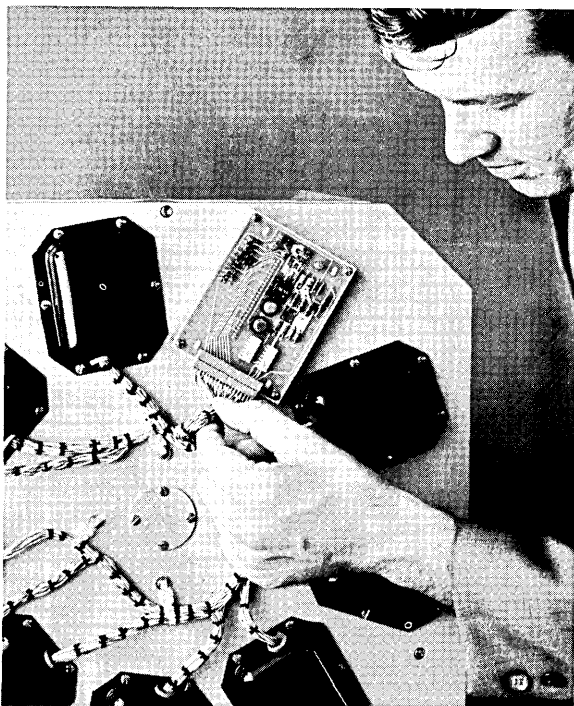
μ -STORE ICM-47 MEMORY SYSTEM / Honeywell, Computer Control Division — The ICM-47 has a full cycle time of 750 nanoseconds, access time of 400 nanoseconds. For 4096 and 8192 word memories, the maximum word length is 28-bits per memory module. In 16,384 word systems, word lengths up to 14-bits are available. The memory unit is made with integrated circuit digital logic modules. It is the second system to be announced by the division in less than a year. (For more information, designate # 60 on the Readers Service Card.)



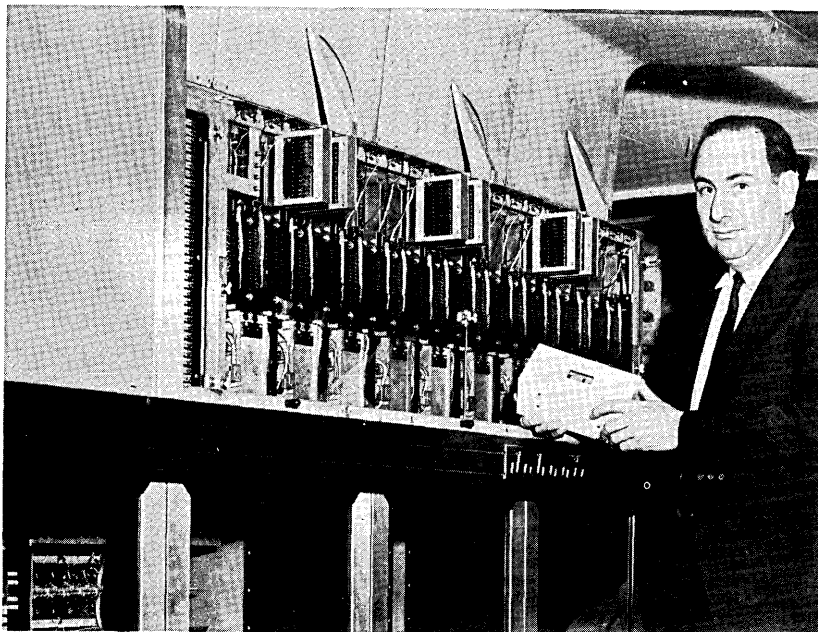
Memories



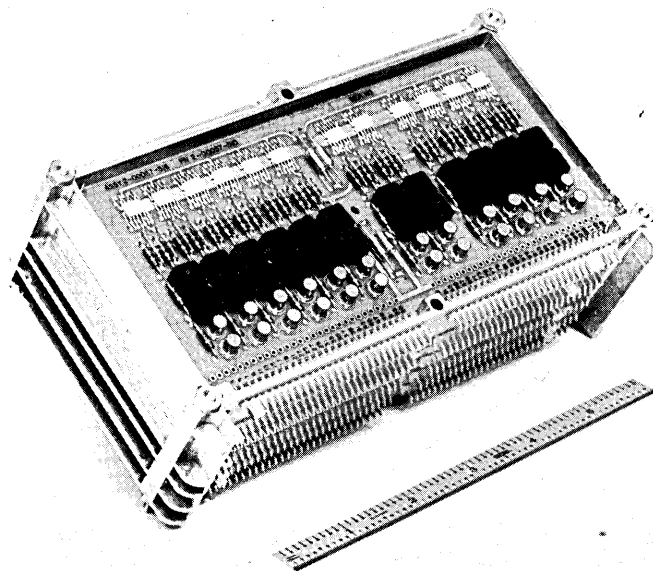
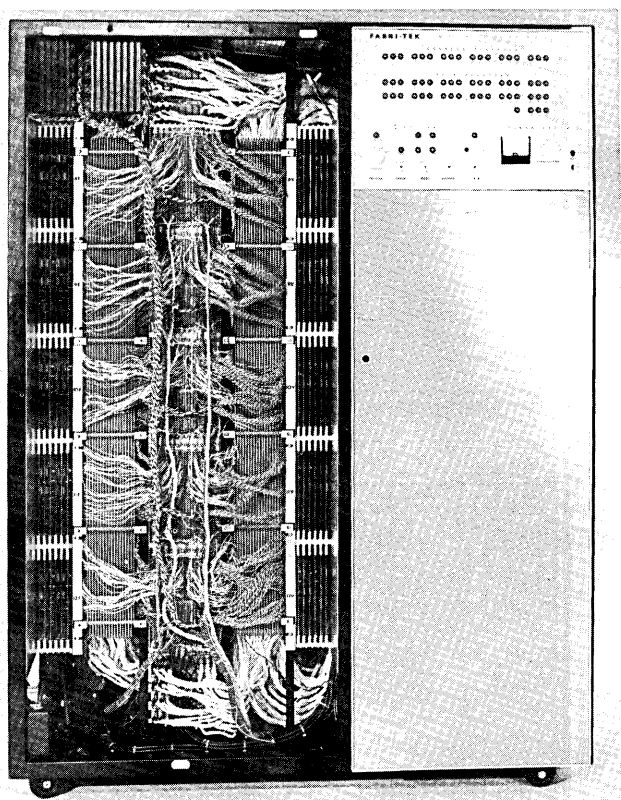
INTEGRATED CIRCUIT, 2- μ SEC CORE MEMORY SYSTEM / Di/An Controls, Inc. — The new 2- μ sec series are Coincident Current Core Memory Systems which are available in capacities of 64 to 32,768 words and word lengths of 4 to 64 bits. System flexibility as well as ease of maintenance is provided through the use of pluggable memory stacks and component cards. Lithium-ferrite core arrays are available to allow system operation over a wide temperature range. This modular concept permits the user to increase both the system operating temperature range and/or storage capacity in the field. (For more information, designate #61 on the Readers Service Card.)



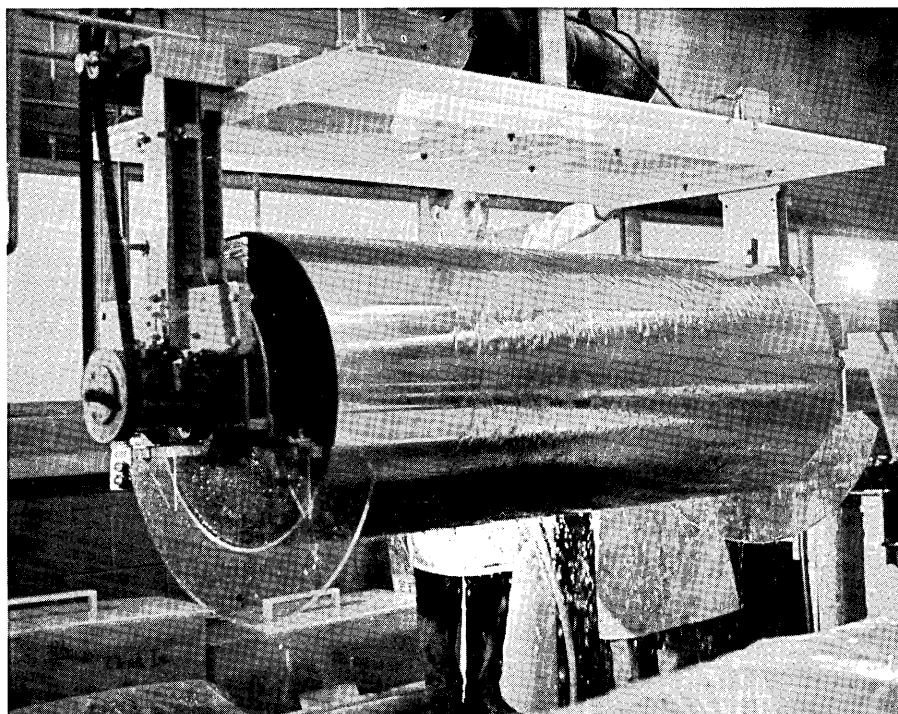
LIBRASCOPE DISC MEMORY, MODEL L416 / General Precision, Inc., Librascope Group — Integrated circuitry is used for the first time in a Librascope disc memory in the L416 shown here. Packaged and mounted directly on the head-mounting plate, integrated circuits greatly enhance the memory's compactness and reliability. Here, a Librascope employee checks circuitry before delivery. The L416 has a storage capacity in excess of 24 million bits of information, utilizing both sides of its two 16-inch magnetic discs. Average access time is 8 milliseconds. Primary applications of the new memory are main storage, buffer storage, or as a supplement to other memories. Librascope memories range in capacity from 30,000 data bits to more than 400 million bits, and use discs varying in size from 6½ inches in diameter to 48 inches in diameter. Most models can be delivered virtually off-the-shelf. (For more information, designate #62 on the Readers Service Card.)



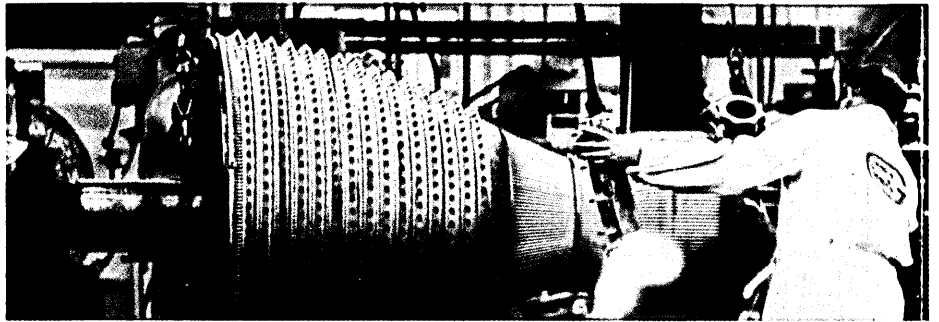
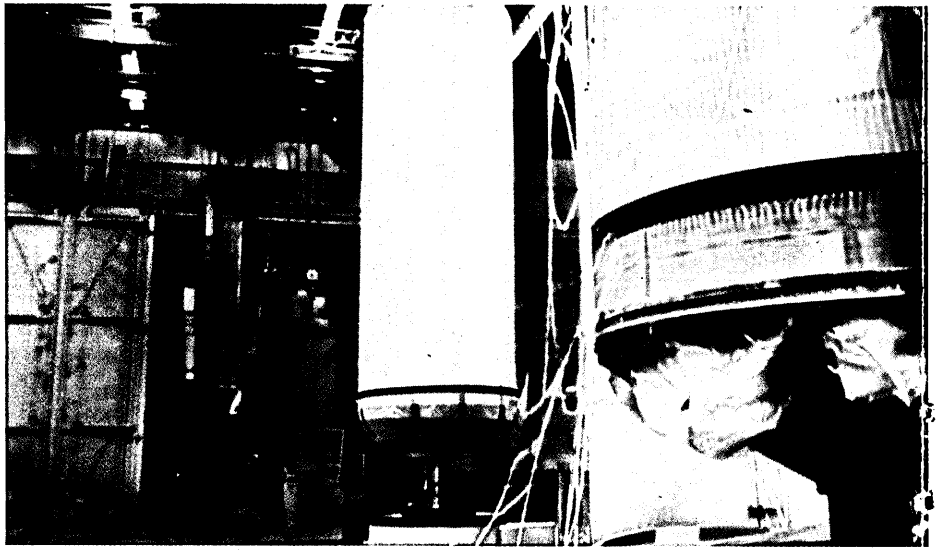
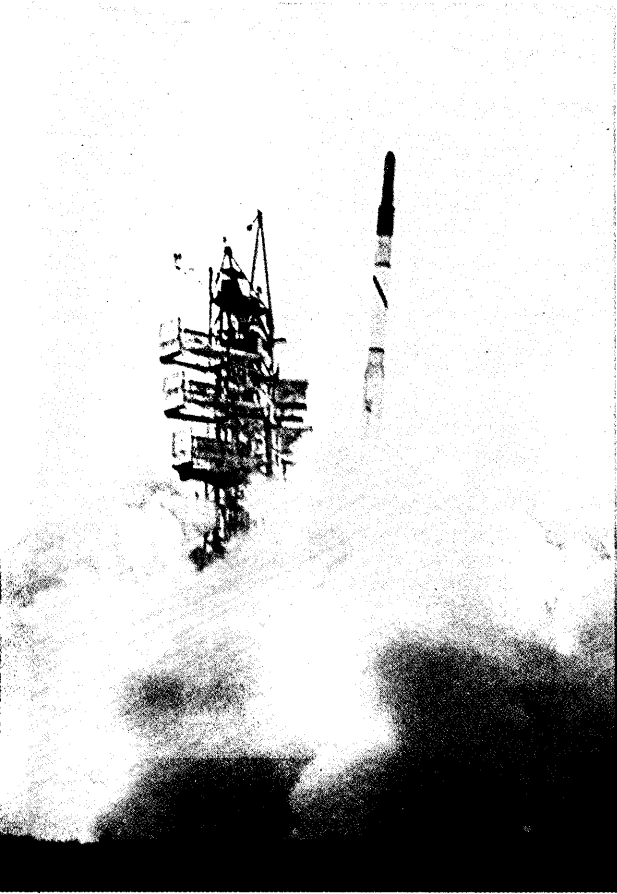
SEMS 5 / Electronic Memories — The white box is SEMS 5, a new 7-pound integrated circuit memory which stores as much data as the 800-pound 1955 memory behind it. SEMS 5 is designed for rugged military and space uses. It has a fast cycle time of 2 μ seconds and an access time of 700 nanoseconds. SEMS 5 operates at temperatures from 66 degrees below freezing to 185 degrees above (-55°C to $+85^{\circ}\text{C}$). The 800-pound memory is the first commercial core system, used in the historic Johnniac computer until 1966. Both memories contain 4096 computer words of comparable lengths. (For more information, designate #63 on the Readers Service Card.)



COMPUTER MEMORY SYSTEMS / Fabri-Tek Inc. — Systems shown at the Fall Joint Computer Conference by Fabri-Tek ranged from an airborne memory weighing only 2 pounds (shown above right) to a mass core memory capable of storing 20-million bits (above left). The airborne type system has a storage capacity of 2048 words by 18 bits packed into a 67 cubic inch package. Fabri-Tek's mass core memory system is capable of interfacing with all computers. (For more information, designate #64 on the Readers Service Card.)



FASTRAND MEMORY DRUM / Sperry Rand Corp., Univac Division — A technician in the Engineering Department of the Univac Division rinses a FASTRAND Memory Drum after it has emerged from a chrome plating bath. The chrome coating is the last of a number of plating operations performed on the drum before it becomes part of a computer system. (For more information, designate #65 on the Readers Service Card.)



At Aerojet-General, all SYSTEM/360's are go...

Three IBM SYSTEM/360's are on line at the Sacramento Plant. All operating at full capacity.

One Model 30 SYSTEM/360 doubles the output at half the cost of a former setup. Two Model 30's do as much or more production than three previous systems.

No wonder Aerojet-General is pleased. And though the other systems were IBM's, we're just as pleased as Aerojet-General.

SYSTEM/360 took over with hardly a pause. Programs that emulate existing systems made it possible.

That's how A. W. Cole, Manager of the Computing Sciences Division, keeps the Division on schedule. Schedules at Aerojet-General are vitally important to projects like Polaris,

Minuteman, Titan and Apollo.

One SYSTEM/360 acts as a peripheral unit for two computers. It reads three output tapes, drives three printers, converts 1000 cards a minute to tape. Simultaneously.

Another SYSTEM/360 does general accounting. It picked up programs from the former system. Got 50% more output the day it went on the air. The IBM Basic Operating System (BOS/360) controls its operation.

A third SYSTEM/360 is on line at the firing line—a test stand for engine firings. It collects and reduces data on pre-firing functions. Transmits a "go-ahead" back to the test stand in a matter of minutes.

IBM Operating System (OS/360) with FORTRAN and ASSEMBLER programming languages, provides the control and communications for this system.

And, what about the future?

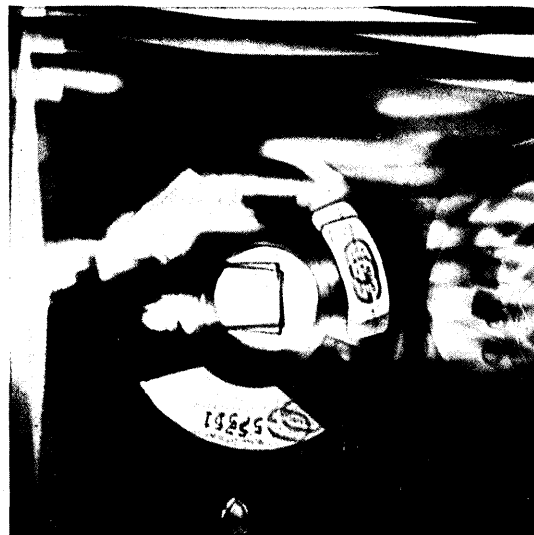
Aerojet-General looks to larger systems, huge data banks, complete management information in real-time, on-the-spot engineering computations with remote consoles linked to computers.

It looks like more SYSTEM/360's for so many of the business functions that will affect tomorrow's successes.

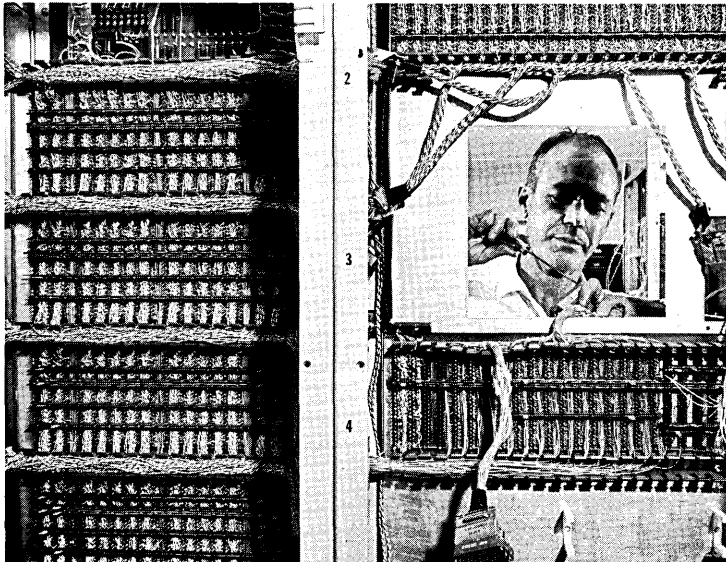
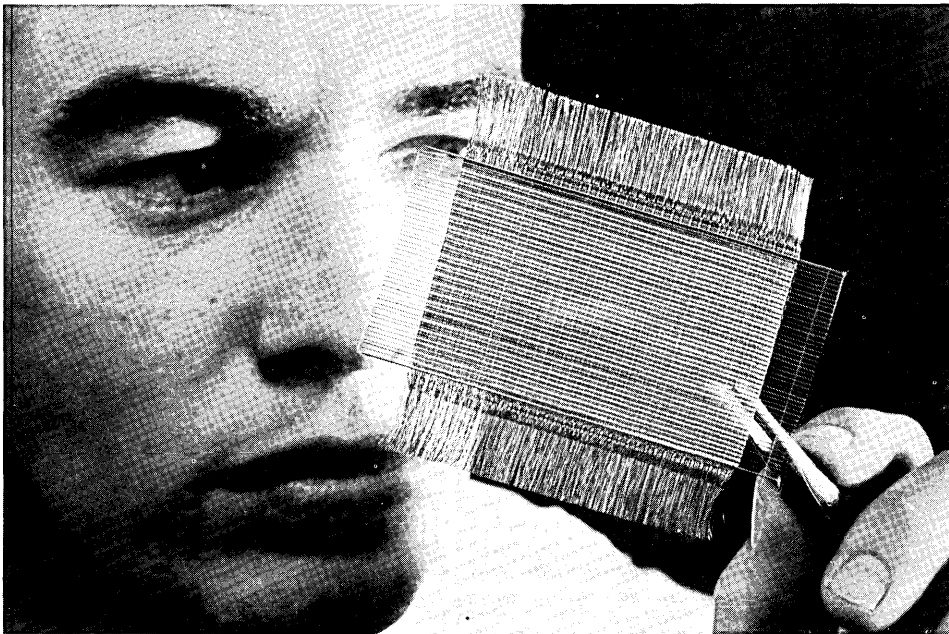
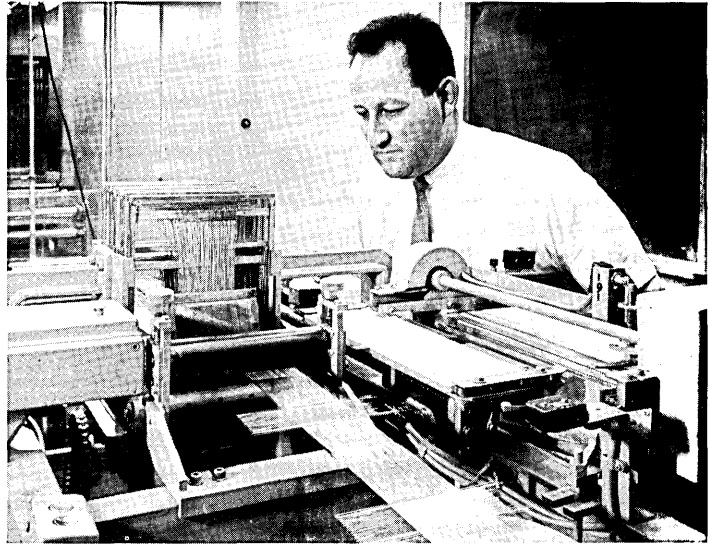
That's why other companies in all kinds of industries find SYSTEM/360 the way of the future.

IBM®

all projects on course.

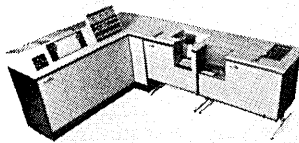


WOVEN PLATED WIRE MEMORY / General Precision, Inc., Librascope Group — At the right an operator checks electronic memory being automatically woven into matrices (foreground) on a loom. The memory operates in less than 100 billionths of a second (100 nanoseconds) making it one of the fastest in existence. Below an engineer checks the new computer memory, which looks like a piece of cloth. Data is magnetically stored at intersections of the wires. A number of the cloth-like planes are stacked one on top of another to make a memory system that is fast, small, and lightweight. It uses very little power and generates no memory-element heat. This is the first computer memory automatically woven in the United States. (For more information, designate #104 on the Readers Service Card.)



FRAMED IN WIRE — Improved wiring techniques are being used in electronic and logic circuitry in the Spectra 70 computer system manufactured at RCA's Electronic Data Processing plant in Palm Beach Gardens, Fla. Special production skills, as displayed by technician James Thyne, are required to handle the compact wiring that make up this high speed memory unit. (For more information, designate #103 on the Readers Service Card.)

Here's the Univac[®] 9200: the first computer at tab equipment prices.



The Univac 9200 is the first in a series of interlinking computers. You can rent the 9200 for about \$1,000 a month or own it for less than \$45,000.

This low-priced system is compact and is internally programmed. It provides for card input/output with high-speed printing, and is delivered with a complete software library.

The memory starts at 8,192 bytes and can be expanded to twice that size. The high-speed memory of the powerful central processor provides many operating advantages. For example, simultaneous input/output and processing capability. The Univac 9200 offers more throughput... in less time... at lower operating cost than ever before possible.

When the 9200 is combined with the Univac 1001 Card Controller, the system automatically delivers more benefits. It can read from as many as four separate files at combined speeds of over 2000 cpm. This combination does the work of six conventional punched-card machines: Accounting machine, calculator, collator, sorter, reproducer, and summary punch.

The Univac 9200 provides varied input/output capabilities to meet your specific needs. Punched cards are read at 400 cpm. The Univac 1001 Card Controller provides dual 1000 cpm feeds for input speeds up to 1000/2000 cpm. Cards are punched at the rate of 75-200 cpm. A read/punch feature is available which means an additional file can be read concurrently at 2000 cpm. The basic printing speed is 250 alphanumeric lpm and can be increased up to 500 numeric lpm—within the same report if needed.

Built-in growth potential is easily realized with the 9200. In fact, the 9200 can be modified on-site to the Univac 9300 system.

No switch in processors is required.

The 9200 programs can be run on the Univac 9300 system immediately. Be sure to get all the facts. Call

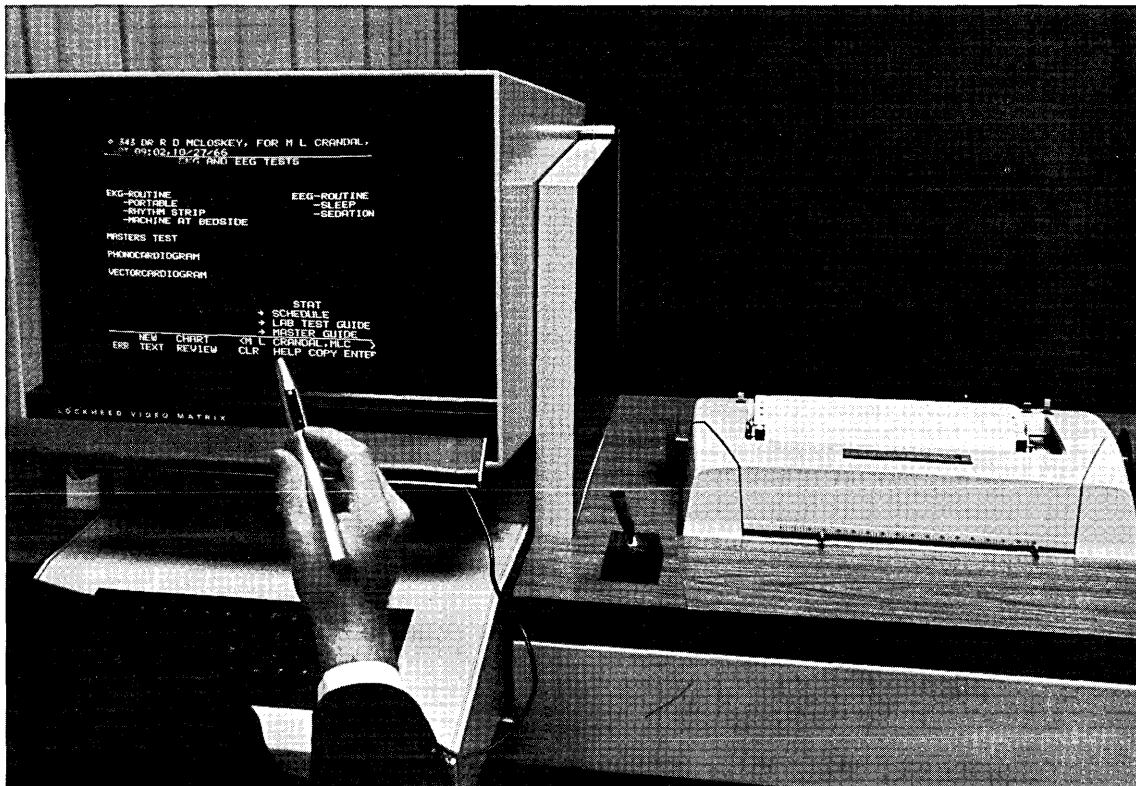
UNIVAC
DIVISION OF SPERRY RAND CORPORATION

Designate No. 9 on Readers Service Card

INPUT-OUTPUT EQUIPMENT

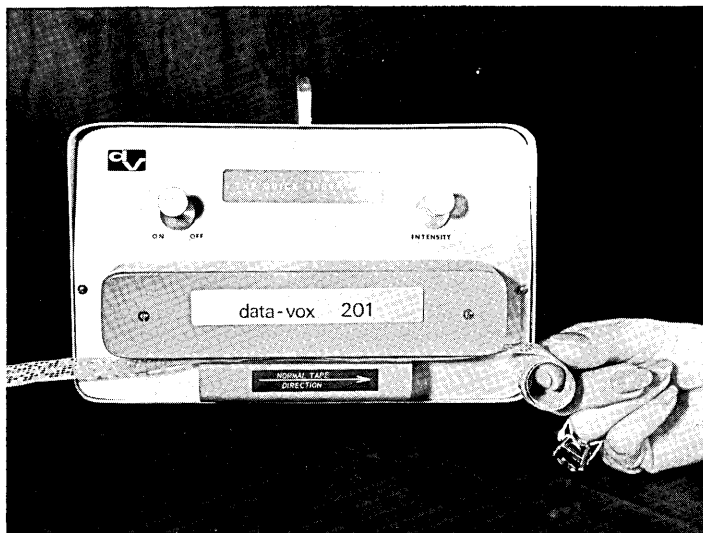


NCR 404 BANK SORTER / The National Cash Register Company — When a pocket of NCR's new "404" low-cost bank sorter is filled, the machine stops automatically, and a light signals the operator. When documents are removed, sorter starts again automatically. Sorter features 11 pockets, maximum speed of 600 documents a minute. The 404 will accommodate a wide variety of document sizes and weights, in thicknesses ranging from .003 inch to .01 inch. (For more information, designate #69 on the Readers Service Card.)

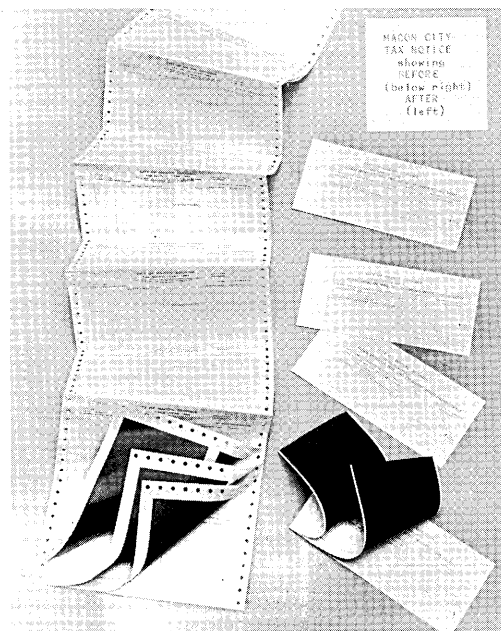


HOSPITAL INFORMATION SYSTEMS / Lockheed Missiles & Space Co. — The remote terminal is connected to an SDS 92 computer. Roughly 1000 stored matrices contain many thousands of bits of information covering medical orders and minute tasks related to treatment of hospital patients. To use the terminal, a doctor inserts his own magnetic-coated card into the vertical slot to the right of the video screen. The terminal recognizes the user as an authorized doctor (or nurse, or whatever). The first image shown is a list of the particular doctor's patients. The doctor points his light pen at one patient's name, and the picture shifts to a list of possible medical orders. He points the pen at one order, and a list of sub-orders appears...and so on. When all his selections are complete, the final orders are printed out on the printer beside the video screen. The doctor thus can sign a copy for the official files, and nurses responsible for executing the orders have quick access to them. The keyboard is for entry of highly topical or specific data, such as patient names or room numbers, into the system. (For more information, designate #70 on the Readers Service Card.)

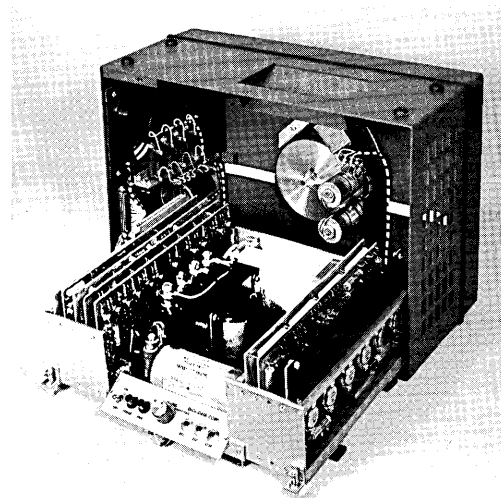
MODEL 201 PAPER TAPE EDITOR (PTE) / Data-Vox Corporation — The PTE contains a high-speed block reader which scans a 16-character segment of the tape, immediately decodes each character and projects the appropriate alphanumeric symbol in proper sequence on a cathode ray tube. The message field on the screen remains stationary or travels in either direction as the tape is moved. Optional tape spoolers, either motorized or manual, are available. The device is adaptable to 5-, 7-, or 8-level chad tape and reads all conventional paper tape materials, colors, and thicknesses. (For more information, designate #71 on the Readers Service Card.)



CONTINUOUS FORMS / Transkrit Corp. — The accompanying photograph shows the "before" and "after" tax bills for the City of Macon, Ga. Earlier this year the 6-part continuous form was designed for use on an IBM 1401 computer by the Transkrit Corp. The new continuous form, produced on rotary equipment by Transkrit, is $8\frac{1}{2}$ " x $4\frac{1}{4}$ ", or $7\frac{1}{2}$ " x $4\frac{1}{4}$ " detached. The old form overall size was $7\frac{1}{2}$ " x $3\frac{1}{2}$ ". In both cases, the same colors of stock were employed but the new form is redesigned to provide a better layout. Various patterns of hot wax spot carbonizing were used in both forms on all six parts, since the last part transfers some information to a permanent record in the tax collector's office. (For more information, designate #72 on the Readers Service Card.)

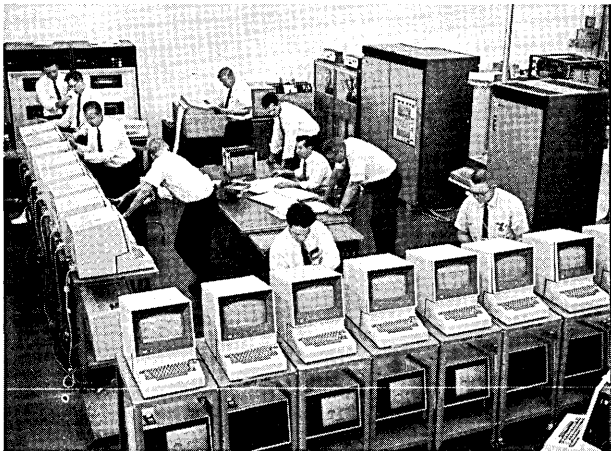


PORTABLE RECORDER / Digi-Data Corporation — This portable recorder, shown opened for service, is not much larger than its two standard $10\frac{1}{2}$ " diameter computer reels — $11-1/2$ " W x 17 " D x $7-3/4$ " H. All electronics and tape handling for making computer compatible recordings are contained in this package which weighs but 37 pounds when loaded with a full 2400 foot reel of computer tape. All switching and control logic are solid state with the exception of the control panel switches and one micro switch which detects broken tape. The electronics are assembled on printed circuit boards that plug into connectors mounted on the card cage. The card cage which carries the card connectors, wiring, control panel, and power supply folds out for service. Digi-Data incremental tape recorders are designed to have a useful life of over ten years. (For more information, designate #73 on the Readers Service Card.)

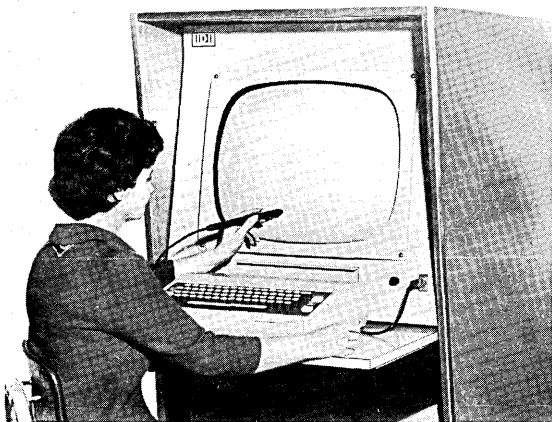




VIDECOMP / Radio Corporation of America — An engineer inspects punched paper tape used in the RCA Videocomp, a unique type composition system capable of setting the entire text for a newspaper page in two minutes through the use of video and computer techniques. Original copy is fed into a computer which hyphenates and justifies the text and produces an output tape. This is read electronically by the Videocomp, which calls from its memory the proper characters in desired type font and size. The characters, such as the "a" generated on the oscilloscope in the picture, are written on the face of a high resolution cathode ray tube and exposed through a precision lens directly onto sensitized film or paper for subsequent printing by offset, letterpress or gravure processes. (For more information, designate #74 on the Readers Service Card.)

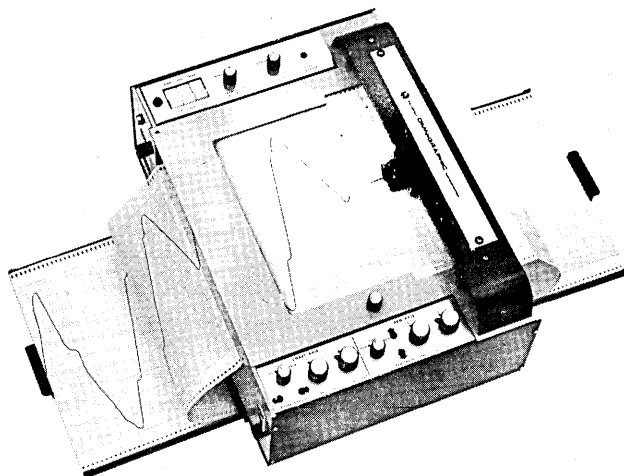


IBM 1500 INSTRUCTIONAL SYSTEM / IBM Corporation — The IBM 1500 uses television-like consoles, slide projectors and audio systems to compose a student station. In the picture a prototype system is shown undergoing final tests at the company's San Jose plant before delivery to Stanford University's Institute for Mathematical Studies in the Social Sciences. In operation, the system at Stanford has 16 student stations and two teacher stations all channeled into a single computer. The computer furnishes instructions at a pace set by each student, keeps track of their scores and analyzes the data so that teachers and school officials who are preparing the courses will have reports on the student's progress. (For more information, designate #75 on the Readers Service Card.)

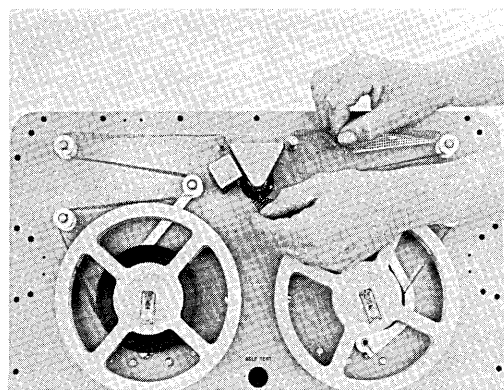


IDI TYPE CM10058 COMPUTER CONTROLLED DISPLAY / Information Displays, Inc. — This high capacity, solid state, computer controlled display system recently was delivered to Glasgow's National Engineering Laboratories where it is expected the equipment will be used for computer-aided design, and other man-machine applications. The system can generate up to 80,000 characters a second and features a light pen and keyboard by which the operator can query, add, delete, and edit displayed information. The equipment delivered to Scotland includes an interface which permits operation directly from a UNIVAC 1108, but the modular design permits adaptation to use with most other computers. (For more information, designate #76 on the Readers Service Card.)

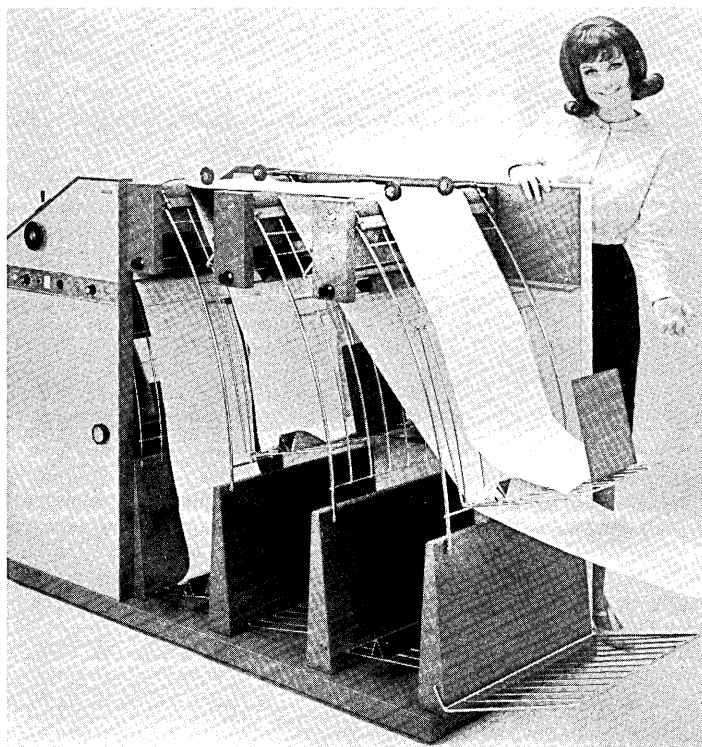
MODEL 6650 OMNIGRAPHIC[®] RECORDER / Houston OMNIGRAPHIC Corporation — This device is a bi-directional incremental plotter which operates from a wide variety of driving signals. Both the pen and paper (fan-fold) move independently in discrete or incremental steps at speeds up to 18,000 increments per minute following an input which supplies change of state information. These inputs may include digital computers, incremental encoders, pulsers, four wire commutated encoders, pulse generators, stepper motor drive circuits or contact closures. The pen will draw a continuous trace or plot points. The recorder accuracy is 0.002 inches and it may be either powered from AC or DC sources. (For more information, designate #77 on the Readers Service Card.)



EEO 3002 PUNCHED TAPE READER / Electronic Engineering Company of California — This lightweight (15 pound), ruggedized photo-electric punched tape reader is for airborne, mobile or "suitcase" use. A direct coupled stepping motor drives the tape in either direction at any speed up to 200 characters/sec. The tape reels will hold 850 feet of tape. Driving and reading electronics use silicon integrated circuits and semiconductors. (For more information, designate #78 on the Readers Service Card.)



DECOLLATOR / Tab Products Co. / According to the manufacturer, this is the first decollator specifically designed for in-line processing and for new carbon back forms. This solid state decollator takes continuous forms directly from high speed printers and other machines. An electric eye control enables it to automatically slow down or speed up without jerking or tearing paper, and without interfering with computer printout operation. Set-up time is reduced to a minimum, since special program rod allows presetting for sizes in a matter of seconds. Advance design carbon removal apparatus is faster and safer. (For more information, designate #79 on the Readers Service Card.)

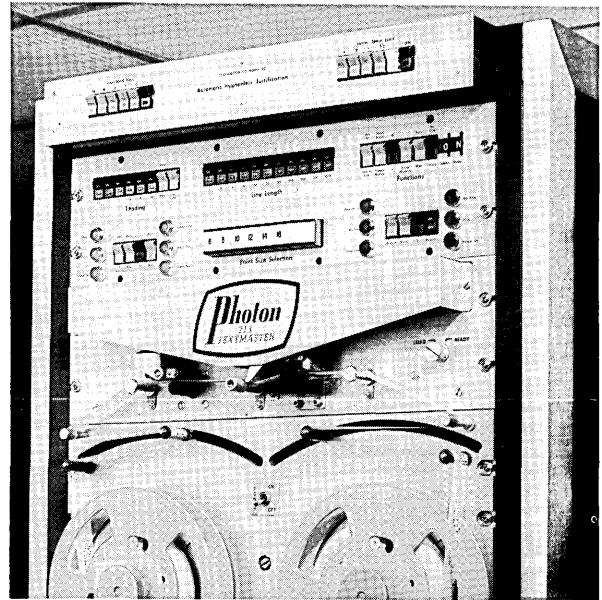




CALCOMP MODEL 835 ELECTRONIC PLOTTER / California Computer Products, Inc. — The 835 combines the digital incremental plotting principle developed by CalComp with the ultra high speed capability of an all-electronic system. Operating directly from the computer output, the new system is capable of plotting graphic data up to 300 times faster than an electromechanical ink-on-paper plotter. The graph or picture is traced out on the screen of a cathode-ray tube and automatically photographed on 35mm or 16mm microfilm. The picture shows the Model 835 logic and control unit, and 35mm microfilm camera. Film is advanced automatically at end of each plot, and camera holds up to 400 feet. The recessed panel (foreground) includes provisions for complete checkout of logic circuits. Front panel includes operating controls and status indicators. (For more information, designate #80 on the Readers Service Card.)

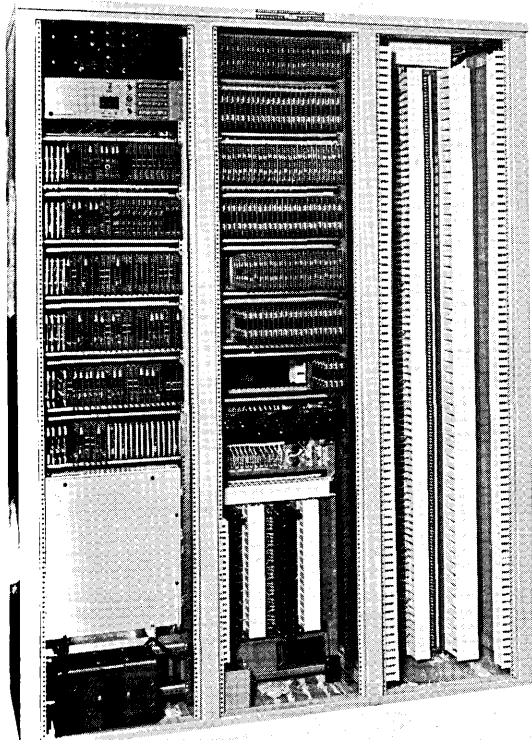
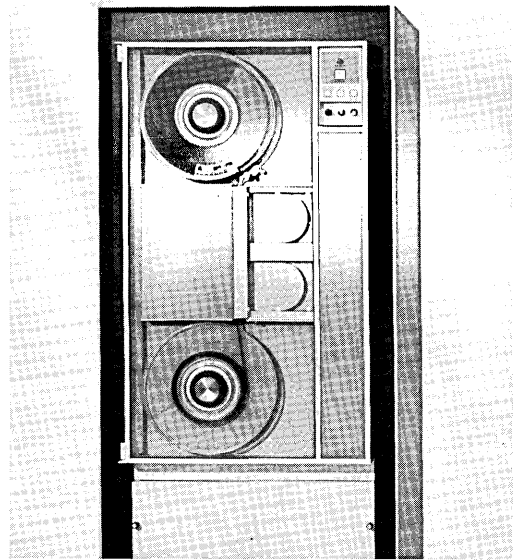


MODEL HSP-3502 CHAIN PRINTER / Potter Instrument Co., Inc. — Newly-designed chain provides superior vertical registration. Number of different electrical and mechanical parts have been reduced to approximately 200. This new model is capable of printing at speeds up to 400 lines per minute and provides up to 192 different characters in up to 132 columns. Alphanumeric, numeric, and symbolic printing as well as upper and lower case characters are provided. Design improvements have resulted in lower cost system. (For more information, designate #81 on the Readers Service Card.)

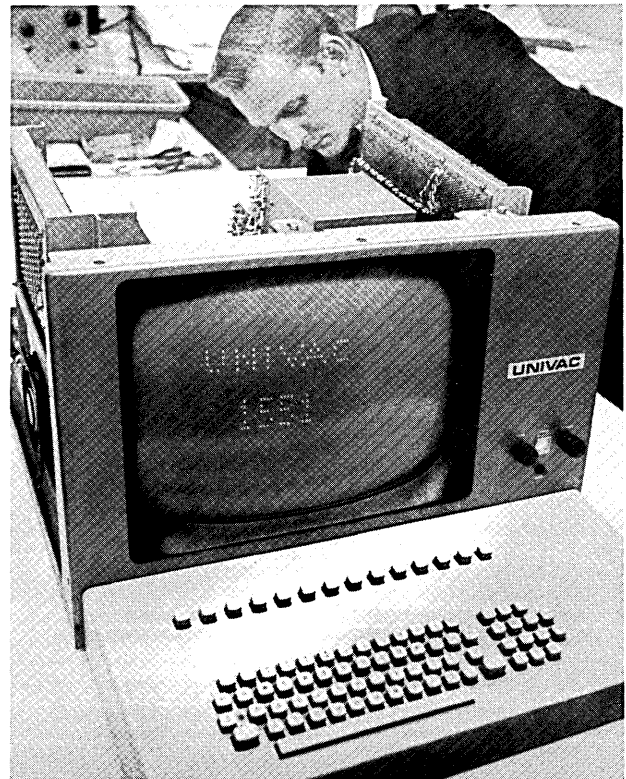


713 TEXTMASTER MODEL 20 / Photon, Inc. — This device is the first typesetting machine with ability to justify automatically from "raw" paper tape produced by non-counting keyboards. The 713-20 reads 6, 7, or 8 channel paper tape at 500 characters a second, and puts the content into core memory. Automatic computation then determines the optimum line-breaking points and the correct size of inter-word spaces to achieve hyphenless justifying. In any line in which inter-word spaces would exceed in size a limit point of aesthetic acceptability, the machine automatically inserts fine increments of inter-letter spacing equally in all words throughout the line. (For more information, designate #82 on the Readers Service Card.)

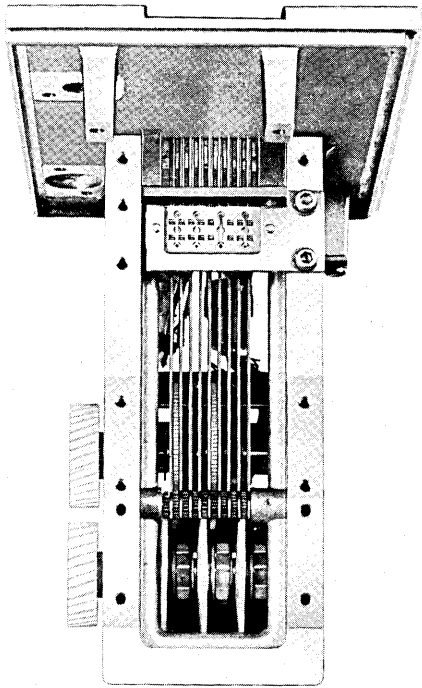
ADR-100 DIGITAL RECORDER / 3M Company, Revere-Mincom Division — This new asynchronous digital recorder writes data at the rate of 2000 characters per second, and can record during the start interval in the asynchronous mode. Three models of the system are designed to complement and be compatible with the seven-channel IBM Systems 727 and 729 and the 800-bpi nine-channel IBM 360. Specifications state packing densities of 200, 556 and 800 bpi, with a recording error rate of better than 1 in 10^6 bits and skew held to less than 250 microinches. (For more information, designate #83 on the Readers Service Card.)



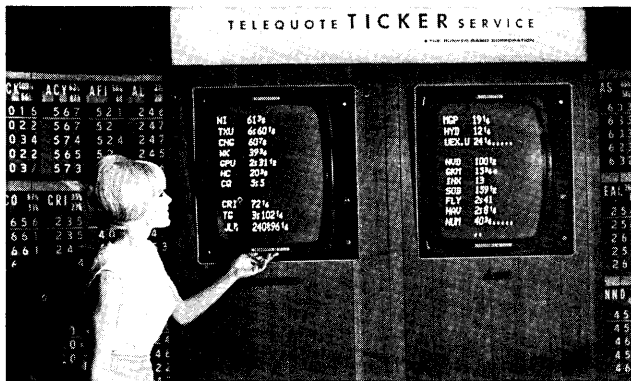
ENGLISH LANGUAGE RECORDER - RA-170 / Rochester Instrument Systems, Inc. — This sequential operations recorder monitors large numbers of points and provides a permanent record of events — in sequence — printed as complete English words. The new English language recorder employs a non-volatile, magnetic drum memory which provides up to 50 characters to describe the condition of each input. Sequential operations recorders, widely used to monitor equipment in power generating stations, also find application in switchyard and substation operations and in the manufacturing and chemical processing industries where a large number of variables must be monitored continuously. (For more information, designate #84 on the Readers Service Card.)



UNIVAC 1551 ALPHANUMERIC CATHODE RAY TUBE DISPLAY / Sperry Rand Corp., UNIVAC Defense Systems Division — First production model of the new UNIVAC 1551 is shown undergoing check-out by engineers. Up to 2000 straight or curved line alphanumeric characters — 25 lines of 80 characters each — may be formed on the 17-inch screen. Each character is formed in 4 μ sec. The device has a deflection system and digital character generator. The digital character generators are considered an outstanding feature. These circuits are switched between the off and fully saturated conditions, thereby supplying stable, drift-free images on the screen. The device is compact, 16"H x 24"W x 34"D with keyboard, and weighs 125 pounds. (For more information, designate #85 on the Readers Service Card.)



P-120 TAPE PERFORATOR / Tally Corporation — The P-120 operates at 120 characters per second and will perforate paper and Mylar as well as the many paper, Mylar, and metallized sandwich tapes. The photo shows the punch pin contacts for the 120. The compact, panel mounted P-120 features integral tape supply and take-up reeling with a capacity of 1000 feet; front tape loading; and shielded packaging. Standard units have unidirectional tape advance. Many options are available including remote tape backup and error checking (bit echo or parity). (For more information, designate #86 on the Readers Service Card.)

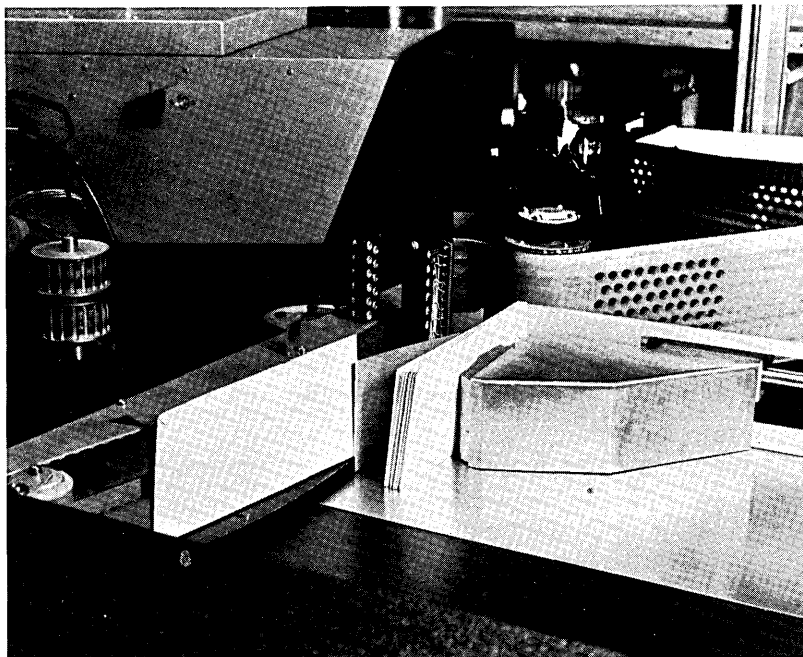


TELEQUOTE TICKER / The Bunker-Ramo Corporation — This new system which utilizes cathode ray screens overcomes reading difficulties of present systems by presenting information in a book-page format and increasing "dwell time" to at least six seconds. Screens display the stock information line-by-line, starting at the top. As one line fills in, the line underneath blanks itself readying it for the next display, as shown in the photo. The NYSE screen on the left has blanked out line 8 while the ASE screen has blanked out line 4. As these lines fill in the one beneath will blank out. System is not restricted to the New York and American Stock Exchanges. Tickers of any exchange can be displayed as required. (For more information, designate #87 on the Readers Service Card.)

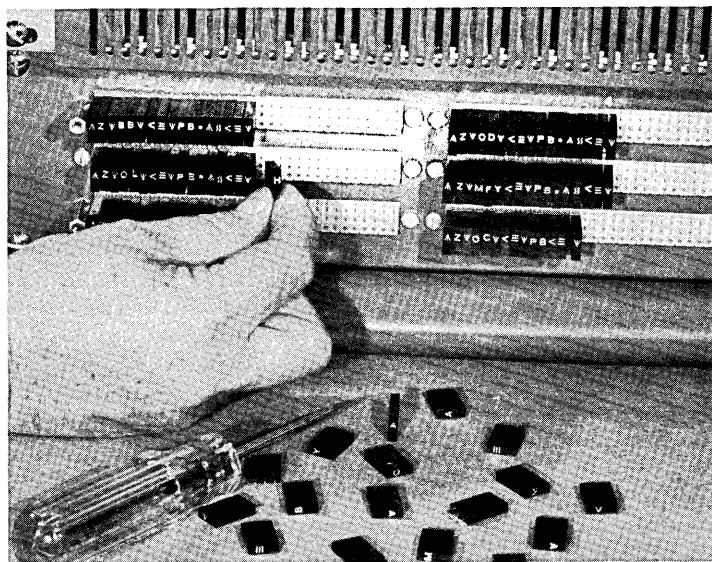


IBM 1287 OPTICAL READER / IBM Corporation, Data Processing Division — Handprinted numbers, pencilled on a wide variety of business forms, can be read directly into a computer by this new machine. The 1287, designed for use with IBM's System/360, also reads printed, credit card imprinted and pencil-marked numbers, and five handprinted alphabetic characters. The optical reader enables nearly everybody in a business organization — clerks, salesmen, production-line workers, truck drivers — to communicate directly with a computer. The TV-like scope (right) creates exact images of numbers as they are read. (For more information, designate #88 on the Readers Service Card.)

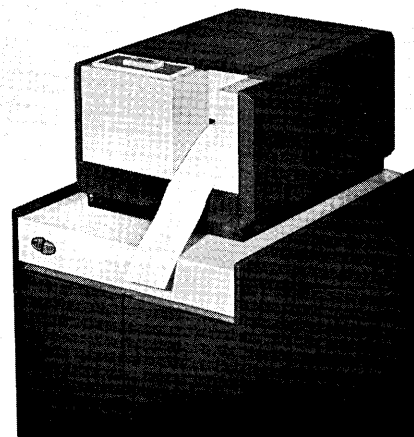
PHILCO/FORD OPTICAL ADDRESS READING SYSTEM / Philco Corp., Communications & Electronics Div. — This picture illustrates mail being transported past the reading stations for optical address reading and sorting. Mail is read and sorted at the rate of 30,000 per minute. The system is installed in the Detroit Post Office; additional systems are scheduled for delivery to other Post Offices in 1966/1967.



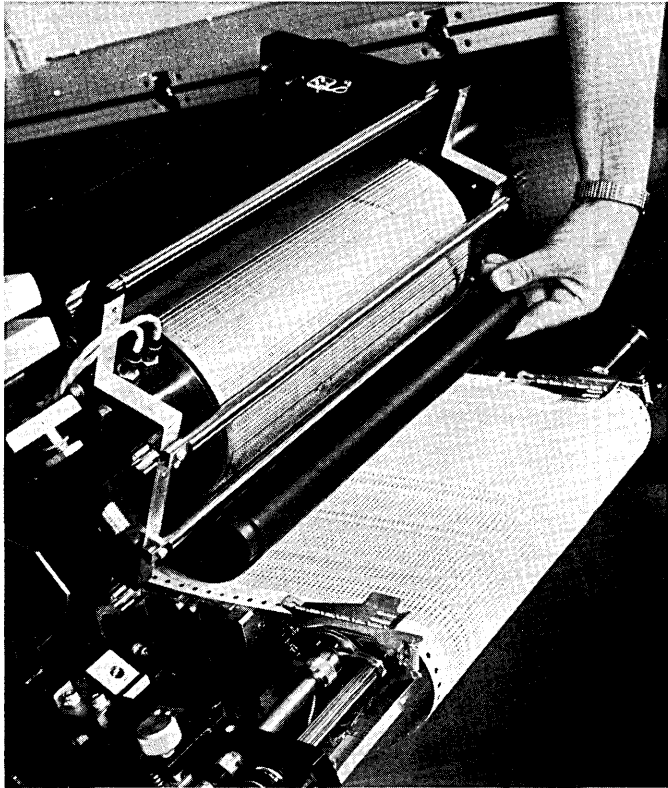
PUSH-BUTTON ADDRESSER (PBA) / The Pioneer Electric & Research Corp. — This device for teletypewriter systems, now makes it possible to transmit up to an entire 32-character address merely by pushing one button. Plug-in character chips (shown in photo), which can be changed by anyone, determine specific address. The chip itself measures 5/8" x 1/8" x 7/16" and has printed on it the character it represents. Character chips are available which encode all of the possible Baudot combinations. (For more information, designate #89 on the Readers Service Card.)



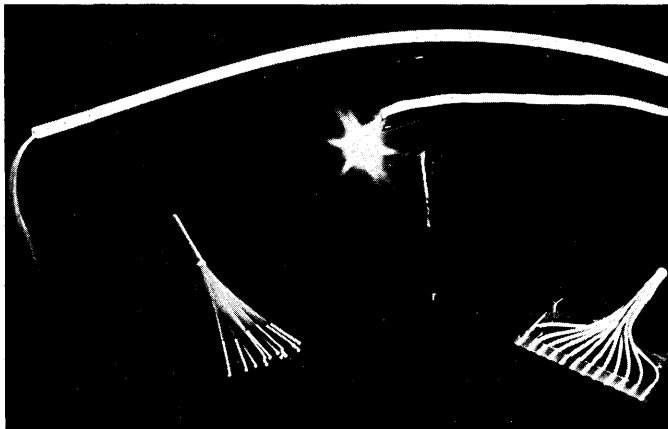
PONY PRINTER / Di/An Controls, Inc. — This new Computer Interfaced Pony Printer bridges the gap between today's expensive high-speed, full-page printers and the low-speed teleprinters. This system is 60 times faster than a teleprinter; it has equivalent half page formatting at 32 columns of numeric or alphanumeric printout; and is completely compatible both electrically and logically, with a wide variety of today's small, scientific data processing computers (the only thing needed is a connecting cable). Modular construction has been used throughout to simplify maintenance or replacement of parts. Printing elements are self-cleaning. (For more information, designate #90 on the Readers Service Card.)



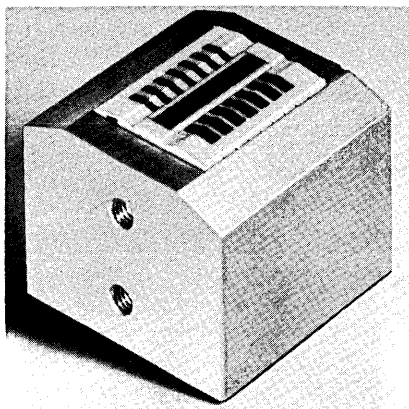
COMPONENTS



128 CHARACTER DRUM FOR LINE/PRINTERS / Data Products Corporation — Now available as an option on Line/Printers, this new drum was designed for on-line and off-line printer applications requiring a large number of special symbols, multiple alphabets in upper and lower case, bold face characters, etc. According to the manufacturer, quality of printout rivals that of an office typewriter, permitting use with optical scanners and in photocopy work. (For more information, designate #91 on the Readers Service Card.)



FIBER OPTIC BUNDLES / Corning Glass Works — The unique optical properties of flexible fiber optic bundles permit the gathering and efficient transfer of light or image information with little loss of energy. Shown are fiber optic bundles with single and multiple output surfaces. Applications include transmission of remote light or optical data in medical instrumentation, electronic data processors, inspection systems, high speed photo printing systems, counting equipment, and the like. Fiber optic bundles prove ideal in situations where direct lighting may be hazardous or where multiple lighting sources could be replaced by a single source with branching optical fibers. (For more information, designate #92 on the Readers Service Card.)

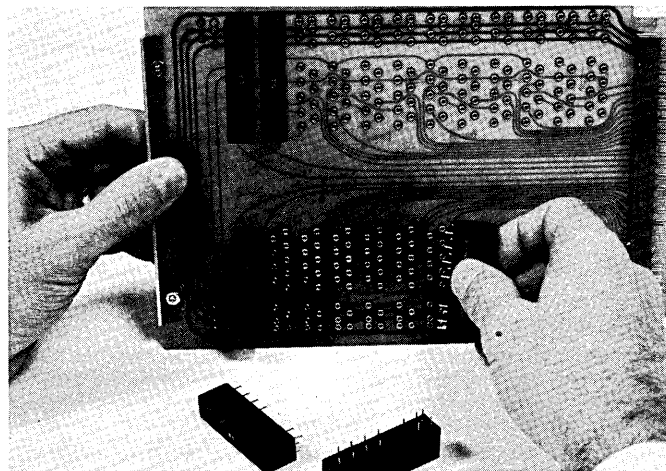


MAGNETIC RECORDING HEAD / Ferroxcube Corporation of America — This new 7-track, IBM-compatible, record/reproduce contact tape, magnetic recording head has an unconditionally guaranteed life of 2000 hours. The outstanding feature of the new head is its almost complete immunity to wear. This property is made possible by a patented manufacturing technique called all-glass bonding. No relapping or recrowning is required for the life of the head. It is designed for high-density recording and reproducing of digital information. (For more information, designate #93 on the Readers Service Card.)

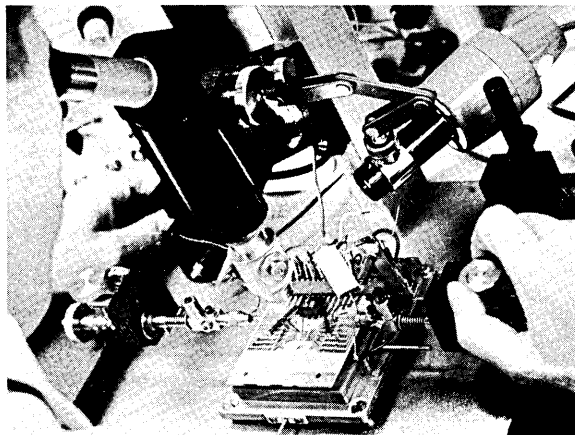
SOLDER-LUG TERMINALS / Honeywell Inc. — 'Hat-tractive' Patricia Garon appears to be tilting a "coolie hat" at a provocative angle. But, she's simply adjusting a supply of computer connections at Honeywell's electronic data processing plant at Lawrence, Mass. The solder-lug terminals are used in making wire cables for the firm's Series 200 computer systems. (For more information, designate #94 on the Readers Service Card.)



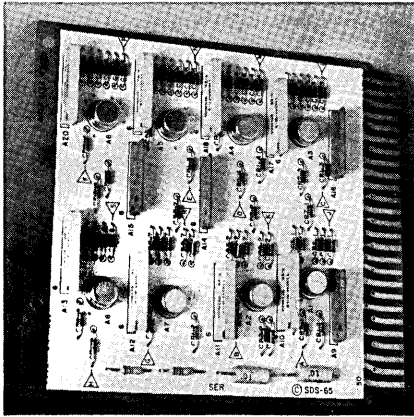
INPUT-OUTPUT CARD / Leeds & Northrup Co. — Hybrid integrated circuits and wire wrapped back panels provide the high reliability of this product. The modules are plugged in on the plug-in mother card for easy maintainability. There are seven modules in various configurations used throughout the input-output system. Consequently, the spare parts stock is minimized and interchangeability maintained. (For more information, designate #95 on the Readers Service Card.)



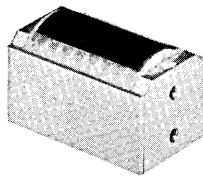
INTEGRATED CIRCUITS / Texas Instruments Inc. — These custom-designed circuits are the heart of Computer Control's new low-cost "MICRO-PAC" logic modules, memory systems and memory test equipment. The same circuits are used in the recently introduced DDP-516 series. Each of the tiny circuits combines several electronic functions on a single chip of silicon. These chips are so small that thousands could be carried in a thimble. (For more information, designate #96 on the Readers Service Card.)



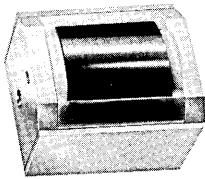
Components



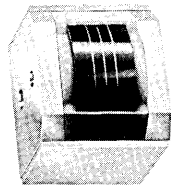
10-mc FLIP-FLOP / Scientific Data Systems — Model FT12 is designed for clock rates up to 10 mc, which provides eight fully-gated integrated-circuit flip-flops on a 4-1/4 inch by 4-3/4 inch, 52-connector card. Set input overrides reset input when set is True, reducing input wiring by half in many applications. Each flip-flop output can drive 14 gates. Individual flip-flop circuits are housed in hermetically-sealed TO-5 cans. This module is part of the new T Series integrated-circuit module line used extensively in third-generation digital systems and in SDS Sigma computers. (For more information, designate #97 on the Readers Service Card.)



7+1 TRACK RECORDING HEAD



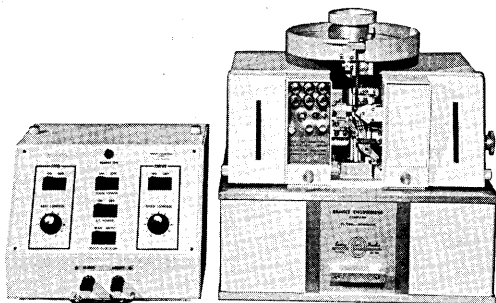
3+1 TRACK RECORDING HEAD



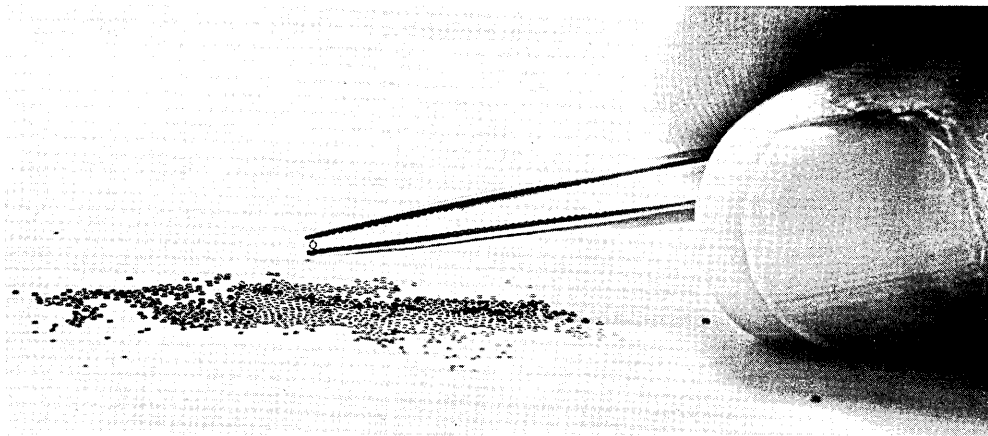
4 TRACK RECORDING HEAD

ANALOG MAGNETIC RECORDING HEADS / Ferroxcube Corp.

— The first in a new line of analog magnetic recording heads to be made available are 3 + 1 and 4-track, 1/2 inch, record and reproduce heads and 7 + 1 track, one-inch record and reproduce heads. The heads are designed for low to medium frequency recording with gap lengths as small as 40 microinches permitting signal frequencies in the megahertz range. The new heads are all-glass-bonded ferrite types featuring an all-ceramic recording surface which is almost impervious to wear. The new heads have an unconditional guaranteed life of 2000 hours. (For more information, designate #98 on the Readers Service Card.)

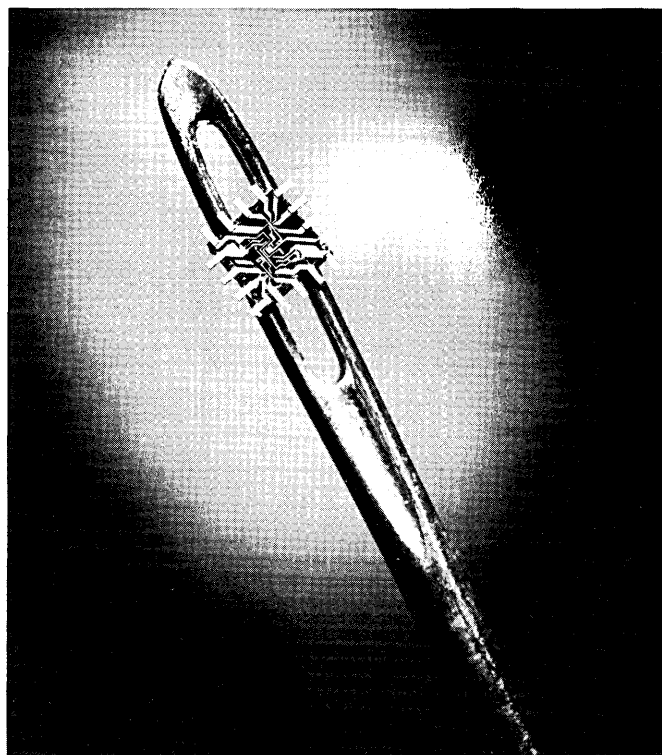


MODEL CH-100 CORE HANDLER / Computer Test Corp. — The CH-100 automatic handler is available for high speed processing and grading of ferrite memory cores. It is designed to handle ferrites ranging in size from 16 to 50 mils O.D. at any rate between 18,000 to 60,000 cores per hour. Shown below are tiny 20 mil size ferrite memory cores. The fast switching speed of these small cores have introduced critical high frequency problems in handling and testing. The Model CH-100 Core Handler is able to process these cores without difficulty at rates up to 60,000 per hour. (For more information, designate #99 on the Readers Service Card.)

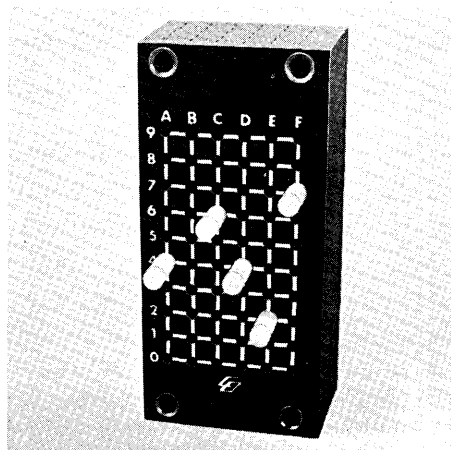




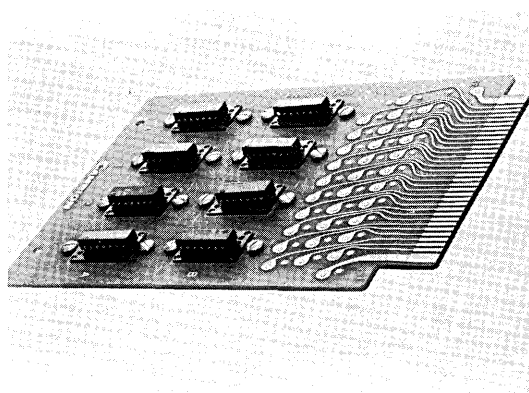
NUMBER LIGHTS / General Electric Company's Miniature Lamp Dept. — Number lights are actually thin-as-a-dime electroluminescent lamps, cool light sources whose entire surface glows. Larger lamp on the right is GE's new eight-inch "readout" lamp, the largest ever made. Readout lamps (lamps which can change rapidly to form any digit) are widely used in computers. Applications of the kingsize G-E lamp will be on large automatic scales such as those used in the meat-packing and product industries, outdoor clocks and temperature devices, and stock listing boards. (For more information, designate #100 on the Readers Service Card.)



MINIATURIZED INTEGRATED CIRCUITS / Western Electric — How can 18 diodes, four transistors and eight resistors be balanced on the eye of a sewing needle? Pack them into an integrated circuit, like the one on this magnified $2\frac{1}{4}$ -inch-long needle. An example of the electronic miracle of miniaturization, the circuit is only one-twentieth of an inch wide. It is under manufacturing development at Western Electric's Allentown works for use in new Bell System communications equipment.

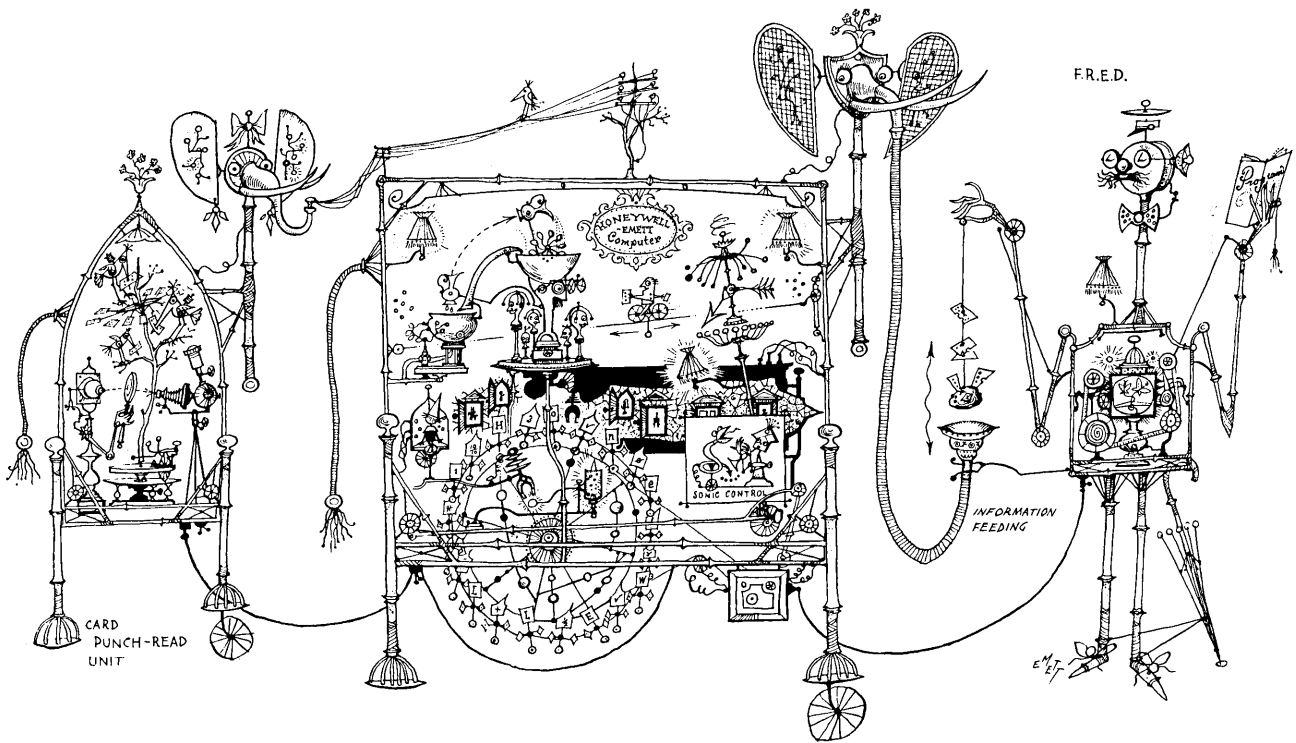


COMPUTER CODED OUTPUT SWITCHES / CO-ORD Switch Div., LVC Industries, Inc. — New Series 63030 switches offer a wide variety of binary codes within a compact package, featuring low contact resistance in dry circuit conditions. Insertion of a single pin provides a 3, 4, 5 or 6 word output. Decades can be provided in 1248, 1247, 1125, 1224 or other codes specified. Applications include: EDP systems, test equipment, automation systems. (For more information, designate #101 on the Readers Service Card.)



IN-LINE IC CAMBI-CARDS / Cambridge Thermionic Corp. — Two standard epoxy glass board sizes are available with provisions for mounting 8 or 16 in-line integrated circuits, 4.50" x 6.06" and 4.50" x 9.25", respectively. In-line IC packages are mounted in CAMBION in-line sockets which may then be mounted to board. Printed circuit card connector has 70 available pins for maximum board-to-board connection capacity. These printed circuit boards provide a high degree of flexibility for engineers designing digital equipment and control systems using micro-electronic logic packages. (For more information, designate #102 on Readers Service Card.)

MISCELLANY



THE "ULTIMATE" COMPUTER

In a whimsical spoof of the serious science of automated calculation, Honeywell's electronic data processing division — in cahoots with England's celebrated cartoonist, Rowland Emett — presented for the first time in the United States what it terms the "ultimate" computer, officially known as the Honeywell-Emett Forget-Me-Not. The four-dimensional cartoon — a moving, blinking, noise-making creation of bamboo, birds, door knobs, lamp shades, playing cards and measuring tapes — was exhibited October 17, 1966 at the annual Business Equipment Exposition at McCormick Place, Chicago, Ill. It's first showing was in London the prior week at the Business Efficiency Exhibition.

According to British Cartoonist and Way-Out Inventor Rowland Emett, the computer combines "proven techniques with new ideas," some bordering on the fringes of the future. Emett's line drawing of his ultimate computer, clearly draws the line between this machine and any predecessor. The sketch points up the machine's three major units: FRED, a Fantastically Rapid Evaluator and Dispenser; Forget-Me-Not Sr., the central processor; and Forget-Me-Not Jr., the card reader-punch unit.

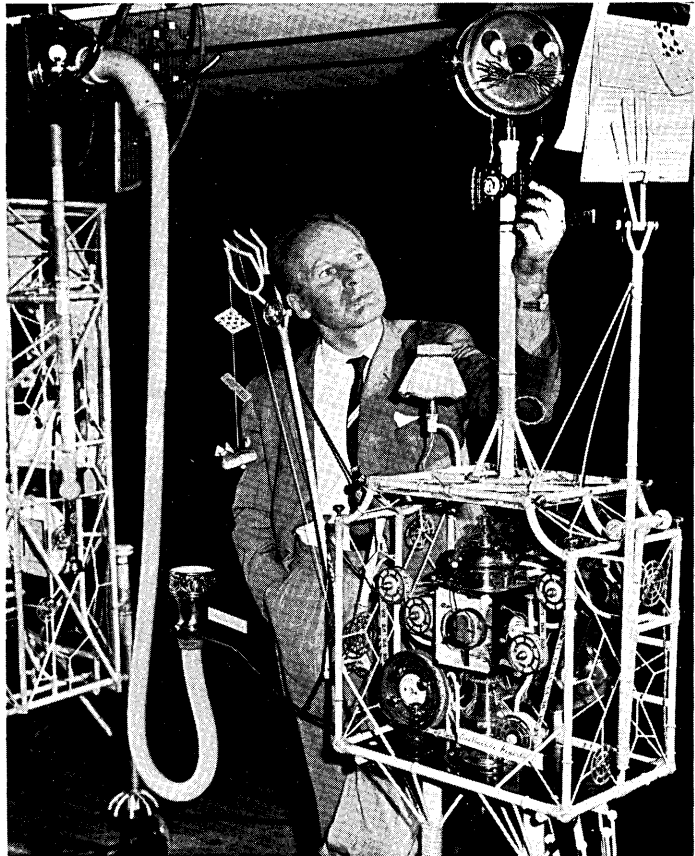
In the picture at the top of the next page, Mr. Emett takes time to fix FRED's tie. FRED is a "butterflies-in-the-stomach" executive type who controls activities of the Honeywell-Emett Forget-Me-Not

Computer — an elephant, obviously (because elephants never forget). In his left hand he holds the computer program (any real computer has to have a program), while his right hand dunks a preloaded "information bun" (British for a deck of punched cards) in and out of the elder pachyderm's trunk. FRED's head turns back and forth between the program and the "information bun" — a crumplet naturally. His left hand brings the program within reading distance as he turns toward it. The wealth of information to be digested from the program causes FRED's eyes to "bug out" as he reads.

Of prime interest to programmer and systems designers is the central processor, Forget-Me-Not Sr. In keeping with current state-of-the-art trends, the unit features solid-state design, sonic control (it's quiet), mass memory, fluid technology, random access, floating point unit and speeds of one Billicycle. Solid-state design has been updated by half-a-brick from a stately Scottish home. According to Emett, "Nothing could be more solid or stately than that." He defined the Billicycle as the unit of time it takes little Billy, sitting on his bicycle, to ferry a message from one end of the computer to the other. Emett did not believe the million-cycle-a-second operating speeds of conventional "third-generation" computers would be practical in his computer "because having things dashing around inside of something made of bamboo would definitely cause trouble."

At the left in the line drawing, at a discrete distance behind Dad — although in direct telephonic communication with him — is the card-reader-punch, Forget-Me-Not Jr., a simple application of electrified woodpeckers to a very common computer function — card punching. The cards are read "through a glass lightly" by a single electronic roving eye. At times, the eye lowers its arm and turns to fix its glassy stare on the viewer.

All activities of the Honeywell Emett main frame are directed by a single motor. Hence, all motion is in harmonic multiples, providing a smooth and graceful sequence.



THE "AMAZING MISS DENNISON"



An employee take off her head during rest periods? That's exactly what the female did who was hired by Dennison Manufacturing Company to help demonstrate its new Compact Copier at the Business Equipment Exposition (Chicago) and the International Visual Communications Congress (Los Angeles). An unusual habit? Not if you're a robot. Billed as the "Amazing Miss Dennison", the robot was there to demonstrate the simplicity of operating Dennison's electrostatic copiers.

The movements of the robot — a creation of Mark Wilson Enterprises — are directed by an elaborate control panel complete with flashing lights and crackling sound effects. A cable runs from the robot's back to the control panel. When not demonstrating the Dennison equipment, the electronic young lady retired to a telephone booth-shaped cabinet to rest. There an operator removed her head and placed it next to the control panel until the next demonstration.

WORLD REPORT — GREAT BRITAIN

Computer builders in Britain are rather worried at signs that the State Department is relenting from its previous determination not to allow the latest of America's computers to go into Eastern Europe.

Cynically, some say that if the East European countries had been prepared to take obsolete IBM 1401's, slow card, and other equipment from the United States, the embargo would have continued. But buyers there, while not interested in modernity for the sake of modernity, resent being treated as "developing nations." Nor is it safe to assume that they are not following very closely the great battle for adequate software that users the world over are waging with the computer builders.

This is one of the reasons for the success in Czechoslovakia of the English Electric LEO machines which have been operating in multi-programming modes for at least four years. The British Post Office is a major user of this equipment and has a nucleus of distinguished programmers and systems men who have pushed the software array for the Leo series very rapidly ahead.

The latest move in the East for the British exporter has come from Bulgaria, which has ordered one 1904 machine from International Computers and Tabulators with, it is expected, 19 more to follow. They are also virtually basic configurations and it is believed that over the next three years, ICT could make at least £6m in Bulgaria alone. Each machine will go into a local authority's computing center to be used for administrative work but also as a bureau to serve local industries.

The delicate question of sales to the People's Republic of China is on the move. English Electric has actually sold a powerful KDF-9 worth possibly £1m, and the Chinese have built the center to house it. But the deal is stymied by the politicians, backed by RCA because some of its peripherals would be involved. Half way down the production line for big machines at West Gorton, ICT has a 1905 labelled China. Elliott-Automation also has had some dealings with Peking. Now, it is believed that for machines below a certain rating, exports may be permitted in the not too distant future.

Negotiations between France and Britain for joint development of computers may be taken up again after several months of complete stagnation during which the giant computer project gasped its last breath. At a Lyons ceremony to inaugurate the 32nd ICT computer delivery to France — £12m worth — the Joint Parliamentary Secretary at the Ministry of Technology, Mr. Edmund Dell, said he hoped for such collaboration and pooling of research resources. The alternatives facing both nations, which had taken steps to protect their domestic computer industries, was either to continue to work alone or to seek collaboration with other European nations.

Meanwhile, inside Britain, the credit squeeze and freeze does not yet seem to have taken off the edge of fresh computer ordering, partly because management are being pressed

to make the best possible use of available manpower. But money is also running short and while there has been a swing from leasing to purchasing in the past few years, the pendulum could swing the other way.

One matter of great concern for the Government is rapid expansion of plants to make microcircuits. It is clear that six full-scale or pilot lines are far too many for the demand likely to develop here over the next few years — put at about £20m by 1970 — in a market already hotly contested by the major U.S. manufacturers. It is the old, old story of the threshold size of company needed to support enough research and development to enable it to compete world-wide. There is a lot of official talk of mergers and rationalisation but it is still early. In two to three years, the ranks will be thinned. Britain's Ministry of Technology, officially designated as the Government organ supporting the computer industry, is acting somewhat in the role of a peacemaker between the developers of small military computers and the Ministry of Defence, which recently presented them with a set of specifications just like those for IBM's new 4Pi range. The Ministry of Technology is not wholly altruistic in this role since it may soon get overall responsibility for defence computers as well as those on the civil side. Be that as it may, one slight sop obtained by the manufacturers is that they may present any design they care to choose, to the Ministry of Defence and provided it performs as well and costs the same as the machines described in the military specifications, the design will be admissible.

At the time of writing, two more major orders appear to be coming the way of ICT. They include over £4m worth of equipment for the five regional headquarters of the Central Electricity Generating Board, and a very large machine for Czechoslovakia, where ICT and English Electric are slugging it out doggedly for business.

However, since IBM's World Trade Corporation president Gilbert E. Jones has gone on record in "The Director" that no technology later than 1964 is being offered by IBM in Eastern Europe, this precludes offers of 360 machines. Since English Electric claims that System-4 is even more advanced in technology than the 360's, it looks as if some time must elapse before System-4 machines can be offered in Eastern Europe.

Ted Schoeters

Ted Schoeters
Stanmore
Middlesex
England

ACROSS THE EDITOR'S DESK

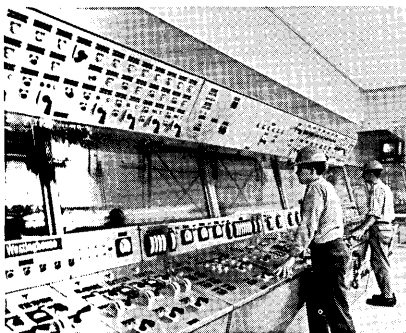
Computing and Data Processing Newsletter

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COMPUTER-CONTROLLED HOT SHEET MILL

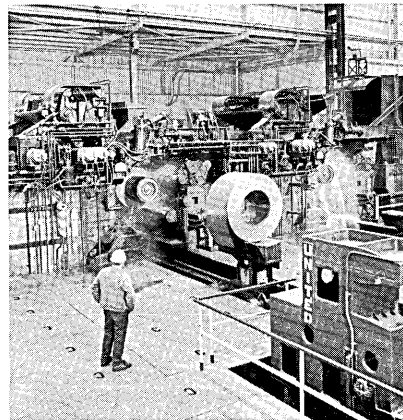
Product is now being rolled on the nation's first completely computer-controlled hot sheet mill at Bethlehem Steel Corporation's new \$400-million Burns Harbor plant located along the shores of Lake Michigan in northern Indiana. With a highly sensitive in-line process computer to control the entire mill operation from start to finish plus many other features, Bethlehem has in its new 80-inch hot sheet mill the most advanced technology found in the steel industry today.



In this long control pulpit (shown above) are the dozens of electrical controls and instruments for operation of the complex finishing train in the new hot sheet mill. The in-line process computer, which guides the operation of the entire mill, flashes readings, speeds, temperatures and other vital data to operators in the pulpit. Controls in the pulpit also permit the operators to communicate with the computer by initiating necessary changes in mill operation.

APPLICATIONS

Products from this mill range in thickness from .047 to .500 gage and in widths from 20 to 75 inches. The mill is capable of producing coils weighing up to 1000 pounds per inch of width with a maximum outer diameter of 80 inches. Two



high-speed coilers wind the sheet into coils. The computer selects the coiler to be used and sets the side guards for the proper width of the metal.

The production flow is tracked by the computer from the time the slab leaves the depiler in the slab yard until the steel sheet reaches the coil scale on the delivery side of the coilers. In other words, the slab is controlled completely by the computer as it is charged, heated, rolled, coiled, weighed, and marked. (The slabs used for rolling on the hot mill range from 5 to 12 inches in thickness, from 20 to 65 inches in width, and from 12 to 32 feet in length.)

Hot-rolled coils and sheets are used in the production of automotive parts, shipping containers, railroad cars, agricultural implements, and many other products. In addition, the Burns Harbor hot mill will supply hot-rolled coils for further processing in the plant's cold-rolled sheet and tin mill. (Previously, the cold mill processed hot-rolled coils shipped in from other Bethlehem plants in the east.)

LABOR-MANAGEMENT RELATIONS GET ASSIST FROM COMPUTER

Florida electrical contractors long have been plagued by a problem arising from a clause in union contracts that imposes critical time limitations for payment of wages to electricians. If paychecks arrive late, overtime must be paid for every hour past the stipulated deadline. On the surface, this would not appear to present a serious dilemma. But when construction sites are in isolated areas, far from the main payroll files, it is difficult for contractors to meet the deadline. And the farther away they get, the higher their labor costs rise.

Lowry of Florida, one of the nation's largest independent data processing companies, plans to offer a service whereby up-to-date paychecks can be prepared at construction sites. President James R. Lowry, Sr., says this will be achieved by using a portable remote input-output terminal linked to an RCA Spectra 70/45 computer at Lowry's headquarters in Coral Gables.

Newsletter

Payroll records will be maintained by the computer, and the number of hours worked by each employee will be fed into it daily from the remote terminal. On the last day of the pay period, the computer will tabulate the total weekly wages for each worker, make the appropriate deductions and almost instantly print out a check on the remote terminal at the construction site. The entire payroll will be completed in a matter of minutes, leaving both labor and management happy.

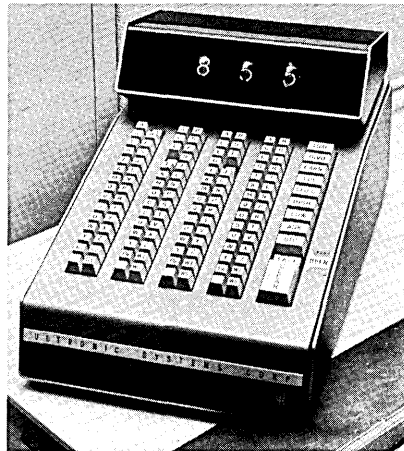
COMPUTER CONNECTS SOUTHEAST ASIA WITH STOCK EXCHANGES

The world's longest computer connection has brought the financial community of Southeast Asia into instant, continuous communication with American stock and commodity exchanges. In a recent demonstration, a representative of an American brokerage firm pushed a button on an Ultronic STOCKMASTER[®] desk machine in his Hong Kong office and received the latest price quotation of stock being traded on the floor of the New York Stock Exchange.

The data is being transmitted to Hong Kong from the master computer center of Ultronic Systems Corp. in Pennsauken, N.Y., via the Ultronic satellite computer in Montreal, Canada through a trans-Pacific cable. At a press conference held in the Bache & Co. office in Hong Kong, Mr. Robert S. Sinn, president of Ultronic said, "... this extension of up-to-the-second service to investors and traders in Southeast Asia is expected to have a significant effect on American securities and commodities markets. By providing brokerage offices in this increasingly important area with the same information available in a Wall Street brokerage office, at the same time, a whole new arena has been opened for active participation in American business...."

The STOCKMASTER[®] installations in Hong Kong display such information on stocks and commodities as the last sale price, current high and low for the day, previous day's close, current bid and asked, earnings per share, dividend paid, the number of shares or contracts traded in any individual stock or commodity. In addition the desk unit (which is about the size of two telephones) displays such stock market trend information as the

number of issues up, off and unchanged, the current Dow-Jones averages, Standard & Poors' indexes, Value line averages, the New York Stock Exchange Indexes and American Stock Exchange Price Level and the number of minutes the ticker tape of either the New York or American Stock Exchange is running late.



— The STOCKMASTER[®] desktop quotation unit, most recently put into service in Hong Kong, allows brokers there to get trading information from Wall Street and other North American investment centers in less than seven seconds.

Hong Kong is noted for its interest in investing and trading, and brokerage firms located there already do a brisk business. Now hard-working brokers in the exotic city face a new problem. Stock Exchange hours in the United States open at 10 a.m., close at 3:30 p.m. In Hong Kong these hours become 11 p.m. till 4 a.m.

C&O-B&O RAILROAD SETS UP COMPUTERIZED COMMUNICATIONS NETWORK

One of the railroad industry's largest computerized communications networks, capable of pinpointing in a split second the locations of 150,000 freight cars along 11,000 miles of track, will go into operation this year on the C&O-B&O railroads. The elaborate system consists of four RCA 3301 computers.

Two of the computers will control a high-speed teletype message-switching system at the company's Huntington, W. Va., facilities. They will be linked to another pair of RCA 3301's which will handle message switching as well as con-

trolling an electronic car-tracing file at the C&O-B&O headquarters in Baltimore. Data that is never more than a half-hour old will be available on inquiry on every car in the two railroad systems. Shipment status and estimated arrival times will be available automatically to the customer.

Chesapeake & Ohio-Baltimore & Ohio systems send and receive more than 25,000 teletype messages a day on nearly 700 teletype terminals on the railroad's network. The messages are concerned primarily with train and car movements, sales office reports, and the general administration of the railroad.

COWS FED BY COMPUTER

Tim Jon Runner, 22, a data processing and operations research consultant in Redlands, Calif., rents time on Lockheed Propulsion Company's IBM 360 computer — normally used to design reliable new solid propellant rockets for military and civilian space programs — to determine the most economical and nutritious combinations of feed to fatten beef cattle. This imaginative young businessman includes among his clients 28 feed yards running some 400,000 head in eight states. These include Texas, Arizona, New Mexico, California, Montana, Idaho, Nevada, and Hawaii. Runner calls his service "linear programmed feed blends".

His goal is to obtain the most nutrition for the lowest cost in each of the client areas. To do this, he works with consulting nutritionists to determine and classify the commodities that will fulfill the feeding requirements. As one of his inputs to the computer, he prepares a nutritional breakdown of some 50 commodities, including such items as corn, hay, beet pulp, molasses, citrus pulp and barley. He then does a lot of telephoning to get the latest prices on all these feed items in the various localities serviced. This information is fed into the computer, which in less than two minutes comes up with the most economical feed recommendation for each of the client yards.

As an offshoot of the basic feed blend service, Runner now is doing a coded feed yard comparison, which lets the cattlemen see how their cattle fattening stacks up against the industry. Some of the clients also subscribe to an analysis of overall cattle production

to show results broken down by breed of cattle and place of origin, thus helping them evaluate cattle purchases.

THE SPORT OF KINGS AND COMPUTERS

The sport of kings also is becoming computerized. At New York Racing Association's three tracks (Saratoga, Aqueduct and Belmont when completed) a pair of Honeywell 200 computers process all pari-mutual wagering — computing odds, totaling money pools and producing numerous administrative reports. The real-time system controls up to 600 ticket issuing machines capable of handling up to 1200 bets a second.

COMPUTER COMPLEX INAUGURATED BY CALIFORNIA DEPARTMENT OF MOTOR VEHICLES

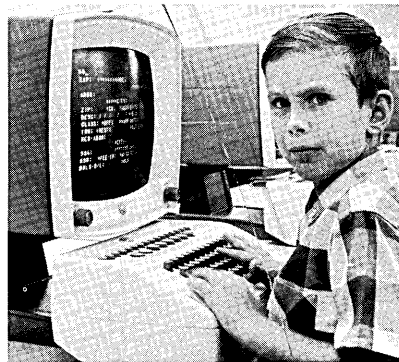
A \$13.5 million computer-communications network was inaugurated at the California Department of Motor Vehicles last October. Governor Edmund G. Brown and State Director of Motor Vehicles Tom Bright announced the Radio Corporation of America computer complex, largest ever planned at the state level, has begun the two-year task of electronically transcribing license and traffic records of 10.5 million California drivers for computer storage. Automobile registration data will be fed into the RCA Spectra 70 systems beginning next year, and the changeover of all records will be completed by 1969.

Once on file, the case history of any California driver and the identity of each automobile — in a motor vehicle population that will reach 15 million by 1970 — may be "dialed" as easily as a telephone number from major metropolitan centers. It will be picked up on viewing screens (Video Data Terminals) or reproduced by teletypewriter equipment linked by cable to the master computer in Sacramento.

The automated system gradually will be hooked into a statewide network of inquiry terminals, beginning with data centers at DMV and law enforcement offices in major population centers. Instant statewide access to the stored information in the Sacramento Data Center will expedite law enforcement, speed the issuing and renewal of drivers licenses and auto

registrations, and assist in highway safety research. In addition to answering more than eight million inquiries annually from DMV field offices, law enforcement agencies and the courts, the computer system also will keep close tab on accidents and traffic violations. Drivers whose records indicate gross negligence will be spotted by the computer and corrective action will be taken.

Governor Brown said, "We are acting now to head off future information bottlenecks which would result from the spectacular growth of California's motoring population as well as the number of automobiles on the highways. We have passed the point where the solution can be 'more space, more people, more typewriters'. With the growth rate California is experiencing, the old style files would have to grow to such a size that clerks on roller skates couldn't possibly get around once a day to all parts of the system".



— No Batman? Young Noel Hopkins appears somewhat bewildered by the TV-like screen he's watching, one of 88 RCA Video Data Terminals recently installed at the California Department of Motor Vehicles for transmission and retrieval of computerized data.

Additionally, after the 1974-75 fiscal year, Governor Brown stated, the Department of Motor Vehicles (DMV) will operate at approximately \$5.3 million a year less than it would without an automated system.

COMPUTER AIDS HIGH-FORCE TEST PROGRAM ON MISSILE STRUCTURES

A CDC 3300 computer coupled to a new high-force facility for testing entire substructures of NASA's mighty Saturn V's second

stage (S-II) has gone into operation at Wyle Laboratories' Testing Division in Huntsville, Ala. Wyle is the nation's largest independent testing company. The new test facility provides engineers with two massive Hydrashaker systems which simulate the terrific vibration generated by Saturn's engines at launch and during the early stages of flight.

The tests are providing scientists and engineers with crucial information about the behavior of the structures under conditions of vibration closely simulating those which they will encounter in their service environment. To detect and measure the response of the test specimens to vibratory forces, and to record and analyze the resulting data, Wyle engineers have designed and installed a highly sophisticated data acquisition and processing system. It consists of accelerometers, signal switching equipment, signal conditioning equipment, and a Control Data Model 3300 digital computer.

When a test is in progress, the accelerometers originate analog data signals corresponding to the "g" levels at various critical points on the test specimen. The outputs of the accelerometers are routed to junction boxes. Three-to-one coaxial switches allow a maximum of 450 accelerometers to be routed to the signal conditioning equipment in sets of 160. These switches are relay operated, and are controlled from the data acquisition calibration and monitor console located in the instrumentation control room.

Charge amplifiers are used to amplify the accelerometer signals, and the outputs are routed to the CDC 3300 computer's multiplexer and analog-to-digital conversion system. The computer records the data on digital tape for subsequent analysis and reduction — completing in hours what older equipment would require weeks to accomplish. Thus, changeovers from one test setup to the next can be made with full assurance that the data obtained from the previous test is valid and complete.

The design of all buildings and equipment was completed by Wyle engineers under a \$3.5 million contract from the Space and Information Division of North American Aviation, Inc., the prime contractor to NASA — Marshall Space Flight Center for design and fabrication of Saturn V second stage.

Newsletter

NEW CONTRACTS

<u>FROM</u>	<u>TO</u>	<u>FOR</u>	<u>AMOUNT</u>
Westinghouse Electric Company	Scientific Data Systems, Santa Monica, Calif.	Sigma computers and related equipment	\$5 million
Honeywell, Computer Control Division, Framingham, Mass.	Texas Instruments Inc., Dallas, Texas	Integrated circuits to be used in new low-cost "MICRO-PAC" logic modules, memory systems and memory test equipment as well as in Honeywell's new DDP-516 computer	over \$4 million
U. S. Army Electronics Command, Automatic Data Field Systems Command	Howard Research Div., Control Data Corporation, Bethesda, Md.	Transportable ADP (Automatic Data Processing) equipment to be used in a field experiment in the Seventh U. S. Army, Europe, to assist in determining hardware and software requirements for an Army-wide Tactical Operations System (TOS)	\$4,345,758
Computer Reporting Systems, Inc., Los Angeles, Calif.	IBM Corporation	IBM 360 multiple-use computer system which will eventually store the credit record of virtually every individual in the Pacific Southwest	\$3.5 million
U. S. Air Force	Computing and Software, Inc., Los Angeles, Calif.	Data processing and data reduction services at the Air Force Systems Command, Rocket Propulsion Laboratory, Edwards AFB, Calif.	over \$1.4 million
Department of the Army	Informatics Inc., Sherman Oaks, Calif.	Designing and implementing computer software and user procedures to integrate the display hardware of a graphics output display analysis system, using The Army Operations Center computer and display hardware system	\$188,000
National Cash Register Co.	Decision Control, Inc., Newport Beach, Calif.	Quantity production of buffer memory systems	over \$800,000
U. S. Air Force	Bolt Beranek and Newman Inc., Data Equipment Div., Santa Ana, Calif.	A special graphical-to-digital conversion system to be delivered to the Rome Air Development Center (RADC), Griffiss AFB, N.Y.	\$90,000
Far West Laboratory for Educational Research and Development	Lockheed Missiles & Space Co.	Designing a computerized system by which all public schools in northern California and most of Nevada could draw mutually and instantly on new findings in educational research	\$85,000
Army Electronics Command	Sylvania Electric Products Inc., Sylvania Electronic Systems	Design of an electronic steering technique which will keep a laser beam "on target" while transmitting data	\$77,289
New Jersey Hospital Association	System Development Corp. (SDC), Santa Monica, Calif.	Design of a time-shared information system that would result in a total automated hospital information system serving the 147-member institutions of the New Jersey Hospital Association	\$54,950
U. S. Department of Housing and Urban Development (HUD)	System Development Corp. (SDC), Santa Monica, Calif.	Review and evaluation of the major automated systems that have been used for metropolitan area planning and programming	---
U. S. Army's Frankford Arsenal	California Computer Products, Inc., Anaheim, Calif.	Production of FAULT logic testers and auxiliary equipment to be used for field testing of the FADAC computer portion of automatic artillery fire control systems	---
Digital Equipment Corp., Maynard, Mass.	Programming Services, Inc., Tarzana, Calif.	Development of a FORTRAN IV compiler for PDP-9	---

NEW INSTALLATIONS

<u>AT</u>	<u>OF</u>	<u>FOR</u>
Aluminum Company of America (ALCOA), Pittsburgh, Pa.	Two IBM System/360 Model 30's	Control unit in nationwide communications network linking plants, sales offices, and subsidiaries (119) in 78 cities across the nation
Westinghouse Electric Corp., Westinghouse Tele-Computer Center, Pittsburgh, Pa.	Control Data 6600 computer system and multiple Control Data 3100 computer systems	Initially plans to use the 6600 and its satellite computers for processing both scientific and engineering data
The Data-Way Corp., Uniondale, N.Y.	GE-115	Handling payrolls, statistical work, billing and similar customer services
Chemical Bank New York Trust Company, New York, N.Y.	Four Burroughs B300 computer systems	Upgrading proof transit processing methods; all four systems communicate electronically with a central 19.2 million character disk file memory
Augustana College, Rock Island, Ill.	IBM 1130 computer	Educational and administrative purposes

<u>AT</u>	<u>OF</u>	<u>FOR</u>
U. S. Rubber Co., Midwest Management Information Center, Allen Park, Mich.	Three IBM System/360s — Models 30, 40 and 50	Nationwide communications network handling sales forecasting, order processing, billing, purchasing, production planning and inventory control
Chicago Bridge & Iron Co., Oak Brook, Ill.	SDS 930 computer	Complementing engineering efforts and in Critical Path Method (CPM) scheduling
Suburban Bank and Trust Company, Kansas City, Mo.	NCR 315 computer system	Use primarily for demand deposit accounting; also will serve some 16 other banks in Kansas and Missouri which share common ownership
Ward Schools of Business, Boston and Worcester, Mass.	Two H-120 computer systems	Dual-computer system for pupil instruction in basic and advanced computer technology; systems at both locations will be identical except that the Boston school will house tape control units and Worcester will have direct communication link to provide memory to memory transfer of information between systems
Merchants National Bank, Cedar Rapids, Iowa	IBM System/360 Model 30	Internal accounting and auditing needs as well as serving needs of some 40 businesses and correspondent banks
Department of Computer Science, Queen's University, Belfast	I.C.T. 1905 computer	Research projects for the development of multi-access software; also for administrative use including usual accounting procedures
Dry Dock Savings Bank, New York, N.Y.	IBM System/360 computer	Processing of its savings accounts on-line; a second System/360 handles mortgage accounts, Club accounts, bank's payroll and also will serve as back-up for the first system
Florida State University, Tallahassee, Fla.	Control Data 6400 computer system	Inclusion in a time-sharing mode via remote consoles (on-campus) to serve a wide variety of users; off-campus remote consoles to serve local educational institutions also being considered
Kentucky Finance Co., Inc., Lexington, Ky.	UNIVAC 9200 computer system	All types of accounting requirements; also for centralized direct mail advertising, personnel statistical reports and stockholder accounting
National Machinery Co., Tiffin, Ohio	IBM System/360 Model 30	Helping to cut product assembly time and eliminating production snags; also company payroll, inventory control, engineering and sales analysis, and an expanding personnel recording job
Houbigant, Inc., New York, N.Y.	Spectra 70/15 computer	Use handling increased accounting and administrative work
The Parker Pen Co., Janesville, Wis.	IBM System/360 Model 30	Second phase of long-range program to integrate data gathering procedures, and for production and marketing forecasting and control
Cox Broadcasting Corp., Atlanta, Ga.	Honeywell 200 series, Model 120	Analyzing market data and preparing sales development material; also for compilation of local election results, public opinion poll tabulations, TV log writing, TV scheduling; plus accounting and billing for about 40,000 Cox cablevision subscribers across country
Detroit Free Press, Detroit, Mich.	IBM System/360 Model 20	Accounting and statistical tasks previously handled on punched card equipment; later the newspaper's payroll will be added to its tasks
The Alaga and Whitfield Companies, Montgomery, Ala.	IBM 1130	Accounting functions performed by earlier computer as well as adding market research and inventory functions
H. P. Wasson and Co., Indianapolis, Ind.	NCR 315 system	Stock control; also accounts receivable, accounts payable and payroll
Pana-Hillsboro Mutual Insurance Co., Hillsboro, Ill.	IBM System/360 Model 20	Meeting the increased accounting demands of the firm's expanding windstorm insurance business; also anticipate applications in automatic rating and writing of policies and bookkeeping functions such as calculating and printing premium notices
General Atomic Division, General Dynamics, San Diego, Calif.	UNIVAC 1108 system	Nuclear research and development work; also will be offered commercially to outside organizations for technical and business data processing
Pierce National Life Insurance Co., North Hollywood, Calif.	IBM System/360	Development of an advanced management information system — system will contain all of firm's insurance policy information and financial data, which will be updated daily
Northwestern Mutual Insurance Co., Seattle, Wash.	IBM System/360 Model 30	Use as the hub of a nation-wide computerized information system permitting daily updating and immediate access to all of company's policies by its regional offices and agents
Louisiana State Police Headquarters, Baton Rouge, La.	UNIVAC 418 system	An advanced computer-based "real-time" police information system
Department of Public Instruction, Pennsylvania	NCR 315 computer	An "Educational Management Information System" that eventually will put 500 school districts and 14 colleges into direct communication with the computer, located in Harrisburg

ORGANIZATION NEWS

MAJOR ORGANIZATIONAL CHANGE WILL BE MADE BY EAI

Electronic Associates, Inc., West Long Branch, N.J., will decentralize its U.S. operations in January 1967 to form four major product-line divisions and a marketing division, it has been announced. According to EAI president Lloyd F. Christianson, the move is designed to prepare for future growth and product diversification. It is the first major organizational change in the 21-year history of the company, which has more than doubled its sales volume and manpower in the past five years.

Under the new organization, the four product-line divisions will have their own production, engineering and product planning facilities, and will be individually responsible for product-line profitability. The divisions and their general managers will be: Analog/Hybrid Computer Division, Fred L. Martinson; Digital Computer Division, Romeo R. Favreau; Control and Information Systems Division, William J. Peet, II; Instrument Division, William K. Kindle.

The fifth division, Marketing, managed by John A. Curtis, will be responsible for all selling functions, service engineering, operation of the company's computation centers, and education and training facilities.

FRENCH-GERMAN CO-OPERATION FOR HYBRID COMPUTING SYSTEMS

An agreement has been signed between CAE (Compagnie européenne d'Automatisme Electronique) a member of the CITEC Group, and TELEFUNKEN AG for the sale and maintenance of hybrid computing systems, including digital computers C 90-40 and C 90-80 manufactured by CAE and analog computers RA 770 manufactured by TELEFUNKEN.

The agreement provides for each firm the marketing of hybrid systems in its own country and allows for a large collaboration in the design and implementing of this technique. The first system will be set up in Germany at the Institute for Mathematical technique of the Berlin Technical University.

SDS WILL SELL COBOL PROGRAMMING SYSTEM FOR SIGMA COMPUTERS

Scientific Data Systems, Los Angeles, Calif., will offer a COBOL-65 business programming system as an extra cost option with its new Sigma 7 computers, it was announced recently by SDS President Max Palevsky. In announcing the decision to sell COBOL, he explained that "Many users of Sigma 7 may not require the business capability provided by COBOL. By charging those who use it an additional fee, we avoid penalizing customers for software they may not use."

Commenting on the impact of this new concept, Dan L. McGurk, SDS Vice President of Marketing, explained, "For the first time the small user will be able to buy only that software which he requires for his applications rather than paying the hidden cost for software formerly included in the price of the machine."

SDS is the first computer manufacturer to require an additional payment for a major programming system such as COBOL (Common Business Oriented Language). Traditionally, the cost of programs developed by computer manufacturers has been included in the price of the equipment.

STAFF BUILDERS' DATA-PROCESSING DIVISION IN NATIONAL EXPANSION MOVE

Staff Builders, Inc., a leader in the temporary data processing personnel business in New York, has announced the expansion of its data-processing personnel division to all its offices throughout the nation. Expansion was made, according to George Rubin, President, to meet the unprecedented demand for personnel equipped to handle all aspects of the "computer revolution". All offices now offer a full roster of temporary data-processing personnel both for electronic computers and the more conventional equipment.

Staff Builders is not an employment agency. It is a temporary personnel contractor. All categories of personnel are hired and paid by Staff Builders, and are leased out to all types of businesses on part-time and temporary assignments. (For more information, designate #41 on the Readers Service Card.)

OLIVETTI ANNOUNCES NEW LEASE PLAN

A new office equipment leasing plan which is free of any interest or carrying charges during the lease term was announced recently by Olivetti Underwood Corporation, New York. The plan, which includes all models of the corporation's typewriters, calculating machines, accounting machines, desk-top computers, and copying machines, is effective now at the several thousand Olivetti Underwood branches, exclusive agents, and dealers coast to coast.

Under the Olivetti Underwood plan, a customer leases new office equipment for a two or three year term, making monthly payments, and with no advance deposits required. These payments in total will never exceed the normal purchase price of the same equipment. When a lease expires, customers have the option of either returning the equipment to Olivetti Underwood, or Olivetti Underwood will replace the used machine with the latest model of the same type of machine under a new lease.

Leasing arrangements under the new Olivetti Underwood national plan are being handled by the Equilease Company, a division of ELTRA Corporation, with headquarters in New York, and branch offices coast to coast, as well as in Canada and in Europe.

TRI-CONTINENTAL FORMS NEW DATA PROCESSING UNIT

Tri-Continental Corporation, the nation's largest diversified publicly-traded investment company, and the Mutual Funds of the Broad Street Group have formed a new company to provide up-to-date electronic data processing and computer services for these and associated companies, Fred E. Brown, president, has announced.

Through the new company — Union Data Service Center, Inc. — it is believed that Tri-Continental becomes the first diversified publicly-traded investment company to have its own electronic data processing organization.

Progressively in 1967, Union Data Service Center will take over such tasks as stock transfers, dividend payments, proxy distribution and tabulation, stockholder services connected with dividend in-

Newsletter

vestment plans, and the maintenance of portfolio and accounting records.

C & S ACQUIRES MAJOR SERVICE BUREAU

Computing and Software, Inc. (C&S), Panorama City, Calif., in a move designed to provide further impetus to the firm's planned growth program, has acquired Commercial Business Services (CBS) of Long Beach, Calif. Financial details of the transaction were not disclosed.

In conjunction with an existing data center operated by C&S in the San Fernando Valley, the newly acquired Long Beach data center will make a broad range of data processing services more readily accessible to business and industrial communities within the Greater Los Angeles area.

As a result of acquiring CBS, one of the nation's oldest data processing service organizations, over one million dollars in commercial sales will be added to C&S' annual revenues. The newly acquired company will operate as a division of C&S.

COMPUTING CENTERS

DAIRY HERD IMPROVEMENT COMPUTING SERVICE

The Dairy Herd Improvement Computing Service, Provo, Utah, is using an IBM System/360 to help take some of the guesswork out of herd management. DHI, founded in 1954, was the first organization to use data processing equipment in herd management. It now serves 1400 member farms of the Dairy Herd Improvement Association and keeps records on a total of 120,000 cows. "The dairyman of today," said Bliss H. Crandall, owner of DHI, "now has at his disposal a complete management information and control system to help make breeding, culling and feeding decisions."

Once each month, the dairymen enter the daily weight of milk and percentage of butter fat each of their cows produces on DHI special forms. These forms are sent to DHI's headquarters where the information is punched into IBM cards and inserted into the System/360.

The computer prints out a complete record of the cow's current production along with its historical production figures which have been on file in the System/360 Model 30. Another sheet is printed out showing the individual cow's standing in relation to the rest of the herd. The report also provides a monthly updated forecast of each cow's production during the average 305-day lactation period.

By comparing production records with breeding, the dairyman knows which sires and dams to breed, which to provide additional feed, and which to cull from the herd.

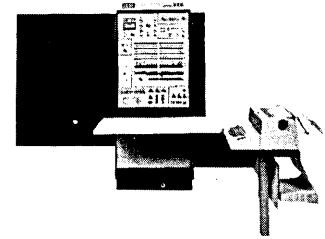
EDUCATION NEWS

SDC TO AWARD POSTDOCTORAL RESEARCH FELLOWSHIPS

As many as twelve postdoctoral research fellowships in the mathematical, information processing and social sciences will be awarded annually by System Development Corporation (SDC), Santa Monica, California, under a new program announced by SDC President Wesley S. Melahn.

Fellows selected under the program will receive a \$9,000 stipend while conducting research of their own choosing in SDC's Research and Technology Division in Santa Monica. A representative, but not exhaustive, list of areas that may be proposed for research includes man-machine interaction, education and training, computational linguistics, automata theory, formal and programming languages, the application of information processing to law, medicine, economics, and other fields. Major resources available to Fellows are the knowledge and experience of a multi-disciplinary staff of senior investigators, and the facilities of a computer-based man-machine laboratory.

Fellowships will be awarded for full-time research at SDC with normally a one-year tenure. A Ph.D. or equivalent degree is required to apply. Requests for applications or for additional information should be directed to the Information Office, Research and Technology Division, 2500 Colorado Ave., Santa Monica, Calif. 90406.



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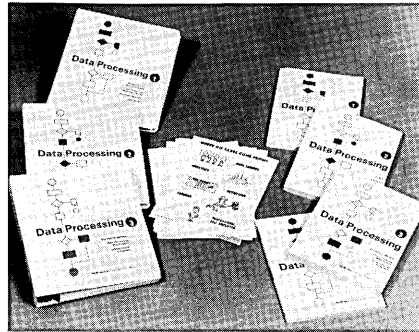
Newsletter

3M COMPANY COURSE

The 3M Company, St. Paul, Minn., is going to industry with a new course giving employees an introduction to the entire field of electronic data processing (EDP) without the need to disturb data processing equipment or for instructors previously trained in EDP.

To help launch the program, 3M is offering two-day seminars in EDP to qualified persons in industry at its new Creative Teaching Center in St. Paul. The seminars will include an in-depth introduction to the course, tours of the

3M data processing center where visitors will see how the course has helped train 3M employees and trips to leading computer manufacturers in the Twin Cities.



Teaching material for the data processing course consists of a three-volume text and an illustration book for the student, an instructor's guide and more than 250 visual aids for the teacher's use on the overhead projector. Most of the work is programmed, with the student being led through ten increasingly-complex units of instruction. These range from "Introduction to Data Processing" to "Data Processing Mathematics," from "Card Format and Beginning Wiring" to "Introduction to Computers." (For more information, designate #42 on the Readers Service Card.)

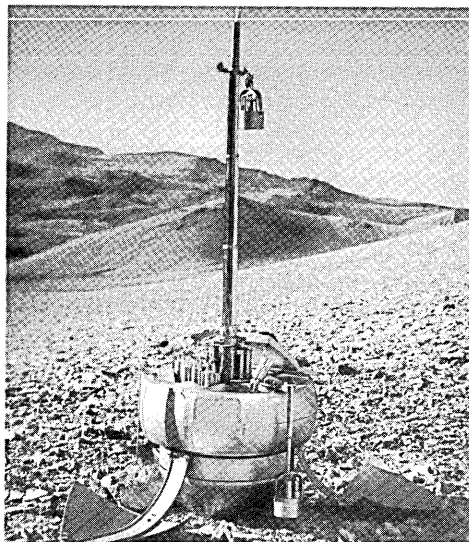
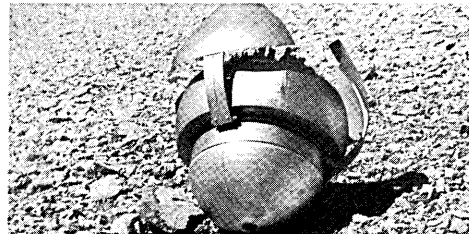
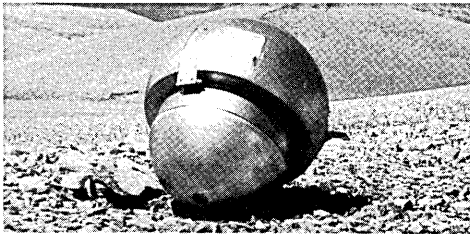
RESEARCH FRONTIER

LIFE ON MARS?

This fully miniaturized space laboratory, shown unfolding as it would after landing on Mars, has been developed to determine if life

has existed or exists on the Martian surface. Called the Automated Biological Laboratory by its developer, the Space and Re-entry Sys-

tems Division of Philco-Ford Corporation, Newport Beach, Calif., the space capsule is designed to conduct a series of highly sophisticated tests under on-board computer command or under command from earth scientists via radio link. Two top photos in this simulated landing show ABL just after impact and as it begins to unfold its legs, which orient the capsule to a vertical position. In photo at lower left, ABL has deployed its legs and is preparing to deploy its mast and other scientific equipment. In the final sequence, ABL has raised the mast, which also contains photographic and other sensing equipment and has deployed devices which can sample the soil immediately surrounding ABL or from ranges as distant as 1000 feet. Note sampling device on pulley at top of mast and sampling device prepared to make tests on soil on right side of capsule.



BUSINESS NEWS

RCA SALES AND PROFITS SET RECORDS

RCA expects to set an all-time record in sales and profits in 1966, with sales expected to reach \$2.5 billion, Elmer W. Engstrom, Chairman of RCA's Executive Committee, has announced. Dr. Engstrom cites the following highlights of the current pattern of RCA's business:

— Defense and space activities are again on the rise, with government sales this year expected to increase by 15% over the 1965 total, and a backlog to approach \$400 million by the year's end.

— Sales and earnings in data processing eventually are expected to become as important in RCA's total pattern as color television is today.

— Sales and operating earnings of RCA Communications, Inc., have continued to set new high records annually for the past 12 years.

Dr. Engstrom notes that RCA has fixed its eyes on a future where, in addition to its established businesses, it sees new opportunities and new sources of profits in these areas: graphic systems where we are marketing and developing advanced electronics equipment and technology for the printing industry; publishing where we have acquired Random House as a basis for new business opportunities in the written word; education where electronics is shaping new techniques of learning and is entering a vast growth market; and in medical electronics where we are collaborating with Hoffmann-LaRoche to develop and market new techniques and instruments for the expanding medical field.

MEMOREX REPORTS RECORD SALES AND EARNINGS

Memorex Corporation reported record sales and earnings for the first nine months, Laurence L. Spitters, President announces.

Net income for the nine months ended September 30 was \$1,925,000, a 136% increase over the corresponding figure a year earlier. Earnings per share were \$1.92 on an average of 1,005,000 shares outstanding compared with \$0.81 in the first nine months of 1965.

Net sales of \$16,980,000 were achieved in the first nine months, a gain of 89% over the \$8,963,000 comparable sales of a year earlier.

Of great significance to the future of Memorex, Mr. Spitters commented, was the successful public sale in August of \$12,000,000 of 5% convertible sub-ordinated debentures. This financing provided a threefold increase in the amount of capital permanently invested in the business, and affords Memorex a large capital base from which future expansion of business can be launched.

TALLY CORP. REPORTS RECORD 9-MONTH REVENUES, EARNINGS

Revenues and earnings of Tally Corporation, Seattle, for the first three quarters of 1966 surpassed previous records for the same period achieved a year ago, Philip E. Renshaw, chairman, announces. Cumulative revenues from sales, service, and rentals for the nine months ended Sept. 30, 1966, were \$5,088,990, compared with \$3,024,579 for the same period of 1965.

Net income for the 1966 nine months amounted to \$309,675, compared with \$171,643 for the same period in 1965. Tally reported revenues of \$4,537,723 and net operating income of \$314,032 for all of 1965.

Renshaw said the fourth quarter outlook virtually assured that the company will exceed its growth objective of a 40% increase in revenues for the full current year.

MOORE CORP. EARNINGS UP 18.6% ON INCREASED SALES FOR NINE MONTHS

Moore Corp., Ltd., has reported a 15.2% increase in sales, and an 18.6% increase in net earnings for the first nine months of 1966, compared with the corresponding period of 1965.

Sales for the first nine months of 1966 were \$203,507,353 compared with \$176,629,372 in the same period last year. Net earnings after providing for income taxes were \$18,939,270 this year compared with \$15,975,187 in the first nine months of 1965.

At the same time, the company announced the opening of a new plant in Tlalnepantla, a Mexico City suburb. It replaces premises rented in the City for the past 14 years.

Short run tapes can cost you \$72 an hour in computer downtime

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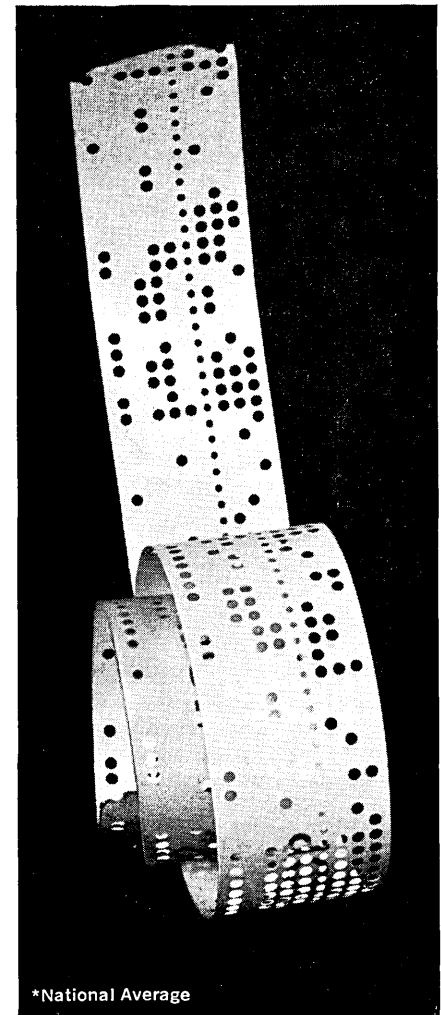
- 180 rolls can be spliced in an hour
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MONTHLY COMPUTER CENSUS

The number of electronic computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the computer market, and familiar machines have gone out of production. Some new machines have been received with open arms by users — others have been given the cold shoulder.

To aid our readers in keeping up with this mushrooming activity, the editors of COMPUTERS AND AUTOMATION present this monthly report on the number of general purpose electronic computers of American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box-score"

of progress for readers interested in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this census are developed through a continuing market survey conducted by associates of our magazine. This market research program develops and maintains a data bank describing current computer installations in the United States. A similar program is conducted for overseas installations.

Any additions, or corrections, from informed readers will be welcomed.

AS OF NOVEMBER 10, 1966

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFULFILLED ORDERS	
ASI Computer	AST 210	Y	\$3850	4/62	25	0	
	AST 2100	Y	\$4200	12/63	7	0	
	ADVANCE 6020	Y	\$4400	4/65	12	5	
	ADVANCE 6040	Y	\$5600	7/65	6	5	
	ADVANCE 6050	Y	\$9000	2/66	5	6	
	ADVANCE 6070	Y	\$15,000	10/65	5	6	
	ADVANCE 6130	Y	\$1000	11/66	0	15	
Autonetics	RECOMP II	Y	\$2495	11/58	37	X	
	RECOMP III	Y	\$1495	6/61	8	X	
Bunker-Ramo Corp.	BR-130	Y	\$2000	10/61	160	2	
	BR-133	Y	\$2400	5/64	25	44	
	BR-230	Y	\$2680	8/63	15	X	
	BR-300	Y	\$3000	3/59	36	X	
	BR-330	Y	\$4000	12/60	31	X	
	BR-340	Y	\$7000	12/63	20	X	
Burroughs	205	N	\$4600	1/54	43	X	
	220	N	\$14,000	10/58	34	X	
	E101-103	N	\$875	1/56	128	X	
	B100	Y	\$2800	8/64	164	15	
	B250	Y	\$4200	11/61	04	1	
	B260	Y	\$3750	11/62	230	4	
	B270	Y	\$7000	7/62	165	5	
	B280	Y	\$6500	7/62	130	7	
	B300	Y	\$10,000	7/65	118	85	
	B2500	Y	\$5000	1/67	0	40	
	B3500	Y	\$14,000	5/67	0	30	
	B5500	Y	\$22,000	3/63	59	13	
	B6500	Y	\$33,000	2/68	0	8	
	B8500	Y	\$200,000	2/67	0	1	
	Control Data Corporation	G-15	N	\$1600	7/55	310	X
G-20		Y	\$15,500	4/61	23	X	
LGP-21		Y	\$725	12/62	118	X	
LGP-30		semi	\$1300	9/56	122	X	
RPC-4000		Y	\$1875	1/61	55	X	
160*/160A/160G		Y	\$2100/\$5000/\$12,000	5/60;7/61;3/64	458	5	
924/924A		Y	\$11,000	8/61	26	X	
1604/1604A		Y	\$45,000	1/60	59	X	
1700		Y	\$4000	5/66	30	120	
3100		Y	\$11,000	12/64	102	40	
3200		Y	\$14,000	5/64	87	X	
3300		Y	\$15,000	9/65	55	50	
3400		Y	\$25,000	11/64	19	X	
3500		Y	\$30,000	9/67	0	10	
3600		Y	\$58,000	6/63	50	X	
3800		Y	\$60,000	2/66	12	16	
6400		Y	\$50,000	5/66	9	18	
6600		Y	\$85,000	8/64	20	15	
6800		Y	\$130,000	4/67	0	4	
Data Machines, Inc.	620	Y	\$900	11/65	23	30	
Digital Equipment Corp.	PDP-1	Y	\$3400	11/60	60	X	
	PDP-4	Y	\$1700	8/62	57	X	
	PDP-5	Y	\$900	9/63	115	1	
	PDP-6	Y	\$10,000	10/64	23	2	
	PDP-7	Y	\$1300	11/64	95	40	
	PDP-8	Y	\$525	4/65	490	270	
	PDP-9	Y	\$1000	12/66	0	60	
	El-tronics, Inc.	ALWAC IIIIE	N	\$1820	2/54	16	X
	Electronic Associates, Inc.	8400	Y	\$12,000	6/65	12	8
Friden	6010	Y	\$600	6/63	470	70	
General Electric	115	Y	\$1800.	12/65	200	575	
	205	Y	\$2900	6/64	44	X	
	210	Y	\$16,000	7/59	50	X	
	215	Y	\$6000	9/63	54	X	
	225	Y	\$8000	4/61	205	X	
	235	Y	\$10,900	4/64	69	2	
	415	Y	\$9600	5/64	195	60	
	425	Y	\$18,000	6/64	82	44	
	435	Y	\$25,000	9/65	30	18	
	625	Y	\$50,000	4/65	20	18	
	635	Y	\$56,000	5/65	18	22	
	645	Y	\$90,000	7/66	2	10	
	Honeywell	DDP-24	Y	\$2500	5/63	82	3
		DDP-116	Y	\$900	4/65	130	40
DDP-124		Y	\$2050	3/66	20	40	
DDP-224		Y	\$3300	3/65	42	11	
H-120		Y	\$3800	1/66	270	300	
H-200		Y	\$7500	3/64	910	130	

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFULFILLED ORDERS
Honeywell (cont'd)	H-400	Y	\$8500	12/61	116	X
	H-800	Y	\$30,000	12/60	90	2
	H-1200	Y	\$8000	2/66	25	80
	H-1400	Y	\$14,000	1/64	12	1
	H-1800	Y	\$42,000	1/64	18	1
	H-2200	Y	\$13,000	1/66	15	55
	H-4200	Y	\$20,500	3/67	0	6
	H-8200	Y	\$35,000	3/68	0	2
	DATAmatic 1000	N	\$40,000	12/57	2	X
IBM	305	N	\$3600	12/57	145	X
	360/20	Y	\$2000	12/65	925	6300
	360/30	Y	\$7500	5/65	2200	4500
	360/40	Y	\$15,000	4/65	1100	1500
	360/44	Y	\$10,000	7/66	15	150
	360/50	Y	\$26,000	8/65	130	550
	360/62	Y	\$55,000	11/65	1	X
	360/65	Y	\$50,000	11/65	24	210
	360/67	Y	\$75,000	10/66	2	65
	360/75	Y	\$78,000	2/66	14	30
	360/90 Series	Y	\$140,000	6/67	0	10
	650	N	\$4800	11/54	172	X
	1130	Y	\$1200	11/65	500	3800
	1401	Y	\$6600	9/60	7700	200
	1401-G	Y	\$2300	5/64	1600	50
	1410	Y	\$14,200	11/61	805	70
	1440	Y	\$4800	4/63	3300	150
	1460	Y	\$11,500	10/63	1800	60
	1620 I, II	Y	\$4000	9/60	1680	20
	1800	Y	\$7600	1/66	60	300
	701	N	\$5000	4/53	1	X
	7010	Y	\$22,600	10/63	212	6
	702	N	\$6900	2/55	6	X
	7030	Y	\$160,000	5/61	6	X
	704	N	\$32,000	12/55	32	X
	7040	Y	\$22,000	6/63	120	4
	7044	Y	\$32,000	6/63	125	5
	705	N	\$38,000	11/55	52	X
	7070, 2, 4	Y	\$27,000	3/60	325	X
	7080	Y	\$55,000	8/61	85	X
709	N	\$40,000	8/58	9	X	
7090	Y	\$63,500	11/59	45	X	
7094	Y	\$72,500	9/62	117	2	
7094 II	Y	\$78,500	4/64	127	5	
National Cash Register Co.	NCR - 304	Y	\$14,000	1/60	25	X
	NCR - 310	Y	\$2500	5/61	20	X
	NCR - 315	Y	\$8500	5/62	365	90
	NCR - 315-RMC	Y	\$12,000	9/65	64	70
	NCR - 390	Y	\$1850	5/61	1030	40
	NCR - 500	Y	\$1500	10/65	620	780
	1000	Y	\$7010	6/63	16	X
Philco	2000-210, 211	Y	\$40,000	10/58	16	X
	2000-212	Y	\$52,000	1/63	12	X
	2000-212	Y	\$52,000	1/63	12	X
Radio Corporation of America	RCA 301	Y	\$7000	2/61	644	2
	RCA 3301	Y	\$17,000	7/64	67	7
	RCA 501	Y	\$14,000	6/59	96	X
	RCA 601	Y	\$35,000	11/62	5	X
	Spectra 70/15	Y	\$4100	9/65	70	110
	Spectra 70/25	Y	\$6700	9/65	40	65
	Spectra 70/35	Y	\$10,400	7/66	10	90
	Spectra 70/45	Y	\$17,400	11/65	20	100
	Spectra 70/55	Y	\$40,500	11/66	0	12
	250	Y	\$1200	12/60	175	X
Raytheon	440	Y	\$3500	3/64	16	3
	520	Y	\$3200	10/65	19	6
	520	Y	\$3200	10/65	19	6
Scientific Control Corporation	650	Y	\$500	5/66	3	7
	655	Y	\$1800	10/66	0	2
	660	Y	\$2000	10/65	5	3
	670	Y	\$2600	5/66	1	2
Scientific Data Systems Inc.	SDS-92	Y	\$1500	4/65	64	30
	SDS-910	Y	\$2000	8/62	186	6
	SDS-920	Y	\$2900	9/62	135	10
	SDS-925	Y	\$3000	12/64	28	10
	SDS-930	Y	\$3400	6/64	132	18
	SDS-940	Y	\$10,000	4/66	7	11
	SDS-9300	Y	\$7000	11/64	32	8
	Sigma 2	Y	\$1000	12/66	0	140
	Sigma 7	Y	\$12,000	12/66	0	25
Systems Engineering Labs	SEL-810/810A	Y	\$1000	9/65	28	8
	SEL-840/840A	Y	\$1400	11/65	3	6
UNIVAC	I & II	N	\$25,000	3/51 & 11/57	26	X
	III	Y	\$20,000	8/62	77	X
	File Computers	N	\$15,000	8/56	16	X
	Solid-State 80 I,II					
	90 I,II & Step	Y	\$8000	8/58	250	X
	418	Y	\$11,000	6/63	95	38
	490 Series	Y	\$35,000	12/61	110	54
	1004	Y	\$1900	2/63	3200	50
	1005	Y	\$2400	4/66	425	275
	1050	Y	\$8000	9/63	290	40
	1100 Series (except 1107)	N	\$35,000	12/50	10	X
	1107	Y	\$55,000	10/62	29	X
	1108	Y	\$65,000	9/65	25	52
	9200	Y	\$1500	6/67	0	550
	9300	Y	\$3400	6/67	0	150
	LARC	Y	\$135,000	5/60	2	X

TOTALS 39,108 23,328

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversion from existing 7040, 7070, and 7090 computers respectively.

BOOKS AND OTHER PUBLICATIONS: Reviews

Neil Macdonald
Assistant Editor
Computers and Automation

We publish here citations and brief reviews of books and other publications which have a significant relation to computers, data processing, and automation, and which have come to our attention. We shall be glad to report other information in future lists if a review copy is sent to us. The plan of each entry is: author or editor / title / publisher or issuer / date, publication process, number of pages, price or its equivalent / comments. If you write to a publisher or issuer, we would appreciate your mentioning **Computers and Automation**.

Gilmore, John T., editor, and staff members of Charles W. Adams Associates, Inc. / *The Computer Display Review* / Charles W. Adams Associates, 575 Technology Square, Cambridge, Mass. 02139 / July, 1966, printed, approx. 500 pp., \$750; price includes updating supplements for one year (at four-month intervals); \$150.00 for annual renewals.

"Seeing is believing" is an old saw. The results of advances during the last few years in techniques for the entry, processing, and display of visual information by computer systems may well

make "believers" in on-line techniques out of most computer users.

This is a definitive reference guide to computer displays . . . what they are, how they work, how to use them, who makes them, and how good are the ones offered for sale. The "Computer Display Review" is designed as an information service rather than a static reference text; updating information is supplied three times a year on products and techniques in the display field. In addition, abstracts of timely articles and paper on display systems will be included in the updates.

The explanations in the review are clear and largely understandable to even the non-technical reader. Photographs and illustrations are extensively used to aid rapid comprehension. The work appears to provide thorough coverage of the field in even this, the first installment. The *Computer Display Review* should be useful to product planners, programmers, systems analysts working with displays, and consultants.

George, F. H. / *Computer Arithmetic* / Pergamon Press Inc., 44-01 21st Street, Long Island City, New York 11101 / 1966, printed, 277 pp., \$4.95

This is a programmed text, using the Crowder method (i.e., if you choose a wrong answer, you travel through more pages than if you choose a right answer; the reading path does not travel on consecutive pages). The book is instructive, and well-written, though rather elementary.

Dearden, John, and F. Warren McFarlan / *Management Information Systems: Text and Cases* / Richard D. Irwin, Inc., Homewood, Ill. / 1966, printed, 427 pp., \$10.65

This is a strange book. In spite of the fact that it is based on a course given at the Harvard Business School, there seem to be hardly any summaries or conclusions. Two thirds of the book is devoted to the presentation of cases, descriptions of what actually happened in various companies with management information systems and data processing. But no conclusions are given — just the "case" is given. Not even questions are given for many of the cases.

Carne, E. B. / *Artificial Intelligence Techniques* / Spartan Books, 1250 Connecticut Ave., N.W., Washington, D. C. 20036 / 1965, printed, 149 pp., \$7.25

The chapters of this book are: Introduction; Neuron Models; Simple Learning Systems; Pattern Recognition; Programming; Reliable Networks. The author has had some first-hand experience with computer components and computer-controlled systems. The book contains a good deal of interesting information about the various topics, evidently gathered from more than ordinary research and reading. But the book often contains trite or elementary remarks.

Hilton, Alice Mary, editor, and over 30 authors / *The Evolving Society* / The Institute for Cybercultural Research, New York / 1966, printed, 410 pp., \$8.95

This is the proceedings of the "First Annual Conference on the Cybercultural Revolution — Cybernetics and Automation", June 19-21, 1964. It consists of the presentations and discussions of a diverse group of persons talking on many diverse topics. There is no index.

Notices

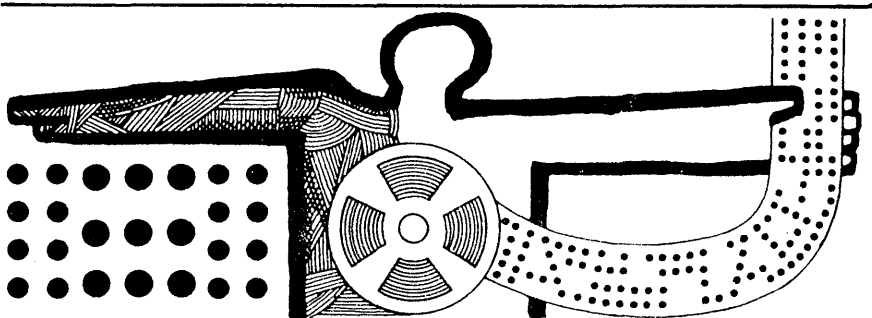
Brozen, Yale / *Automation: The Impact of Technological Change* / American Enterprise Institute for Public Policy Research, 1012 14 St., N. W., Washington 5, D. C. / 1963, printed, 47 pp., \$1.00

Rosine, Lawrence L., editor / *Advances in Electronic Circuit Packaging*, vol. 3. Proceedings of the 1962 Electronic Circuit Packaging Symposium. Boulder, Col., 1962 / Plenum Press, Inc., 227 West 17 St., New York 11, N. Y. / 1963, printed, 456 pp., \$16.50

Jarman, W. Edwin, editor / *Problems in Industrial Dynamics* / M. I. T. Press, Cambridge 42, Mass. / 1963, offset, 124 pp., \$6.00

CDC 3100 COMPUTER

Will sublease or sell CDC 3100 computer system well below manufacturer's price. Full line of peripheral equipment available. For further details, write Box 122, Computers and Automation, 815 Washington St., Newtonville, Massachusetts 02160.



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nine years ago and started acquiring programs for distribution. Since then, computer technology has moved so swiftly that only a few of the original programs remain on file.

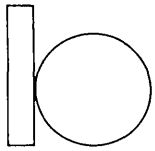
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BRANDON APPLIED SYSTEMS, INC.

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DATA PROCESSING MANAGEMENT COURSES

COURSE 67:

DATA PROCESSING ORGANIZATION AND PERSONNEL

The success or failure of a data processing installation clearly hinges on its personnel, and its ability to use the resources available on an effective, efficient basis. This has been a difficult problem in many installations, further compounded by the scarcity of qualified personnel, and the resultant high turnover and salary spiral.

As a result, it is becoming necessary to establish separate personnel administration practices, and to consider EDP personnel and organization separately from other activities in the organization. This seminar explores this emerging new science, and discusses the important elements and concepts of good EDP personnel policy and the optimal organizational environment.

FOR WHOM IS THIS COURSE INTENDED?

This course is intended for all managers with responsibilities for personnel and organization. This includes the data processing manager, the systems manager, programming and operations manager, as well as the personnel manager or the EDP personnel specialist.

OBJECTIVES OF THIS COURSE

The major objective of this course is to provide a general review of practices in organization and personnel management in the data processing industry. Within this objective, it will be possible to identify solutions to specific problems, and to establish basic policy on personnel and organization.

CONTENTS OF THIS COURSE

Introduction and Objectives

Personnel Concepts

- Types of personnel
- Problems of personnel
- Shortages in the industry
- Optimum functional breakdown

Personnel Practice

- Prerequisites
- Recruitment
- Promotion and transfer
- Job descriptions

Organization

- Concepts
- Systems and data base integration needs
- Ultimate objectives
- Location of data processing
- Centralization
- Structure
- Selection
- Formal training programs
- Systems
- Programming
- Operation
- D.P. Management
- On-the-job training needs
- Supervision and administration
- Salary structure

Course 61:

Management Standards for Data Processing

A two-day course for data processing management covering effective management and control techniques.

Course 62:

Operations Control

A one-day course to provide operations managers and supervisors with a body of techniques and discipline for operations management.

Course 63:

Computer Systems Analysis Techniques

A two-day course for senior systems analysts, supervisors, and data processing managers providing systems analysis and feasibility study techniques.

Course 64:

Management Audit of Data Processing

A one-day course to provide data processing executives and top management with measurement techniques to evaluate the performance of a data processing installation.

Course 65:

Appreciation Course in Data Processing

This course, for top executives and departmental management, examines the technical concepts, economics, planning steps, and environments necessary for successful installations.

Course 66:

Introduction to Data Communications and Time Sharing

A course for data processing, departmental, and other executives concerned with use of data communications equipment or time sharing techniques.

Course 68:

Review of Programming Languages

A one-day course to provide data processing management a brief review of language structure and status and to assist in the possible selection of a language.

Course 69:

Top Management Control of Electronic Data Processing

A two-day course for top management to provide guidance in control over data processing installations.

TO: BRANDON APPLIED SYSTEMS, INC.
30 East 42nd Street
New York, New York 10017

Please send me the Course Catalog.

My name and address are attached.

CALENDAR OF COMING EVENTS

- Mar. 7-9, 1967: 8th Annual AFETR Range User Data Symposium, Air Force Eastern Test Range, Orlando Air Force Base, Fla.; attendance by invitation only; a SECRET clearance is required; contact Col. Asa P. Whitmire, Chief of Data Processing Div., Patrick Air Force Base, Fla. 32925
- May 18-19, 1967: 10th Midwest Symposium on Circuit Theory, Purdue University, Lafayette, Ind.
- Mar., 1967: Fifth Annual Symposium on Biomathematics and Computer Science in the Life Sciences, Shamrock Hilton Hotel, Houston, Texas; contact Office of the Dean, Division of Continuing Education, the University of Texas Graduate School of Biomedical Sciences, 102 Jesse Jones Library Bldg., Texas Medical Center, Houston, Texas 77025
- April 18-20, 1967: Spring Joint Computer Conference, Chalfonte-Haddon Hall, Atlantic City, N.J.; contact AFIPS Hdqs., 211 East 43 St., New York, N.Y. 10017
- May 9-11, 1967: Spring Joint Computer Conference, Convention Center, Philadelphia, Pa.; contact AFIPS Headquarters, 211 E. 43rd St., New York, N.Y. 10017
- June 26-27, 1967: Computer Personnel Research Group Fifth Annual Conference, University of Maryland, College Park, Md. (near Washington, D.C.); contact Dr. Charles D. Lothridge, General Electric Co., 570 Lexington Ave., New York, N.Y. 10022
- June 28-30, 1967: 1967 Joint Automatic Control Conference, University of Pennsylvania, Philadelphia, Pa.; contact Lewis Winner, 152 W. 42nd St., New York, N.Y. 10036
- Aug. 28-Sept. 2, 1967: AICA (International Association for Analogue Computation) Fifth Congress, Lausanne, Switzerland; contact secretary of the Swiss Federation of Automatic Control, Wasserwerkstrasse 53, CH 8006 Zurich, Switzerland
- Aug. 29-31, 1967: 1967 ACM (Association for Computing Machinery) National Conference, Twentieth Anniversary, Sheraton Park Hotel, Washington, D.C.; contact Thomas Willette, P.O. Box 6, Annandale, Va. 22003
- Sept. 11-15, 1967: 1967 International Symposium on Information Theory, Athens, Greece; contact A. V. Balakrishnan, Dept. of Engineering, U.C.L.A., Los Angeles, Calif. 90024
- Nov. 14-16, 1967: Fall Joint Computer Conference, Anaheim Convention Center, Anaheim, Calif.; contact AFIPS Headquarters, 211 E. 43rd St., New York, N.Y. 10017
- May 21-23, 1968: Spring Joint Computer Conference, Sheraton Park/Shoreham Hotel, Washington, D. C.; contact AFIPS Headquarters, 211 E. 43rd St., New York, N.Y. 10017
- Aug. 5-10, 1968: IFIP (International Federation for Information Processing) Congress 68, Edinburgh, Scotland; contact John Fowlers & Partners, Ltd., Grand Buildings, Trafalgar Square, London, W.C. 2., England
- Sept. 25-28, 1967: International Symposium on Automation of Population Register Systems, Jerusalem, Israel; Contact D. Chevion, Chairman of Council, Information Processing Association of Israel, P.O.B. 3009, Jerusalem, Israel

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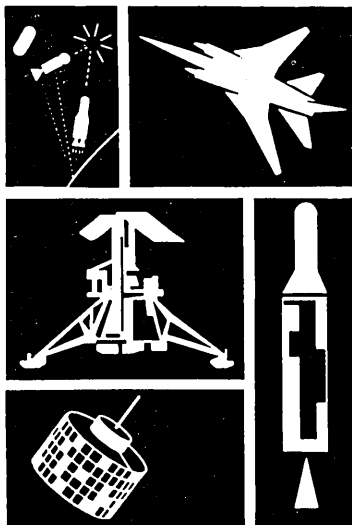
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Phone: 212-679-6535

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ADVERTISING INDEX

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

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- Brandon Applied Systems, Inc., 30 E. 42 St., New York, N. Y. 10017 / Page 68 / --
- Burroughs Corp., 6071 Second Blvd., Detroit, Mich. / Page 72 / Campbell-Ewald Co.
- Computron Inc., 122 Calvary St., Waltham, Mass. 02154 / Page 4 / Larcom Randall Adv. Inc.
- Digital Equipment Corp., 146 Main St., Maynard, Mass. 01754 / Page 3 / Kalb & Schneider Inc.
- Forms, Inc., Willow Grove, Pa. / Page 71 / Elkman Advertising Co., Inc.
- Hughes Aircraft Co., Culver City, Calif. / Page 70 / Foote, Cone & Belding
- International Business Machines Corp., Data Processing Div., White Plains, N. Y. / Page 67 / Marsteller Inc.
- International Business Machines Corp., Data Processing Div., White Plains, N. Y. / Page 37 / Marsteller Inc.
- International Data Corp., 355 Walnut St., Newtonville, Mass. 02160 / Page 13 / --
- Information Displays, Inc., 102 E. Sandford Blvd., Mt. Vernon, N. Y. / Page 69 / George Taubert Agency
- Lockheed Missiles & Space Co., P. O. Box 504, Sunnyvale, Calif. / Page 66 / McCann-Erickson, Inc.
- National Cash Register Co., Main & K Sts., Dayton, Ohio 45409 / Page 6 / McCann-Erickson, Inc.
- L. A. Pearl Co., 801 Second Ave., New York, N. Y. 10017 / Page 70 / --
- Prestoseal Manufacturing Corp., 37-12 108th St., Corona, N. Y. / Page 63 / Spiegel & Laddin
- Randolph Computer Corp., 200 Park Ave., New York, N. Y. 10017 / Page 61 / Albert A. Kohler Co., Inc.
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