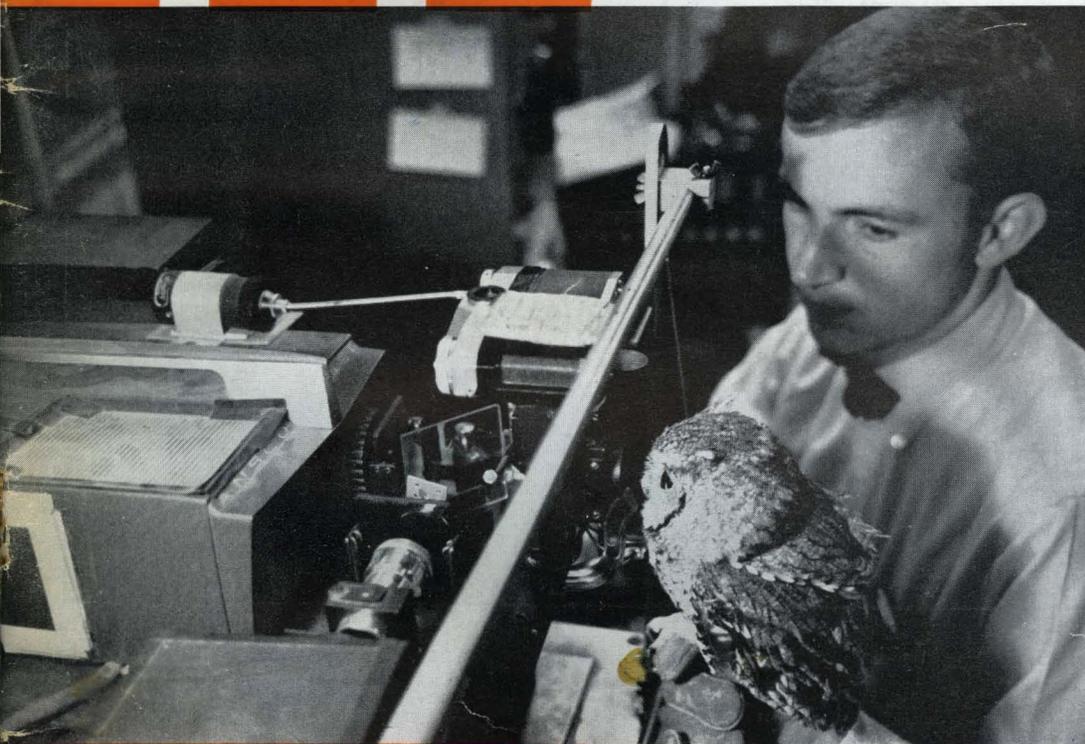


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**A Computer Market
Survey: The Banking
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**Automatic
Data Processing
in the Internal
Revenue Service**

**The Spectrum of
Information
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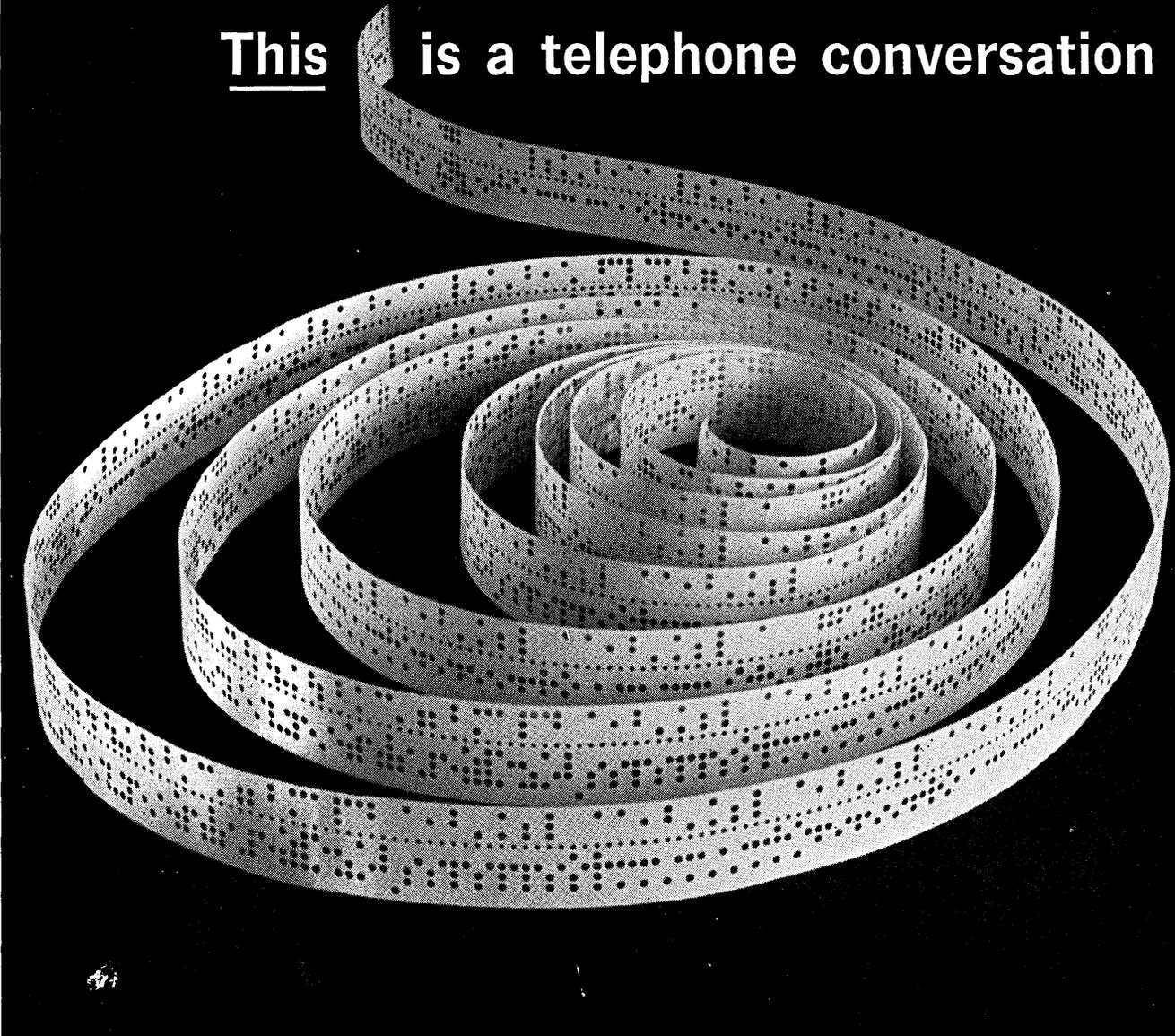
**A Report on
The IFIP Congress 62**

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**OCTOBER
1962**

Vol. XI — No. 10

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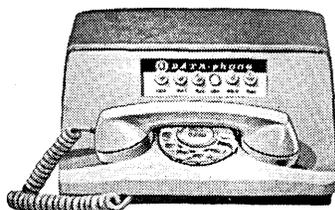
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- *every computer be bound by the principles established for the first computers 16 years ago?*
- *the split-second reaction of a computer be forever limited by the time-consuming necessity for operator intervention?*
- *computer users be content with a conventional computer which was NOT designed or built to make effective use of higher level languages?*
- *the language of computers be irrevocably oriented more to machine than to man?*
- *computer users, hearing about the advantages of problem oriented hardware from computer experts, be satisfied with anything less?*

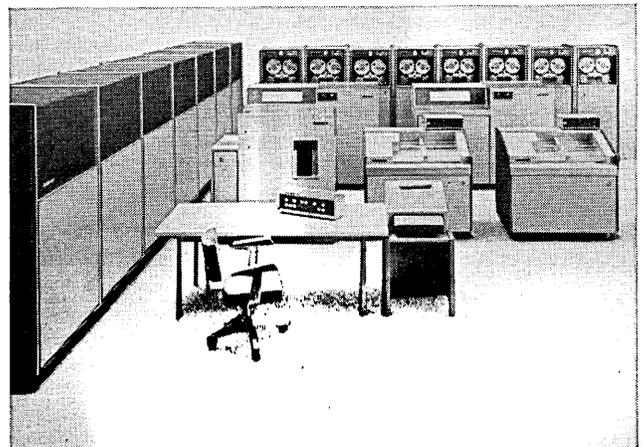
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COMPUTERS and AUTOMATION

COMPUTERS AND DATA PROCESSORS, AND THEIR CONSTRUCTION,
APPLICATIONS, AND IMPLICATIONS, INCLUDING AUTOMATION

Volume XI
Number 10

OCTOBER, 1962

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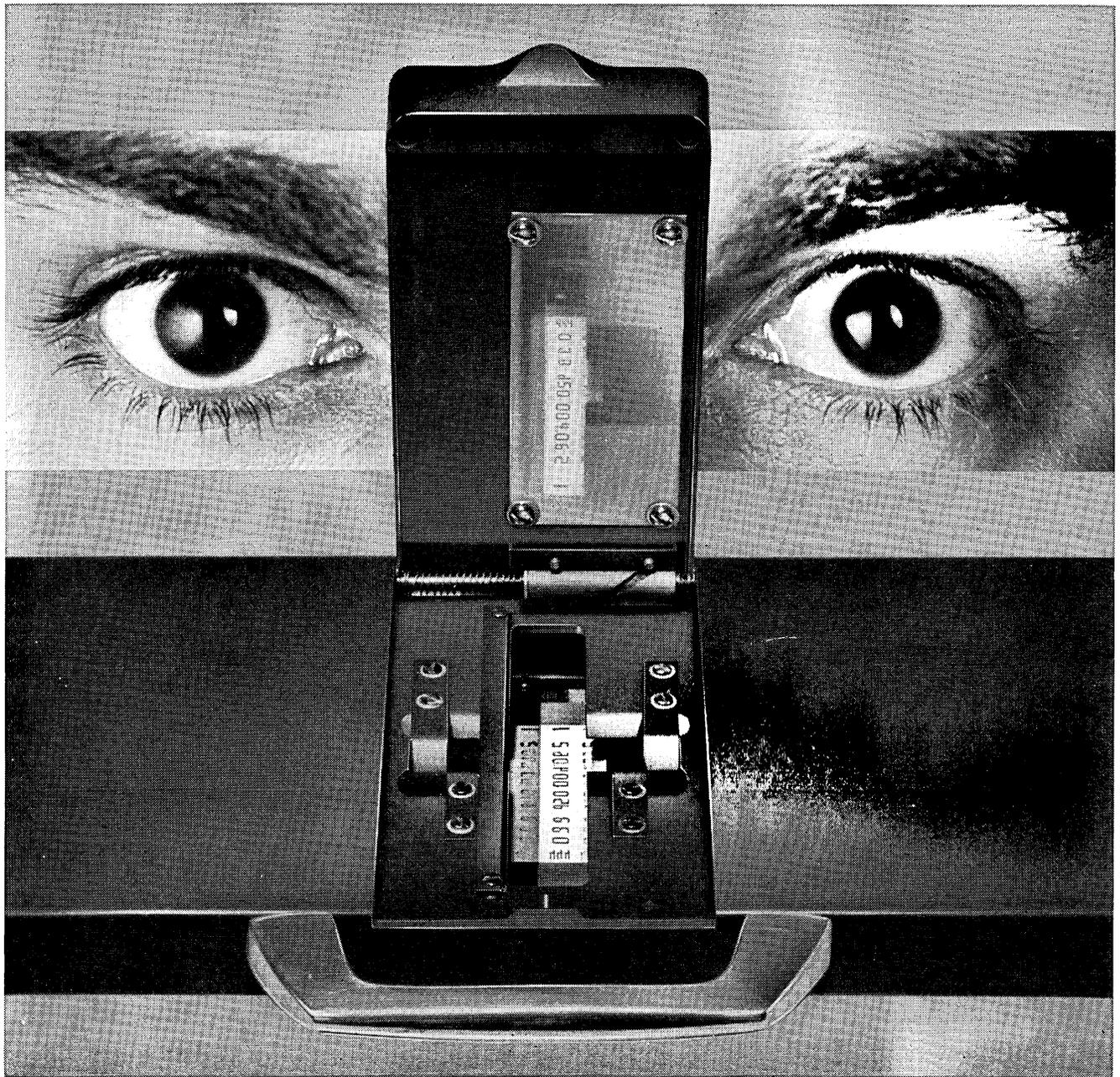
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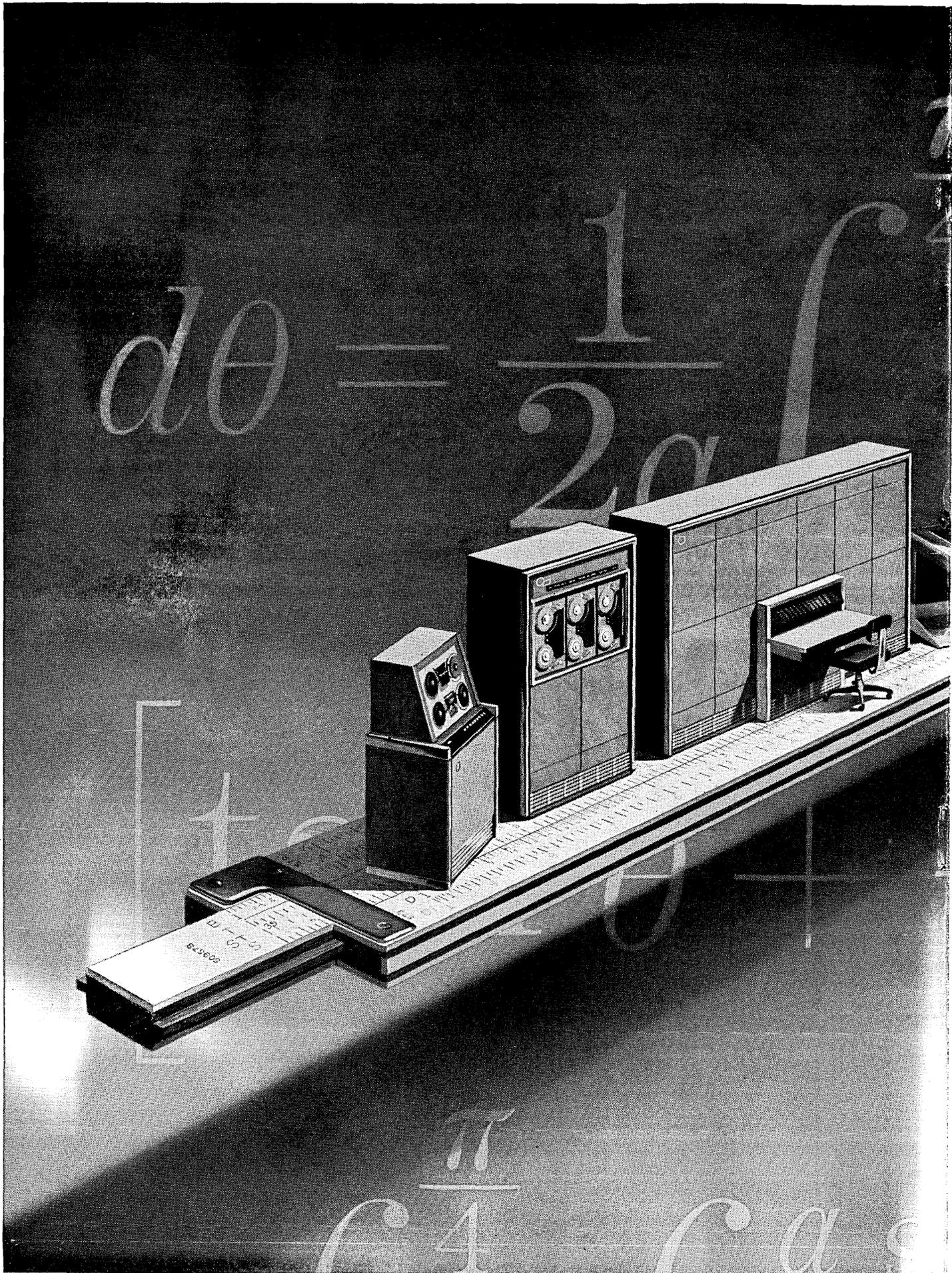
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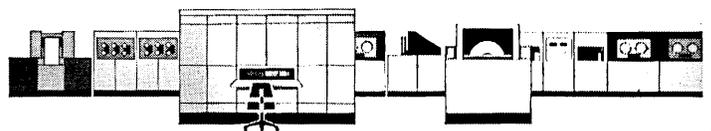
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Readers' and Editor's Forum

FRONT COVER: THE OWL AND THE COMPUTER

The scrubby little barnyard owl on the cover is teaming with a modern electronic computer to study some of the mysteries of the nervous system. The owl's name is Orpheus; the computer, a GE-225.

Dr. Lawrence Stark, a neurologist at the Massachusetts Institute of Technology, is using Orpheus, an *Otus asio* owl, in a pioneering study of pupillary systems. This and other experiments are aimed at development of a clearer understanding of human nerve and brain disorders such as Parkinson's disease.

Dr. Stark's specific interest in Orpheus is in the servomechanism controlling the pupil of the eye. His neurology group selected the eye for study because it is representative of other body systems and because it is externally located and easily observed.

The General Electric computer records the experimental data and takes complete closed-loop control of the problems introduced by Dr. Stark and his associates in the school's Electronics Systems Laboratory. The computer reacts faster—it can take a reading every 1/1000 of a second—than nature's servomechanism linking the eye with the brain.

For the experiments, the owl is carefully and comfortably placed in a pupillometer harness. Two devices, one a tiny light source and the other an infrared photocell, are trained on the pupil of the subject's eye.

The computer is programmed to direct a light beam of a certain intensity on the pupil. The beam causes no discomfort or damage to the eye. After the light passes through the pupil, it stimulates the photosensitive cells of the retina, sending electric nerve impulses to the brain.

The brain, then, analyzes the disturbance and sends a signal back to the pupil, causing it to contract. The time required for this circuit to be completed and the degree of dilation or constriction are recorded and analyzed by the computer.

As the reading from the photocell enters the computer and is recorded, the computer automatically introduces a different light intensity and starts the process again.

Through these experiments Dr. Stark and his associates are working toward the development of clearer definitions of some of the design principles which occur in the natural evolution of nature. It is his hope that they can then transfer these principles to man-designed electronic and mechanical systems.

AMERICAN COMPUTERS—A VIEW FROM POLAND

International computer crosstalk was promoted by the presence of a leading Polish computer expert at

the National Meeting of the ACM last month. Dr. Wladyslaw Tarski of the Computer Center at the Polish Academy of Sciences came to the meeting primarily to present a paper on an external language for the Soviet-built URAL-II computer.

However, Dr. Tarski, in an interview with an editor of C&A had some provocative things to say about the American computer industry. He commented, for instance, that "there are presently in Poland a total of 10-20 computers, but we expect that there will be about 50 in 1965. There are two foreign computers: a URAL-II of which two more are on order, and the National Elliott 803 of which one more is on order. We are unable because of trade restrictions to buy any American-made computers directly. However, we are too poor to choose anything but the best, and the Europeans have some fine competition for you.

"Why don't you Americans, with your fine technical capability, make such a fine computer as the Danish Disadec. This computer has a working ALGOL compiler, 1,024 words of core storage, and 12,000 words of drum storage. The access time from the drum is only 23 usec. It can perform 20,000 operations per second, and it has a total weight of only 1,100 lbs. And the Disadec only costs \$110,000, without magnetic tape units.

"The Swedish people are also making some fine memory systems that are comparable with your own, and far more economical."

On the role that computers are playing in Poland's economic development, Dr. Tarski noted, "There is about to be some significant advances in the application of computers in economic planning in Poland. A 'sensation' report is soon to be released on the use of computers to control housing development, and in the general construction industry. You know, we are about to suffer from a demographic peak due to a high rise in population soon after the war and before there was an active interest in birth control. To find housing and schools for this peak of people has to be a thoroughly planned operation, and a computer will be used to schedule this development. In fact, at the Warsaw computer center, the bread and butter group is the econometrics group who have been doing fine work in the field."

FJCC 62 FEATURES ANNOUNCED

A varied program, offering 35 papers on the latest EDP developments by over 60 international authorities, has been arranged for the 1962 Fall Joint Computer Conference, December 4-7, Sheraton Hotel, Philadelphia.

The conference will be keyed by Robert C. Seamans, Jr., associate administrator of NASA, who will

(Please turn to Page 42)

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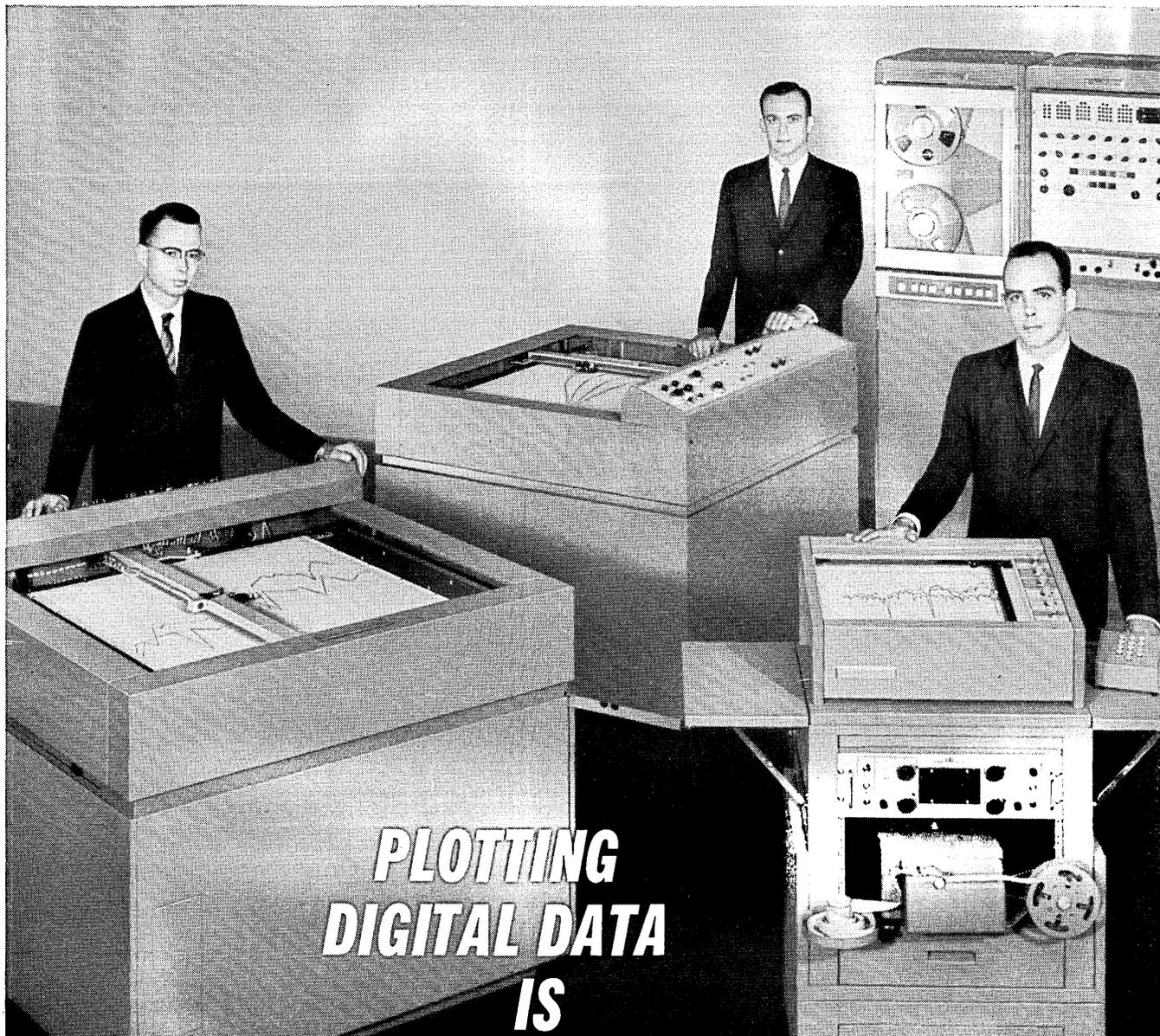
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Automatic Data Processing In The Internal Revenue Service

William H. Smith
Assistant Commissioner
Internal Revenue Service
U. S. Treasury Dept.
Washington 25, D. C.

How ADP is putting a sharp probe into the paperwork, pocket, and conscience of the taxpayer — as it helps to close the tax administration gap.

The mission of the Internal Revenue Service is to administer the Federal tax laws.

The art of administering Federal tax laws is doing a job which is almost unlimited in scope—with limited resources.

The special function of automatic data processing (ADP) in the Internal Revenue Service—in tax administration—is to enlarge and strengthen these limited resources, to give us the means and the capacity to make the job of tax administration one of manageable proportions.

Our ADP system was conceived about 4 years ago, and it came to life early this year. Although it is not scheduled to reach operational maturity for about 5 years, we believe that the objectives involved in strengthening our resources will be realized in full measure—and with extra dividends besides.

Our experience with ADP to date has been very gratifying. Apart from those situations ordinarily encountered in launching a computer system, our greatest difficulty has been to resist the temptation to overload the system. There is a continuing need to practice restraint and to hold off the conversion of applications until the system gains strength and is ready to absorb with facility operations now performed manually.

Need for ADP

With this as an introduction, let's provide a perspective with a few words about the forces in Federal tax administration that gave rise to our ADP system.

The major physical or tangible factor was paper—hundreds of millions of documents annually moving in and out of the Service. Specifically, the Service receives a torrent of paper that includes

- 61 million individual income tax returns;
- 96 million tax returns of all kinds;
- 350 million information returns;

and much more. The Service mails

- 90-odd million blank forms;
- 40 million refunds; and
- millions of bills and notices.

And the volume grows every year.

Our limited resources, which I mentioned earlier, were hopelessly inadequate to cope with, and exploit, this kind of volume. We were forced to do what we could, and leave the rest undone. Under this kind of pressure, our tax administration gap—representing what we couldn't accomplish—widened year after year.

A related and perhaps more critical problem in tax administration was lack of a master file of taxpayers—a single, central point at which we could identify every taxpayer, and record all transactions

reflecting his current tax status. I'll have more to say about the master file later, but the point should be made here that it was a practical impossibility to build a master file without an ADP mechanism.

We had the raw material, then—these hundreds of millions of documents—in over-abundance, but because of the staggering proportions of the processing and association job, we lacked the resources with which to do anything about it.

Out of these conditions grew the idea and then the design and organization of our ADP system.

Organization for ADP

The over-all structure of the Internal Revenue Service was well suited to accommodate an ADP organization.

Very briefly, we have 62 district offices where the main enforcement job of the Service is performed—collection, tax audit, and intelligence. In addition, there are 9 regional offices for the general supervision and support of the districts, and for the performance of certain operating functions (alcohol and tobacco tax supervision and the appeal of tax determinations) which can best be performed at a semi-centralized level. Then, capping the structure, we have our National Office in Washington, D. C., which is organized by functions: Compliance, Technical, Planning and Research, Administration, Inspection and, now, Data Processing. Each function is headed by an Assistant Commissioner who reports to the Commissioner and his Deputy.

Onto this structure, we have grafted several electronically equipped regional service centers and a National Computer Center. The entire operation is headed by an Assistant Commissioner for Data Processing who provides broad program and systems direction.

In broad terms, our main paper processing operation is to be transferred to these regional service centers. These centers, working in tandem with the National Computer Center—and we'll see some examples of how they'll work later—will perform a complete processing and revenue accounting operation for the district offices, and provide the personnel of these offices with up-to-date intelligence of a kind and quantity which was a practical impossibility before ADP.

In designing the ADP system and organization, we had to provide for easing it into our over-all operation by stages. The system represents such a complete change that Servicewide installation in a single stroke could have produced crippling dislocations in organization, systems, and personnel.

On January 1 of this year our first regional service center went into operation—in Atlanta. The Atlanta Center is servicing our district offices in 7 South-eastern states. At the same time, the National Computer Center went into operation in Martinsburg, West Virginia, with an IBM 7070 and peripheral equipment; and it is here that the Master File of taxpayer accounts will be maintained. The next regional center scheduled to come off the planning board and into operation is the one that, beginning on January 1, 1963, will service the 7 district offices making up our Philadelphia Region in the States of Pennsylvania, New Jersey, Delaware, and Maryland. Over the next few years the remaining centers will be gradually phased into the system—and ADP will have become an accomplished Internal Revenue Servicewide fact.

Accounting Under ADP

Moving in now for a closer look at the system, I believe that its impact on our internal accounting methods would be of some interest. To begin with, under ADP the major revenue and refund accounting operations will move from the district offices to the regional service centers. The move will shift revenue accountability from our 62 district directors to our regional service center directors. Some idea of what this means in dollar terms can be gathered from the fact that in 1961 our district director in the Anchorage District collected and was accountable for about \$66 million; the figure for the Manhattan District came to \$13.6 billion, with the other districts coming in between these extremes for a grand 1961 total of \$94.4 billion.

Under ADP, the general ledger, supporting journals, and data control accounts will be maintained at each regional service center instead of at each district office. Data for posting these accounts will come from two sources: From district offices will come a flow of summarized predetermined totals, as in the case of certificates of deposits made by district offices. Also from the district offices to the service centers will come a continuing stream of returns and documents reflecting transaction data affecting taxpayers' tax liability—prepayments, payments, audit adjustments, and the like. These data will be recorded on magnetic tape, and the summary print-outs posted to data control accounts, including the general ledger. From the National Computer Center will come recapitulations of totals of detailed registers and vouchers produced on tape by the computer from input transactions or from computer-generated data printed as outputs for posting to control accounts. Also from Martinsburg will come reels of magnetic tape periodically bringing each taxpayer's account up to date in terms of his total outstanding tax liability, including penalties, refunds and all other pertinent tax settlement information.

Districts now maintain unit ledger cards for accounts receivable—a separate card for each taxpayer, for each tax period, and for each type of tax. As accounts become delinquent, a transcript of pertinent data is prepared and distributed to revenue officers for follow-up action. This entire receivable mainte-

nance operation will be transferred to one point, Martinsburg, where the whole operation will be electronically telescoped—and where for the first time, through the master file, all receivable records will be pulled together.

The entire detail accounting operation, in fact, which is now done manually in district offices—by typewriter, adding machine, and bookkeeping machine—will be performed electronically at the centers, except for final postings of totals to the ledger and journals, and except for some miscellaneous accounts which will still be maintained in the districts. The nature and characteristics of the computer system will also make it possible to do away with many sectional controls now manually hand-posted, without affecting the internal control aspects of the accounting system.

Advances in Tax Management

Although ADP's contribution toward a streamlined accounting operation is quite important, it means a great deal more to us than a mechanism for efficiency—a device which can perform electronically tasks that used to be performed manually. The central significance of ADP to the Revenue Service is its capacity to produce data and intelligence which will enable us to achieve broad, across-the-board advances in tax management of a character and degree we could not heretofore hope for.

Let's look at a few.

Master File

I referred earlier to the master file—the master file of taxpayers. Although it would be clearly overstating it to say that without a master file the Service was operating blindly, I believe it would be fair to say that we have been operating myopically. Consider just part of the picture—practices in filing returns:

—62 million individual and fiduciary returns, and 6 million declarations of estimated tax, being filed in 62 districts—with many individuals, because of population mobility and for other reasons, filing in one district one year, another district in the next year, and even a third district in the third year.

—One million partnership returns filed in 62 districts, with partners often filing their individual income tax returns in districts other than the one in which their partnership Forms 1065 are filed.

—Over 1 million returns for corporations, many of them closely held, filed in 62 districts, with the principal officer-stockholders filing their Form 1040 in districts other than the one in which the corporation filed its Form 1120.

Consider next the receipt by the Service of 100 million information returns a year reporting payments to individuals of dividends, interest, and certain other income by names of individuals, and the virtually impossible job of processing and matching an information return for J. Randolph Doe with his tax return filed under the name of John R. Doe—and perhaps different addresses.

Consider, finally, the problems involved in associating data from all these documents and a system of internal accounting under which the tax liability

of a single individual or corporation for different types of taxes, and for different tax periods, was maintained separately—in separate accounts.

Consider, then, these oversimplified statements of just these situations (there are others), and there may be little difficulty in visualizing the operational handicaps under which we have had to function without ADP—and what a master file of taxpayers created by ADP can mean to the tax administrator.

The concept of the master file is simple. Through association of data electronically, we will have a revealing tax profile of every individual and business tax entity in terms of:

- How much he owes the Government by type of tax and tax year;
- How much the Government owes him;
- What returns he must file, and when, and whether he has in fact filed them;
- His payments to the Government, and refunds to him;
- His income during the year as reported to the Service on information returns; and
- Similar and related data.

The file, when we complete it, will contain some 78 million taxpaying entities, about 6 million of them business establishments. It will be maintained on magnetic tape, will be updated weekly, and will include in each record-tax base and tax settlement information for each entity's most recent 3 years of tax history, thus showing us significant patterns and trends about each taxpayer.

In summary, the other than professional operations of the Service—processing, matching, bookkeeping, and many other tasks—will have been performed by machine, leaving district office staffs free for personal contact with the taxpayers.

Other Uses

There are other benefits to be derived from the system. The identification of those who fail to file returns is one. Still another is represented by a long forward stride in the processing of refund claims, all of which henceforth will be passed against the master file before being approved to determine whether the claim is a duplicate, or perhaps even fraudulent, or whether the taxpayer's record shows an unsatisfied indebtedness for the same or another tax for the same or a prior tax period.

Selection of Returns for Audit

A third will involve the automatic selection of returns for audit by revenue agents. The selection or classification process is now done manually—by experienced agents who scan returns for apparent irregularities. Under ADP, the computer will be used to identify returns that suggest a need for audit examination and to print out for the revenue agent's use apparent irregularities that caused selection—such as, under-reported income; excessive deduction for depreciation, or dependents, or charitable contributions; inventory discrepancies; and many other questionable items.

Fourthly—the Service will have a capability to associate data from a variety of sources on a scale heretofore unavailable.

Tax Model

Data processing has already made it possible for us to bring into being, on magnetic tape, a very useful device which we call our Tax Model. The tape contains about 50 items taken each year from each of 100,000 Forms 1040 and 1040A. The returns are carefully and scientifically selected to make sure that, compositely, they represent the universe—a microcosm of the individual taxpayer community.

The Tax Model, in one sense, is to tax administrators what a wind tunnel is to aircraft designers.

Assumed or hypothetical changes in tax law and other factors can be cranked into the Model which can then be quickly manipulated by computer to measure the revenue effects of the hypothetical changes. The special usefulness of the Tax Model is its capacity simultaneously to compute revenue effects of several assumptions—e.g., changes in tax rates, exclusions, certain types of deductions, etc.—by taking into consideration the interplay of these assumptions on each other as well as on factors that remain constant.

The Model in use today is built on 1960 tax year data; next year we'll have one covering the 1961 tax year. It is small, flexible, and quite inexpensive and easy to work with. It should reduce the degree of guesswork in estimating. And it represents a very useful advance in tax research.

The Anomaly of ADP

For tax administration, ADP presents some interesting contrasts. For example, the processing and other related operations we perform manually will be performed with much greater efficiency with ADP. At the same time that the system reduces our paperwork burdens, it will expand our enforcement capability and narrow our tax administration gap. Among other things, for example, ADP will give us the capacity, to a much greater extent than we now have, to identify not only the universe of taxpayers but to provide the names and addresses of the people who aren't taxpayers—but should be. It should be able to produce for us a multitude of leads to tax irregularities, and in that way very substantially enlarge our enforcement scope.

The result will not be, as some suspect, an uneven contest between machine and man. The system's end product will be placed in the hands of people—Revenue Service people—who will go on from there to deal directly and personally with taxpayers, just as before, except that ADP will enable our staff to deal with taxpayers on a much more informed basis.

Benefits to Taxpayers

The benefits of ADP are not limited to the Internal Revenue Service. The public—our whole society—has a vital stake in Federal tax administration, and to the extent ADP strengthens tax administration the taxpaying public benefits by assurance of a fairer, more equitable, and more even distribution of its tax responsibilities under the laws enacted by the Congress.

In terms that are perhaps more recognizable and immediate to much of the public, ADP also means refunds that reflect all the facts . . . more accurate

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COMB

billings . . . and, because the system relieves our staff of so many routine operations, more personal attention of a higher, more professional, quality. For large business and other organizations with computer systems of their own, ADP in the Revenue Service eventually will make it possible for them to communicate with us, so to speak, by tape instead of by millions of forms. We see the day, not too far off, when large corporations will be able to send to us, in magnetic tape form, data covering payments of salaries, dividends and interest, and other items instead of reporting these data to us on Forms W-2, 1099, and other documents, as they do now.

At this point, I should note, before it is assumed that all the problems of the Revenue Service have been solved, that there is and always will be essential operations in tax administration which are beyond the scope of ADP. The computer cannot hear and judge appeals . . . interpret laws and regulations . . . assist taxpayers . . . set up part-payment schedules for hard-pressed taxpayers . . . conduct audits . . . and it cannot collect tax.

At its core, tax administration is, and must remain, a very human business, requiring reason and judgment and understanding and evaluation in human terms. These and many gray areas of tax administration are, and will continue to be, safely beyond the reach of any ADP system.

The system is extremely efficient and useful in identifying areas of apparent audit irregularities and under-reporting and nonfiling. The rest—the follow-

up—requires manpower: revenue officers to contact delinquent or nonfilers; internal revenue agents and auditors to examine taxpayers' books and records and make technical and professional judgments on tax liability; special agents to investigate suspected tax fraud.

That, then, is the sober, or the balancing, side of the over-all ADP picture. This view sometimes has to be communicated with almost as much force as the other side, although the plus side needs no elaboration or eloquence. A well conceived and implemented system speaks for itself.

Conclusion

I want to conclude this rundown on ADP in the Revenue Service by pointing up what it means in the much broader context of Federal tax administration. The mission of the Revenue Service extends beyond the literal administration of the tax laws and the collection of revenues. Our tax system is grounded in a spirit of self-assessment—voluntary compliance with the law. In this country millions of taxpayers go through an annual ritual, in the privacy of their homes and offices, equipped with blank returns, instructions, paper and pencil—and their consciences—to determine their tax liability and then pay it. The resources that contribute to the strength and economic stability of the United States certainly include the asset of people's voluntary compliance with tax laws.

The thrust of tax administration, in large part, is
(Please Turn to Page 49)

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A Computer Market Survey: The Banking Industry

Prepared by the Editors of
Computers and Automation

An analysis of the present use of electronic banking aids, and a projection of the size of this market for computers during the coming half decade.

If the days are gone when the bearded miner hoarded his nuggets beneath the floorboards, gone too are the days when a bank was a stuffy, imposing institution overstuffed with human calculators laboring over adding machines. The modern commercial bank is a revolutionary institution despite its image of imperturbably stolid conservatism.

Growth of Banking

These innovations have not come without strong motivations. In the last decade the banking industry has enjoyed tremendous and remarkable growth. As the economy expanded in the post-war years, demand deposits grew. New activities and services heightened the administrative load. Large sums of money were wooed by salary deposit plans, accounting services, and research and advisory services. Simultaneously, banks have increased their retail lending, with the figure for loans, as a percentage of assets, more than doubling since 1946. The banking industry therefore today faces challenges that were unknown fifteen years ago.

These challenges are typified by the tremendous surge in checking popularity over the last decade. Ten years ago 8 billion checks were written in the United States. By 1960 the number had rocketed to 13 billion, and today hovers close to 15 billion. If the trend continues, by 1970 there will be 22 billion checks written each year, almost 43,000 checks a minute.

What's more, an average check must pass through 2.3 banks; during this financial sojourn it will be handled from 7 to 20 times. Within a decade, checking activities alone may require of the banking industry up to almost 440 billion handlings each year.

Moreover, external developments offer banks no hope of a respite.

Our population is presently increasing by approximately 2% a year.

By 1970, it is expected that our gross national product, or GNP, will have risen by 45%. The effects of this growth have already registered on the nation's banks. Since World War II, savings accounts have increased by more than 33%, checking account activity has grown by 163%, commercial loans are up 113%, mortgages are up 290%, while consumer installment credit is up an amazing 850%.

Functions of Bank Increase

Banks have gone out aggressively to meet these new demands. They have become increasingly responsive to the needs and interests of their customers. A suburban housewife enjoys the drive-in facilities of a new branch office. Holiday Clubs bring an affluent Santa to more and more children each year. The new customer is offered a spectrum of financial services, from bill paying plans to revolving check credit, from college loan plans to low tax "living trusts," from home

improvement loans to investment counselling. The number of services is growing; the magnitude of each service is on the upswing, and the complexity of each activity sets new demands each day for more records and information.

The result is that the successful urban bank is engaged in a grandiose retail operation involving:

Special money handling: coins, money orders, traveler's checks, bills of credit, handling of foreign currency, foreign bonds.

Savings: savings bonds, Xmas clubs, school savings programs, savings clubs, banking by mail, night, and outdoor services.

Collect and disburse: coupons, drafts, rent payments, mortgage payments, bills, dividend disbursement, service payrolls, act as escrow agent. (Even merchandising of coupons and stamps!)

Protective services: rent safe deposit boxes, maintain night depository, custody of securities.

Special aids to business and individuals: assist in income tax preparation, financial advice, business assistance, credit information, statistical information, provide customer conference rooms, correspondent bank facilities, operate business-aid library, provide letters of introduction, stock transfer, investment advice, handles securities.

Trust Services: estate planning, management of estates.

During this rapid expansion in activity, banks are finding it difficult to obtain all the trained personnel they need, and still keep payrolls under control. While national nonagricultural employment has increased only 20% since the end of the war, employment within the banking industry has risen 65%. If the industry is to attract still more workers, while maintaining a minimum level of employee competence, the economics of supply and demand will require higher wage levels, aggravating the costs situation. The costs associated with a 20% annual turnover in the industry, and the training of new employees, make the employee problem a vital factor in a bank's economic survival. Since 1950, banks' gross earnings per dollar of assets have increased by nearly 50%. Yet bank profits have failed to show a similar rise, having stayed fairly constant at about 8% of total capital accounts. An increase of 98% in labor costs over this period seems to be a major factor in this profit rigidity.

The result of all this is an increasing and almost general acceptance of sophisticated electronic aids within the banking industry. Ledger clerks on high stools are extinct in this impending age of the computerized bank. Already, the first groundswells of this change are evident to the casual observer in the mechanization of vital bank functions.

Nature of Survey

To get an up-to-date picture of the present state of bank automation, the editors of **Computers and Automation** queried the top management of 1,500 banks, picked at random from among the 13,500 that exist in the United States today. We asked for a description of the data processing machines presently being used in banks, an indication of what devices are presently on order, and an estimation of the amount of money that would be invested in the coming years in data processing machines to mechanize banking operations. The rest of this article summarizes the facts we gathered from this survey.

Types of Electronic Aids

The survey showed that modern banks are now enjoying six major types of data processing aids: window posting machines, proof machines, bookkeeping machines, electronic bookkeeping machines, punch card tabulators, and electronic computers.

Description of Electronic Aids

Window posting machines are well known to every bank depositor. These are basically adding machines which record the deposit or withdrawal and strike the new balance. Shuffled piles of documents are sorted, and the ordered material is dropped into separate slots by the proof machines. Typical bookkeeping machines combine the features of adding machines and typewriters. Like the window posters, these machines can enter dates; unlike the posters, they can use symbols and keep track of checking accounts. The first of the truly electronic aids, however, are the electronic bookkeepers, nicknamed "tronics." Where they are used, $\frac{3}{8}$ inch black strips on the monthly statements carry powdered iron, which stores information in the form of magnetic pulses. When a clerk inserts a ledger card into this machine, the machine compares the account number with that written on the black strip. If these match, the machine records the new balance on the ledger card, and stores it magnetically on the black strip as well. Of a still higher order of sophistication are the punch card tabulators. Punched cards, with supporting arrays of collators, verifiers, and card reproducers, have assumed an important role in the storage of masses of financial data.

Use of the Electronic Computer

Yet the most comprehensive solution to the problem of banking mechanization is the electronic computer. In 1956, the first computer went to work for the banking industry with the installation of an ERMA computer by the Bank of America. Its remarkable efficiency and potential was soon recognized. In processing checks, for example, the ERMA could sort according to destination, run check totals, pass along information and operate continuously at a rate of from 750 to 1,500 checks per minute.

As more and more banks organize for computer use, the experience of the Dime Savings Bank of Brooklyn may become fairly typical. The Dime Savings is the third largest financial institution in the country, and its assets are in the billions. It carries 600,000 depositor accounts on an automated basis. All accounts are handled by a National Cash Register

Size Distribution of Banks by Amount of Deposits

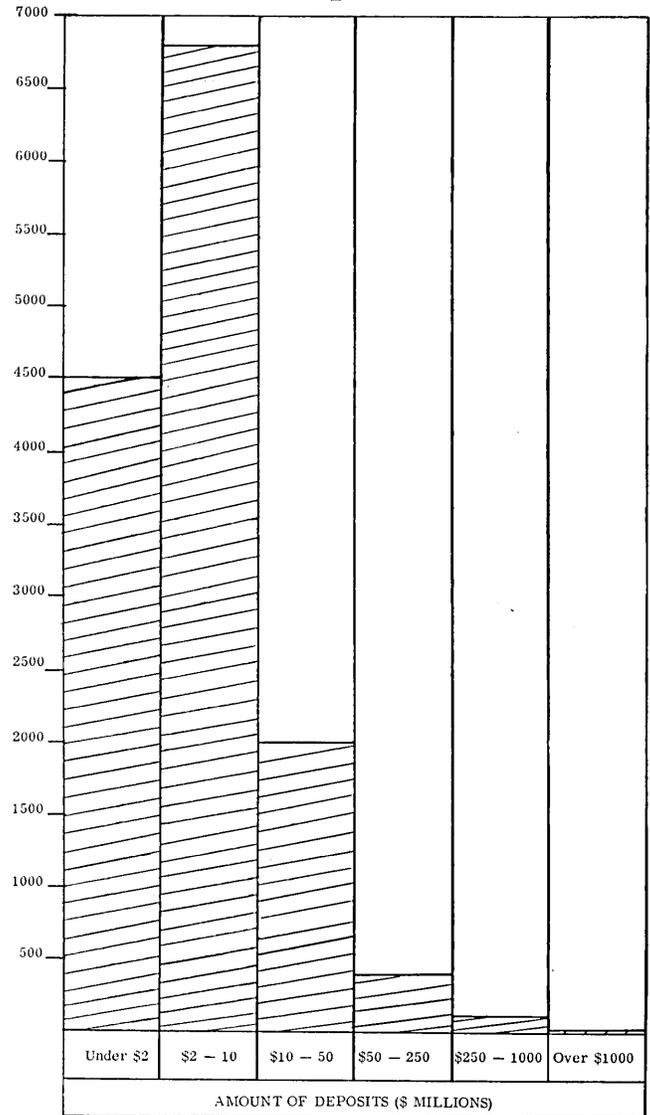


Figure 1. Size distribution of the nation's approximately 13,500 banks by amount of deposits.

315 system, which has brought "a 93% saving in normal effort, and with the highest accuracy," in the words of the bank's president.

When the Dime installed NCR class 42 window posting machines in 1957, it had begun its transition to automation. These machines, equipped with punched paper tape, keep a record of all window transactions. By processing the information contained in these tapes on the NCR 304 system, the bank was able to obtain in twelve minutes all the data from 30,000 savings accounts on a peak day. In three hours, the entire day's business could be processed from initial entry to final tabulation.

With the installation of the NCR 315, the bank operates at an even higher level of automation. The NCR 315 computer has a random access card memory, permitting transition to an on line system with NCR teller machines linked directly to the computer.

It is not surprising that large banks like Dime Savings have accepted automation so enthusiastically. One

Numbering of Accounts

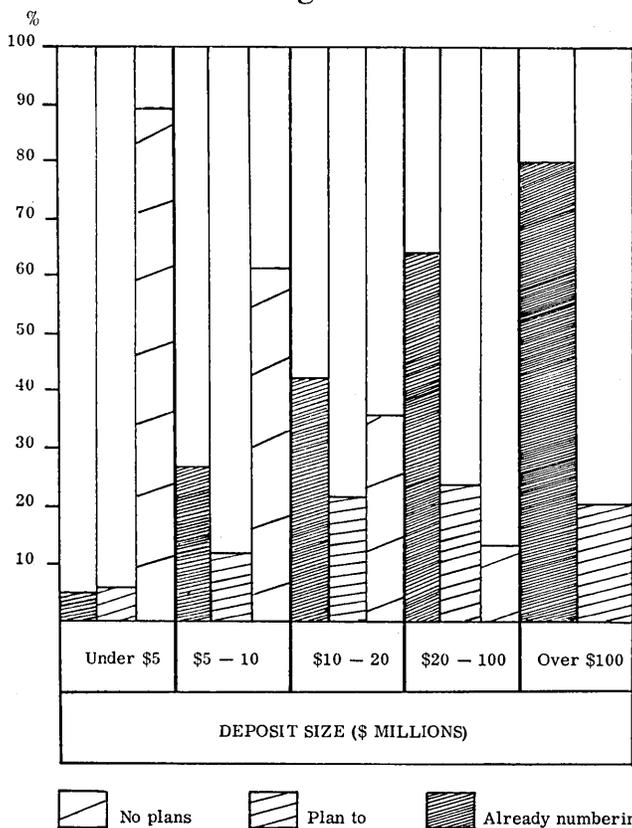


Figure 2. Percentage of banks numbering accounts, or planning to number accounts.

bank with 500 employees, and deposits of \$125 million, is now ordering a second IBM 1401 computer system. It reported being able to reduce its employees by five per cent. Another bank notes that it has halved its employee costs, while still another reports savings of over one million dollars.

However, the plans and facilities of the Dime Savings and other large banks are far from typical. No small bank will ever rival the computerized giants in efficiency. Automation costs money; and small banks have limited budgets. Yet these banks are faced with the same costs problems, and the same competitive needs for high speed processing of information as their larger sisters. While they must automate to compete and grow, the lack of funds make the process very gradual. Once past the superbank's, however, computer manufacturers should find a fertile opportunity for equipment rentals among these smaller banks.

Structure of the Banking Industry

To understand this situation, we must examine the structure of the banking industry. Today, there are approximately 13,500 banks in the nation. Although 20 of these have deposits in excess of \$1 billion, a look at Figure 1 shows that the deposits of very few banks exceed \$10 million, and practically none exceeds \$50 million. Deposits of more than half the nation's banks lie between \$2 and \$10 million. In general, these banks have few employees and little inclination to automate.

The largest banks tend to be concentrated in the same areas. Of the twenty banks whose deposits ex-

Magnetic Ink Imprinting

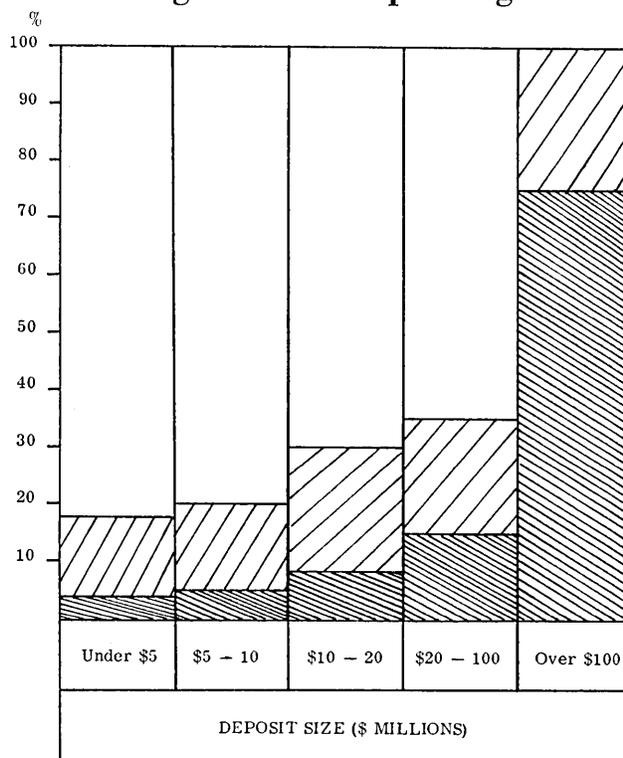


Figure 3. Banks planning to begin magnetic ink imprinting (light hatch), and banks already imprinting (dark hatch).

Window Posters

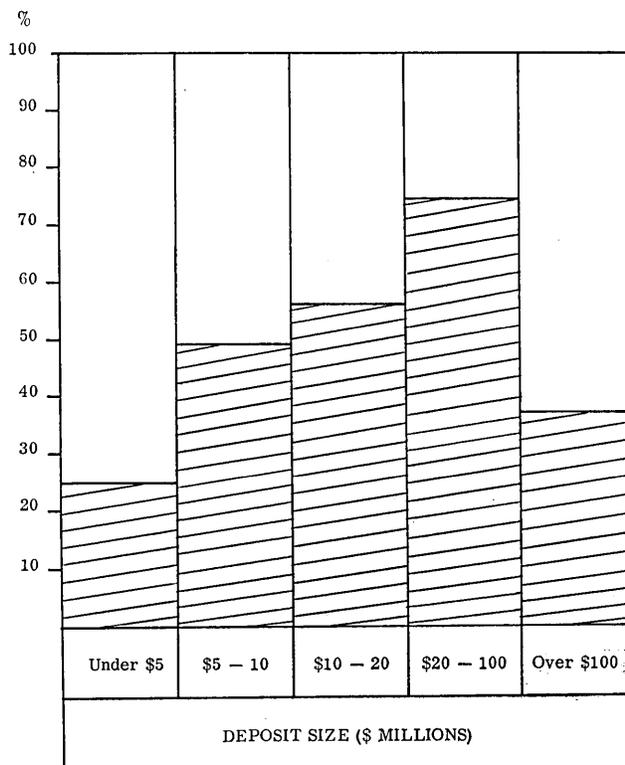
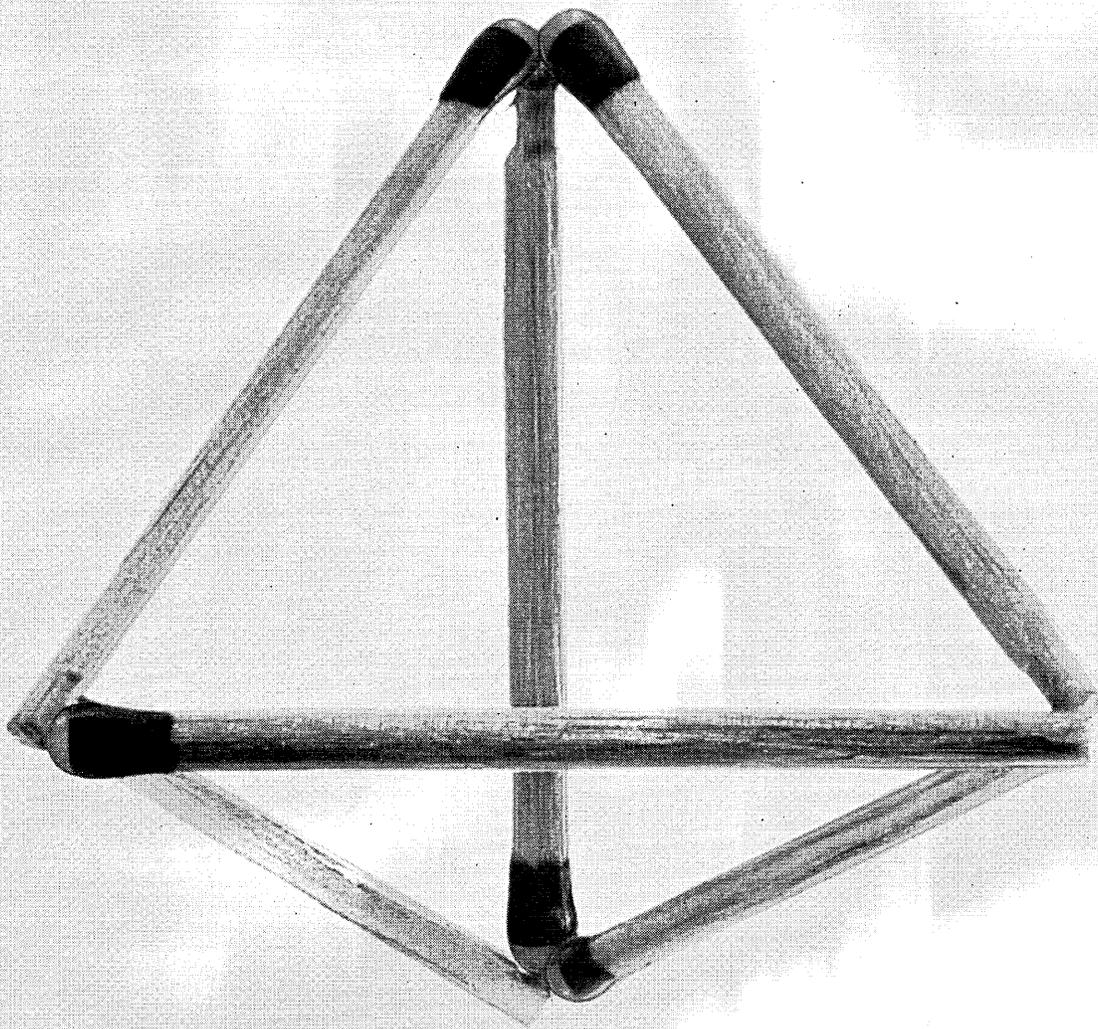


Figure 4. Percentage of banks now using window posters.

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ceed \$1 billion, 5 are in California and 8 are in New York. Ohio has 16 banks with deposits over \$100 million; Massachusetts has 15, and Illinois, 14. On the other hand, while South Dakota has but two banks with deposits over \$50 million, Wyoming has none.

Banks Use of Electronic Aids

Evidence is clearly at hand that smaller banks are beginning to follow the lead of the larger institutions in the mechanization of their information processing procedures. Both numbering of accounts and magnetic ink imprinting, the two preliminary steps to final automation, are either planned or in use in all banks with over \$100 million in deposits. Although only a few per cent of the banks in the \$5 million range are using these techniques, Figure 2 and Figure 3 show that the percentage rapidly increases with the size of the bank. Figures 4, 5, and 6 show similar patterns for the utilization of window posters, proof machines, and electronic bookkeepers.

Punched card tabulators are not in use in any of the banks surveyed with deposits under \$50 million, and only 10% of the banks in the \$50-100 million range have this equipment. However, virtually all (92%) of the banks with over \$100 million have this equipment already in operation. The major change planned by the bigger banks is the introduction of sorter readers. Seventy-seven per cent of the big banks plan to use these machines.

However, 95% of the banks with deposits over \$100 million have punched card tabulators already in operation. The major change planned by the bigger banks in improving this use is the introduction of sorter-readers. Seventy-nine per cent of the banks with deposits between \$50-100 million plan to use these machines.

Degree of Computer Use

At the present time, use of electronic computers is confined to banks with deposits over \$20 million. Of banks within the \$20-100 million range, six per cent presently rent, or lease a computer. Banks with deposits over \$100 million represent an exclusive fraternity where 4% own part or all of an electronic computer, and 15% rent or lease one.

Methods to Computer Ownership

This level of computer ownership is cause for neither optimism nor pessimism. Computers are expensive creatures, and banks have been making purchasing decisions with studied caution. If a bank feels that it may have difficulty utilizing a computer full time, it is reluctant to purchase. However, there are two ways around this situation. One is by renting time on the bank-based computer to outside organizations. The other is to share the costs of a computer with a number of other organizations, especially other banks.

An example of the first approach is the Bank of America. It is presently processing payrolls for the 40,000 employees of 104 companies. It expects the number of firms contracting for this service to increase sixfold within the year. Similarly, the Waterbury National Bank of Connecticut has established a computer division which handles for outside clients

Proof Machines

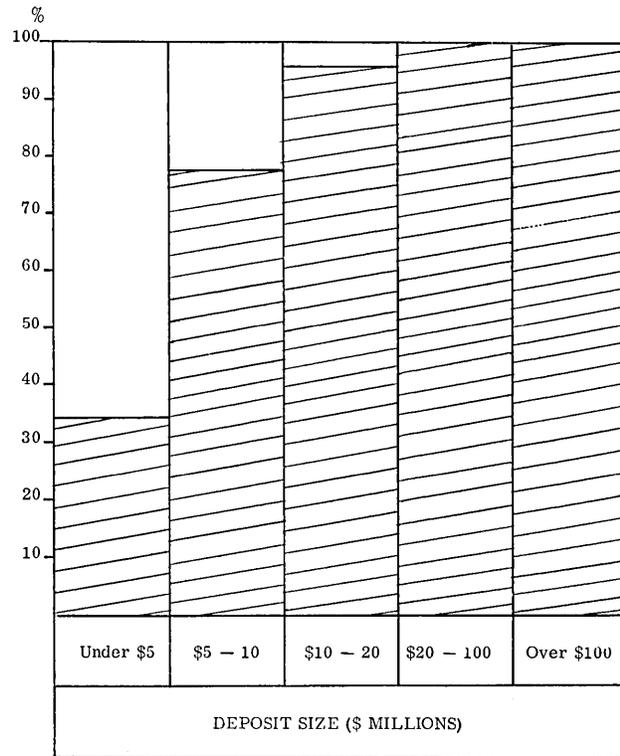


Figure 5. Percentage of banks using proof machines.

Electronic Bookkeeping Machines

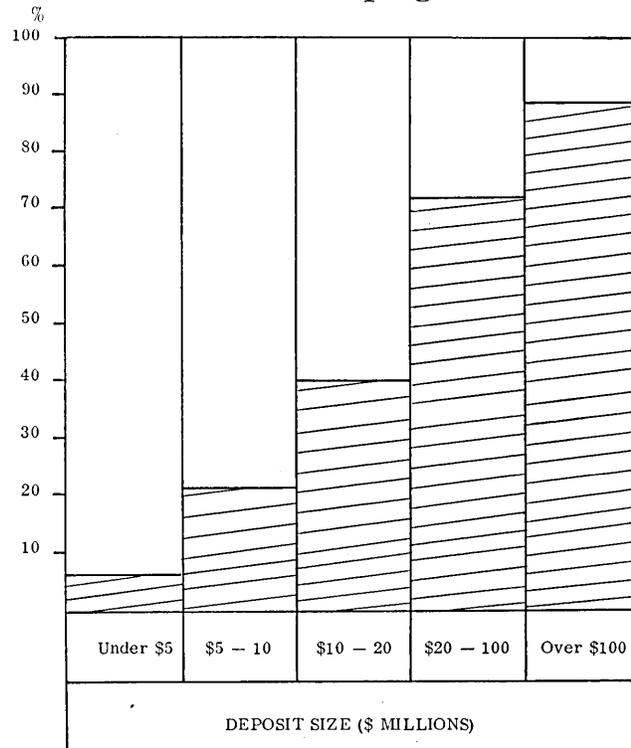


Figure 6. Percentage of banks now using electronic bookkeeping machines.

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such tasks as sales analysis, and matching buyers preferences with available homes.

Computer sharing arrangements have generated the greater amount of interest, however. Sharing arrangements are, in fact, preferred by 37% of the nation's banks. Figure 7 shows that this interest is particularly strong among the medium scale banks with deposits of \$20-100 million.

Preference for Sharing Arrangements

In Figure 8, banker preferences for four possible alternative sharing arrangements are shown. While clearing house or regional bankers' association ownership is popular among the smaller banks, the most attractive proposal seems to be a computer sharing center run by the manufacturer of the equipment.

Computer Sharing

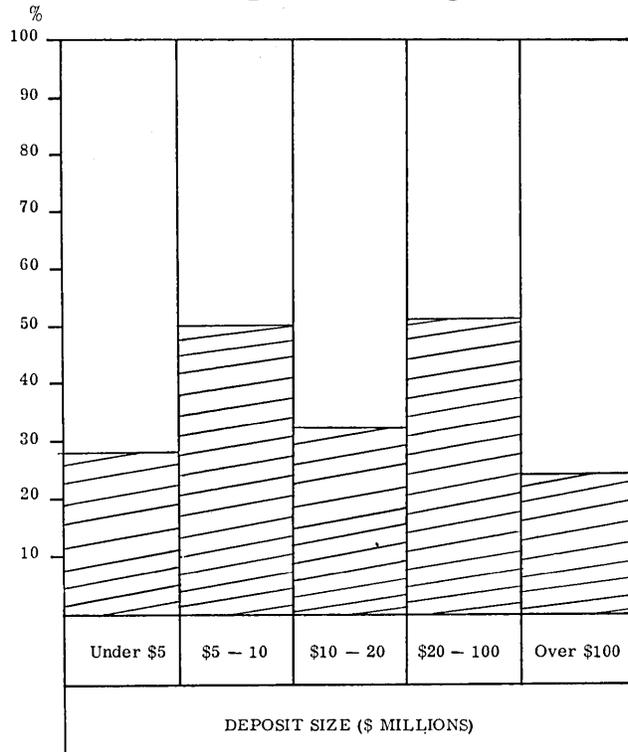


Figure 7. Percentage of banks preferring some type of computer sharing arrangement.

PLAN PREFERRED				
Size of Bank by Deposits (\$1 Millions)	Service Bureaus Operated by Computer Manufacturers	Bankers' Association or Clearing House Ownership	Joint Ownership by Bank Group	Use of Larger Bank's Equipment
Under \$5	37%	32%	25%	6%
\$5 - 10	39%	30%	19%	12%
\$10 - 20	49%	31%	11%	9%
\$20 - 100	45%	4%	51%	-
Over \$100	65%	-	35%	-

Figure 8. Percentage of banks, by size, preferring each type of computer sharing plan.

This preference might present a profitable opportunity for an imaginative computer sales organization.

The Size of the Bank Market

The information collected by the survey indicates that for every \$100,000,000 in deposits, large banks can be expected, on the average, to expend approximately \$250,000 over the next five years for electronic computers. It can be expected that smaller banks will expend less per million of deposits for computers than larger banks during the next five years. It seems likely that almost all computer sales will be to the top two-thirds of banks by size.

In Table A, which is at best an educated guess, no sales are contemplated to the smaller 5,000 of the 13,500 banks in the country. It must be emphasized that the figures are approximate averages only.

TABLE A
Projected Market for Electronic Computers in Banking 1963-1967

Banks, by rank in size of deposits	Average value of installation over the next five years	Total value of installations
Top 20	\$2,500,000	\$ 50,000,000
Next 90	1,500,000	135,000,000
Next 1,000	300,000	300,000,000
Next 1,400	100,000	140,000,000
Next 6,800	17,500	119,000,000
9,310		\$744,000,000

This table suggests that makers of systems in the million-dollar-and-up class are restricted to just 110 institutions—and some of these already have equipment in hand or on order. In the medium-priced computer range, from \$100,000 to \$500,000, there would seem to be 1,000 prospects. Another section of the market, about 1,400 prospects, are potentially in the market for computer equipment in the \$100,000 class which can efficiently be applied to banking functions. The bulk of the market, some 6,800 prospects, are potential users of specialized off-line electronic bookkeeping aids in the \$10,000 to \$25,000 range.

The total market for computers in banks alone, then, appears to be approximately \$750 million over the next five years.

Quick Profits Not Likely

A promise of quick profits is not, however, an adequate explanation of why banks will become increasingly computer-minded in the years ahead. Although many banks with a couple of years of experience with computers have reported very substantial cost savings, this is not the normal situation. Most banks do not anticipate immediate profits. They expect to wait a few years until the computers are fully integrated into the bank's operations. Nor is there any convincing evidence that capital funds for computer purchases can be generated by substantial payroll reductions. Although some banks have enjoyed very substantial labor cost savings, others have felt they were doing well by maintaining the payroll at pre-computer levels.

In fact, many banks will be purchasing computers

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primarily to provide the services demanded by their customers. High speed data processing is often as essential to the maintenance of a bank's competitive position as it is to operational efficiency.

Future Outlook

Yet banking automation is no doubt inevitable in the long run. The projected 22 billion checks, and expanded activities and services of 1970, cannot be handled by manpower increases alone. There simply will not be enough manpower economically available.

To operate efficiently, banks will have to meet the challenge of automation. Checks must be standardized with magnetic ink imprinting. Large banks must aggressively streamline their internal operations. If they are to compete with these banks in efficiency and in services, small banks must jointly purchase and operate automatic data processing centers. Although the legality of such operations is now questionable, late in August the House of Representatives passed and submitted to the Senate a bill to make this form of computer sharing arrangement possible.

Equipment manufacturers must work aggressively to develop and introduce new equipment and methods. Bank officers must develop an intelligent and open-minded approach to upgrading their operational systems. Normal bank operations will then be handled with increased efficiency, and new machines and methods may even suggest new services.

The editors wish to express their appreciation to Roger Weissinger of MIT, and Leon Jacobson of Harvard Univ., for their cooperation in the preparation of this report.

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NEW APPLICATIONS

COMPUTER TECHNOLOGY AN AID TO PSYCHIATRIC DIAGNOSIS

Computer technology is being put to use as an aid to psychiatric diagnosis. This application, reported to be the first of its kind, involves work with emotionally disturbed children. This work is currently underway in Philadelphia at the Children's Unit of the Eastern Pennsylvania Psychiatric Institute. Computer assistance is provided through the facilities of the Sperry Rand Corporation's UNIVAC Division.

The collection of data regarding symptom formation in emotionally disturbed children was begun at the Children's Unit of E.P.P.I. in 1956. The information was obtained from strictly controlled interviews with each parent of a child brought to the Institute for treatment. Questioning revolved around 130 key symptoms. With over 200 cases thoroughly documented, the staff personnel at the Children's Unit faced the problem of analyzing this overwhelming collection of data. The objective was to evolve, through analysis, a picture of how symptoms might tend to form patterns. Diagnosis and treatment procedures could be further advanced if consistent patterns could be shown.

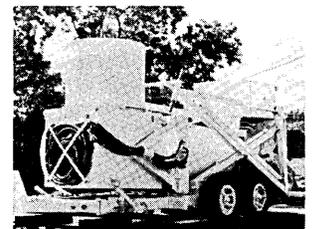
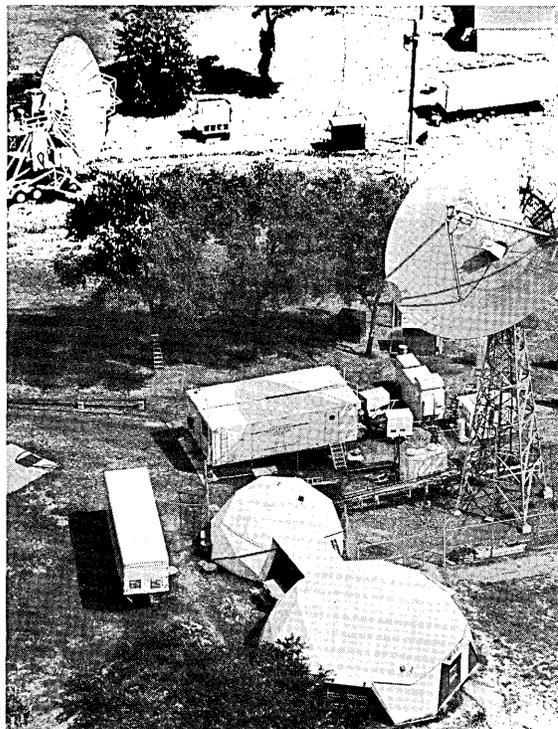
The Institute sought help from Dr. Gilbert Kaskey, Director of Applied Mathematics, at the Sperry Rand Corporation's Univac Engineering Center in suburban Philadelphia. The project involves the use of a number of statistical correlation programs which are part of the extensive mathematical library for Univac computers. Some aspects of this application have required original approaches to statistical analysis. The project is now well on its way and preliminary results already point to new avenues of research.

SATELLITE COMMUNICATION EXPERIMENT

Plans for the first satellite communication experiment linking North and South America have been disclosed by ITT Federal Laboratories. The International Telephone and Telegraph Corporation division said the initial tests would connect ITT's space station in Nutley, N.J., with mobile ground equipment to be set up by ITT on the outskirts of Rio de Janeiro, Brazil. The National Aeronautics and Space Administration will use

its soon-to-be-launched Project Relay satellite to close the 4820 mile Pan American communication system. (Relay will be boosted into orbit later this year from Cape Canaveral.)

The transportable equipment which makes the Brazilian participation possible is a completely self-contained space communications ground terminal designed and engineered by ITT Federal Laboratories to provide telephones, teleprinter, and high-speed data transmission capabilities. The mobile station travels in a van and three trailers which can be shipped by sea, air, rail, or road to any remote destination. Included in this packaging is a 30-foot "dish" antenna which can be dismantled into pie-shaped sections, and the antenna support tower which resembles an old-time locomotive when readied for shipment (see below).



-- This is the equipment that will take part in intercontinental communication tests via NASA's Relay experimental satellite. In the foreground is the antenna and the structures of the northern ground terminal of the North America - South America satellite link. In the background are the antenna and control van of the transportable ground station that will be set up in Brazil as the southern link of the space communications experiments.

In practice runs, four men have assembled the terminal in as little as 16 hours.

The Rio station, to be operated by Companhia Radio Internacional do Brasil (Radional) by authority of the Brazilian Administration in cooperation with NASA, has a capacity for 12 simultaneous two-way telephone con-

versations. The station can handle 12 simultaneous teleprinter or high-speed data circuits per voice channel, or 144 total circuits for data transmissions.

The ITT station uses a 40-foot "dish" antenna and support equipment housed in two igloo-type structures at the foot of the antenna tower. This complex includes a 10 kilowatt transmitter power supply, tracking and communications receivers, antenna controls, monitoring consoles and control equipment that will combine all voice communications into one signal for ease in handling.

The transmissions to and from South America are expected to demonstrate the feasibility of high-quality, long distance communications to any nation in the world. Direct communications via Relay also will be exchanged between the Rio station and Europe. The British Post Office Department's ground terminal at Goonhilly Downs in Cornwall, England, will beam its signal from a transmitter supplied by another ITT affiliate, Standard Telephones and Cables, Ltd.

STUDY PREPARES MEDICAL DATA FOR COMPUTER

A joint study of methods for processing large volumes of medical information is being undertaken by Tulane University and IBM's Advanced Systems Development Division. In this cooperative study a team of computer scientists will explore methods of using EDP equipment to analyze complex physiological data from hospital patients. A second objective will be to investigate a method of simplifying medical records-keeping by trying to design a standard medical record form that can be processed by machine.

The physiological data study phase of the program is expected to define requirements for data acquisition and surveillance systems capable of gathering information, provided by special instrumentation, directly from patients in hospitals. A large quantity of data must be gathered before instrumentation is developed for such a system. Tulane medical researchers are now engaged in analyzing electroencephalograms (brain wave studies) to determine whether physicians can use mathematical models of these brain waves to distinguish between normality and abnormality in patients.

The researchers' approach to the problem of medical records-keeping will be to study the essential information content of medical records used today and determine which portions of the records might be adapted for machine handling. In later stages of the study a group of private and public hospitals throughout Louisiana are expected to participate in evaluating the standard medical records developed in the study.

TRANSATLANTIC SERVICE FOR COMPUTER USERS

The first commercial transatlantic communications service capable of transmitting computer data has been inaugurated between the United States and England by RCA Communications, Inc. It is in operation between offices of Socony Mobil Oil Co., Inc. in New York City and London. The new high-speed service, called Datatelex, is capable of transmitting data in any form at speeds of approximately 1200 bits per second or 1500 words per minute.

Datatelex is a direct customer-to-customer service similar to telex service, yet faster than telex's standard speed of 66 words per minute. Each Datatelex subscriber has a digital sub-set in his office which alternately conditions his lines to accept either teleprinter or high speed data transmission. These sub-sets are provided and maintained by RCA on a monthly rental service charge. Depending on specific customer needs, some type of input/output equipment capable of high-speed transmission and reception of data is also required.

Datatelex represents a step forward toward the eventual ability of computers to communicate directly with each other internationally.

IRE USING MICR

The first reported application of magnetic ink technology outside the financial industry has been completed at the Institute of Radio Engineers' international headquarters in New York City. A Burroughs B250 computer has taken over complex bookkeeping operations for the 100,000-member professional engineering organization.

IRE's new Burroughs B250 EDP system includes a sorter reader, a transistorized central processor,

a ledger processor, and a punched card reader. The Burroughs P703 magnetic ink imprinter is used to make changes in members' personal history in MICR code.

IRE is using the computer-MICR combination to process invoices and related records for dues and special assessment notices. (Special assessments are levied for nearly half of the 100,000 members who also belong to one or more of 29 professional sub-groups within the parent organization.) The specially styled numbers and symbols which make up the MICR code are printed in magnetic ink on the face of the actual transaction documents. This allows an invoice itself, for example, to be read automatically by the computer as well as by the individual members.

The successful application of a magnetic ink computer at IRE is the first demonstration that this technique can be used beneficially by non-financial business and industrial firms. IRE plans to expand its computer operation in the future for payroll preparation, and for keeping records on subscriptions for 30 publications issued by the parent organization and its professional sub-groups.

ANALOG COMPUTER SIMULATES SATELLITE TEMPERATURES

Engineers, at Ford Motor Company's Aeronutronic Division, Newport Beach, Calif., are being provided with detailed pre-launch data on the effect of varying temperatures on an orbiting space vehicle. A compact analog computer used in conjunction with an environmental test chamber and heat exchanger is providing this information.

The 24-amplifier analog computer Model AD-1-24, supplied by Applied Dynamics, Inc., Ann Arbor, Mich., allows simplification of test procedures and confirms predictions and computations as to the actual influence which temperature variations will have on performance of a satellite payload. (Temperatures of a payload may vary as much as 275 degrees -- or from -160°F to +115°F -- during one orbit.)

To determine the effect on satellite performance, the computer generates curves corresponding to temperature differentials encountered by the satellite. The curves, translated into signals, are then fed into a heat exchanger which controls the temperature

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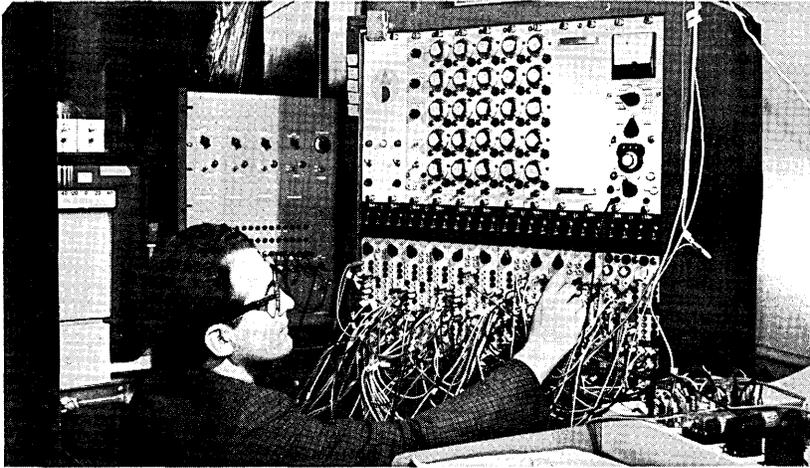
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-- Effects of alternating hot and cold environment on satellite performance are determined by Aeronutronic's engineer D. B. Harrington using Applied Dynamics' Model AD-1-24 analog computer to control environmental test chamber.

within an environmental test chamber containing the satellite. The computer signals are also fed into an X-Y plotter for immediate visual verification by Aeronutronic engineers. Measured temperature data from the test chamber is relayed back to the computer for

comparison with desired conditions in order that modified signals may be introduced as necessary.

The result is greater certainty that the satellite will do the job it was intended to do.

AUTOMATION

TELEPHONE SWITCHING SYSTEM DIAGNOSES OWN FAILURES

An electronic telephone switching system, that diagnoses its own failures when they occur, has been developed at Bell Telephone Laboratories, Inc., Denver, Colo. The system tells maintenance men where to look for the trouble in a "directory" it helped "write". The directory helps insure the continuous operation of the electronic switching system, which must be able to handle telephone calls at any time and run 24 hours a day without more than a few thousandths of a second lapse.

The directory of malfunctions was developed for an experimental Electronic Central Office at Morris, Ill. The system was programmed -- in preparing the directory -- to make over 900 different tests on each of 50,000 simulated failures. The test patterns for each failure and the identity of the faulty components was recorded by the system. A computer then sorted the patterns in numerical order and printed them in a four-

volume directory totaling 1290 pages.

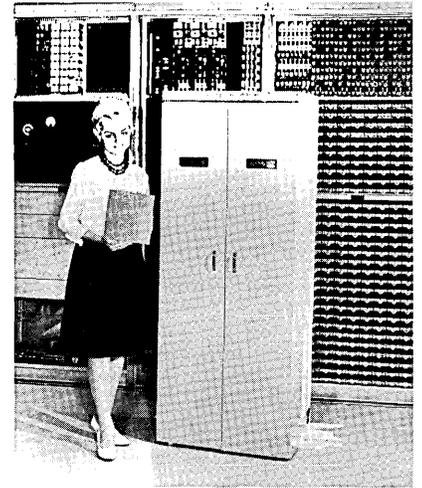
Bell engineers expect a directory of this type to locate 90 percent of the component failures that may develop in Bell System's first commercial Electronic Central Office which will open in Succasunna, N.J. in 1965.

AUTOMATIC TELEPHONE EXCHANGE

An electronic private automatic telephone exchange, the KELEX 2000, has been developed by the Telecommunications Department of ITT Kellogg, a division of International Telephone and Telegraph Corporation, New York, N.Y. The 100-line model is designed for private telephone systems in factories, schools, hospitals, offices, aboard ships, or wherever internal systems are needed.

The KELEX system has no moving parts, gears or contact points. All the functions of telephone communications are accomplished automatically through a new electronic switching concept. The switching network consists of a three-stage array of diodes providing an almost instantaneous choice of paths between line cir-

uits and links without requiring separate control of each switching stage. Even in the event of failure of a particular crosspoint, a suitable path through the network for a particular call can be found by avoiding the defective diode.



-- KELEX 2000 is small compared with the 100-line conventional equipment in the background. A model holds one of the transistorized printed circuit boards which form the operating heart of the system.

The basic exchange accommodates 10 to 100 lines by the insertion of plug-in modules. All common circuits have standby units with automatic transfer. Lamps, as well as an audible signal, indicate malfunctions on circuit boards.



-- An office secretary can easily replace a transistorized printed circuit board with a spare in the event of a malfunction.

Installation of the KELEX 2000 is described as simple. With the subscriber's lines connected to terminals in the cabinet, and with power obtained from an ordinary convenience outlet, the exchange is immediately operational.

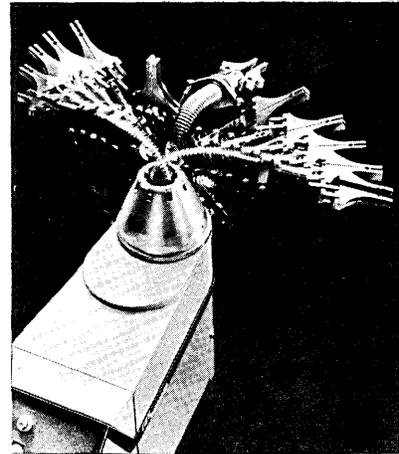
An automatic mechanical hand has been developed and manufactured by United Fleximation Corporation, Schenectady, N.Y. This portable hand, called FLEXiMAN[®], can pick up and position objects as small as pins and as large as bowling balls with ± 0.020 " accuracy. It can be programmed in minutes and under the control of the program, it moves and positions a part and releases it at the desired location.



-- The mechanical hand deals the cards to Anthony Kaye (seated at the right), President of the firm and inventor of FLEXiMAN. At the left is Vice-President Herbert Nidenberg and center is Mary Locke, model.

A single motor drive achieves three dimensional positioning. A lobe-type programming drum controls position and sequence of up to eight locations around a full 360° circle and through 120° vertical arc. The program drum provides for any combination of those eight points in a repeatable sequence of up to sixteen points. A specially designed DC motor drive provides for high speed movement (up to 24 inches per second) and controlled deceleration which enables the hand to ease into position.

FLEXiMAN is claimed to have many and varied applications -- including the automotive electrical and jewelry fields. In one installation, this mechanical hand demonstrates its ability to shift from job-to-job as quantities and mix change by assembling earrings, decorative pins and bangles for a jewelry manufacturer. It can operate in hazardous environments as a programmed manipulator, performing simple repetitive jobs involving radioactive materials, corrosive fluids, chemicals, fuels, heat, dust or any situation where peoples' hands would be in danger.



-- This multiple exposure photograph shows the FLEXiMAN automatic manipulator in action. It has a reach of 36" to handle objects weighing up to 25 pounds. FLEXiMAN can feed drill presses, assemble parts, feed conveyors, run parts through punch presses and welders and do many repetitive drudge jobs that use none of a person's intelligence or skill.

NEW PRODUCTS

NEW COMPUTERS

Digital

PUNCHED CARD COMPUTER

Burroughs Corporation
Equipment & Systems Division
Detroit 32, Mich.

This company has demonstrated a B260 punched card computer. The B260 is a "workhorse" machine designed to sell in the low-price range, and yet handle high volume business data processing work.

The B260, one of four systems in the new Burroughs B200 series, is said to provide complete punched card processing ability. It receives information from punched card reading units, computes data in a solid state central processor and provides answers either in the form of punched cards or printed reports.

The B260 can receive information from two punched card reading units instead of one. Temporary data storage areas for peripheral units of the system eliminate the time lag caused by one unit having to wait for another to complete its role. The paper tape reader operates at speeds of either 500 or 1000 characters per second, and can handle 5, 6, 7 or 8 channel tape interchangeably. Rewind speed of the reader is 1000 characters per second.

Optional paper tape subsystems include code translation facilities, format control for rearrangement of input and output channels, and automatic translation of upper/lower case teletype code to single frame code. The subsystems are compatible with most data collection and transmission devices.

Analog

ELECTRONIC ANALOG COMPUTER WITH CENTRAL PUSHBUTTON CONTROL AND MONITORING

Applied Dynamics, Inc.
2275 Platt Road
Ann Arbor, Mich.

A new console model electronic analog computer with central pushbutton control and monitoring has been developed by this company. The new computer, called AD-2-64PBC, has the operating speed and convenience of central controls, and the flexibility of removable, color-coded patchboards.

A typical complete AD-2-64PBC computer would include: 64 amplifiers, 80 potentiometers, 16 multipliers, 8 function generators, 80 external trunks, 6 electronic comparators, 2 DPDT electronic switches, 8 electronic trace and hold units, and 10 diode networks.

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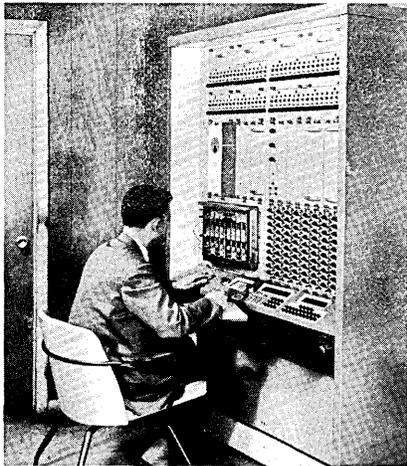
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Four control modules are available with the computer: computer control module; voltmeter module; input-output module; and address selector module. Individual modules and meters are illuminated for easy readability. Real time, fast time, repetitive, and iterative operation are also available.



-- Operator pushes a few centrally located buttons to control and monitor the AD-2-64PBC electronic analog computer.

Field maintenance of the computer is simplified through the use of slide-out modules. Dual amplifiers and non-linear elements unplug for servicing.

order system with a single amplifier using six predetermined RC time constants. The network plugs into the repetitive operation drive slot at the rear of the computer, and the control panel replaces the panel on the computer normally used for potentiometers.

The transport delay simulator is designed to store discrete samples of an input voltage in memory capacitors and later read

them out to generate an approximation of the delayed input voltage. This function is accomplished with a timing unit, a ring counter, a capacitor memory unit and a multiple sample and hold unit. All but the timing unit are in a component chassis that can be located in selected positions in the non-linear row of the computer. The timing unit plugs into the overload alarm position at the rear of the computer.

Input - Output

TV-COMPATIBLE DISPLAY SYSTEM

A. B. Dick Company
5700 West Touhy Avenue
Chicago 48, Ill.

A new TV-compatible character generator and display system has been developed by this company. It permits alphanumeric data presentation on one or more conventional off-the-shelf TV receivers. The new display system will accept data from punched cards, punched paper tape, magnetic tape or computer memories. Remote operations need only a telephone or radio voice circuit.

This system, called Digital-to-Television Alphanumeric Display Model 985, converts digital

data into a tabular display of alphanumeric characters on one or more television receivers. The scanning pattern resulting from use of a special circuitry produces a video-output similar to that which would come from a television camera viewing a printed page. The display is in tabular format; 24 characters per line, 10 lines per message. The 64 characters available can be coded to customer specifications. Available options include parity checking, flicker elimination, random-access loading, and color TV display.

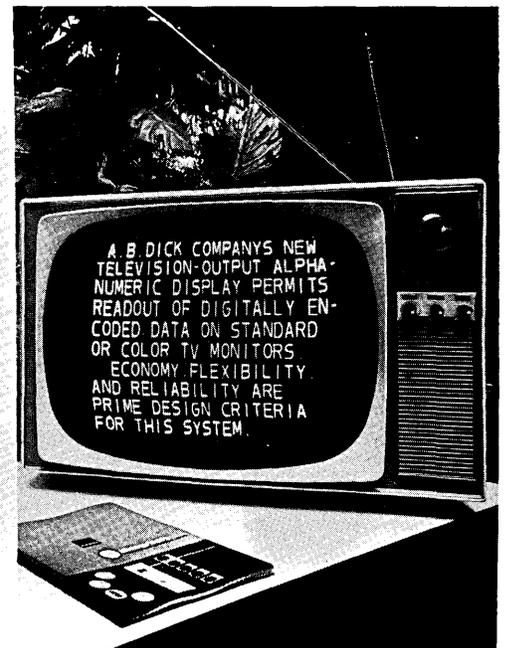
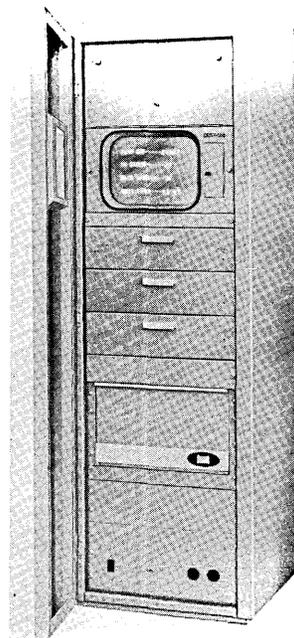
Applications are expected in any system that can use multiple display of digitally coded alphanumeric data, such as airline arrival and departure display systems and hospital computer-file interrogation systems.

DESK-TOP COMPUTER SIMULATES NUCLEAR POWER PLANT WITH NEW COMPONENTS

Electronic Associates, Inc.
Long Branch, N.J.

Two special plug-in components have been developed by this company that permit a desk-top size computer to simulate a complete nuclear power plant and control system. The new components, called reactor kinetics network and transport delay simulator, allow the EAI TR-10 computer to perform the complicated computations in nuclear physics normally performed on a much larger computer. The special nuclear components are interchangeable with standard TR-10 components and do not affect the general purpose capabilities of the computer.

Simulation of nuclear reactor kinetics requires the solution of ordinary differential equations that describe the production of neutrons. Representation of most power reactors is achieved using six delayed neutron equations that require six integrating amplifiers. The reactor kinetics network effects a simulation of the sixth-



-- The new Digital-to-Television Alphanumeric Display Model 985 is shown at the left as it appears ready for operations. At the right is the home television receiver showing a picture of an actual display on the TV screen fed from a Model 985 at work.

NEW HIGH-SPEED PAPER TAPE READER

Autonetics Industrial Products
3400 E. 70th Street
Long Beach 5, Calif.

A new high-speed paper tape reader, called the Facitape Model 510, has been developed by this company, a division of North American Aviation, Inc. The new device increases input speeds for the RECOMP III computer by more than 20 times.

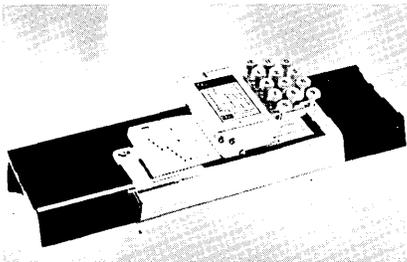
The Facitape Model 510 includes printed circuitry, solid-state electronics and simplified load and unload characteristics. Tape is inserted or removed by lifting the hinged read head cover. A perforated metal tape catcher is standard equipment to prevent tape fouling and facilitate fast rewind of the random-fold tape. It reads 5 through 8 channel tape at a basic speed of 600 characters/second, or approximately 300 characters/second when stopping on a character with the RECOMP III.

Facitape Model 510, described as a capacitance type reader, is unaffected by dust on the read heads or ambient light conditions. It is fully adjustable for variations in paper tape types and thickness.

IBM CARD KEYPUNCH

ElectroMechanics Corporation
502 Sherbrook Drive
High Point, N.C.

An all-mechanical, IBM card keypunch, called the EM Punch Model 80, has been developed by this company. It provides low cost punch card preparation or correction away from standard keypunch facilities. The EM Punch is all-metal with a one-piece aluminum base. It weighs 6¼ pounds and is only half again the size of a cigarette carton.



Model 80 is designed to handle the standard 80-column IBM card. (Low cost adapters for any card under 80 columns are available and can be installed by an operator in

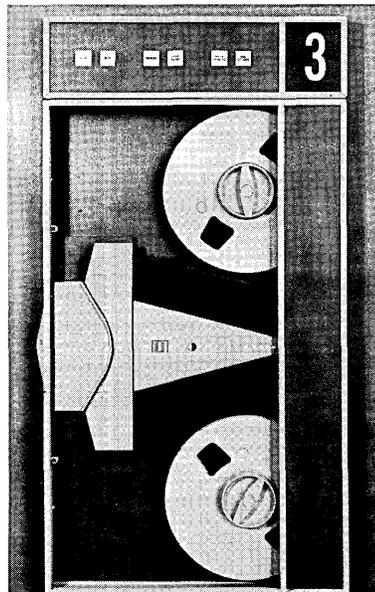
minutes.) Card insertion may be from either side of the punch head. Also, two cards or a two-card set with carbon paper can be punched without making adjustments to the mechanism. The EM Punch has a standard numeric key set to punch numeric or, with multiple key depressions, alphabetic and special characters. A special key disengages the normal automatic column spacing to permit multiple punching when required.

The EM Punch is useful in such areas as on-site recording in warehouses, recording of production control data, punched card stub transactions at cashier booths, and program card preparation for static readers.

NEW COMPUTER TAPE UNIT

Datamec Corporation
345 Middlefield Rd.
Mountain View, Calif.

The D-2020 computer tape unit, introduced by this company, is suited to applications on small and medium scale computers, and off-line systems where there are non-technical personnel. It is designed for long term continuous operation with low maintenance costs.



The D-2020 has vacuum column tape buffers and solid state electronics. It is fully IBM compatible for tape formats of 200 and 556 bits per inch. The series includes the transport, low and dual density signal electronics, plus a complete group of accessories. The Quad-Unit is also available where four transports share a single set of signal electronics by means of a switch under computer command.

DIGITAL NUMERIC PRINTER

Franklin Electronics, Inc.
Bridgeport, Pa.

This company has developed a numeric printer line with claimed speeds up to 20 lines a second and up to 20 columns, including plus and minus signs and decimal point in position.

The printer, Model 1000, is completely solid-state using plug-in cards for all electronic functions. A variety of input signals from scanners or digital voltmeters can be accommodated by changing the proper cards. The printer accepts a 10-line coded input and provides an inhibiting signal to prevent any change of data while in the print cycle. It takes either folded or rolled paper.

Components

PULSE COUNTER WITH A MEMORY

General Electric
General Electric Meter Dept.
Somersworth, N.H.

A new input pulse counter with a memory makes readouts "on the fly" no longer necessary. The electromechanical device, developed by this company, is called the Digital Telemetry Register (DTR)®. It counts pulses that can represent any unit in the processing industry such as gallons, cubic feet of gas, linear yards, revolutions, paper, etc. The DTR is designed to be used as a component to feed back data into closed-loop, computer-controlled, process, digital telemetering systems, and other data logging applications.

DTR gives both visual and electrical readout of the pulses, after receiving the count, and automatically storing the count. It has two visual registers. The lower register receives input pulses on a continual, non-resettable basis. On orders from a transfer signal, either from a separate clock or other external source, the DTR transfers the number indicated on the lower register to the upper register. This number will stay stored until another transfer signal is given.

Electrical readout of the upper register into a computer or data printer is possible with a programming or scanning function. The electrical readout on the DTR

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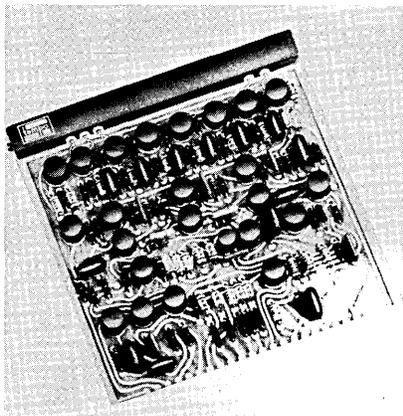
is given in a parallel contact presentation in a binary coded 5-digit number.

MINIATURE MAGNETOSTRICTIVE DELAY LINE

Tempo Instrument Inc.
East Bethpage Road
Plainview, L.I., N.Y.

This company has developed a new family of miniature magnetostrictive delay lines intended for applications where both size and speed are important.

The delay lines are mountable on printed circuit boards. Repetition rates are from up to 5mc for "non return to zero" inputs. The delay lengths are from 3 to 25 μ sec with a signal to noise ratio of 25:1.



Military, industrial and commercial units are available to replace many lumped constant delay lines.

PROGRAMMABLE DIGITAL TRAINERS

Control Logic, Inc.
Natick, Mass.

This company has designed and produced three digital training systems. Each system is constructed of individual logic panels, each panel containing large logic symbols and a color coded banana jack at each input and output. Patch cords are used to rapidly assemble any logic desired.

An intensive study program course entitled "Digital Control Systems Engineering" was completed this summer by more than thirty-five engineers from major companies in the Midwest. The course used a Digital Training System, Model PEI-10, which made

possible the review of all basic logic functions and visual demonstration of control, storage, timing, and their integration into useful systems. Without previous experience, the students learned to perform high speed carry methods for binary and decimal counters, proper triggering techniques, parity checks, and more complex digital circuit applications.

The other two systems developed by Control Logic, Inc. consist of a student trainer, type PEI-1, and a large, two bay console for system design and simulation instruction.

DIGITAL INTERVAL TIMER

General Precision, Inc.
Librascope Division
Glendale 1, Calif.

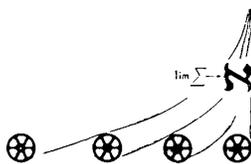
This company has developed a digital timer capable of accuracies to 0.001 per cent. The solid-state timer is designed as a precision time-delay device for use in military applications such as missile guidance and control systems and in commercial applications such as production control systems.

The timer uses a countdown circuit that allows an operator to vary the time delay between functions. A typical time delay is from 0.5 second to 50 seconds in increments of 0.5 second. A countdown sequence is started externally by applying a voltage or by closing a switch. After the predetermined countdown is reached, a silicon-controlled rectifier is fired and the information is switched to the output.

NEW DIGITAL MULTIPLIER

General Data Corporation
1250 North Parker Street
Orange, Calif.

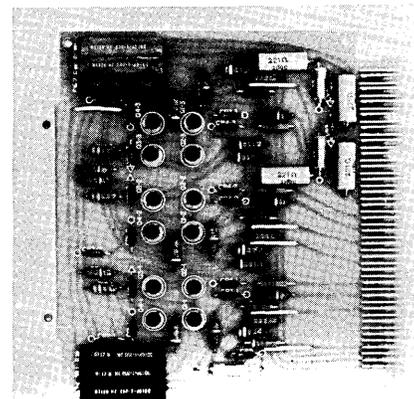
This company has developed a digital multiplier which multiplies an eight-bit multiplicand and an eight-bit multiplier yielding a 16 bit product plus sign within twenty microseconds. A parallel circuit technique provides an additional feature of built-in memory.



SCHMITT TRIGGER MODULE

Scientific Data Systems, Inc.
1542 15th Street
Santa Monica, Calif.

A new silicon circuit module, developed by this company, contains three identical Schmitt trigger circuits on a single $5\frac{1}{2}$ " x 6" etched circuit card. Each circuit has two inputs and a single output, the phase of the output being the same as the input. Both hysteresis and triggering levels are adjustable. Each circuit uses silicon semiconductors to achieve reliable operation at temperatures from 0°C to +100°C.



SOFTWARE NEWS

COBOL AVAILABLE FOR IBM 1401

COBOL -- a standard computer business language of the data processing industry -- is now available for use with the IBM 1401. This brings to five the number of operational COBOL processors available for major IBM systems. Already in use are compilers for the IBM 1410, 7070-7074, 705 and 7080.

The first version of COBOL (Common Business Oriented Language), known as COBOL-60, was published by the Conference on DATA SYSTEMS Languages (CODASYL) two years ago. The revised version, published in June, 1961, and designated COBOL-61, is the current and, with minor continuing modification, ultimate standard. Each of the IBM compilers meets the specifications of COBOL-61.

The new processor permits users of 1401 systems with 12 to 16 thousand positions of core storage to write computer programs in

COBOL and have it automatically translated by the 1401 into the system's binary coded machine language for processing.

A COBOL processor for the smaller 1401 (4 to 8 thousand positions of core storage) is scheduled for release next month.

PROGRAM AUTOMATES CIRCUIT CHECKOUT

A new method using a small-scale general purpose computer for automatically analyzing and evaluating new circuit designs and electronic subsystems has been demonstrated by Autonetics Industrial Products, a division of North American Aviation, Inc., Long Beach, Calif.

The program, called SPARC, can be used by a design engineer to facilitate the tedious process of bread-boarding by allowing the engineer to perform parameter variations at the computer. It also allows rapid design optimization of the number and quality of components, allowable tolerances, and failure rates.

SPARC, using Recomp II computers, has already been used by Autonetics to develop some electronic components and subsystems for Air Force Minuteman and Hound Dog missiles, Navy Ships Inertial Guidance Systems and the Army MABLE orienter.

FOUR COMPUTER PROGRAMS DEVELOPED TO SPEED DESIGN OF LENSES

International Business Machines Corporation, White Plains, N.Y., has developed, with the technical assistance of the Institute of Optics, four computer programs which speed the intricate process of designing lenses.

The four programs make up the new IBM Lens Design Package. Lens designers, using a computer under control of the programs, will be able to evaluate proposed lens systems in seconds and correct the design specifications of the systems in minutes. The computer technique eliminates the need to construct actual models for each design change or make laborious, manual computations. The programs are written for the small-scale IBM 1620 data processing system.

Lens Design is used in such areas as missile guidance, space research and optical maser development.

HONEYWELL 800 "SPRECHT DEUTSCH"

Honeywell Electronic Data Processing, Wellesley Hills, Mass., has developed the first business multi-lingual compiler system. It enables the Honeywell 800 computer to understand German as well as English. The compiler, a German version of FACT (Fully Automatic Compiling Technique), permits a programmer to write a program in German using the lexicon provided, and employing the very same rules of FACT programming as in the English version.

The FACT Compiling system permits the business user to write computer instructions in the language with which he is familiar, having once learned the rules of syntax. The programmer can often direct the computer to execute a very lengthy and complicated sequence of operations, by stating relatively few instruction words.

The German version of FACT was developed to assist in the application of Honeywell 800 computers to business problems on the European Continent.

NEW FIRMS, DIVISIONS, AND MERGERS

DATA PROCESSING SYSTEMS CONSULTANTS

CIRAD (Corporation for Information Systems Research and Development) is a newly formed organization of data processing systems consultants. Corporate offices have been opened at 628 West Rittenhouse St., Philadelphia, Pa.

Paul Colen, president of the new corporation, describes CIRAD as an integrated systems design and product planning group. He says it plans to provide an in-depth consulting capability for data processing systems design and implementation for both government and industry. Mr. Colen is also director of Systems Planning for the firm.

Members of the senior staff are John J. Ogle, vice president and director of Systems Operations; Frank J. Wesner, vice president, treasurer and director of Systems Management; and Benjamin Kuby, secretary and general counsel. Robert S. Barton and Jackson Walter Granholm are consultants to

the newly formed corporation and members of its Board of Directors.

In their previous affiliations, the senior staff has collaborated in many inter-industry projects in the computer field, including designing electronic computers, designing problem-oriented languages and designing and implementing comprehensive programming and data processing systems.

CIRAD presently has a contract with the Navy Department for data systems analysis based on a weapons-type inventory and control procedure. Plans call for eventual expansion into commercial data systems analysis and design.

JAPANESE FIRM SPECIALIZING IN MANUFACTURE, SALES AND CONTRACTING OF COMPUTERS

The first Japanese firm organized to sell electronic computers and lease computer time, has been founded by the Tokyo Shibaura Electric Co. (Toshiba), the Japan Engineering Consultant Corp., the Fuji Telecasting Co. and Tosho Co., Ltd.

The new company, the Japan Business Automation Company (JBAC), will service and install computers, train programmers and provide allied services. JBAC will contract computer time for companies which cannot economically purchase computers.

LITTON INDUSTRIES GROUP OPENS SALES AND SERVICE CENTER

A sales and service center for all products of the Business Machine Group of Litton Industries has opened in Scranton, Pa. The new center brings the various divisions of the Business Machines Group under one roof for the first time.

Divisions represented at Scranton include Monroe Calculating Machine Company, Monroe/Sweda Cash Register, Integrated Data Processing, Inc., A. Kimball Company, Cole Steel Equipment Company and Eureka Specialty Printing Company. Products of the divisions are distributed in 85 countries through branch and dealer networks.

GENERAL KINETICS ACQUIRES COMPUTER TEST EQUIPMENT COMPANY

General Kinetics Inc., Arlington, Va., has acquired a Philadelphia area manufacturer of computer test equipment. GKI has purchased

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all of the outstanding stock of Computer Instrumentation Corporation in exchange for GKI common voting stock. No changes in management, service, or customer relations policies of the wholly-owned subsidiary are contemplated.

The new GKI subsidiary's equipment line includes automatic devices for testing individual magnetic memory cores, and complete core arrays. The company also is developing a line of analyzers for thin magnetic films and similar new memory devices. Products of the new GKI subsidiary will be sold under its own name.

LIBRASCOPE NAMES
SALES REPRESENTATIVE FOR
COMPUTING/CONTROL COMPONENTS

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General Precision's Librascope Division, Glendale, Calif., has named Airsupply--Aero Engineering Co., a division of Garrett Corp., as exclusive national sales representatives for a line of Librascope precision computing and control components produced by Librascope's Components and Special Devices Branch, Burbank, Calif. The components include ball-disc and packaged integrators, differentials, sine-cosine mechanisms, miniature servoamplifiers, and the DigilogTM 1011 solid-state converter.

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Airsupply--Aero will market the mechanical, electromechanical, and electronic components to both military and industrial customers and will provide applications engineering services for the users. This company is also exclusive national sales representative for chemical ordnance equipment produced by Librascope's Sunnyvale, Calif., Branch.

ECMA and BEMA FORMING
A JOINT WORKING PARTY

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The European Computer Manufacturers Association (ECMA) and Business Equipment Manufacturers Association of America (BEMA) are forming a Joint Task Group to study the various proposed MICR codes. This study will result in a recommendation for a common language code or codes for the benefit of the users and manufacturers. The first work to be undertaken is that of MICR for Banks. The group is expected to make a recommendation to the European Bankers Association in the near future.

LITTON INDUSTRIES SIGNS
WITH TWO TOKYO COMPANIES

Litton Industries, Beverly Hills, Calif. has signed an agreement with Mitsubishi Electric Manufacturing Company and Fuji Communication Apparatus Manufacturing Company (Fujitsu) both of Tokyo, for the production, sales and service of Litton's air defense control systems for Japan.

The three firms will cooperate in the production, sales and maintenance of JADE (Japanese Air Defense Environment System) for the air defense of Japan. The manufacture of the system will be done primarily in the Mitsubishi and Fujitsu plants in Japan, with the aid of technological data and assistance provided by Litton and its affiliates.

JADE consists of a series of command and control modules that can be assembled into a system suitable for any air defense and control mission. Three similar systems already have been produced by Litton and the proposed Japanese system is one of several planned for future use. Proposals have been made to the Japanese government on the JADE system and a decision on a contract is expected early next year.

PHILADELPHIA OFFICE
ESTABLISHED BY DIGITRONICS

The Digitronics Corporation, Albertson, N.Y., has established a Mid-Atlantic District Office in Philadelphia, Pa., and Service Centers in Baltimore, Md., Washington, D.C., and Philadelphia.

Mr. Joseph Driscoll is the Mid-Atlantic District Manager and will be in charge of the Service Centers and the District Office.

OUTDATED ANALOG COMPUTERS
MODERNIZED

Computer Products, Inc., Manasquan, N.J., serves the analog computer user by updating older computers to provide performance equal to newest technological developments. Melvin E. May, President of the new organization, reports that the methods CPI has developed for modernizing older computers effectively improve performance to equal -- and in some cases surpass -- those of current new computers.

Modernization programs represent far more than minor parts replacement. Completely redesigned

networks, new and updated components give new usefulness to old computers. Modernization includes advanced display and readout devices and a reworking of the physical appearance of the console.

NEW INSTALLATIONS

FIRST SDS COMPUTER SHIPS TO NASA

Scientific Data Systems, Inc., Santa Monica, Calif., announced that the first production model SDS 900 Series digital computer has been installed at the National Aeronautics and Space Administration Agency's Goddard Space Flight Center in Greenbelt, Maryland. The computer, an SDS 910, will be used to check out and evaluate various experimental equipment to be carried aloft by the NASA Orbiting Geophysical Observatory (OGO).

This delivery signaled the entry into full-scale production of Scientific Data Systems' 900 Series computers. The eleven month old firm shipped three additional computers during September, and is on a one-per-week shipment this month. Equipment is being shipped at a rate in excess of two million dollars annually, with a backlog of approximately six months. The company presently has offices in New York and Washington.

UNIVAC SOLID-STATE II COMPUTER DELIVERED TO GENERAL MOTORS

The first UNIVAC Solid-State II Computer to be shipped by the UNIVAC Division of Sperry Rand Corporation, New York, has been delivered to the Guide Lamp Division of General Motors Corp., in Anderson, Ind.

The UNIVAC Solid-State II Computer is the first computing system produced in the United States to combine the benefits of both core and drum memory in a medium scale computer. The Guide Lamp Division of General Motors Corp. will use the system for production control, critical path scheduling for model change-over planning, payroll preparation, general accounting, and other administrative applications.

FIRST NCR 315 SYSTEMS FOR EUROPE

The first National Cash Register 315 computer systems to be installed in Europe were shipped by air from California. One of the NCR systems was installed by Luft-hansa German Airlines at its operations office in Hamburg. The second system is installed at the Bruno Bader Company, one of Germany's larger mail-order houses, which is located in Pforzheim.

Lufthansa's 315 system is being used for cargo sales and ticket sales accounting. Later the German air line will also handle stock control and stock disposition on the 315.

The Bruno Bader mail-order company is using its system to keep track of more than one million accounts receivable. It will also handle other processing and book-keeping work with the new system.

OKLAHOMA STATE INSTALLS COMPUTER FOR ENGINEERING UNDERGRADUATES

Oklahoma State University's College of Engineering, Stillwater, Okla., has developed a modern computer laboratory for undergraduate instruction. An IBM 1620 digital computer was delivered late this summer to be ready for the fall semester classes. The complete computer facility includes in its equipment: the 1620 central processing unit, a card input-output read punch unit, five card key-punch machines, a control unit for card-to-typewriter communication and the typewriter, a graph-plotting typewriter, and various accessories.

Oklahoma State University's College of Engineering will initiate and maintain the computer educational program for engineering undergraduates. The 1620 will allow engineering undergraduates to learn the types of problems that should be solved by computers.

Paul A. McCollum, professor of electrical engineering and newly appointed director of the engineering undergraduate computer laboratory, has coordinated the program. He has taught courses in computer logic, circuit design, and programming, and is now directing computer use training seminars for the engineering staff.

OIL PRODUCING COMPANY INSTALLS GE 225

The Atlantic Refining Company has installed a General Electric 225 Information Processing System in the Producing Department's Southwest Data Processing Center, Dallas, Texas. The Atlantic central processor includes a magnetic tape unit, with six tape drives; a paper tape reader and punch, and a high-speed printer capable of printing 900 lines a minute. An electric typewriter also is part of the system.

The center is equipped with communications and data transmission facilities, key punch, and related components.

PUBLISHERS' SERVICE BUREAU INSTALLS IBM 1401 COMPUTER

IDR (Industrial Data Reduction), Philadelphia, Pa., has installed an IBM 1401 solid state computer. The computer consists of three major units: a processing unit; a combination card reader and punch; and a high-speed printer.

IDR specializes in high speed electronic processing of reader inquiries for a variety of magazines. Publisher clients are offered a complete processing program -- from postal pickup to direct mailing of reports to individual advertisers.

The new 1401 replaces a Univac I computer, and it will permit an overall increase in the speed, quality, and application of processing operations.

MIT WILL USE HONEYWELL 1800 ON MOON FLIGHT NAVIGATION PROBLEMS

Honeywell Electronic Data Processing, Wellesley Hills, Mass., will install a Honeywell 1800, at the Instrumentation Laboratory of Massachusetts Institute of Technology early next year. The computer is capable of performing 120,000 additions and subtractions per second. The 1800 computer system will include a random access disc file, six high density magnetic tape transports, a high-speed printer, card punch and card reader.

The newly developed machine will be used to handle a variety of complex research and development jobs connected with the navigation of Project Apollo, Amer-

ica's first manned flight to the moon. The Honeywell 1800 will design the circuitry of the guidance computer that will be installed in the Apollo capsule to keep it on course. It also will check out the machine logic and guidance program of the spaceborne computer, and simulate its full operation before actual launching.

COMPUTING CENTERS

ELECTRONIC LOGBOOK

Polaris Director Rear Adm. I. J. "Pete" Galantin recently opened a new data processing center that will keep a 600 million-entry electronic logbook on every piece of navigation equipment in Polaris submarines scattered over the world.

Sperry Gyroscope Company is navigation system manager for Polaris submarines. The center, located in Syosset, N.Y., will permit Sperry to set up a complete control index on every navigation system in the missile-firing fleet. The exact status of every piece of equipment will be known at all times -- when it was installed, what modifications have been made, and are due, and when it is scheduled for replacement.

A UNIVAC Solid State 90 Tape Computer has as its first job the transfer to tape of data now on some 150,000 file cards. By the end of the year, Sperry expects to fill 112 reels of magnetic storage tape with 600 million "bits" of information. This data will be updated weekly.

As navigation system manager, Sperry determines requirements for new equipment; designs and field tests equipment; acts as procurement agent, and establishes and maintains development, production, and maintenance schedules as well as equipment quality.

ANALOG COMPUTER CENTER

The only analog computer center in the South, designed to serve the chemical industry complex in Texas, Louisiana and Oklahoma, has been opened by KinOTrol, Inc. with offices at 5731 Gulf Freeway, Houston, Texas. KinOTrol, Inc. is a consulting firm for chemical process industries. The firm specializes in the use of the analog computer for solving problems.

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The Dystac[®] analog computer, which is in operation in the KinO-Trol offices, is used to mathematically simulate chemical processes and determine the best conditions to operate a given chemical process. The center is available for rental to local industries. Instruction classes in the use of the analog computer are also offered.

PEOPLE OF NOTE

EXECUTIVE PROMOTIONS IN IBM

George F. Kennard has been promoted to president of IBM's Data Systems Division, located in White Plains, N.Y. He was formerly general manager of the company's Advanced Systems Development Division. He succeeds William B. McWhirter who was promoted to the post of director of organization for IBM.



Paul W. Knaplund succeeds Mr. Kennard as general manager of the Advanced Systems Development Division, Yorktown Heights, N.Y. He was assistant manager of the division.

John M. Norton will be the assistant general manager of the Advanced Systems Development Division. He was manager of the division's East Coast systems laboratory, also located at Yorktown Heights.

Leonard E. Clark has been named vice president, headquarters operations of IBM's Data Processing Division, White Plains, N.Y. He was formerly divisional vice president and manager of the Western Region, which serves 14 western states.

TWO VICE PRESIDENTS APPOINTED AT UNIVAC

The UNIVAC division of Sperry Rand Corporation has appointed Lee Johnson and Ralph S. La Montagne as vice presidents.



Mr. Johnson, as vice president of federal government marketing, is responsible for the sale of the entire range of commercially available UNIVAC electronic computer and tabulating equipment to federal government agencies.

Mr. La Montagne, as vice president, defense marketing, is responsible for the sale of special purpose UNIVAC electronic equipment to defense agencies.



Both Mr. Johnson and Mr. La Montagne will make their headquarters in Washington, D.C.

SMITH NAMED VICE PRESIDENT MARKETING FOR HONEYWELL EDP

Claude H. Smith has been named Vice President of Marketing for Honeywell Electronic Data Processing. He was formerly Director of Honeywell's EDP Federal Systems Marketing Division. In his new position he heads both the Federal Systems and Commercial Marketing organizations.



Mr. Smith has been a member of the Honeywell organization since 1943.

He started as a technical representative to the U.S. Air Force at bases in the United States and the Caribbean, and on Guam, Tinian and Saipan.

INTERNATIONAL SYSTEMS MAN OF THE YEAR

The first woman ever to gain the honor of International Systems Man of The Year was named winner over 40 nominees from the United States, Canada, Europe, and South America. Miss Anita P. Loeber of Los Angeles was named by Systems and Procedures Association, an international professional group of people engaged in scientific management operations.

Miss Loeber is a member of the Management Division Staff of the County of Los Angeles and is also the first person engaged in government activities to be given this award. She won the Price Waterhouse Award in 1959 for the best published article in the systems management field and is the first person to have won both prizes. Miss Loeber's activities and achievements in the systems field are numerous. She is also an author, lecturer, and teacher.

PRESIDENT, VICE PRESIDENT, 25 DIRECTORS NOMINATED TO LEAD IEEE

Dr. Ernst Weber, President of Polytechnic Institute of Brooklyn, has been nominated to serve as President of the Institute of Electrical and Electronic Engineers (IEEE), a 160,000 member organization that will come into existence with the IRE and AIEE merger in January, 1963. Dr. Weber was the 1959 President of IRE and is a Fellow of AIEE.



To serve as Vice President with Dr. Weber is Dr. B. Richard Teare, Jr., Dean, College of Engineering and Science, Carnegie Institute of Technology, Pittsburgh, Pa. Dr. Teare is President of the AIEE.



A slate of officers and directors to lead IEEE has been submitted to the membership of the two merging groups, the American Institute of Electrical Engineers and the Institute of Radio Engineers. All voting members of AIEE and IRE will receive ballots and be asked to vote either for or against the entire slate.

VICE PRESIDENT, RESEARCH NAMED BY LFE ELECTRONICS

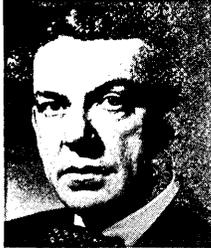
Dr. Ward C. Low has been named to the new post of vice president, research, for LFE Electronics, the major operating group of Laboratory for Electronics, Inc., Boston,

Mass. Dr. Low joined LFE in 1961 from the Mitre Corporation. He has been technical director for LFE Electronics' Systems division and will now direct all research programs and be responsible for long range technical planning.

USAF SCIENTIFIC ADVISORY BOARD MEMBER NAMED

Dr. Gilbert W. King, IBM director of research, has been named a member of the

United States Air Force Scientific Advisory Board. Its members perform consultative services on scientific matters for the United States Air Force.



The group also reviews and evaluates the Air Force's long-range plans for research and development.

Dr. King is also head of the Library of Congress' study group for information retrieval and a recent appointee to the President's Science Advisory Committee Panel on Problems of Scientific Information.

BENDIX G-20 USERS GROUP NAMES 1962-63 OFFICERS

William Anderson was elected president of the Bendix G-20 Users Group at their recent New York City conference. Mr. Anderson is computer director for Bendix Corporation's Mishawaka Division in South Bend, Ind. Bert Went, Battelle Memorial Institute, Columbus, Ohio, was elected vice president, and Dr. Bardley Whitman, Schering Corp., Union, N.J. as secretary.

Mr. Anderson announced the group will meet again in Chicago this November.

DR. JOHN BLYTH JOINS THE DIEBOLD GROUP, INC.

Dr. John Blyth, pioneer in the field of programmed learning, has joined The Diebold Group, Inc. to direct a new department in Programmed Learning. Dr. Blyth will provide services for the development of programmed courses for a wide variety of educational and training problems.

DR. M. S. WATANABE

The International Academy of Philosophy of Science, headquartered in Brussels, has elected to membership, Dr. M. S. Watanabe,

a research staff member of International Business Machines Corporation's Thomas J. Watson Research Center.



Membership in the Academy is limited to 52 scientists and philosophers who have made notable contributions to the philosophy of science.

NEW CONTRACTS

OLIVETTI ORDERS \$2 MILLION OF MAGNETIC TAPE MEMORY UNITS

Ampex Corporation, Redwood City, Calif., has received the largest international order in its history from Ing. C. Olivetti & Co., Milan, Italy. The order calls for delivery of some \$2,000,000 in Ampex magnetic tape units to be used in Olivetti electronic computers.

The equipment will be manufactured at Ampex facilities in Culver City, Calif. Part of the order will be exported directly to Milan; the balance will be shipped in kit form for assembly by Ampex Electronics, Ltd., subsidiary of the corporation in Reading, England, before delivery to Olivetti.

NEARLY \$2 MILLION IN CONTRACTS FOR COLLINS RADIO COMPANY

The U.S. Air Force has awarded Collins Radio Co. three contracts totaling more than \$974,000. The largest of the contracts is for over \$425,000 for ground communications equipment, which will be used primarily in downrange tracking situations on the Atlantic Missile Range. A second award calls for Collins flight control equipment for jet and heavy duty aircraft. The final contract from the U.S. Air Force is for flight director computers. The equipment, the Collins CPU-4/A assists the pilot in steering his craft. It

accepts standard guidance and sensor information for presentation to the pilot through a system of signals.

The Boeing Company Transport Division has awarded Collins Radio Company a contract for nearly \$1 million to supply navigational equipment for its new three-engine 727 jet liners. The purchase calls for Collins course indicators, approach horizons, steering computers, and instrument amplifiers.

DIVISION OF ITT AWARDED CONTRACT FOR OVER \$2.5 MILLION

The ITT Federal Laboratories, Nutley, N.J. has been awarded a contract for over \$2.5 million to build additional units of high performance electronic air navigation equipment by the U.S. Navy. The contract calls for the ITT division to supply units of an improved airborne TACAN (Tactical Air Navigation) set which will provide the Navy's jet aircraft with instantaneous, precise bearing and distance navigation information.

TACAN was originally developed by ITT to meet the precision navigational requirements of the U.S. Navy carrier-based aircraft, and is now a standard short range air navigation system for military aviation.

ELECTRIC COMPANY ORDERS IBM 1710 CONTROL SYSTEM

Public Service Company of Albuquerque, N.M., has ordered an IBM 1710 control system to balance 334,000 kilowatts of generating capability against the requirements of more than 100,000 customers. The electronic computing system will control and dispatch the flow of electricity across high voltage power lines serving a portion of the Southwestern United States. The computer-directed power dispatcher will be able to meet ever-changing load demands. It is scheduled to go into operation early next year.

NATIONAL GEOGRAPHIC TO HAVE UNIVAC III COMPUTER SYSTEM

A UNIVAC III computer system has been ordered from Sperry Rand Corporation for installation next year in the National Geographic Society's Eckington offices in Washington, D.C.

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The computer will make possible temporary changes of address on a day's notice. Magazine copies can be sent to vacationing families or travelers wherever and whenever they go. The adjustments in accounts of the Society's three million members will be processed as quickly as they are received in the Washington headquarters. National Geographic Magazine expects to be the first publication in history to keep its subscriber's addresses -- both foreign and domestic -- and their accounts current on a daily basis through use of an electronic computer.

ARMY AWARDS HONEYWELL CONTRACT FOR MAGNETIC TAPE SUB-SYSTEM

Honeywell Electronic Data Processing, Wellesley Hills, Mass., has been awarded a \$144,000 contract by the Army for delivery of a magnetic tape sub-system to the Army's Electronic Proving Ground at Ft. Huachuca, Ariz. The sub-system includes 8 Honeywell magnetic tape drives. It will be van-mounted for use in testing the Army's Fielddata systems.

NAVIGATION CHECKOUT TIME TO BE CUT 80% -- WILL HIKE POLARIS READINESS

Sperry Gyroscope Company, Great Neck, N.Y., has received \$3.1 million from the U.S. Navy for 14 advanced design checkout consoles. The new shipboard units, called navigation operational checkout consoles, will permit monitoring of the at-sea operation of the submarines' precise navigation systems. The monitoring will be conducted from a central control station inside each sub. The consoles are expected to reduce present checkout time by 80 percent.

The first submarines to carry the equipment will be ten ships of the Lafayette class, scheduled to join the fleet by the end of 1964. Four of the 14 consoles will remain ashore: two for crew training, one for test purposes and one for installation and study in Sperry's landlocked replica of a Polaris sub navigation center at its Syosset, L.I., location.

AIRLINE ORDERS UNIVAC SYSTEM

West Coast Airlines, Seattle, Wash., is the first commercial airline to order the new UNIVAC 1004 Data Processing System. This

system is the most recent addition to the Sperry-Rand Corporation's data processing equipment.

The new equipment represents a transitional step toward West Coast's use of a total-company computer system. The UNIVAC 1004 system will be initially used by the firm's accounting department.

NASA SELECTS COMPUTER DYNAMICS TO OPERATE DATA PROCESSING FACILITY

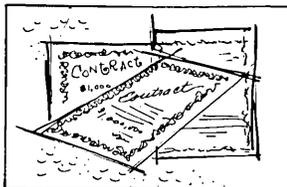
Computer Dynamics Corporation, Silver Spring, Md., has been chosen by the National Aeronautics and Space Administration to operate the Data Processing Facility for its Launch Operations Center at Cocoa Beach, Fla. The quarter million dollar contract gives Computer Dynamics the responsibility for the design, programming and implementation of applications for all types of digital computers in use by the center. It also provides for the development of procedures, operation, and coordination of maintenance for the computers and peripheral equipment used by NASA.

The U.S. Navy's Bureau of Supplies and Accounts has also asked the company to install and make operational its IMPACT (Implementation, Planning And Control Techniques) system for administering and controlling the Bureau's conversion of its small-scale headquarters computer from card to tape operation.

LIBRASCOPE RECEIVES CONTRACT FROM U. S. AIR FORCE

General Precision's Librascope Division has received a letter contract from the U.S. Air Force to produce aircraft computers for the 665A reconnaissance/strike program. The \$215,000 contract represents the initial funding for the program.

The contract calls for production of two AN/ASN-24(V) digital computer sets. The computer systems will be capable of aircraft navigation, processing of electronic intelligence data, and other functions.



BUSINESS NEWS

IBM IS ACCUSED OF CARD MONOPOLY

A \$150,000,000 treble damage suit charging International Business Machines Corporation with monopoly practices in the tabulating card business has been filed under the antitrust laws in the United States District Court in Camden, N.J.

The suit filed by Business Supplies Corp. of America, Princeton, N.J., charges IBM with 53 violations of the Sherman and Clayton Anti-Trust laws, and the Robinson-Patman Act.

Business Supplies is asking for a decree forcing IBM to divest itself of its tabulating card business "to prevent perpetuation of its monopoly and strangulation of all competition because of its superior position".

Business Supplies also asked the court to amend a 1956 consent decree to force IBM to give up all of its interests in the card business. In the 1956 order, signed in U.S. District Court in New York, IBM had agreed to divest itself of 50 per cent of its card business.

Business Supplies states that the chief target of the suit is the tie-in of IBM's machines and cards, "which give IBM a virtual monopoly in both".

IBM has issued a statement categorically denying the charge that it has violated the antitrust laws or that it has engaged in any unethical conduct that might have adversely affected Business Supplies Corporation of America.

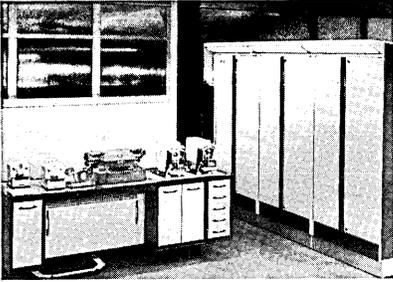
CONTROL DATA'S SALES, ORDERS UP

Control Data Corporation has reported that sales and service income for the fiscal year ended June 30, 1962, amounted to \$41,034,009, up from \$19,783,745 in 1961. Net profits after provision for taxes were \$1,542,622 compared with \$842,524 in the previous year. The backlog of orders on June 30, 1962 was \$49,410,000 as compared to \$24,220,000 on June 30, 1961.

CDC has recently increased its sales offices to 20, and has opened up new marketing areas for the 1604 and the 160 line of computers to include the oil industry, communications and space exploration.

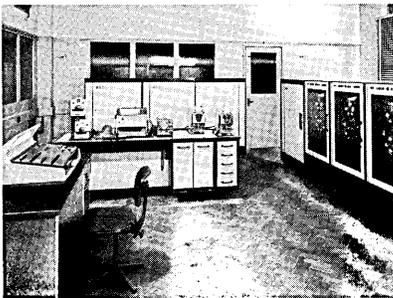
"ONE IF BY LAND . . ."

The Elliott Computing Division of the Elliott Automation Group in England, is launching a drive to capture a part of the American computer market in scientific and educational organizations. The 503 and the 803 computer systems will be the units promoted in the United States. The E-A Industrial Corporation, 70 Pine Street, New York, will handle the American sales for the Division.



— The Elliott 503

The 503 is a new computer presently undergoing final check-out at the Elliott factory in Borehamwood, England. It features an operating speed of 100,000 arithmetic operations per second, with 8192 thirty-nine bit words of basic core storage. Input/output for the computer is via punched tape, read at 1000 characters per second, and punched at 100 characters per second. Control is from an electric typewriter. An ALGOL-compiler is said to be completed for the 503, and the computer is compatible with the older 803 unit. Its price is about \$200,000 in this country, and Elliott feels that it will compete with the GE 225, and the Bendix G20 computers.



— The Elliott 803

The 803 computer, an older, slower, and cheaper unit, has already been placed in over thirty-five installations. It has 40% thirty-nine bit words for basic storage, and a mean working speed of 1500 operations per second. Price in the United States is set at approximately \$95,000. The company hopes to compete with it

in this country against the ASI 210, Recomp II and III, CDC 160A and IBM 1620 computers. The largest present installation of the 803 in the United States is an 8K store; two tape machine at the Lummus Co. plant in Newark, N.J., where it is used for chemical and structural engineering design calculations.

The Elliott Computing Division is the largest British computer manufacturer; they produced, in 1961, 62% of the computers manufactured in the United Kingdom. They have over 150 machines installed throughout the world, including fifteen in the United States.

The first six months of the marketing program for the 503 and the 803 computers will be a feeler program, Elliott reports, to determine if they can independently market their computer to the scientific and the educational market. Elliott already has arrangements with National Cash Register and Information Systems, Inc. for marketing hardware to the business and process control field, respectively.

BURROUGHS LOWERS COMPUTER PRICES

Burroughs Corporation has announced new prices for previously leased computer systems. They reduced the computer systems' cost to 30 per cent of the original list price. A 205 computer now sells for a base figure of \$48,000.

Previously leased systems have been operated under maintenance contract with Burroughs and are sold with a 90 day warranty. Maintenance contracts are optional. Updated software, including an ALGOL compiler, assemblers, executive systems, utility routines and hundreds of programs, has been cataloged for the 205.

A previously leased system with paper tape and punched card input/output and floating point arithmetic now sells for \$61,000, compared to an original list price of \$210,000. Special lease rates for two and three year term leases are also available.

AUDIO DEVICES' SALES RISE

Audio Devices, Inc. has reported that sales for the six months ended June 30, 1962 were \$4,070,103 compared with \$3,677,089

for the same period in 1961. This represents an increase in total sales of 11%.

Earnings for the first half of 1962 were \$446,196 before provision for taxes and \$223,196 after taxes. This is double the earnings for the first half of 1961.

Sales were described as increasing at a steady rate due in part to the expanding market for tape for instrumentation and computer use.

ARMY EXPANDS ITS MICROMODULE PROGRAM MICROPAC COMPUTERS EFFECTED

The United States Army has announced today it plans a substantial expansion of its Micromodule Program. The Army Signal Corps launched the Micromodule Program in 1958 to develop tiny circuit modules to reduce the size of army electronic equipment and at the same time provide high reliability of production.

The Army anticipates committing some \$8 million for equipment and systems in the fiscal year 1963 -- about double the 1962 funding. Up to 1962, \$18 million had already been invested in the program. The Army-industry team conducting the program is expected to achieve a production rate of 250,000 micromodules a year by March of 1963, a million a year by June of 1964 and three to five million sometime in 1965, under existing plans.

Among the contracts the Army awarded during 1962 for new micromodule applications was procurement from RCA of a mobile computer for filed data use, employing some 10,000 micromodules and to be delivered in about 14 months. Future plans provide for development of an entire family of varying sizes of such systems.

Among the micromodule applications chosen for the research and development program in 1963-64, is a production version of a small field computer known as Micropac, the prototype of which will be delivered this November by RCA. The micromodule is a stack of wafer-like components in the form of a compact module 0.36 inch square and usually 0.4 to 0.8 inch high. The micromodule takes advantage of automated production techniques and is compatible with both existing circuitry and with other microelectronic techniques under development.

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 present below the first monthly report on the number of American-made computers installed or on order as of the preceding month. We expect to revise this computer census monthly, pointing out the changes from month-to-month, so that it

will serve as a "box-score" to readers interested in following the growth of the American computer industry.

All figures have been verified by the respective manufacturers except where the figure is marked with an asterisk (*). In the latter cases, estimates were made based upon information in the reference files of COMPUTERS AND AUTOMATION. The figures were then reviewed by a group of computer industry cognoscenti.

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

AS OF SEPTEMBER 20, 1962

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	\$7500	2/61	3	2
Advanced Scientific Instruments	ASI 210	Y	\$2850	4/62	4	2
	ASI 420	Y	\$12,500	-/62	0	1*
Autonetics	RECOMP II	Y	\$2495	11/58	130*	0*
	RECOMP III	Y	\$1495	6/61	25*	0*
Bendix	G-15	N	\$2150	7/55	350*	14*
	G-20	Y	\$15,500	4/61	20*	6*
Burroughs	205	N	\$4600	1/54	92	X
	220	N	\$14,000	10/58	58	X
	E101-103	N	\$1000	1/56	157	X
	B250	Y	\$5000	11/61	18	35*
	B260	Y	\$3750	-	0	40*
	B270	Y	\$7000	6/62	2	30*
	B280	Y	\$6500	-	-	14*
B5000	Y	\$16,200	-	0	9*	
Clary	DE-60/DE-60M	Y	\$650	2/60	68	10
Computer Control Co.	DDP-19	Y	\$2800	6/61	1	2
	DDP-25	Y	\$3000	-	0	1
	SPEC	Y	\$800	5/60	8	2
Control Data Corporation	160/160A	Y	\$2000/\$3500	5/60&7/61	195	55
	1604	Y	\$35,000	1/60	36	12
	3600	Y	\$52,000	-	0	2
Digital Equipment Corp.	PDP-1	Y	Sold only about \$500,000	12/59	17	12
	PDP-4	Y	Sold only about \$100,000	8/62	1	2
El-tronics, Inc.	ALWAC IIIE	N	\$2500	2/54	32	X
General Electric	210	Y	\$16,000	7/59	53*	33*
	225	Y	\$7000	1/61	60*	57*
General Precision	LGP-30	semi	\$1300	9/56	400	20
	RPC-4000	Y	\$1875	1/61	60	20
Honeywell Electronic Data Processing	H-290	Y	\$3000 up	6/60	9	4*
	H-400	Y	\$8000	12/60	14	11*

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILED ORDERS
Honeywell EDP (cont'd.)	H-800	Y	\$22,000	12/60	38	14*
	H-1800	Y	\$30,000 up	-/63	-	3*
	DATAmatic 1000	N	-	12/57	7	X
HRB-Singer, Inc.	SEMA 2000	Y	\$700	1/62	12	14
IBM	305	N	\$3600	3/62	925*	X
	650-card	N	\$4000	11/54	735*	X
	650-RAMAC	N	\$9000	11/54	262*	X
	1401	Y	\$2500	9/60	3000*	4500*
	1410	Y	\$10,000	11/61	33*	450*
	1620	Y	\$1620	9/60	1265*	450*
	701	N	-	-	4*	X
	702	N	-	-	5*	X
	7030	Y	\$300,000	5/61	3*	X
	704	N	\$32,000	12/55	89*	X
	705	N	\$30,000	11/55	160*	X
	7070	Y	\$24,000	3/60	220*	265*
	7072	Y	\$15,800	-	0*	0*
	7074	Y	\$29,300	-	0*	0*
	7080	Y	\$55,000	8/61	30*	25*
	709	N	\$40,000	8/58	45*	X
7090	Y	\$64,000	11/59	190*	150*	
7094	Y	\$70,000	12/62	4*	3*	
Information Systems, Inc.	ISI-609	Y	\$4000	2/58	.18	5
ITT	7300 ADX	Y	\$30,000	7/62	2	1*
Monroe Calculating Machine Co.	Monrobot IX	N	\$340	3/58	145*	20*
	Monrobot XI	Y	\$700	6/60	140*	110*
National Cash Register Co.	NCR - 102	N	-	-	30	X
	- 304	Y	\$14,000	1/60	29	1
	- 310	Y	\$2000	5/61	20	35
	- 315	Y	\$7250	5/62	10	100
	- 390	Y	\$1850	5/61	200	200
Packard Bell	PB 250	Y	\$1200	12/60	109*	22*
Philco	2000-212	Y	\$68,000	-/63	0*	5*
	-211	Y	\$40,000	10/58	10*	10*
	-210	Y	\$36,000	10/58	7*	9*
Radio Corp. of America	Bizmac	N	-	-/56	4	X
	RCA 301	Y	\$6000	2/61	121	330*
	RCA 501	Y	\$15,000	6/59	78	10*
	RCA 601	Y	\$35,000	-/62	0	6*
Scientific Data Systems Inc.	SDS-910	Y	\$1700	8/62	2	10
	SDS-920	Y	\$2500	9/62	1	4
TRW Computer Co.	RW530	Y	\$2500	8/61	13*	6*
UNIVAC	Solid-state 80, 90, & Step	Y	\$8000	8/58	523	153
	Solid-state II	Y	\$8500	9/62	1	32
	490	Y	\$26,000	12/61	3	12
	1107	Y	\$45,000	10/62	0	15
	III	Y	\$20,000	8/62	1	65
	LARC	Y	\$135,000	5/60	2	X
	1100 Series (except 1107)	N	\$35,000	12/50	32	X
	I & II	N	\$25,000	3/51 & 11/57	65	X
	File Computers	N	\$15,000	8/56	77	1
	60 & 120	N	\$1200	-/53	904	37
1004	Y	\$1350	2/62	0	700	

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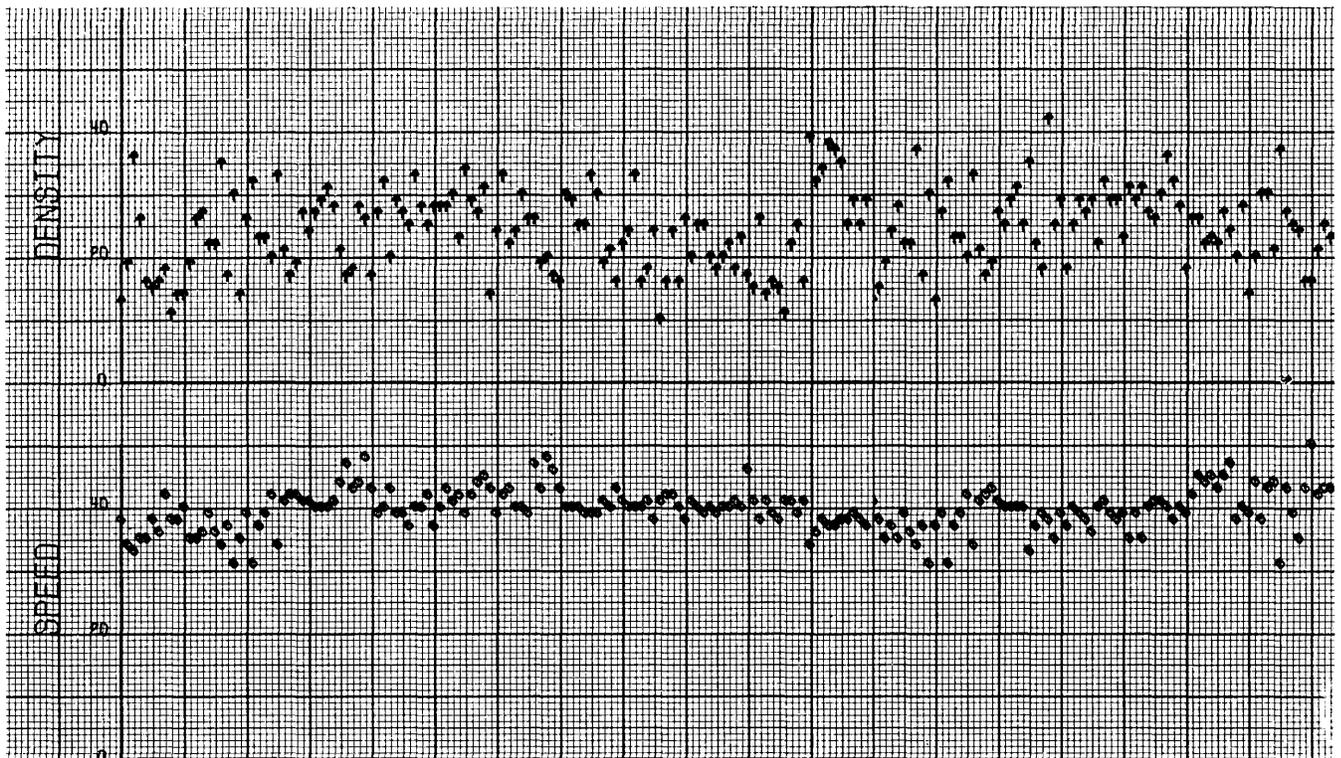
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THE SPECTRUM OF INFORMATION PROCESSING

A. Walther
Darmstadt, Germany

The general chairman of the IFIP Congress presents an engaging picture of the structure and growth of information processing.

Let us recall the spectrum in optics. The white light of the sun is dispersed by a prism into the 7 magnificent colors of the rainbow: violet, blue, bluegreen, green, yellow, orange and red. At the upper and at the lower end invisible ultraviolet and infrared radiation has to be added. The white light is equivalent to information processing, the prism to the IFIP Congress. By its 25 sessions with 119 papers and by 26 symposia and panel discussions it separates the entire field of information processing into 7 subjects corresponding to the rainbow colors:

- 1) Business information processing
- 2) Scientific information processing
- 3) Real-time information processing
- 4) Storage and retrieval of information
- 5) Linguistic analysis and mechanical translation
- 6) Pattern recognition
- 7) Logical and technical fundamentals and progress

On the boundaries we find the university education in information processing is equivalent to the ultraviolet. Several advanced concepts are equivalent to the infrared, for instance, connections to biology, psychology and philology, generalizations of concepts, and methods and views into the future.

Now I shall give some characteristic examples for the subjects mentioned, which we may call Fraunhofer lines in the spectrum.

Subject 1: The business information processing is in principle electronic data processing with high volume input and output and relatively few and simple calculations, for instance: statistical evaluations, wage calculations, accounting in banks, insurance companies, and in the postal money order service, inventory control, seat reservation. All this means office automation.

An example is an original wage sheet such as one from a big car factory, Adam Opel A.G. at Russelsheim. The factory employs 28,000 workers to whom wages are paid weekly. An IBM 650 computer multiplies the working hours by the wage per hour, takes into account the family status and the number of children, subtracts taxes and insurance rates, performs all calculations otherwise necessary, and summarizes the results on the wage sheet. On the rear side, the worker finds his wages in cash in a plastic pocket. The second copy of the wage sheet is sent to the accounting office.

Another example is data processing in medicine. A patient asks the hospital for a questionnaire. This

form carries a number. The connection of the number to the patient is known only to the hospital in order to guarantee confidential treatment. The patient answers by "yes" or "no" 254 precise questions for men and 266 questions for women, numerated according to symptoms, for example:

How often do you have a headache?

- 001 Very rarely?
- 002 Occasionally during the week or the month?
- 003 Several times per week?
- 004 Every day?

Where do you locate the headache?

- 008 In the front immediately above the eyes or in one of the cheeks below the eyes?

- 031 Do you suffer from noise in the ears?

Do you suffer from backaches and where do you locate them?

- 071 In the upper part?
- 072 In the middle part?
- 073 In the lower part?

- 241 Are you easily irritated and do you flare up easily?

- 251 Was there a case of alcoholism among your ancestors?

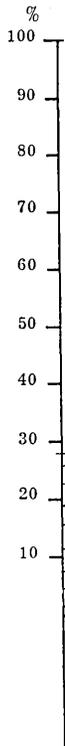
- 264 Do you suffer from irregularities in your blood circulation and do you perspire easily?

The answers are punched into a paper tape which is fed into an electronic computer. The computer compares the symptoms marked by the patient to combinations of symptoms characteristic for 80 diseases. Likely diagnoses are then printed out together with corresponding symptoms. Probability indications rated from 1 to 4 are added according to relevant symptoms. This preliminary diagnosis is sent to the hospital by teletype where it is studied by the doctor. If he considers the case to be dangerous, he asks the patient for an immediate appointment. Otherwise the name of the patient is put on the general waiting list. From the machine diagnosis, from the personal impression, and, if necessary, from additional examinations the doctor writes the final diagnosis. This means that the machine assists in preparing the treatment, but it does not replace the personal contact between doctor and patient which is an essential part of the doctor's work. The results of the procedure have been reported to be most satisfying. In particular by the precise questions a great deal of unnecessary questioning and talking is avoided. Apparently patients are less hesitant about answering certain questions when asked in written form rather than in an interview.

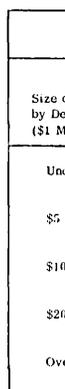
Presented at the opening session of the IFIP Congress 62, Munich, Germany, Aug. 27, 1962.

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Subject 2: An example for scientific data processing is the summary of the so-called Mersenne prime numbers $2^p - 1$ which is one detail from the theory of numbers in pure mathematics. For more than seventy years $2^{127} - 1$ was the highest prime number (39 decimal digits) known. Starting with 1952 in addition to the 12 Mersenne prime numbers known so far 8 further numbers were found. Several electronic computers cooperated in this project which honors the human mind. The last prime number was discovered by A. Hurwitz in Los Angeles late in 1961. He used the computer IBM 7090 for 50 minutes and he found the highest prime number known: $2^{4423} - 1$, a number having 1332 decimal digits.

Another example is optimization programming, such as the production of a routing schedule for empty freight cars for a national railway system, and a minimum cost scheme for blending gasoline of a number of components that have different technological properties and different prices.

Subject 3: The most important example for real-time information processing is the automatic control of machine tools which can also be applied to controlling traffic signals. The prediction of bad weather conditions is based on a number of meteorological data which are transmitted by radio. If the prediction has to be useful, the information must be processed in real-time. The same is true for load calculations in an electric power network.

Subject 4: As an example of information storage and retrieval, I should like to mention documentation problems and the classification problem. These terms are self-explanatory.

Subject 5: An example here is the automatic translation from Latin into German produced at the institute of Professor Dörr in Saarbrücken by the computer Zuse Z 22. Since Latin is a dead language it is governed by a fixed set of rules and therefore it is particularly well suited for fundamental studies.

Linguistic analysis is related to semantics and syntactics and creates new bridges between humanities and technology.

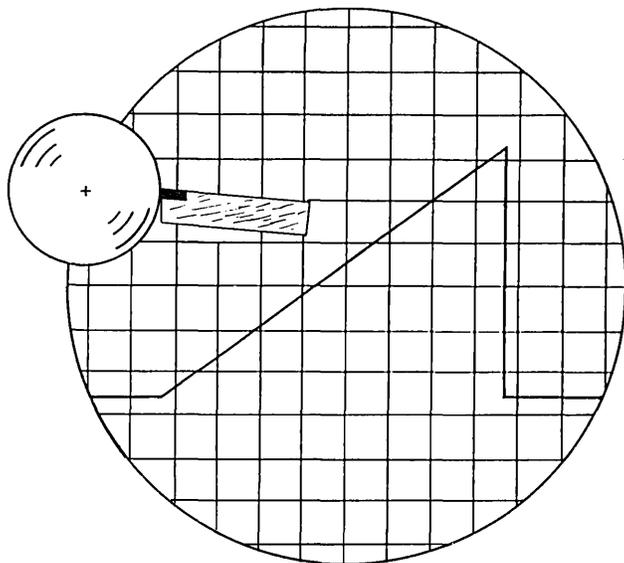
Subject 6: Automatic pattern recognition is one example of artificial perception. During the Congress, papers will be read about the automatic analysis of electroencephalographs and about the control of a typewriter by the human voice. Further reports about the automatic reading even of cursive writing will be heard. The technical realization of automatic reading will be of far-reaching importance for office automation. For example, it is to be appreciated that in the highly monotonous, though very responsible, process of punching data into cards the human being will be replaced by a machine.

Subject 7: The progress in components, for example, tunnel diodes, drift transistors, special forms of ferrite cores, carrier frequency systems for the parametron, cryotron circuits for very low temperatures, fast access storage disks, twistors, and thin magnetic films, has opened the realm of nanoseconds (10^{-9} sec) for cycle time. Significant progress in logical de-

sign was realized during the last years by the creation of programming languages (algorithmic languages, operative languages) and the construction of corresponding processors. Rightfully this topic will be widely discussed during the Congress. An example of progress is the calculation of the quotient $q := x / (a - x)$ by means of the operative language ALGOL. The new symbol $:=$ which signifies "is to be replaced by" is of particular importance. It is, for example, used in the calculation of a table if the program is to jump from x to $x + \text{delta}$, with the step delta . This subject represents particularly well the development of the last years.

Subject 8: I should like to present at this point a new development of L. A. Hiller of the University of Illinois. Hiller is well known for the book, "Experimental Music," which he wrote in cooperation with L. M. Isaacson, and for the ILLIAC string quartet composed by the big and fast computer ILLIAC. The ideas of a composer triggered by fantasy and intuition are set equivalent to random numbers which are fed into the computer. The composer transforms his ideas by the laws of harmony and composing. Correspondingly the random numbers are processed in the computer by a program which simulates the laws mentioned above and which discards the unsuitable numbers. The result is a ready composition. Some of you may like the sound of the string quartet, others will object to its monotony and will be horrified. However, even the musicians protesting this development will gladly accept another development by Hiller which will help to overcome the well-known difficulties in music printing. The original manuscript of the music is punched into a paper tape which then is entered into a computer. A program edits the music in such a way that equally spaced lines and pages are printed. By the same method the music for the single instruments can be extracted from the score.

By this talk I have tried to guide you through the extended spectrum of information processing with electronic speed. I hope that I was able to stir your interest in, and to display the colors and the beauty of, the fascinating domain of information processing.



THE IFIP CONGRESS 62, MUNICH, GERMANY

Edmund C. Berkeley
Editor
Computers and Automation

An on-the-spot report of some highlights.

The second congress of the International Federation for Information Processing in Munich, Germany, held during the six days, August 27 to Sept. 1, 1962, was a remarkable and rewarding conference. Most of the time there were five parallel sessions: two for papers and three for symposiums and panel discussions. No one could have personally attended more than 12 full sessions, yet there were 51. Dr. A. Walther's introductory talk "The Spectrum of Information Processing" (printed elsewhere in this issue of **Computers and Automation**) gives a general report of the content of the conference. But there was no substitute for accidentally being present at some of the really interesting symposiums or panel discussions of the conference. For it was impossible to tell ahead of time who was going to speak well and clearly and have something worthwhile to say and relevant to the subject of the session.

The hosts for the conference, the program committee, the local arrangements committee, and the other committees, deserve praise for a splendidly organized conference, with plenty of signs, ample multiple translation facilities that worked well, and an endlessly working staff, including representatives of the Dresdner Bank, Lufthansa, the German post office, and other firms, who made one feel their only purpose was to be of real help, hour after hour, including Saturday until two p.m.

Although preprints of the contributed papers were given to every person who registered for the conference up to some time in August, these did not contain the texts of the invited papers, nor the texts of any prepared talks for the symposiums or panel discussions. The entire proceedings of the conference are to be published by the North Holland Publishing Co., Amsterdam, Netherlands.

Comparisons of How Computers Perform

J. A. Gosden and R. L. Sisson (U.S.A.) presented an invited paper "Standardized Comparisons of Computer Performance." This paper is based on the sensible idea of constructing model problems requiring computers and model configurations of computer equipment, and then programming the model configuration to solve the model problem, and finding the time and cost for the solution. More than 13 model configurations have been worked out. For each configuration two or more sets of computing systems made by different companies have been specified. Then, having assumed the configuration, the particular computing system, and the problem, various times can be computed such as: the time to deal with a block record in the master file, the delays in the processor if any, etc. The model problems are constructed by selecting problem parameters, such as sizes of input and output records, amount of computing, and the "activity factor." The *activity factor*

can be 100% as in payroll where each payee recorded in the master file has a record for time worked in the detail file, and each person requires a calculation to be made for him. Or, the activity factor may be as low as 1% activity, in some specialized accounting problems. When the standardized comparisons of computer performance are given to a client, even though they will not directly apply without change, nevertheless the comparisons give him a head start in relating the problems of his organization to his choice of a computer. This gives him a non-sales-biased picture of computers.

Scheduling Classes and Teachers

As a result of the contributed paper "The Construction of Class-Teacher Timetables" by C. C. Gotlieb (Canada), it became evident that this is a very common problem and that very many people are working on it. To simulate the principal of a high school is difficult or impossible, because he carries too much in his head. But a systematic examination of requirements enables a high school to be scheduled rather easily, a university with more difficulty. Because of the interest shown, a group is being formed, according to Dr. Gotlieb, to pursue this topic.

Flame Cutting of Steel Plates

In the panel on Numerical Control of Machine Tools, P. M. Stocker (England) reported on a combination of two computers, a general purpose computer—the Ferranti Pegasus—and a special purpose one, or curve generator. Pegasus with an interpretive program accepts the geometrical and cutting information in the simplest possible way, and produces a punched paper tape containing information in "sentences"; each "sentence" defines the cutting line from the present position of the flame cutter nozzle to the next change point, along either a straight line, a circular arc, or a parabolic arc. The curve generator in turn accepts the punched paper tape and produces a magnetic tape used in the control console of the oxygen cutting machine. The system is used by 40 separate customers, and is having a significant effect on ship fabrication.

Douglas T. Ross (U.S.A.) said that an informal survey in December, 1961, had shown that over 40 different automatic programming systems for numerical control have been prepared on computers in the United States, and that of these, over 25 are still in use. Most of the applications are concerned with contour milling in a continuous path.

Learning Which Sentences Are Meaningful

In the session on Artificial Intelligence, V. M. Glushkov (U.S.S.R.) talked of some of the experimental work in self-learning systems going on at the Institute of Cybernetics in Kiev. He reported on a "self-learning" machine for learning the meaning of

simple sentences in Russian. Each sentence was constructed on the pattern: Subject, Verb, Preposition, Object. The machine had a dictionary of 100 Russian words, 70 nouns, 20 verbs, etc. Could the machine learn to construct phrases that were meaningful and grammatical? The machine was programmed to examine the information and from time to time offer a sentence to the programmer: Was it meaningful? The programmer would answer correctly. Then the machine would examine again, and again ask. (About one third of all possible phrases are meaningful.) The machine learned to correctly classify as not meaningful the remaining $\frac{2}{3}$ of sentences. For example, the machine might offer as meaningful: "a professor is a thinker; a student is a thinker; a boy is a thinker; two talkers are thinkers; all talkers are thinkers."

The behavior of the machine varies considerably according to the values set in its hardware of the coefficient of retentivity and the coefficient of caution. Maximum retentivity leads to an appearance of learning by rote. Minimum retentivity leads to an appearance of fantasy.

Evolution in Learning Machines

O. G. Selfridge (U.S.A.), in the Symposium on Artificial Intelligence, discussed evolution as a notion in learning machines. The evolutionary mechanism which is available to us, as we produce machines with artificial intelligence, is broader than nature's. In nature a profitable gene is restricted to one species; but as soon as a profitable design feature is observed in any machine, it can be incorporated in other machines. In nature, it is hard to see how a mechanism like wings could have evolved from non-wings; to account for it, we must assume that the intermediate stages from non-wings to wings were profitable ones, for example, that a transitional limb was useful for perhaps keeping balance or fluttering or gliding. With machines, we human beings can take a goal "we wish to fly" and construct parts individually, later putting them together to make a flying machine. But there is still diversity and beauty in nature which we have not yet expressed in learning machines. In nature, species have the ability to inherit an optimization procedure; this feature is not yet present in any learning machine.

The Pattern of Learning

A. Newell (U.S.A.), in his invited paper, "Problem Solving, Learning, and Generality," began by saying that "Our general problem is constructing the information mechanisms that we see in man," and he inquired what is the special role of learning. The pattern of learning is that the learning program modifies the performance program; and significant learning involves storing of information much longer than the duration of solving one problem. All learning requires a representation of the environment inside the machine; the purpose of the representation is bridging the gap between the environment and the machine's experience. The variety of the world exceeds the capacity of any machine to hold it. He held out the possibility of environment-oriented machines, and programs that build constructive models of the environment.

Ultra High-Speed Computers

G. M. Amdahl (U.S.A.) reported at a press conference of the panel discussion on Ultra High-Speed Computers. The general opinion of the panel is that the expected gain in performance of computers is at least 20 to 50 times the speed of existing computers, before the end of the 1960's. At least 8 companies are working vigorously in this field. Three major problem areas are: fabrication; organization; and adequate peripheral units. In fabrication, problems are how to deal with a dielectric .002 inch thick and metal ribbons deposited on the dielectric .010" wide and .004" thick. Temperature is a problem. In organization, in order to retain small dimensions, one has to build functionally independent boxes, putting all the controls within the box—as for example, what is to be done at any step in division depends on what happened at the last step. Adequate peripheral units include adequate input, output, and storage. Laboratory methods are very costly to produce devices of this degree of precision and miniaturization; it is better to set up product production facilities. The ultra high-speed computers are facing the relativity barrier of the speed of light—the maximum speed of an electrical pulse in a conductor is about half a foot in a nano-second (10^{-9} second).

Investigation and Computers

M. S. Wilkes (England) at one of the press conferences spoke about the conference and the computer field in general. He objected to saying that a computer solved such and such a problem—he said the credit should go to the scientist who used the computer. One investigator has said that ever since he had a computer to play with, he had to think 10 times as fast to keep up with it. An astronomer has said that the most important instrument in astronomy, when he was young, was the telescope, but now it is the computer. A dozen years ago it might have been so long and troublesome to tell the computer what to do to solve a problem, that it would have been shorter to do it yourself; but nowadays a computer can be spoken to easily. And a world movement under the IFIP is under way to produce a standard language in which to talk to computers.

Some Meditations on Programming

E. W. Dijkstra (Netherlands) gave an invited paper "Some Meditations on Advanced Programming." He said he would express an honest personal conviction, rather than a colorless average of a number of conflicting personal opinions of other people. The programmer's world is a very dark one, with only patches of bright sky on the horizon—based on the fact that when the first computers were built and mankind was faced with a new technical wonder, programmers did nearly impossible jobs by using the inadequate machines in tricky ways. There was an atmosphere of pioneering guided by opportunism rather than principles. No matter how crazy a computer facility was provided, a more crazy programmer would turn it to advantage. The employer would employ a programmer who was a good puzzle-solver rather than one who had a clear and systematic mind. But the sky is

lightening. The basic theorem of importance is that designing a computer is equivalent to making a program. Yet the computers of today are very disappointing, boring, uninspiring, and hopelessly old-fashioned—because they have been built subject to the requirement that all the old programs of previous models of that manufacturer must run on the new machine. This is a never-failing mechanism to prolong the lifetime of grievous mistakes. So the programmer suffers regularly from the monstrosity of his tool. But the situation is changing. The classical computer plus communication facilities is becoming equivalent to a group of sequential machines, with the central processor dividing its attention among an arbitrary number of sequential processes. But the publication of the ALGOL 60 report has had tremendous influ-

ence. However, the same attention to reliability which the computer receives must now be given to the translator from ALGOL which produces the program that actually runs on the computer. When changing from an old computer to a newer and faster one, why not invest some of the saving in the convenience, elegance, and reliability of the translator? The language for dealing with the problem should also be a reliable one; it should assist the programmer in his most difficult task, satisfying himself that the program he has written down really does solve the problem he wants to solve. Finally, we need to stress that the tools of the programmer should be charming, elegant, inspiring, and worthy of one's love, for unless a craftsman loves his tools he hardly can create something of superior quality.

READERS' AND EDITOR'S FORUM

(Continued from Page 8)

offer a progress report entitled "The National Space Program," underscoring the theme of the conference "Computers in the Space Age."

The annual banquet will be highlighted by an address on the "Computer and Man" by Sir Edward Playfair, chairman of ICT, London. His comments will stress the need for realism—not ivory-tower day-dreaming—in planning for the future of computers.

Evening discussion panels are planned for the first time at FJCC 62. The three sessions scheduled include the effect of new devices on computer technology, organization of computers, and computer languages.

Another innovation at the meeting will be a panel discussion on the impact of information processing, accenting the virtues of EDP as a national resource. Worldly representatives from the fields of education, industry, labor, government and the scientific community will be on hand including J. B. Carey, president AFL-CIO International Union of Electrical Workers, and Dr. G. P. Harnwell, president of the Univ. of Penna.

A number of EDP educational events for high-school consumption has also been planned. Movies on electronic data processing will also be shown on a continuous basis during normal meeting hours of the conference.

TWO LOCATIONS CHANGED FOR JCC's— ONE CANCELLED

The change in location of two previously scheduled Joint Computer Conferences has been announced by Dr. Willis H. Ware, chairman of the governing board, American Federation of Information Processing Societies (AFIPS), sponsor of the conferences.

The FJCC, November 12-14, 1963, previously scheduled for Los Angeles has been changed to the Convention Center, Las Vegas, Nevada. The SJCC, May 26-28, 1964 has been changed from Boston to the new Washington Hilton Hotel, Washington, D. C., which is scheduled for completion October, 1963.

"Due to the growth in exhibitors and attendance at the JCC's it has become necessary for us to look for more space than conventional conference facilities offer," Dr. Ware explained.

The main auditorium at the Las Vegas Convention Center seats 8,500 and the center includes 90,000 sq. ft. of exhibit space and 17 meeting rooms for numbers from 25 to 1,000. It is one of the few centers in the world specifically designed for conference and exhibition activities.

The Washington Hilton has 50,000 sq. ft. of exhibit areas adjacent to a ballroom seating 4,000 (or 1,000, 1,000 & 2,000), as well as numerous meeting rooms seating from a few to a few hundred.

It was announced at the Munich meeting of the IFIPS that the next international conference of IFIPS would take place in 1965 in New York. To allow full time for the preparations for this event, AFIPS, the host organization, has cancelled the SJCC that was scheduled to be held in New York in 1965.

CALL FOR PAPERS FOR 63 SJCC

The 1963 Spring Joint Computer Conference to be held May 21-23, 1963, at Cobo Hall, Detroit, Michigan, invites intending authors to submit full texts of their papers beginning with 100-150 word abstracts on or before December 1, 1962.

Papers making original contributions in the areas of programming, analog and hybrid systems, artificial intelligence, algorithms in business data processing, machine organization including hardware/software interplay, new logic and memory devices, data acquisition—transmission and display, information retrieval including applications, are invited as well as papers of outstanding significance in other areas.

Each accepted paper, preferably not exceeding 10,000 words, will be published in hard bound proceedings available at the conference and abstracts will be published in the conference programs.

Papers should be sent to: Mr. B. W. Pollard, Burroughs Corporation, 6071 Second Avenue, Detroit 32, Michigan.

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BOOKS AND OTHER PUBLICATIONS

Moses M. Berlin
Allston, Mass.

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*.

Hall, Arthur D. / *A Methodology for Systems Engineering* / D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J. / 1962, printed, 478 pp, \$12.00

This book aims to increase the understanding of systems engineering as a philosophy, methodology, or process. It considers approaches to the main problems—problem definition, goal setting, systems synthesis and analysis, and choice among alternative systems. The first part, "Philosophical Foundations," discusses the nature of systems engineering and its objectives, tools and relation to other fields. Among the chapters in this section are: "A Case History: The TD-2 Radio Relay System," and "Some Fundamental Concepts of Systems Engineering." Part Two called "Problem Definition," includes "Environmental Research" and "Needs Research." The final two parts, "Decision Making" and "Systems Synthesis and Analysis," discuss selection of criteria in decision making, data reduction, game theory, programming analog computers, and mathematical analysis of output data. Each section includes problems relating to the subjects covered. Index.

Kipiniak, Walerian / *Dynamic Optimization and Control: A Variational Approach* / The M.I.T. Press and John Wiley & Sons, Inc., 440 Park Ave. South, New York 16, N. Y. / 1961, photo offset, 233 pp, \$4.95

This mathematical monograph discusses a general control theory for dynamic systems of electrical, mechanical or chemical nature. Computation and certain analog computers are applied to problems of optimization. Chapters include "Statement of the Research Problem," "Dynamic Optimization Theory," "Control Law Computations," and "Control in the Presence of Stochastic Disturbances." Seven appendices include nomenclature and descriptions of systems. References and index.

Niemann, R. A., and R. N. Learn / *Mechanization of the PERT System on NORC; Naval Weapons Laboratory Technical Memo. No. K-19-59 / Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.* / 1960, offset, 22 pp, 30¢

This paper describes the PERT system and the mechanization of the PERT system on the Naval Ordnance Research

Calculator. PERT stands for Program Evaluation and Review Technique. The efficacies of its application on a fast computer are discussed. Three appendices discuss the salient characteristics of the NORC, of the Universal Data Transcriber, and a typical event network.

Thaler, George J., and Robert G. Brown / *Analysis and Design of Feedback Control Systems* / McGraw-Hill Book Co., Inc., 330 West 42 St., New York 36, N. Y. / 1960, printed, 648 pp

This is a second edition of "Servomechanism Analysis," and incorporates a number of revisions of the first edition. The authors consider feedback control problems as design problems and provide the engineer with a variety of analysis and design tools with which to approach the subject. The text is intended for use in a postgraduate level first course, and includes a chapter "General Background." Thirteen other chapters include: "The LaPlace Transformation," "Equations of Physical Systems," "Transient Analysis of Servomechanisms," "Introduction to Design," "Application of Design Principles," and "Describing Functions and Their Applications." Five appendices include tables, and information about error detectors, controllers, servomotors and compensating devices. Index.

Vygotsky, Lev Semenovich; edited and translated from the Russian by Eugenia Hauffmann and Gertrude Valsar / *Thought and Language* / The M.I.T. Press and John Wiley & Sons, Inc., 440 Park Ave. South, New York 16, N. Y. / 1962, printed, 168 pp, \$4.95

This English translation from the Russian discusses the interrelation between thought and language, developing a "genetic analysis" of the relationship as it evolves from childhood. The original Russian edition, published posthumously in 1934, was disregarded in 1936 due to its non-conformist viewpoints; it was republished in 1956. The book provides experimental evidence that word meanings undergo evolution during childhood, demonstrates the specific psychological nature and linguistic function of written speech in its relation to thinking, and discusses the nature of inner speech and its relation to thought. Seven chapters include: "The Problem and the Approach," "Piaget's Theory of Child Language and Thought," and "The Development of Scientific Concepts in Childhood." Bibliography and index.

Borko, Harold, editor / *Computer Applications in the Behavioral Sciences* / Prentice-Hall, Inc., Englewood Cliffs, N. J. / 1962, printed, 633 pp, \$11.65

This book, written for the social scientist who is not a specialist in computers, introduces the computer as a research tool in the behavioral sciences and provides numerous examples of applications. The emphasis is on noncomputational work. Part I, "Computer Systems," includes four papers. Among the titles: "Do Computers Think?" and "Computer Functions and Their Applications." Part II, "Computer Fundamentals," includes, "Functional Components of a Data Processing System," and two other papers. The third part, "Computer Applications," consists of eighteen papers on a wide range of applications. Among the titles: "Data Processing in Psy-

chological Research," "Studies of Perception," "Automated Teaching," "Synthesis: Toward Computer Synthesis of Human Language Behavior," "Computer Music," "Business Simulation," and "A Look Into the Future." The book was prepared in connection with a research project sponsored by the System Development Corp., Santa Monica, Calif.

McCracken, Daniel D. / *A Guide to IBM 1401 Programming* / John Wiley & Sons, Inc., 440 Park Ave. South, New York 16, N. Y. / 1961, printed, 199 pp

This publication explains the operations and applications of the IBM 1400 series of data processing systems. The text is aimed at a non-technical readership and is not intended as a programming manual. The eleven chapters include: "Introduction to Computing Equipment," "Coding Fundamentals," "Symbolic Programming," "Miscellaneous Operations," "Random Access File Storage," "Planning and Installing a Computer Application," and "Additional Programming Methods." Five appendices include information about the IBM 1401 instruction repertoire, "Autocoder Operation Codes," and timing data. Glossary, bibliography, answers to exercises and an index.

Vitushkin, A. G. / *Theory of the Transmission and Processing of Information* / Pergamon Press, 122 East 55 St., New York 22, N. Y. / 1961, offset, 206 pp, \$15.00

This is an English translation from the Russian monograph on the concept of the complexity of a tabulation problem, i.e., the construction of tables for complex functions using concrete problems as examples. The text is highly advanced and mathematically rigorous, requiring a facile knowledge of advanced mathematics for full understanding. Among the seven chapters: "The Concept of the Entropy of a Metrical Space," "The Entropy of Some Subspaces of Continuous Functions," "Estimates of the Variations of Some Concrete Sets," and "The Representation of Some Classes of Continuous Functions." The author develops methods for applying the problem to an automatic computer for solution. A section is included on "Basic Concepts and Notation" in which the concept, notation, and the page where it is discussed, are given. References.

Morrison, Philip, and Emily Morrison, editors / *Charles Babbage and His Calculating Machines: Selected Writings by Charles Babbage and Others* / Dover Publications, Inc., 180 Varick St., New York 14, N. Y. / 1962, printed paperback, 400 pp, \$2.00

This book includes a wide and varied selection of writings by the eminent scientist and pioneer in the field of calculating machines. An introduction by the editors discusses Babbage's life and works, and epitomizes his contributions to mathematics and machines. The book's first part consists of thirteen chapters from "Passages from the Life of a Philosopher," in which Babbage discourses on his childhood, on his recollections of Laplace, Biot, Humboldt, Davy and others, on picking locks, on hints for travelers, and on sundry topics related to engines. Part two includes ten chapters from "Babbage's Calculating Engines," in which Babbage and others discuss the theory and applications of the calculating

machine. The third part, consisting of five miscellaneous papers, includes a list of Babbage's printed papers. Index.

Amber, George H., and Paul S. Amber / Anatomy of Automation / Prentice-Hall, Inc., Englewood Cliffs, N. J. / 1962, printed, 245 pp, \$10.60

The principles and foundations of automation are discussed. The text is accompanied by numerous illustrations including a pictorial representation of the evolution of automation from hand tools to automatic control. The text is non-technical and is intended for the pre-engineering and business administration student. Fourteen chapters include: "Automation Yardstick," "The Areas of Automation," "Methods, Tooling, and Operations," "Information and Feedback," "Controllers and Computers," and "Automation Trends." Four appendices include charts, definitions and a bibliography. Index.

Van Trees, Harry L. / Synthesis of Optimum Nonlinear Control Systems / The M.I.T. Press, Mass. Inst. of Technology, Cambridge, Mass. / 1962, offset, 102 pp, \$4.00

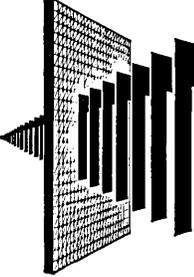
This study of techniques for the synthesis of nonlinear systems applies the Volterra functional expansion to the synthesis of feedback systems. The author adopts an approach which concentrates on techniques not oriented to a specific system. The six chapters include: "The Nonlinear Control Problem," "Functional Power Series Compensation Solution," "Controllability of Fixed Elements," and a final chapter of "Critique and Extension." References and an index are included. The research reported in the text was supported in part by the M.I.T. Research Lab. of Electronics and U. S. Army Signal Corps.

Quarterly International Bibliography of Automatic Control, vol. 1, no. 1 / Gordon and Breach Science Publishers, Inc., 150 Fifth Ave., New York 11, N. Y. / 1962, printed, 260 pp, \$25.00 (annually)

936 classified entries giving titles in English and French, and indicating the original language of publication, are here published. In addition, an author index and lists of periodical and non-periodical sources are given. The sources are from the U. S. and many foreign countries, including France, Germany, Japan, the U.S.S.R., and Czechoslovakia. Topics covered include measurement, digital and analog computing, engineering, bio-cybernetics, standards, terminology, symbols, patent information, bibliography, and teaching. Publication is with the cooperation of the National Member Organizations and the Technical Bibliography Committee of the International Federation of Automatic Control, and the UNESCO Department of Natural and Exact Sciences.

Wilf, Herbert S. / Mathematics for the Physical Sciences / John Wiley & Sons, Inc., 410 Park Ave. South, New York 16, N. Y. / 1962, printed, 284 pp, \$7.95

This text, based on a two-semester course on mathematical methods in physics, presents fundamental information on many mathematical topics and includes exercises which enable the student to test his knowledge of the theory. The seven chapters are: "Vector Spaces and Matrices," "Orthogonal Functions," "The Roots of Polynomial Equations," "Asymptotic Expansions," "Ordinary Differential Equations," "Conformal Mapping," and "Extremum Problems," which discusses functions of real variables, the first problem of the calculus of variations, and problems with side conditions. Solutions to the exercises, bibliography and index.



NEW DIMENSIONS IN DATA SYSTEMS

Engineers and scientists at RCA's Data Systems Division in Van Nuys, California are currently engaged in creating new dimensions in the development and design of digital data processing and display systems, special purpose data handling devices, information storage and retrieval systems, automatic launch control and checkout systems, and electronic warfare systems. Professional engineers and scientists interested in exploring career employment opportunities at RCA's Data Systems Division in Van Nuys, 30 miles from metropolitan Los Angeles, are invited to contact:

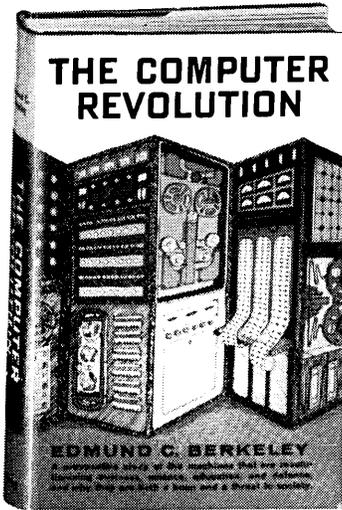
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DOUBLEDAY & COMPANY, Inc.
Garden City, New York

Goussinsky, B. / Continuity and Number / Government Printing Press, 5 Rosenbaum St., Tel Aviv, Israel / 1959, printed, 31 pp, 50c

The logical foundations of mathematics are examined, with an emphasis on continuity and discontinuity, and the "riddle of the irrational numbers." The author, who conducted research on the subject under sponsorship by the Cultural Council of the General Federation of Labour in Israel, analyzes the number concept, the line-point relation and the concept of infinity. The text covers, briefly, a wide range of topics, including: masses and sets, mathematical paradoxes, the atomistic theory, Zeno's paradox of the arrow, and real numbers.

Oakford, Robert V. / Introduction to Electronic Data Processing Equipment: Its Operation and Control / McGraw-Hill Book Co., Inc., 330 West 42 St., New York 36, N. Y. / 1962, printed, 340 pp, \$10.00

The principles of operating computer and peripheral equipment and methods for communication with the machines are here discussed. The author, an Associate Professor of Industrial Engineering at Stanford University, uses the IBM 650 as the typical machine. The book's seven chapters are: "What is Data Processing?"; "Coding of Alphabetic and Numeric Characters," "Electronic Computer Organization," "Preparation of a Computer Program," "Program Testing, Isolation of Errors and Computer Operation," "Controlling Machine Functions by Plug-board Wiring" and "An Algorithmic Language (BALGOL)." The text is presented in clear and relatively non-technical language. An Appendix describes the Program Test Supervisory Routine which is used to test batches of

650 programs with a minimum of manual intervention. Index.

Popov, E. P. / The Dynamics of Automatic Control Systems / Addison-Wesley Publishing Co., Inc., Reading, Mass. / 1962, printed, 761 pp, \$10.75

This English translation from the Russian presents the theory and design of automatic control systems on the graduate level, and is intended as a text on the subject. The book serves to demonstrate the Russian methods for approaching engineering problems. Part I, "General Information about Automatic Control Systems," includes: "Forms of Automatic Control Systems," "Methods of Improving the Regulation Process," and "Some Problems in the Theory of Automatic Regulation." Part II, "Ordinary Linear Automatic Regulation Systems," includes: "Stability Criteria for Ordinary Linear Systems," "Approximate Criteria of the Quality of Transient Response in Linear Systems from the Roots of the Characteristic Equation," and "Approximate Criteria . . . Taking into Account the Right-Hand Side of the Equation of the Closed System." Part III, "Special Linear Automatic Regulation Systems," includes three chapters on the derivation and investigation of the equations of systems with delay and distributed parameters. Part IV, "Non-Linear Automatic Regulation Systems," includes: "Derivation of the Equations of Non-Linear Automatic Regulation Systems," and "Self-Oscillations in the Presence of an External Force and Forced Oscillations on Non-Linear Systems." The final part, "Methods of Plotting the Regulation-Process Curve," includes two chapters. References.

Weber, Philip H. / Salary Administration for Data Processing Personnel / OA Business Publications, Inc., Book Div., 288 Park Ave., West, Elmhurst, Ill. / 1962, offset, 214 pp, cost?

This manual, bound in loose-leaf form, is a comprehensive collection of information on salaries of data processing personnel. Its author, head of a company which specializes in developing employee compensation plans, intends the manual as an operating guide for administering a salary program. The information is presented in sixteen sections, and the loose-leaf form allows for insertion of a company's facts and figures alongside the ones given. An introductory section discusses the problems of determining fair salaries. Some of the other section titles are: "Procedures," "Rating," "Survey Data," "Evaluation Charts," "Salary Structure," "Grade and Range Record," "Policies and Procedures," and "Calculating Aids," which includes graphs and charts useful for calculating and recording salary fluctuations.

Chow, Yutze and Etienne Cassagnol / Linear Signal-Flow Graphs and Applications / John Wiley & Sons, Inc., 449 Park Ave. So., New York 16, N. Y. / 1962, printed, 144 pp, \$6.95

This monograph, based in part on a course of lectures on applied electronics, given at the Instituto Tecnológico de Aeronáutica, is written for the beginner. It discusses the method of signal-flow graphs as "a realization of visualizing a physical system by diagrammatic means." Following an introductory chapter, seven chapters include: "Linear Signal-Flow Graphs," including basic definitions and rules; "Reduction of Linear Signal-Flow Graphs"; "Study of Some Properties of Linear Systems by Flow Graphs," and "Principles of Calculation and Transformation of Network Parameters." Two appendices discuss "System Gain and Transmission Gain," and "Proof of the Generalized Formula of Bode." References and index.

WHO'S WHO IN THE COMPUTER FIELD — CUMULATIVE EDITION, 1962

Computers and Automation will publish this fall a cumulative edition of "Who's Who in the Computer Field."

If you are interested in computers, please fill in the following Who's Who entry form (which may be copied on any piece of paper) and send it to us for your free listing. If you have friends in the computer field, please call their attention to sending us their Who's Who entries. The cumulative edition will include only the entries of persons who send us their Who's Who information.

Name? (please print)

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Your Organization?

Its Address?

Your Title?

Your Main Computer Interests?

Applications

Business

Construction

Design

Electronics

Logic

Mathematics

Programming

Sales

Other (specify):

Year of birth?

College or last school?

Year entered the computer field?

Occupation?

Anything else? (publications, distinctions, etc.)

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Management Decision Tester: Computer Used to Simulate Operations of Small Business

Alfred G. Dale
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Austin, Texas

A debugged small business game for management training that allows the player to test tactics as well as grand strategy.

Existing computerized business games generally pose problems in a simulated environment to be designed to represent large-scale enterprises. The decision inputs required from participants in such games are usually on a grandiose scale and represent the allocation of very large expenditures at a top policy making level. The competitive environment is typically that of a closed oligopoly, in which participants may manipulate aggregate demand for their hypothetical products, as well as the allocation of demand within the industry. Whether or not such games adequately mirror the view from the board room of a large corporation, they clearly do not convey the flavor of managerial decision-making in smaller companies. Both have in common the requirement of resource allocation, but to the executive of a small company, the question of means is as important as the question of ends. His span of direct control over, and intervention in, the micro-processes of the enterprise is necessarily broader and deeper than that of his counterpart in the large company. He must be both strategist and tactician. He cannot, in general, avoid the administrative consequences of his major strategic decisions.

Small Business Game

The Texas Small Business Game¹ is an attempt to construct an environment in which analogues of typical small business problems will be generated, and in which some of the skills necessary for their resolution can be illustrated.

Characteristics of the Model

The model permits competitive interaction among a maximum of ten competing companies operating manufacturing enterprises with initial assets of \$250,000, and with 25-30 employees. They are producing a homogeneous (in the economic sense) small metal fitting used in building construction, and selling to construction contractors in a fairly well defined regional area. Aggregate demand for the product is externally determined. The small companies are also competing in the market with a number of much larger concerns who may unilaterally modify marketing procedures to the disadvantage of the small companies, with little fear of reprisal. In brief, the initial environmental situation is one in which the small companies occupy an essentially static and defensive position.

Internally, the scale of production facilities is non-

optimal, inventories are relatively high, and the working capital situation is tight.

Trials of Small Business

These environmental and internal characteristics of the companies in the initial stage of the simulation typify the conditions under which many, perhaps most, small manufacturers live, and to which too many also succumb. In the long run, the success and viability of the small enterprise depends on how it adapts to its market environment, and how its internal operational procedures are organized. The small firm, operating in a restrictive competitive environment must seek to create or find a new set of conditions over which it can assert a greater measure of control, and within which it can reassume market initiative. Internally, because the firm does not possess the resources to cushion the consequences of poor decisions (a small company cannot launch an Edsel and survive its foundering), its information collection, analysis, and planning procedures should provide an adequate basis for necessary routine control over operations, and for rational risk-taking under conditions of uncertainty.

The Strategy Space

The Small Business Game permits solutions to the problem of initial environment via new product development and new geographic market penetration. An interesting and, in some respects, the key feature of the simulation is that while participants are given an elaborate scenario prior to play, describing the history and current conditions of the industry, the range of permissible strategies is not revealed. Participants are advised that they may request information of any type they desire, that is not included in their manual, or contained in the periodic feedback from the computer runs. They are also advised of the possibility of proposing changes in their method of operation. This open-end feature of the game has proved most successful. Psychologically, it leads participants to invest their mythical operations with a sort of auto-created reality. Pedagogically, it allows us to encourage players to recognize the existence of restraints, to seek relevant information in a specific type of problem context, and to propose solutions. The game administrator has an extensive pre-prepared information bank consisting of reports and data that cover most of the information typically requested during the course of a game. An inventive administrator can also produce relevant *ad hoc* information to supplement the prepackaged material at his dis-

¹Based on a paper presented at the National Meeting of the Association for Computing Machinery, Syracuse, N. Y., September, 1962.

posal. We recognize, of course, that the market solutions permitted within the game are not necessarily relevant for all small companies under actual conditions. In post-game discussions with players we consider the solutions available within the model simply as particular instances of the general necessity for a small company to attempt to gain control over some of its environmental parameters.

Thirty-five Decision Variables

Operationally, the players are required to set values on up to 35 routine decision variables at each decision sequence, covering elements such as pricing, deployment and support of salesmen, production scheduling, short-term financing, and hiring and layoff of personnel. This relatively large number of inputs to the model, and the feedback in terms of manufacturing cost, financial status, and sales reports, puts a premium on adequate processing and analysis of internal accounting and other data.

Use of Computer

A group will take an average of one and a half hours to prepare a routine decision input. If non-routine decisions are also in process, the time might be much longer. For this reason, we have never considered the game suitable for continuous sessions with rapid decision sequences. Data processing and keypunching take about thirty minutes. Running time on the 1604, exclusive of printing time, is less than three minutes when all sections of the model are being utilized. The model consists of three interlinked programs written in FORTRAN, one containing the demand model for the original geographic market area, together with all production and accounting models for all companies, one comprising the demand model for an additional market area, and a printing program to generate output for the companies and the administrator. The largest program uses about 12,000 words in the 1604, including arrays, although it has been compiled with modifications on a 7070 with 10K core.

The time requirements for the decision process, computer requirements, and the problems involved in small business in releasing managerial personnel for several days at a time, combined to suggest that use of the game by small business management would have to be incorporated in some type of discontinuous program organized so as to make minimal extra calls on executive time.

Experience With the Game

The gaming session plan adopted for a series of games initiated in September, last year, required participating groups to make decisions on their own time at 10-14 day intervals, mailing decisions to the University computer center for processing and running with a 2-3 day elapsed time between dispatch of the decisions and receipt of the results. Gaming sessions were organized in seven different cities, involving about 220 participants from 53 companies. Each gaming team consisted of officers from the same firm, an arrangement that permitted participants to organize decision-making sessions to suit their own convenience. After an initial briefing ses-

sion, held as a joint meeting with all participants present, each team operated quite independently, subject only to the requirement that decisions be mailed in on designated dates. Each gaming session had a project representative in the locality for local liaison, but administration was centralized.

Results of Gaming

The sessions extended from September, 1961, to February, 1962, permitting play through twelve decision periods in most games. Aspects of a couple of the games are illustrated in the accompanying charts. The first shows the pricing patterns that developed in Game 1, with a steady initial decline in the average price of the original product to the \$22 level, a period of stability in the middle game, and renewed competition in the closing periods. The red bars show the price ranges on the substitute new product, introduced in this game in the fourth quarter of play.

Contrast the pattern of Game 1 with that of Game 5. Again, there is an initial downward movement with a period of midgame stability, with prices tending to be somewhat lower than Game 1 for the original product. But aggressive price competition for the new product was characteristic almost from the outset, and the final stages of the game witnessed ruinous price cutting across the board among a group of companies laboring under chronic overcapacity.

The net income figures for Game 5 illustrate the dangerous state of the companies towards the end. The corporate histories in Game 1 tended to be more satisfactory, largely because the industry as a whole had not built an unsustainable capacity.

Advantages of the Small Business Game

Experience with the gaming sessions suggests that the technique we followed can be successfully applied in small business executive development programs. The two great advantages are, first, the possibility of efficiently and flexibly integrating program activity with other demands on participants' time, and, second, the high motivation and interest of participants in the problems generated by the simulation. Even though the gaming sessions extended over five months, we observed no significant diminution of interest.

Summary

In summary, we feel we have created a system suitable for middle-management training in larger small businesses and for top-management training in the smallest companies, that has been adequately debugged, and that can be used by interested organizations after minimal familiarization and set-up time.

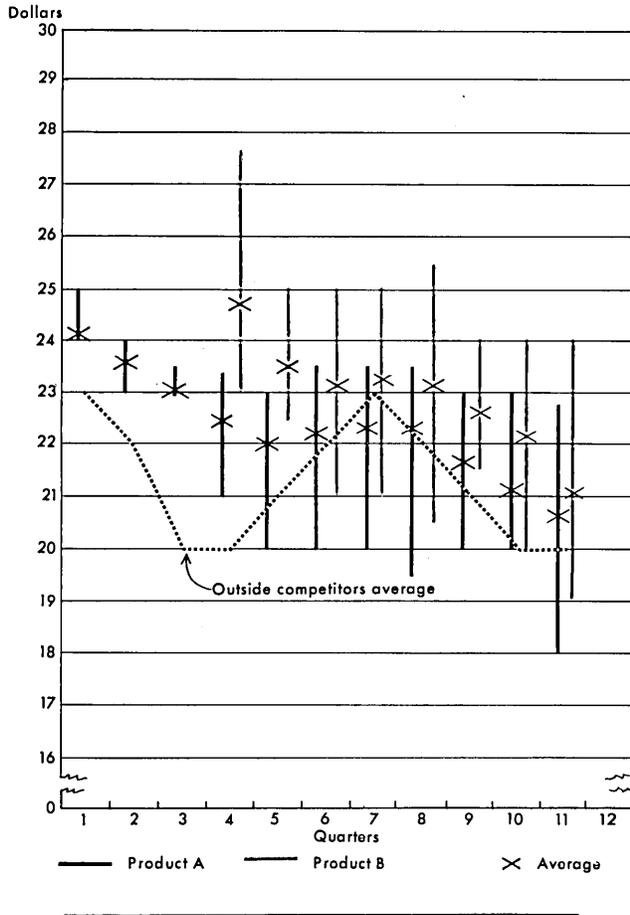
It appears to have particular training value in the following areas:

1. Use and analysis of internal accounting data for control and planning purposes.
2. Use and analysis of environmental information as a basis for planning.
3. Appreciation of the functional relationships existing within the total enterprise.
4. Emphasizing the need for evaluating information specific to a particular environment and acting upon it, rather than upon preconceived notions of what correct behavior may be.

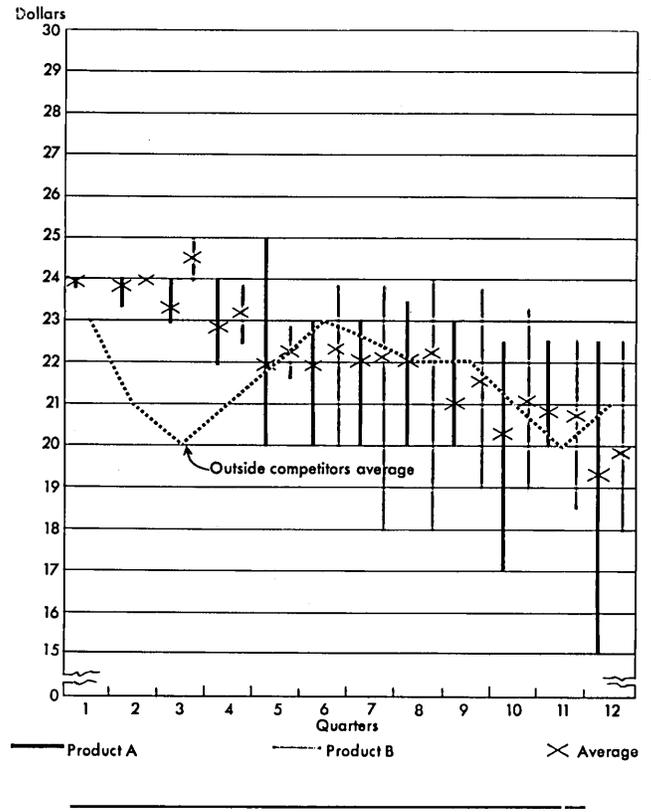
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Game 1
PRICES, PRODUCTS A AND B



Game 5
PRICES, PRODUCTS A AND B



Game 1
QUARTERLY NET INCOME (ROUNDED TO NEAREST DOLLAR)

Quarter	Company								
	Co.1	Co.2	Co.3	Co.4	Co.5	Co.6	Co.7	Co.8	Co.9
1	4,897	5,167	4,677	5,519	5,900	5,382	5,336	3,830	5,103
2	3,411	4,160	3,603	4,704	4,531	2,966	4,831	5,009	5,699
3	- 490	4,693	- 884	2,962	5,624	4,561	2,932	3,757	2,576
4	- 2,580	- 1,210	- 544	52	2,270	2,192	1,334	- 1,656	-10,329
5	- 794	45	- 4,363	- 1,118	8,210	4,994	- 695	5,955	- 9,189
6	1,641	2,462	4,646	- 6	9,629	5,904	4,499	8,900	- 6,695
7	965	4,892	3,366	1,625	11,455	5,035	6,125	5,032	- 2,061
8	- 3,977	3,630	3,811	965	9,645	1,358	4,596	13,129	- 3,596
9	- 6,008	5,571	8,699	251	19,992	-13,364	9,426	17,652	-13,345
10	- 8,790	4,759	8,241	- 8,858	15,804	- 8,402	7,924	11,816	-18,494
11	- 8,905	3,170	6,457	- 9,822	3,385	809	4,586	6,573	-22,883
12									

Game 5
QUARTERLY NET INCOME (ROUNDED TO NEAREST DOLLAR)

Quarter	Company						
	Co. 1	Co. 2	Co. 3	Co. 4	Co. 5	Co. 6	Co. 7
1	4,587	5,582	3,678	4,721	5,099	5,179	4,481
2	4,292	4,528	3,123	135	4,301	1,071	4,051
3	2,246	- 531	1,551	1,157	5,628	6,700	358
4	- 713	- 4,424	6,141	- 2,266	2,187	- 394	770
5	- 2,614	- 44,430	- 2,266	1,564	- 5,640	- 8,277	472
6	- 35,736	- 3,652	5,152	814	- 480	- 8,847	- 1,356
7	- 7,518	1,671	2,946	6,190	4,541	997	5,899
8	- 5,745	- 13,720	- 1,671	5,147	412	- 4,458	5,016
9	- 28,013	- 16,068	6,770	3,420	1,458	- 1,649	8,226
10	- 11,596	1,298	5,489	- 2,523	2,406	- 13,075	1,385
11	- 9,226	4,875	- 30,733	- 7,909	- 3,428	- 16,023	4,171
12	- 29,235	- 9,450	- 22,572	- 8,958	- 1,424	- 8,596	- 6,601

Finally, the simulation illustrates the importance of certain principles crucial to the survival of the firm. For example, unbalanced inventory positions tend to cumulate rapidly in the simulation, and it is most difficult for players to recover from any severe erosion of their working capital position. Such principles may be clichés: but, one thing a businessman, and particularly an unsuccessful one, learns, both in the game and in the real world, is never to underestimate the value of a cliché.

¹ The development and testing of the Texas Small Business Game was supported by research grants from the Small Business Administration. It is anticipated that the Small Business Administration will release the simulation for general use early in 1963.

ADP IN THE IRS

(Continued from Page 13)

in the direction of maintaining and promoting that asset. Voluntary compliance is sound and will remain that way as long as taxpayers know that the tax laws are equitably and fairly and justly administered—that each citizen bears the responsibility imposed on him by law. Strengthened tax administration contributes toward such assurance, and automatic data processing—the leading advancement in the field in many years—represents a major contribution to a strengthened tax administration.

CALENDAR OF COMING EVENTS

- Oct. 2-4, 1962: National Symposium on Space Elec. & Telemetry, Fountainbleu Hotel, Miami Beach, Fla.; contact Dr. Arthur Rudolph, Army Ballistic Missile Agency, R & D Op. Bldg. 4488, Redstone Arsenal, Ala.
- Oct. 7-12, 1962: AIEE Fall General Meeting, Pick-Congress Hotel, Chicago, Ill.; contact D. W. Gilman, AIEE, 345 East 47th St., New York 17, N. Y.
- Oct. 8-10, 1962: National Electronics Conference, Exposition Hall, Chicago, Ill.; contact National Elec. Conf., 228 N. LaSalle, Chicago, Ill.
- Oct. 8-26, 1962: Seminar in Search Strategy, Drexel Inst. of Technology, Philadelphia, Pa.; contact Mrs. M. H. Davis, Seminar in Search Strategy, Graduate School of Library Science, Drexel Inst. of Technology, Philadelphia 4, Pa.
- Oct. 15-18, 1962: Conference on Signal Recording on Moving Magnetic Media, The Hungarian Society for Optics, Acoustics and Cinetronics, Budapest, Hungary; contact Optikai, Akusztikai, es Filmtechnikai Egyesulet, Szabadsag ter 17, Budapest V, Hungary
- Oct. 15-18, 1962: Instrument Society of America's 17th Annual Instrument-Automation Conference and Exhibit, New York Coliseum and Hotel New Yorker, New York, N. Y.; contact D. R. Stern, Publicity Mgr., Instrument Society of America, Penn Sheraton Hotel, 530 Wm. Penn Pl., Pittsburgh 19, Pa.
- Oct. 24-25, 1962: 1962 Computer Applications Symposium, sponsored by Armour Research Foundation of the Ill. Inst. of Technology, Morrison Hotel, Chicago, Ill.; contact Ed Hansen, Ill. Inst. of Technology, 35 W. 33 St., Chicago 16, Ill.
- Oct. 24-26, 1962: Cooperating Users' Exchange Meeting, Los Angeles, Calif.; contact A. P. Jensen, Vice Pres., CUE, Georgia Inst. of Technology, Rich Electronic Computer Center, Atlanta 13, Ga.
- Oct. 29-31, 1962: 15th International Systems Meeting of the Systems and Procedures Association, Statler Hilton and Sheraton Plaza Hotels, Boston, Mass.; contact John M. Sinclair, Director of Publicity, 1962 ISM, Bentley College, 921 Boylston St., Boston 15, Mass.
- Oct. 29-Nov. 2, 1962: 9th Institute on Electronics in Management, International Inn, Thomas Circle, Washington, D. C.; contact Dr. Lowell H. Hattery, Director, 9th Inst. on Electronics in Management, The American University, 1901 F St., N.W., Washington 6, D. C.
- Oct. 30-31, 1962: Conference on Eng. Tech. in Missile & Spaceborne Computers, Disneyland Hotel, Anaheim, Calif.; contact William Gunning, EPSCO-West, 240 E. Palais Rd., Anaheim, Calif.
- Nov. 4-7, 1962: 15th Annual Conf. on Elec. Tech. in Medicine and Biology, Conrad Hilton Hotel, Chicago, Ill.; contact Dr. J. E. Jacobs, 624 Lincoln Ave., Evanston, Ill.
- Nov. 5-7, 1962: NEREM (Northeast Res. & Engineering Meeting), Commonwealth Armory, Somerset Hotel, Boston, Mass.; contact NEREM-IRE Boston Office, 313 Washington St., Newton, Mass.
- Nov. 7-9, 1962: Data Processing Management Association South Central Div. Conference, Washington Youree Hotel, Shreveport, La.; contact J. D. Parker, Jr., Conference Chairman, P. O. Box 1724, Shreveport, La.
- Nov. 29-30, 1962: Sort Symposium, Nassau Inn, Princeton, N. J.; contact Mrs. L. R. Becker, c/o Applied Data Research, Inc., 759 State Rd., Princeton, N. J.
- Dec. 3-7, 1962: Course in Mathematics of Information Storage and Retrieval, Georgia Institute of Technology, Atlanta 13, Ga.; contact Director, Department of Short Courses and Conferences, Georgia Institute of Technology, Atlanta 13, Ga.
- Dec. 4-6, 1962: FJCC (Fall Joint Computer Conference), Sheraton Hotel, Philadelphia, Pa.; contact E. Gary Clark, Burroughs Research Center, Box 843, Paoli, Pa.
- Dec. 6-7, 1962: PGVC (PG on Vehicular Communications) Conference, Disneyland Motel, Los Angeles, Calif.; contact W. J. Weisz, Motorola, Inc., Comm. Div., 4545 West Augusta Blvd., Chicago 51, Ill.
- Dec. 12-14, 1962: American Documentation Institute Annual Meeting and Exhibit, Diplomat Hotel, Hollywood, Fla.; contact John L. Whitlock Associates, 253 Waples Mill Rd., Oakton, Va.
- Jan. 28-Feb. 1, 1963: 1963 Winter General Meeting of the American Institute of Electrical Engineers, New York, N. Y.; contact Dr. D. R. Helman, ITT Federal Laboratories, 500 Washington Ave., Nutley 10, N. J.
- Jan. 30-Feb. 1, 1963: 4th Winter Convention on Military Electronics, Ambassador Hotel, Los Angeles, Calif.; contact IRE L. A. Office, 1435 La Cienega Blvd., Los Angeles, Calif.
- Feb. 4-8, 1963: ASTM Committee Week, Queen Elizabeth Hotel, Montreal, Canada
- Feb. 20-22, 1963: International Solid State Circuits Conference, Sheraton Hotel and Univ. of Pennsylvania, Philadelphia, Pa.; contact S. K. Ghandi, Philco Scientific Lab., Blue Bell, Pa.
- Mar. 15-16, 1963: Pacific Computer Conference, California Institute of Technology, Pasadena, Calif.; contact Dr. E. J. Schubert, Systems Division of Beckman Instruments, Inc., 2400 Harbor Blvd., Fullerton, Calif.
- Mar. 19-21, 1963: Symposium on Bionics, sponsored by Aeronautical Systems Div. of the Air Force Systems Command, Wright-Patterson Air Force Base, Ohio, Biltmore Hotel, Dayton, Ohio; contact Commander, Aeronautical Systems Div., Attn.: ASRNEB-3, Lt. Col. L. M. Butsch, Jr., Wright-Patterson Air Force Base, Ohio
- Mar. 25-28, 1963: IRE International Convention, Coliseum and Waldorf-Astoria Hotel, New York; contact Dr. D. B. Sinclair, IRE Headquarters, 1 E. 79th St., New York 21, N. Y.
- April 17-19, 1963: International Conference on Nonlinear Magnetics, Shoreham Hotel, Washington, D. C.; contact J. J. Suozzi, Technical Program Chairman, Bell Telephone Labs., Allentown, Pa.
- April 23-25, 1963: The Eleventh National Conference on Electromagnetic Relays, Student Union Bldg., Oklahoma State University, Stillwater, Okla.; contact Prof. Charles F. Cameron, Technical Coordinator of the NARM, Oklahoma State University School of Electrical Engineering, Stillwater, Okla.
- April 24-26, 1963: Power Industry Computer Application Conference, Hotel Westward Ho, Phoenix 4, Ariz.; contact E. J. Lassen, 453 E. Lamar Rd., Phoenix 12, Ariz.
- May 20-22, 1963: National Telemetry Conference, Hilton Hotel, Albuquerque, N. M.; contact T. J. Hoban, NTC Program Chairman, Sandia Corp., P. O. Box 5800, Albuquerque, N. M.
- May 21-23, 1963: Spring Joint Computer Conference, Cobo Hall, Detroit, Mich.; contact Dr. E. Calvin Johnson, Bendix Aviation Corp., Detroit, Mich.
- June 23-28, 1963: ASTM 66th Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

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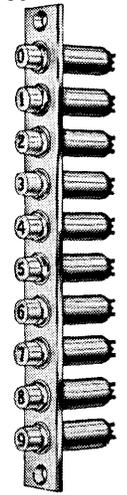
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The following is a compilation of patents pertaining to computer and associated equipment from the "Official Gazette of the U. S. Patent Office," dates of issue as indicated. Each entry consists of patent number / inventor(s) / assignee / invention.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

July 3, 1962

- 3,042,199 / W. Gordon Welchman, Lexington, and Heinz M. Zeuschel, West Newton, Mass. / Itek Corporation, Waltham, Mass., a corp. of Delaware / Data Processing System.
- 3,042,900 / Everett W. Werts, Normal, Ill. / General Electric Co., a corp. of New York / Shift Registers.
- 3,042,902 / Robert L. Weida, Whitestone, and Edgar Wolf, Bronx, N. Y. / Curtiss-Wright Corporation, Carlstadt, N. J., a corp. of Delaware / Information location apparatus.
- 3,042,903 / Eugeni Estrems, Saint Mandé, and Maurice Papo, Paris, France / I.B.M. Corp., New York, N. Y., a corp. of New

July 10, 1962

- 3,043,505 / Edgar A. Brown, Owego, N. Y. / I.B.M. Corp., New York, N. Y., a corp. of New York / Data sensing circuit.
- 3,043,510 / Howard D. Sheckels, St. Paul, Minn. / Sperry Rand Corp., New York, N. Y., a corp. of Delaware / Digital computer control.
- 3,043,511 / John E. Scott, Rego Park, N. Y. / Sperry Rand Corp., Great Neck, N. Y., a corp. of Delaware / Logical combining circuit.
- 3,043,513 / Eugene W. Sard, Flushing, N. Y. / U.S.A. as represented by the Secretary of the Army / Magnetic core serial adder.



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- 3,045,209 / James H. Pomerene, Poughkeepsie, N. Y. / I.B.M. Corp., New York, N. Y., a corp. of New York / Checking System for data selection network.
3,045,211 / Isaac L. Auerbach, Philadelphia, Pa. / Burroughs Corp., Detroit, Mich., a corp. of Michigan / Bistable Circuits.
3,045,213 / Hans Zschekel, Stuttgart, Germany / International Standard Electric

- Corp., New York, N. Y., a corp. of Delaware / Magnetic storage system.
3,045,216 / Arthur Edward Brewster, London, England / International Standard Electric Corp., New York, N. Y. / Magnetic information storage devices.
3,045,217 / Bennett Housman, Poughkeepsie, N. Y., Richard C. Jeffrey, Princeton, N. J., Rollin P. Mayer, Concord, Mass., and Donald B. Thompson, Poughkeepsie, N. Y. / Research Corporation, New

York, N. Y., a corp. of New York / Signal storage system.
3,045,228 / Andrew J. Bullock, Jr., Ithaca, N. Y. / I.B.M. Corp., New York, N. Y., a corp. of New York / Magnetic core storage device.

July 24, 1962

- 3,045,915 / Ray T. Kikoshima, Wappingers Falls, N. Y. / I.B.M. Corp., New York, N. Y., a corp. of New York / Magnetic Core Circuits.
3,046,524 / Miles C. Johnson, Mount Holly, and Thomas J. Burke, Westmont, N. J. / U.S.A. as represented by the Secretary of Navy / Error Store and Reset Circuit.
3,046,526 / John R. Scantlin, Los Angeles, Calif. / Scantline Electronics, Inc., a corp. of Delaware / Selector Apparatus.
3,046,527 / Russell A. Rowley, Binghamton, and Francis V. Adams and John F. Gaffney, Endicott, N. Y. / I.B.M. Corp., New York, N. Y., a corp. of N. Y. / Character group recognition system.
3,046,528 / Thomas H. Rowe, James P. Hammer, and Charles J. Kennedy, Endicott, N. Y. / I.B.M. Corp. New York, N. Y., a corp. of New York / Transfer mechanism for storage devices.
3,046,529 / George R. Briggs, Princeton, N. J. / Radio Corp. of America, a corp. of Delaware / Ferroelectric memory systems.
3,046,530 / Robert C. Kelner, Concord, Mass. / Laboratory for Electronics, Inc., Boston, Mass., a corp. of Delaware / Reversible magnetic shift register.
3,046,531 / Edward J. Armata, Glen Cove, N. Y. / Potter Instrument Co., Inc., Plainview, N. Y., a corp. of New York / Saturable Reactor Shift Register.
3,047,226 / Desmond R. Hearsum, Dayton, and Ernest V. Gulden, Centerville, Ohio / The National Cash Register Co., Dayton, Ohio, a corp. of Maryland / Data analyzing and recording means.

July 31, 1962

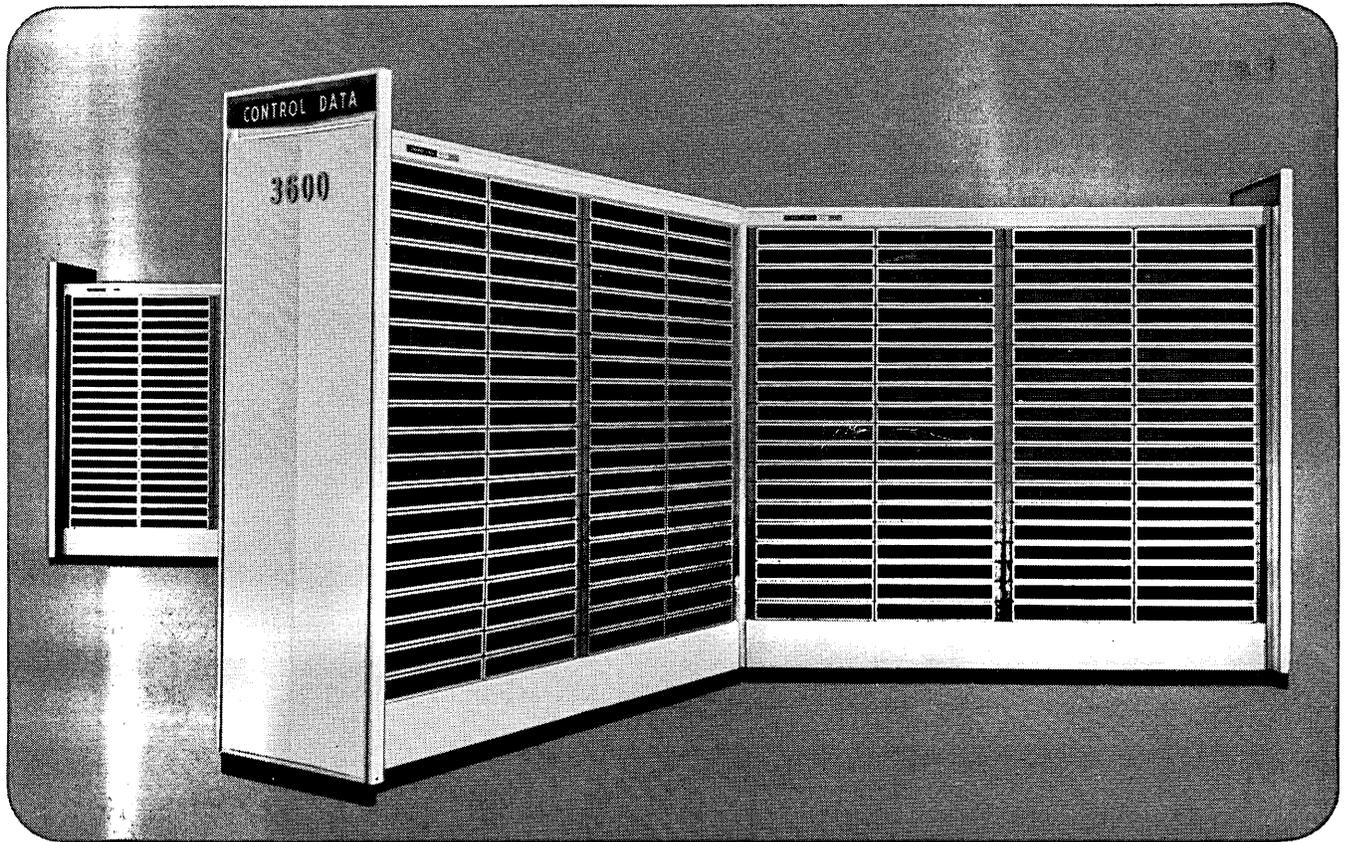
ADVERTISING INDEX

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.

- American Telephone & Telegraph Co., 195 Broadway, New York 7, N. Y. / Page 2 / N. W. Ayer & Son, Inc.
Bendix Computer Div., 5630 Arbor Vitae St., Los Angeles 45, Calif. / Page 43 / John B. Shaw Co., Inc.
Burroughs Corp., Detroit 32, Mich. / Page 3 / Campbell-Ewald Co.
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