COMPUTERS AND AUTOMATION

CYBERNETICS · ROBOTS · AUTOMATIC CONTROL

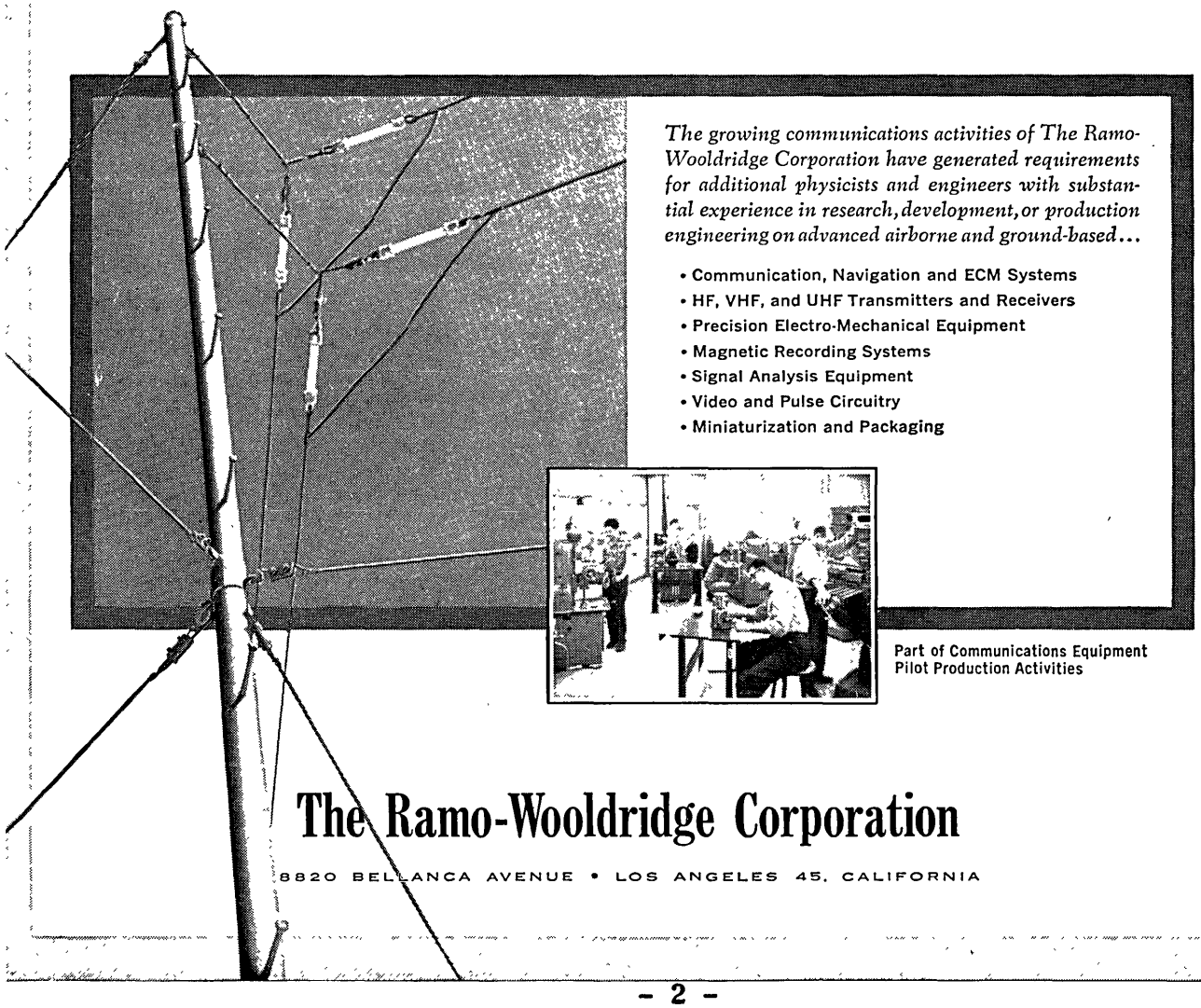
Vol. 5
No. 3

Mar.
1956

ADVANCED Communications

The design of modern communications equipment involves much more than electronic circuit techniques. Keyboards and coders are often required to translate the intelligence to be transmitted into "machine language." Recording and reproducing devices store intelligence until the equipment is ready to transmit it, or hold received intelligence until it can be translated back into human language by a printer or other output display device.

The combination of such mechanical and electromechanical techniques with the better known but still developing techniques of electronic circuit design makes of modern communications a much broader field than is commonly recognized. When such technical tools are used to provide equipment tailored to our rapidly improving understanding of propagation phenomena and information theory, the resulting practical improvements in communication are sometimes little short of spectacular.



The growing communications activities of The Ramo-Wooldridge Corporation have generated requirements for additional physicists and engineers with substantial experience in research, development, or production engineering on advanced airborne and ground-based...

- Communication, Navigation and ECM Systems
- HF, VHF, and UHF Transmitters and Receivers
- Precision Electro-Mechanical Equipment
- Magnetic Recording Systems
- Signal Analysis Equipment
- Video and Pulse Circuitry
- Miniaturization and Packaging

Part of Communications Equipment Pilot Production Activities

The Ramo-Wooldridge Corporation

8820 BELLANCA AVENUE • LOS ANGELES 45, CALIFORNIA

COMPUTERS AND AUTOMATION

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THE EDITOR'S NOTES

The Computer Directory

The June 1956 issue of "Computers and Automation" will be "The Computer Directory, 1956". It will contain three parts: "Part 1, Roster of Organizations in the Computer Field; Part 2, The Computer Field, Products and Services for Sale; and Part 3, Who's Who in the Computer Field".

As we go to press in the middle of February for the March issue, we are currently mailing out last year's entries of Products and Services and blank forms, with the expectation that this year's edition will be fuller, more accurate, and more useful.

In a few more weeks, we expect to mail out entry forms for Part 3, Who's Who in the Computer Field. We have had some discussion with one of our staunch readers (Mr. Paul Armer -- see below), and as a result we expect to include a special offer.

COMMENTS ON THE "WHO'S WHO", ETC.

I. From Paul Armer
Santa Monica, Calif.

In your January, 1956, issue you asked for comments on your announced plans for "The Computer Directory, 1956". I strongly object to your proposal to charge $2.00 per individual entry in the "Who's Who in the Computer Field" section of the directory. I think it's fine to charge for entries in the "Products and Services for Sale" section, since there is an obvious motive for organizations to be included in the list. But what motivates the individual to cough up two bucks? So, as an individual, I object to paying the money. And as a user of your directory, I object on the basis that the list will be so short (since I believe most individuals will feel as I do) that it will be useless. Possibly I am misinterpreting what you mean by "... a brief entry may appear in condensed form if desirable ...". Something like "Jones, J. - Los Angeles, Calif." might just as well be omitted.

To close on a more harmonious note, I'd like to say that I've found "Computers and Automation" to be a useful and interesting publication. I applaud the inclusion of articles like "Machines and Religion". I believe the inclusion of a short biography of the author would have enhanced the interest of the article. Why not include biographies of all authors?

One more small point regarding format. I frequently find myself stumbling over words at the end of a line due to the justification. For example, see line 10 of the right half of page 13 in your January issue. The spacing between the letters in "long" is the same as between the words "a" and "long". Personally, I prefer no justification at all to the present product.

II. From the Editor

We thank Mr. Armer for his friendly and frank comments on the Who's Who and various other aspects of "Computers and Automation".

To cover the matters he mentions, in reverse order, the reason for the style of justification we use in the magazine is Post Office requirements. When we applied in 1952 for second class mailing privileges, we were told by the U. S. Post Office that we had to justify, at least approximately, our lines of type (and in addition we had to use a type face which was different from the ordinary typewriter type faces, elite and pica). As is clear from the appearance of our lines of type, we type once and not twice, achieving approximate justification. But we can try to produce a less confusing result.

We have no objection in principle to publishing brief biographies of authors. But we do think the best place for the publication of a brief biography of any person in the computer field is in the "Who's Who" that we publish.

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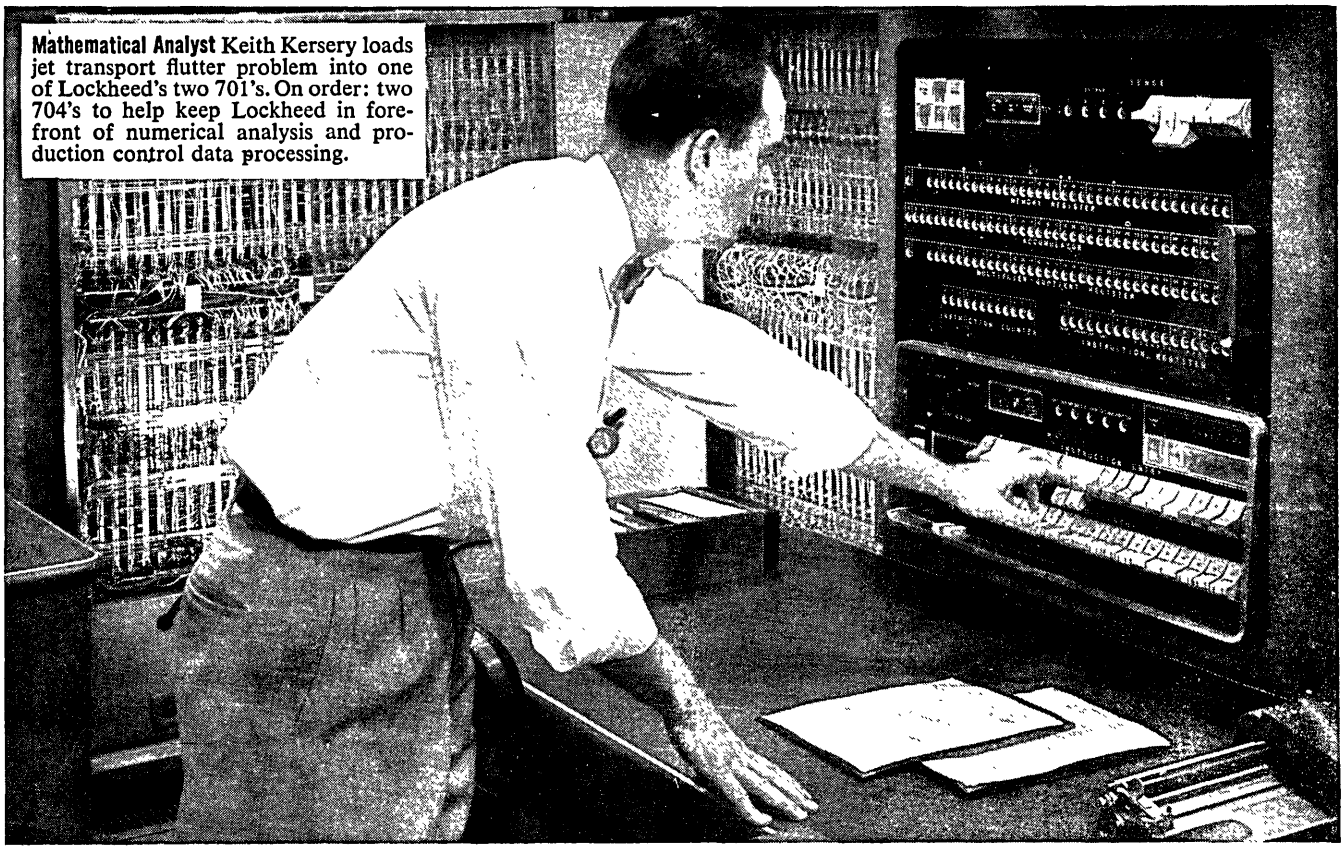
INDEX OF NOTICES

Address Changes: If your address changes, please send us both your new and your old address, (torn off from the wrapper if possible), and allow three weeks for the change.



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

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

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

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

Career positions for Mathematical Analysts

Lockheed's expanding development program in nuclear energy, turbo-prop and jet transports, radar search planes, extremely high-speed aircraft and other classified projects has created a number of openings for Mathematical Analysts to work on the 704's.

Lockheed offers you attractive salaries, generous travel and moving allowances which enable you and your family to move to Southern California at virtually no expense; and an extremely wide range of employe benefits which add approximately 14% to each engineer's salary in the form of insurance, retirement pension, etc.

Those interested in advanced work in this field are invited to write E. W. Des Lauriers, Dept. MA-31-3.

LOCKHEED AIRCRAFT CORPORATION • CALIFORNIA DIVISION

BURBANK **CALIFORNIA**

THE ORGANIZATION OF A PROGRAM LIBRARY FOR A DIGITAL COMPUTER CENTER

WERNER L. FRANK
Ramo Wooldridge Corp.
Los Angeles 45, Calif.

The efficiency of a computing center is not only a function of the equipment and personnel employed, but also of the collection of routines comprising its Program Library. The availability of general subroutines, those for the calculation of the more common mathematical operations, will reduce the elapsed time usually associated with a problem's formulation and subsequent numerical solution. Of no less importance is the collection of what may be classed as supervisory (or service) routines: routines which provide the tools for manipulating information (assembly or compiling programs), monitoring (post mortem and alarm routines), and expanding the capabilities of the built-in machine logic (floating-point and complex-number-arithmetic routines.)

The generation of such a library is no small task. Experience has shown that it takes over ten man-years to establish a versatile collection of routines. For a large scale digital computer center this may represent an investment of over $150,000.00 in manpower and machine use. In addition, there is the ever present cost of maintenance and expansion of the library.

In order to reduce this investment for any one istallation, recent attempts have been made to combine the efforts of users of like computing machines in the development of a Program Library. By formulating standards and assigning specific responsibilities to avoid duplication of efforts, groups such as SHARE (IBM 704 users) and USE (ERA 1103A users) have recognized the need for mutual assistance.

Ultimate responsibility for a Program Library must nevertheless remain with the individual computing center. This entails a well thought out plan of cataloging, standardizing and distributing the more common routines.

Cataloging

Cataloging implies the classification and labeling of routines. The procedure followed for either process depends on the philosophy adopted by the computing center.

Since a well established computing facility may have over 100 routines at its disposal, subdivision and classification of this material is imperative. Hence, if one seeks a fixed-point decimal card punch routine, it is only necessary to search through the inclusive class of Output Routines in order to find an applicable subroutine.

While a first breakdown of routines might be the previously mentioned categories of supervisory routines and general subroutines, these classes are still too wide. The following list presents one possibility which has been adopted and found practical:

Supervisory Routines:

1. Executive Routines —Assembly or compiling routines
   Bootstrap and Basic Read-In routines
2. Code Checking and Diagnostic Routines — Post mortem and Monitoring routines
3. Special Arithmetic Routines — Floating-point arithmetic
   Complex number arithmetic
   Double precision arithmetic
4. Demonstration Routines

General Subroutines:

1. Input Routines
2. Output Routines
3. Quadrature (definite integral evaluation)
4. Differentiation
5. Differential Equations (ordinary and partial equations)
6. Vector Algebra - Simultaneous linear equations
   Matrix inversion
   Eigen value and eigen vectors
   Linear programming
7. Non-Linear Equations - Roots of polynomials
   Minimization of functions
8. Statistical - Correlations, variances, means, random number generator
9. Data Reduction - Sorting, ordering, listing
10. Logical Arithmetic
11. Function Evaluation --Trigonometric
    Exponentials and Roots
    Logarithmic
    Special Functions

12. Differencing and Interpolation
13. Approximations and curve fitting
14. Miscellaneous

That the task of labeling routines is not arbitrary is seen in the case of a compiling program which may require some identifying tag, of fixed form, to be associated with each subroutine. If only for the sake of simplicity, it is desirable that both tag and label be the same.

It is possible, for example, to assign labels serially or by mnemonic tags. While the first method prohibits a recognizable correspondence between label and class, the second can create some confusion for those persons who are not fully acquainted with the system. Thus, while a second version of a sine routine can be designated by SIN-2, one could recognize INT-3 as either an integration or interpolation routine.

It is seen then that the label must not only identify each routine uniquely, but must also place it within one of the above classes. In addition, the tag should indicate whether the routine is designed for fixed or floating point operation (and possibly if it is in single or double precision). Finally, some information ought to be forthcoming in regard to the status of the routine, such as:

1. Is the routine a revision?

2. Is the routine obsolete, but not retired?

3. Is the rotuine available from some auxiliary storage (active) or must it be assembled into a program from cards or tapes?

It will be assumed for these purposes that the fixed form adopted for the tag consists of three alphabetical characters and two decimal digits (XYZ-00). The X position identifies the routine to be in one of the categories listed above. The Y character further breaks down the X class, while Z indicates whether the routine operates in fixed (O), floating (F), complex (C), etc. The tens digit of the numerical part designates a specific function or operation while the unit digit specifies the version or method employed. To illustrate, we choose the class entitled Function Evaluation (M) and list a possible breakdown:

Function Evaluation (M)

1. Trigonometric Functions (T)

MTO-00 Sine-Cosine (radians)
MTO-01 Small angle Sine-Cosine
MTO-02 Sine-Cosine (degrees)
MTO-10 Arcsine-Arcosine
MTO-30 Tangent (radians)
MTO-31 Tangent (degrees)
MTO-40 Arctangent

MTF-00 Floating Point Sine-Cosine
MTF-10 Floating Point Arcsine-Arcosine
MTF-30 Floating Point tangent
MTF-40 Floating Point arctangent

2. Exponentials and Roots (P)

MPO-00 Square Root
MPO-10 Cube Root
MPO-20 p^{th} Root
MPO-30 Fractional Power (x^y) Routine
MPO-40 e to x power

MPF-00 Floating Point Square Root
MPF-10 Floating Point Cube Root
MPF-40 Floating Point Exponential (e^x)

3. Logarithmic (L)

MLO-00 Logarithm Base 2
MLO-10 Natural Logarithm

MLF-10 Floating Point Natural Logarithm

4. Special Functions (S)

In addition to this vertical grouping, it is desirable to include some horizontal organization. Hence, if ICF-10 is a floating point card input routine one would expect OCF-10 to be this routine's counterpart in the output category.

Now it is a simple task to add to this nomenclature further information. It is possible, for example, to interpret the following:

MTO-11 r - This routine is a revision
MTO-11 o - This routine is now obsolete
MTO-11 i - This routine is available, but not in the active form

Standardization

A standard format for library routines is important since it serves to facilitate recognition and learning of new subroutines. It also develops modes of operation within the computing center by establishing procedures with regard to parameter presentation, subroutine entries, scaling conventions, etc.

There are three basic parts comprising the description of a particular routine:

(1) Summary concerning the structure and

application of the program (one or two pages).
(2) Details of the routine and description of the method employed.
(3) Code listing of the program.

The first section should be self-contained and encompass the information needed by the programmer to successfully employ the routine. This should include:

(a) Name and label of the routine.
(b) Type of routine (supervisory or subroutine).
(c) Number of words of the program.
(d) Temporary storage requirements.
(e) Description of the function of the program with sufficient information to indicate its capacities and limitations.
(f) Programming procedure, including parameters needed and form of the entry.
(g) Accuracy of the computation.
(h) Duration.
(i) Special remarks concerning use of alarm indications, constant pools, etc.
(j) Name of the individual who coded the routine.
(k) Date of issue of the routine.

The second part further delineates the information contained in the initial summary. The mathematical method employed should be presented here, giving the adaptions made, with adequate references to source material. When applicable, an error analysis should describe the accuracy of the process, considering the effects of both truncation and round-off. Examples relating to input, computation and output of the routine ought to be given. A valuable addition to a routine of major proportion is a description of the results which were obtained by application of the program to some selected cases.

The code-listing comprises the third section. It should be fully annotated, giving comments and symbols in order to facilitate tracing through the steps of the program.

The most complete presentation of the routine will incorporate all three of the above parts. In this form the copy is suitable for distribution, not only within the computing center, but also as part of the exchange program existing between the various facilities.

Distribution

The Program Library is one of the major sources reflecting the status and capabilities of a computing center. Prompt and efficient distribution of available routines is necessary in order to keep the programming staff informed of the current state of the organization.

The exchange of information between various computing organizations is also facilitated through the distribution of the library programs. By this means each group has the opportunity to compare operations leading to more efficient use of the machine and to better techniques of computation.

A disadvantage resulting from a wide distribution of the Program Library is the responsibility which is involved in maintaining the material up-to-date. Experience has shown that no routine remains static. Changes are made with respect to storage assignments, parameter requirements and more often, errors are detected in the original write-ups. Even a minor change or correction may invalidate a routine description.

To reduce the probability of issuing revisions it may be necessary to impose some restrictions on the general routine description explained above. Thus, excluding the code listing from the wider library distribution represents one possibility since infrequent references are made to this section and it is relatively useless to persons unfamiliar with the code. However, the code listing may be made available upon request.

Another suggestion is to limit temporal information, such as storage assignments and entrance requirements to the first section. Hence, when these more frequent changes are made, only the first portion of the write-up is invalidated and consequently a revision affects only one or two pages.

The publication of a periodic library bulletin serves to correct typographical errors and keeps the library users informed of impending changes or additions to the Program Library. This device is especially useful in filling the gap between an error's detection and the publication of a program revision.

Finally, a word should be said concerning the relationship between the Program Library and the staff of the computing center.

It has been found that persons who use the library routines over an extended period of time soon require only a basic amount of information concerning a particular routine. At this point the first part of the full description of the routine becomes a convenient and condensed form which will serve this requirement. Therefore, it is desirable to issue to such persons a full Program Library and also a condensed version made up of the summary sheets of each routine.

TRANSLATING SPOKEN ENGLISH INTO WRITTEN WORDS

EDMUND C. BERKELEY

Recently in "Computers and Automation" (in The Editor's Notes for December, 1955) we referred to the problem of translating spoken English into properly spelled English words. This problem has two parts: Part 1 consists of recognizing spoken sounds and writing them down as English phonemes, sounds which carry meaning, such as "p" in "cup", "ng" as in "sing", the "eh" in "very", and the longer "eh" in "vary"; Part 2 consists of converting the sets of phonemes into properly spelled English words.

Part 1 of the problem is being worked on under the direction of Professor William N. Locke of Mass. Inst. of Technology, head of the Department of Languages and author of the article "Translation by Machine" printed in the "Scientific American", January, 1956. The work is being carried out by Dr. Morris Halle and George W. Hughes in the Acoustics Laboratory of M.I.T.

About two years ago a protytype machine that distinguishes between vowels and consonants, successful about 90% of the time, was finished; the machine was christened Grundoon, after a character in a comic strip who speaks only in consonants. When you look at an oscilloscope report by Grundoon, of a sentence, you see a vowel as a great cluster of waves above and below the base line, while a consonant shows no departures at all from the base line; or vice versa, depending on a switch.

In January, 1956, the consonant sounds F, SH, and S were successfully distinguished by electronic gear. The separation is based on distinctive differences in the pattern of energies at various sound frequencies, which occur during the pronunciation of the consonant. A paper detailing the technique for distinguishing them by machine is to appear shortly in the "Journal of the Acoustical Society" published by the Institute of Physics, New York.

Currently, the work in the laboratory is to distinguish electronically between the sounds P, T, and K, as spoken by different speakers. For example, the words "LOOP, LOOT, LUKE," are clearly spoken by half a dozen different speakers, recorded on magnetic tape, and played over and over, until the equipment settings differentiate them by automatic analysis. In fact, for a single speaker, all the problems of distinction of phonemes are, according to Halle and Hughes, so easy that they are "not interesting". The essential difficulty at the present stage comes in designing circuits which will still distinguish the sounds when different speakers "clearly enunciate" the same phonemes. The final stage will come in distinguishing different sounds spoken by anybody in normal rapid speech. (In fact, I will predict that the first half minute of listening to any speaker will require an automatic tuning in to that particular person's pattern of speech sounds).

Similar investigations are being pursued at Bell Telephone Laboratories, Murray Hill, N. J., at Haskins Laboratories, New York, and probably elsewhere. But the particular principles being used in the investigation at M.I.T. are different: they are the principles of recognizing distinctive differences, rather than recognizing patterns — on the theory that when a man is trying to find his way with a map, a small number of judgments made correctly is sufficient for him to tell where on the map he is.

None of the work being investigated at the laboratory in M.I.T. includes the problem of subsequent correction of the sounds heard, by clues from context. For example, suppose a foreigner speaking English says to you "Please sit down in this share." You correct "share" into "chair" a few seconds after you recognize "sh" in your brain, by a rapid process of mental query, analysis, and correction, using possible contexts. This process is of course important, but comes later.

The added value of the investigation at M.I.T., if finished in a year or two, instead of five or ten years, would be simply enormous. A tremendous volume of work is done in the business world and elsewhere all through society, which involves the recognition of meaningful sounds of language, phonemes. Great quantities of work done by typists, stenographers, dictating machine transcribers, and many other persons are waiting to be mechanized. Here at M.I.T. is a place where, if the present annual budget of $10,000 a year (provided by a grant from the National Science Foundation) could be increased through gifts and further support to $20,000 or $30,000 a year, a very great gain to all sorts of business and other human activities would soon result.

- END -

Program Library
(continued from page 8)

The system outlined above has proved itself effective and efficient, reflecting experiences with the Program Library of the Digital Computer Center of The Ramo-Wooldridge Corporation and of the University of Illinois.

- END -

GROWTH OF I.B.M. ELECTRONIC DATA PROCESSING OPERATIONS ON THE WEST COAST

NEIL D. MACDONALD

I.

A multimillion dollar expansion of the West Coast operations of International Business Machines Corp., the greatest regional expansion program in the company's history, was announced in Los Angeles on Feb. 1. The program includes:

1- A new thirteen-story office building and data processing center of advanced design in Los Angeles. Construction will start at Wilshire Boulevard and Mariposa Avenue in mid-1956, and occupation by 600 IBM people will get underway in mid-1957. An IBM 704 and a 705 will be in the Data Processing Center here.

2- A six-story office building now nearing completion at Market and Front Streets in San Francisco. Occupation by nearly 300 IBM people will begin in February.

3- New manufacturing, engineering, and education facilities at San Jose. Approximately 400,000 square feet will be built during this year and occupied by 1,500 employees beginning in the fall of 1956. The new facilities at San Jose will be built on a 190-acre site in a campus-style arrangement.

4- A new office building in Santa Monica. Over 150 people moved into this two-story structure in mid-January.

5- Data processing centers in Portland and Seattle. These facilities, the first of their type in the Pacific Northwest to use electronic data processing machines (Type 650), will be installed in Portland in March, in Seattle in June.

Commenting on the building program, Mr. Thomas J. Watson, Jr., president of IBM, said: "On the Pacific Coast there is the largest concentration of giant electronic computers in the world. We know from the healthy look of the business climate out here that the surface has only been scratched in the computer and data processing market. Within the next several months, scores more of these powerful tools will be installed in business, industry, and government enterprises in California, Oregon, and Washington. This is a major reason why IBM is building in Los Angeles, and is expanding its activities up and down the coastal area."

The new buildings will provide space for IBM to carry out every phase of its activities — research, development and product engineering, manufacturing, sales, service, and education.

II.

One of the world's greatest concentrations of "electronic brain power" has grown on the West Coast in the past few years. Today, these machines are in operation throughout the area, and handle a wide variety of commercial and technical problems for business, industry, and government. Many more will be installed in the next few years. A large part of this "electronic brain power" consists of IBM electronic computers. At the beginning of 1956, over 25 of the five IBM types of electronic data processing machines were installed and in operation on the West Coast, with scores more scheduled for delivery. These types are the IBM 650 -- medium-sized computer (magnetic drum) — and the IBM 701, 702, 704, 705 -- giant-sized electronic computers. In addition, there are several hundred IBM electronic calculators such as the IBM 604, 607 and Card Programmed Calculator installed on the Coast.

Following are some examples:

Richland, Wash. .... The General Electric Company has an IBM 702 at its Hanford Atomic Products Operation; it is used for scientific and engineering design and technical data reduction. The machine also processes the 7,000 employee weekly payroll and handles other accounting problems.

Seattle, Wash. .... The Boeing Airplane Company has had a 701 since December 1953 and a 650 since last June. Both machines are used to assist engineers and designers in solving problems involved in the study of aerodynamics, stress and structural development, and flight testing of supersonic and jet aircraft and guided missiles. The company will install a 705 later this year to handle payroll and labor distribution for its 40,000 employees in this

area, material requirements and stock control, and accounts payable, which usually exceed over 50,000 open purchase orders.

Anong the 650's on order is one for the University of Washington for its computer center, to be used for class instruction in data processing and numerical analysis, in pure science research, to facilitate grade prediction studies by the Admissions Department, and, for about two hours a month, to handle the university's hourly payroll of 2,500. The grade prediction studies are expected to have wide application in the educational world. LIFE Magazine devoted a page of its January 9 issue to the system, which was developed by Dr. Paul Horst, executive director of the university's counseling and testing service division. Using a complicated formula, Dr. Horst's system requires over 1,000 separate additions and multiplications to obtain each student's grade prediction for 32 subjects that can be taken in four years of college. The IBM 650 will compute one forecast in about five seconds. It will compute predictions for an entering Freshman class of 3,000 students in the time it now requires a trained clerk to work out one forecast on a desk calculator.

Also the Department of Lighting, of Seattle, Washington, will use an IBM 650 for computing customer electric utility bills, load statistics, payroll and related personnel data, stores accounting, and transportation cost allocation.

Portland, Oregon .... One of the 650's to be delivered is a machine for the Oregon Liquor Control Commission, which plans to use its 650, in this instance a magnetic-tape operated model, to provide centralized inventory control over the 150 retail outlets. Such control is not possible under the present method; the commission expects the resulting store and warehouse stock balance integration will save thousands of dollars annually.

Also, the Bonneville Power Administration will use its 650 to compute payroll, distribution, and leave records and an engineering study of load flow. The use of a digital computer to handle the load flow study is a new approach and is expected to have wide application in this field.

San Francisco, Calif. .... The Bank of America has in operation at its new data processing center here an IBM 702 -- the first large-scale, general-purpose machine of this type to be installed in any bank. As the first of many tasks it will perform for the bank, the 702 is processing about 90,000 individual real estate loan accounts for customers of 66 of the bank's Bay area branches. It services all of the 90,000 accounts in less than four hours. It is expected that the Type 702 computations will serve the bank's headquarters as well as branches in many other fields of accounting.

Southern Pacific is installing two Type 650's, the first primarily for payroll and labor distribution and related statistical reports for 20,000 employees of the railroad for whom payrolls are prepared in San Francisco; the second, for other large volume paperwork procedures in passenger and freight accounting. To facilitate its plans to extend 650 procedures to payrolls prepared in other locations, Southern Pacific has ordered four IBM Data Transceivers for the telegraphic transmission of timekeeping and payroll punched card data from outlying points to central processing locations.

Another 650 is scheduled for the California Packing Corporation, world's largest canner of fruits and vegetables -- a tape-operated 650 -- to handle sales analysis reports. Other probable applications include raw products accounting, accounts receivable, inventory control, order allocation, payroll, cost accounting, and operations research projects.

Another 650 will go to Crown Zellerbach Corporation, which plans to use its machine initially for the preparation of customer orders, and later for invoice writing, sales accounting and statistics, and other accounting and production planning application.

Another 650 will go to the Pacific National Fire Insurance Company, which will use it for statistical distribution work and rating and coding. The machine will eliminate many steps in the company's accounting routines and provide more complete records for management at reduced costs.

Another 650 will go to the U. S. Post Office Department for the 12th Region of the department's Bureau of Finance. This 650 is one of 12 being installed in these Post Office regions throughout the country, primarily for general and disbursement accounting, management reports and man-hour control. The 12th Region here is responsible for the payroll of 12,500 postal employees, with upcoming changes and conversions expected to swell this figure to 41,000 by June.

San Jose, Calif. .... Stanford University has just installed a 650 in its computing center here. The center shares the machine with Stanford Research Institute in solving more complicated mathematical problems than it was possible to solve previously, both for industrial researchers and for investigators in departments of the university.

Moffett Field, Calif. .... The National Advisory Committee for Aeronautics has a 650 in operation at the Ames Aeronautical Laboratory, to aid in solving complex mathematical calculations connected with aeronautical research in transonic and supersonic flight.

Sacramento, Calif. .... The State of California Department of Employment is scheduled to start using its 702 this month for processing unemployment and disability insurance claims. This is the first state to apply electronic data processing equipment to state government operations. The 702 will handle five main applications: processing of about 20,000 claims each week, involving reference to magnetic tape records on 5,400,000 employees; employer notice preparation for each employer affected by a claim; fraud match to detect possible cases where claims have been paid to those earning wages above stipulated amounts; keeping wage earnings records current by quarterly up-dating of the master wage record, with each up-dating involving about 8,000,000 change items; and maintaining employer accounting records for 400,000 employers, of which 270,000 are active at any one time; determination of tax rates from these and the claims records.

The State of California Department of Public Works has recently ordered a 650, which will be used for computing problems involved in the construction of highways, bridges, and other public works, as well as to process cost accounting and inventory data.

The McClellan Air Force Base uses an IBM 650 for inventory control, maintenance costs, and the projection of aircraft parts requirements to flow through the Sacramento Air Materiel Area's supply pipe-line.

Burbank, Calif. .... The Lockheed Aircraft Corporation has two 701's installed at its California Division. The giant machines are usually in operation 24 hours a day, seven days a week, handling both engineering and production data. Lockheed's Mathematics Analysis Department uses the machines to handle a wide variety of problems related to aircraft design, such as aerodynamic performance and stability, thermal dynamics, and structural and flight dynamics. Production data handled on the 701's by Lockheed's Factory Data Processing Group include: preparation of the project base schedule; parts scheduling; shop order writing; direct labor hour forecasting; parts activity ledgers. Future planned applications include material control, and payroll and labor distribution. Lockheed will soon replace the two 701's with two 704's which will double the computing capacity of the installation.

Van Nuys, Calif. .... Marquardt Aircraft Company has a 650 at its Air Force Jet Laboratory. It is used for the physical conversion of pressure, temperature, and fuel measurements sampled at high speed in ramjet development tests; and it is also used to expedite design and development of ramjet components and accessories. The computer processes data into calculated form for engineering analysis within two and a half hours after completion of a test run of a ramjet -- five times faster than previous methods used.

The Systems Research Corporation will install an IBM 704 in the computing center it is planning here. The machine will be utilized in the center's solving of problems of complex guidance and control systems, both technical and military.

Canoga Park, Calif. .... The Rocketdyne Division of North American Aviation will install a 704 in the near future. Problems to be handled on the machine include the reduction and analysis of rocket engine performance data. Atomics International Division of the company will use the 704 for research, design, development, engineering, and production problems associated with nuclear reactors for use in industrial, medical, and scientific research, and for the production of useful power.

Los Angeles, Calif. .... Among 705's on order here are machines for the Automobile Club of Southern California, the Farmers Insurance Group, and the Prudential Insurance Company of America. The Automobile Club will use its 705 to handle insurance records and membership production and accounting to provide better service to its 443,000 members. The Farmers Insurance Group machine will be applied to maintenance of policy-in-force records, premium billing of over 2,000,000 policyholders, and preparation of accounting records, commission statements, and statistical analyses. The Prudential's 705 will be installed in its Western Home Office, and will handle a variety of insurance premium billing operations and related accounting procedures. Similar 705 machines will be installed in the company's other home offices in Chicago, Houston, Jacksonville, Minneapolis, and Newark.

Chrysler Corporation's West Coast Division uses a 650 for handling payroll and calculating material requirements and shipping schedules. The machine also will be used for perpetual inventory.

Among the 650's on order are ones for the City's Department of Water and Power, the Maywood Air Force Depot, and the Occidental Life Insurance Company of California. The Water and Power Department plans to use its 650 in payroll preparation, stores accountings, and transportation and construction equipment accounting. The Maywood Air Force Depot's machine will be one of the 650's to be used at about 16 Air

Materiel Command installations throughout the country, principally for keeping perpetual inventory records; such records include accounting for the monetary value of each transaction affecting the Command's stock piles of over a million items. Initial applications of the Occidental Life 650 will be premium selection and computation, determination of correct policy and rider forms, and data processing involved in policy writing and recordkeeping.

Santa Monica, Calif. .... North American Aviation, Inc. has two 701's installed in its main plant at the Los Angeles International Airport for handling almost every type of aeronautical engineering problem, from the selection of the basic configuration of the aircraft, through aerodynamic and structural design, to the analysis of flight test data. Plans are now under way to expand the use of these machines to include recordkeeping and data processing for accounting functions. Later this year, the company will replace the two 701's with two 704's to further expand computing capacity.

The Rand Corporation has made extensive use of an IBM 701 for over two years in solving a wide variety of problems in economics, mathematics, aircraft, missiles, electronics, nuclear energy and the social sciences. The machine has been moved to the company's West Los Angeles location to make way for a new 704 at its main building. In addition, two more 704's will be installed in a new building under construction in Santa Monica to house Rand's System Development Division, which is playing an important role in the SAGE project, the new automatic aircraft control and warning system which is being developed for the Air Defense Command.

Douglas Aircraft Company has two 701's installed and one 704 on order. Thanks to the company's first 701, installed at its plant here for almost three years, the giant DC-7 transport got into the air months ahead of schedule. The machine is kept busy seven days a week solving engineering and scientific problems on all Douglas commercial air transports -- the DC-6B, DC-7, DC-7C's and development of the DC-8. The Douglas El Segundo plant also has a 701 in 24-hour use every day of the week, shared with the company's Long Beach plant, on vital engineering problems for the Navy on the A 3 D Skywarrior, A 4 D Skyhawk and F 4 D Skyray, and for the Air Force on the C-133 Cargo Transport and RB-66 Twin Jet Bomber. The Douglas 704 will be installed at the El Segundo plant to expand scientific computation power.

Culver City, Calif. .... Hughes Aircraft Company has installed three 650's which are at work aiding in guided missile design, doing material and labor distribution accounting, and handling a score of routine paper work jobs and complex engineering problems.

Point Mugu, Calif. .... The U. S. Navy has in operation at the Naval Air Missile Test Center here an IBM 650 for processing data collected during the launching and flight of guided missiles.

San Diego, Calif. .... The Ryan Aeronautical Company has a 650 for handling many engineering problems, including: calculations for the development of Ryan's automatic navigator; flight path studies for guided missile projects, and the solution of complex matrix problems involved in the radically new design of the company's jet VTO (vertical take off) airplane.

China Lake, Calif. .... The U. S. Naval Ordnance Test Station here has had a 701 for over two years which is being used for calculating rocket and missile performance and to simulate flight conditions of these devices. Research on physical properties of materials and other studies are also aided by the machine. An IBM 704 is included in the station's plan to more than double its present computing facilities.

San Bernadino, Calif. .... The Air Materiel Area at the Norton Air Force Base here recently installed a 650, which is utilized for supply and aircraft maintenance accounting.

Santa Ana, Calif. .... The State Farm Mutual Insurance Company has a 650 on order for its branch here. It will be used chiefly for processing automobile insurance data. The machine will do premium rating and perform selective underwriting by separating risks not requiring checking from those requiring checking.

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Forum

IBM 702 COMPUTING SERVICE

A. R. Zipf, San Francisco, Cal.

In connection with your roster on automatic computing services you may wish to list the following:

Bank of America National Trust and Savings Association, Controllers Department, Equipment Research Section, 500 Howard St., San Francisco, Cal. / IBM 702 Automatic Digital Computer / Unrestricted

- END -

Forum

AUTOMATION MEETING AND EXHIBITION, PARIS, FRANCE, JUNE 18-24, 1956

F. H. Raymond
President of the French Association
of Electronic Engineers
President of the 8th Section
(Applied Electronics)
of the "Société des Radioelectriciens"
10, rue d'Ayen
Saint Germain-En-Laye (S.& O.), France

Having duly considered that Electronic Engineers should take the initiative to organize a meeting, in Paris, for discussing questions relative to "Automatics", we have selected the week from the 18th to the 24th June 1956.

It clearly stands out that the success of this endeavor calls for the collaboration of all personalities, associations and scientific institutions.

We shall have to define with precision what we exactly mean by the term "Automatics". If we say that it is the science of automatic operation, the definition is not clear nor quite appropriate, but it gives a general idea of the subject involved.

Already, the term "Automation" stimulates a great interest. Let us understand that by Automation we shall refer to the application of Automatics to Industrial Production.

If we consider that all Engineers have to become conscious of the importance of Automation -- whence the initiative taken by Electronic Engineers, -- Automatics offers an extensive subject for study by scientists, and accordingly our Congress will extend much beyond the scope of Automation such as defined above.

The economic and social aspects of the problem will also be included in our programs.

Finally, we will organize an exhibition, the documentary and didactic nature of which will be demonstrated by industrial realizations.

The tentative program is as follows:

Automatics: Definition of Automatics
Present theoretical concepts
-- engineering point of view
-- electronics point of view

Fields of application
-- technical
-- scientific
-- economic

(continued on page 31)

Forum

HIGHLIGHTS OF THE INTERNATIONAL ANALOGY COMPUTATION MEETING, BRUSSELS, SEPT. 26-OCT. 2, 1955

E. L. Harder, Director, Analytical Dept.,
Westinghouse Electric Corp.,
East Pittsburgh, Pa., and
American Vice President,
Association Internationale
pour le Calcul Analogique

This meeting was important in bringing together for the first time representatives of all of the principal analog computing projects in Europe together with a good representation from principal projects in the United States. The latter included the analog installations at Mass. Inst. of Technology, Wright Air Force Base, and Westinghouse Electric Corp., as well as Washington University, Notre Dame University, and University of Cincinnati.

The "Microreseau" or miniature power system network for direct testing was set forth, in contrast to electronic analog and network calculator techniques for studying the behavior of rotating machines on interconnected electric power systems. The conference provides a thoroughgoing review of all the latest techniques of analog computation, including many more widely used in Europe than the States. For example, some of the latest advances in this field are the electrolytic tank techniques at the Institut Blaise Pascal in Paris (of which F. H Raymond is an advisor) and at the University of Brussels. The use of capacitive elements as function generators and for performing other computing functions in carrier type analog computers have been highly developed. These were described and on display.

A wide range of new non-linear techniques were described, many of them using operational amplifiers in novel ways.

At the close of the meeting, an international organization was formed, known as the "Association Internationale Pour le Calcul Analogique", having its seat in Brussels. This association has as its purpose the exchange of information among specialists, manufacturers, and users, interested in analog methods of calculation, by means of the organization of periodic international meetings and expositions, scientific publications, and contacts with associations for study of numeric methods of calculations. Individuals interested in becoming associated with this organization may apply to the Secrétariat des Journées Internationales de Calcul Analogique, 50, ave.F.D. Roosevelt, Brussels, Belgium.

- END -

INTERNATIONAL ANALOGY COMPUTATION MEETING, BRUSSELS, BELGIUM

Sept. 26 to Oct. 2, 1955 — Program, and Titles of Papers

This meeting was organized by the Société Belge des Ingénieurs des Télécommunications et D'Electronique (S.I.T.E.L.) in collaboration with the Société Belge des Electriciens and the Société Belge des Mecaniciens. The address of the Organizing Committee was 50, Ave. F. D. Roosevelt, Brussels, Belgium. The portion of the program of permanent interest follows:

THE SPEAKERS (BY COUNTRY):

ALLEMAGNE (GERMANY)

Dhen, W., Dipl. Ingenieur, Assistent, Technische Hochschule, Darmstadt (G-22)
Gundlach, F. W., Dr. Ing. Professor, Technische Universitat, Berlin (G-40)
Leseman, K. J., Dipl. Ing., Institut fur Praktische Mathematik, Technische Hochschule, Darmstadt (F-53)

BELGIQUE

Bridoux, G., Ingenieur, A. I. Br., Universite Libre de Bruxelles (K-8)
Degesves, A., Professeur, Faculte Polytechnique de Mons (B-21)
Germain, P., Docteur en Sciences Mathematiques, University Libre de Bruxelles (D35A, B)
Haus, F., Professeur, Universites de Gand et de Liege (L-43)
Isabeau, J., Ingenieur A. I. Br., Universite Libre de Bruxelles (G-49)
Lafleur, C., Ingenieur A. I. Br., Universite Libre de Bruxelles (K-8)
Peretz, R., Ingenieur, A. I. Br., Universite Libre de Bruxelles (A-70A, C-70 B)
Renchon, R., Ingenieur -- Chef de Service, Union Generale Belge d'Electricite (M-19)
Witsenhausen, H., Ingenieur A. I. Br., Universite Libre de Bruxelles (C-97)

CANADA

Hooper, F., Professor, Mechanical Dept., Univ. of Toronto (P-54)

ESPAGNE (SPAIN)

Garcia Santesmases, Professor a l'Universite de Madrid (A-33)
Gonzales del Valle, Ingenieur des Telecommunications, Madrid (L-38)
Rogla Altet, V., Ingenieur -- Professeur, Ecole des Ponts et Chaussees, Madrid (F-79)

ETATS-UNIS (U.S.A.)

De Vogelaere, R., Associate Professor, University of Notre-Dame, Ind. (L-16)
Juhasz, S., Executive Editor, Applied Mechanics Review, Midwest Research Institute, Kansas City, Mo. (P-54)
Harder, E. L., Director, Analytical Section, Westinghouse Electric Co., Pa. (Conf 9/28, 9:00 - 42)
Honnell, P. M., Professor of Electrical Engineering, Washington University, Miss. (L-45)
Horn, R. E., Instructor in Electrical Engineering, Washington University, Miss. (L-45)
Ludeke, C. A., Associate Professor of Physics, University of Cincinnati, Ohio (N-57)
Seifert, W. W., Director, Dynamic Analysis and Control Laboratory, M.I.T., Cambridge (C-83B, E-83A)
Warshawsky, L. M., Chief, Analog Section, Aeronautical Research Laboratory, Wright Air Development Center, Ohio (A-92)

FRANCE

Andre, G., Chef de Departement, S.E.A. Courbevoie (A-3)
Armanville, J., Ingenieur, S.E.A. Courbevoie (A-15)
Ballet, M., Ingenieur Principal du Genie Maritime, Direction des Constructions et Armes Navales (L-12)
Boscher, J. L., Attache de Recherches, C. N. R. S., Paris (K-6)
Braffort, P. L., Ingenieur, Centre d'Etudes Nucleaires de Saclay (M-7)
Brodin, J., Professeur, Laboratoire de Recherches Balistiques et Aerodynamiques, Vernon (Conf. 9/30, 9:00 — 9)
Cahen, G., Ingenieur General du Genie Maritime, Direction des Constructions et Armes Navales, Cherbourg (L-12)
Carteron, J., Ingenieur Chercheur, Electricite de France (E-14)
de Brem, F. R., Chef de Section, Gaz de France (B-20)
Duquenne, R., Ingenieur, O. N. E. R. A., (D-23)
Fournier, A., Sous-Directeur, Laboratoire National d'Essais (K-29)
Froidevaux, C., Physicien, Laboratoire National d'Essais (K-29)
Gendreau, G., Ingenieur, Centre d'Etudes Nucleaires de Saclay (D-34)
Girerd, J., Ingenieur du Genie Atomique, Laboratoire Derveaux (A-36)
Henon, M. C., Agrege de Physique, Institut d'Astrophysique, Paris (B-44)
Huard de la Marre, Attache de Recherches, C. N. R. S. (K-47)
Liebaut, A., Charge de Conferences a l'Ecole Centrale des Arts et Manufactures, Paris (P-54)
Malavard, L., Professeur, Faculte des Sciences de Paris (Conf. 9/28, 14:00 -- 61)
Miroux, J., Ingenieur de Recherches, Vanves (K-64)
Parodi, Professeur, Conservatoire National des Arts et Metiers, Paris (L-68)
Piel, G., Chef du Departement de Calcul Numerique, S. E. A. Courbevoie (G-80)

Raymond, F. H., Directeur, S. E. A. Courbevoie (Conf. 9/27, 11:00 -- 72A)
Renard, G., Attache de Recherches, C. N. R. S., Paris (D-74)
Renouard, P., Ingenieur en Chef, Gaz de France, La Plaine St.-Denis (P-76)
Revuz, J., Ingenieur, O. N. E. R. A. Eaubonne (D-77)
Robert, R. J., Ingenieur a la Direction Etudes et Recherches, Electricite de France, Paris (B-78)
Salvat, M., Ingenieur, Centre d'Etudes Nucleaires Saclay, Gif-sur-Yvette (S. et O) (D-34)
Scanlan, R. H., Charge de Recherches, Laboratoire Blaise Pascal, C. N. R. S., Chatillon-sous-Bagneux (K-82)
Sokoloff, B., Ingenieur, Groupe Electronique, Cie. Francaise Thomson Houston, Paris (E-84)
Uffler, H. J., Directeur, Technique du Dep. Calculateur, Cie. Generale de T. S. F., Paris (P-87)

ITALIE

Perotto, P. G., Ingenieur, Fiat Dipartimento Esperienze, Torino (A-71)

PAYS-BAS (NETHERLANDS)

Brouwer, G., Ingenieur, Research Laboratories, Philips, Eindhoven (K-10)
Ensing, L., Research Engineer, Koninklijke Shell Laboratorium (N-25)

POLOGNE (POLAND)

Lukaszewicz, L., Charge de Cours, Academie Polonaise des Sciences (L-52)

ROYAUME-UNI (UNITED KINGDOM)

Archibald, J. I., Professional Engineer, Decca Radar Ltd. (F-1)
Baker, B. O., Electrical Engineer, The General Electric Co. Ltd. (D-2)
Bergman, G. D., Electronic Engineer, Kings College (L-4)
Blake, D. V., A. M. I. E. E., National Physical Laboratory (N-5)
Burt, E., Principal Scientific Officer, Royal Aircraft Establishment (P-11)
Coales, J. F., Electrical Engineer, Cambridge University, Engineering Dept. (E-17)
Crowley-Milling, M., Research Engineer, Metropolitan Vickers Elec. Co. Ltd. (F-18)
Fisher, M. E., Physicist, King's College (L-27)
Foody, J. J., Chief Mathematician, Short Brothers and Harland Ltd. (E-28)
Fuchs, H., Engineer, University of Southampton (M-30)
Gait, J. J., Principal Scientific Officer, Royal Aircraft Establishment (A-31)
Gomperts, R. J., Mathematical Physicist, The English Electric Co. Ltd. (A-37)
Gordon, R. L., Ph.D., Safety in Mines Research Establishment (G-39)
Hales, A. W., Electrical Engineer, Central Electricity Authority, London (B-41)
Humphrey, Davies, Reader in Electrical Engineering, Imperial College of Science and Technology, City and Guilds College, London (B-48)
Kendall, P., Research Engineer, Electrical Research Association, Greenford (M-63)
Liebmann, G., Senior Research Physicist, Research Laboratory, Associated Electrical Industries Ltd., Aldermaston (Conf. 9/29, 14:00 -- 55A, D-55B)
MacLusky, Senior Scientific Officer, Electronics Division, Atomic Energy Research, Harwell (N-59)
Michel, J. G. L., Director Department of Scientific and Industrial Research, National Physical Laboratory, Teddington (Conf. 9/29, 9:00 -- 62)
Miedzinski, J., Senior Research Engineer, Electrical Research Association, Perivale, Greenford (M-63)
Palmer, P. J., Doctor, Department of Civil Engineering, University of Birmingham (K-67)
Paul, R. J. A., Head of Electronics Section, Short Brothers & Harland Ltd., Belfast (M-69)
Redshaw, S. C., Professor of Civil Engineering, University of Birmingham (K-73)
Saraga, W., Doctor Phil., Telephone Manufacturing Co. Ltd., Pettswood, Orpington, Kent. (L-81A, P-81B)
Williams, R. W., Head of Simulator Section, English Electric Co. Ltd., Luton, Bedfordshire (C-94)
Wilson, I., A. M. I. E. E., Abingdon (E-96)

SUEDE (SWEDEN)

Backstrom, M., Professor, Royal Institute of Technology, Stockholm (P-54)
Elgeskog, E., Tekn. Lic., Chalmers University of Technology, Goteborg (C-24)
Lofgren, L., Research Engineer, Research Institute of National Defence, Stockholm (G-56A, B)
Wallman, H., Professor, Chalmers University of Technology, Goteborg (Conf. 9/30, 14:00 -- 90)
Wentzel, N. V., Master of Science, Chalmers University of Technology, Goteborg (C-93)

SUISSE (SWITZERLAND)

Choquard, P. F., Docteur es-Sciences, Battelle Memorial Institute, Geneve (N-58)
Cuenod, M., Ingenieur, Societe Generale pour l'Industrie (M-19)
Erismann, T. L., Chef de departement, Amsler et Cie., Schaffhouse (F-26)
Gallo, M., Docteur Ingenieur, Contraves S. A., Zurich (F-32)
Luscher, J., Ingenieur Electricien, Battelle Memorial Institute, Carouge, Geneve (N-58)

YOUGOSLAVIE

Madic, P., Ingenieur d'Electrotechnique, Institut "Boris Kidric", Belgrade (M-60)
Mitrovic, D., Docteur es-Sciences, Chef du Laboratoire de Mathematiques appliquees, Institut "Boris Kidric", Belgrade (A-65)
Obradovic, I., Directeur, Institut "Nikola Tesla", Belgrade (E-66)
Tomovic, R., Docteur es-Sciences Techniques, Institut "Boris Kidric", Belgrade (C-86)

PROGRAM OF MEETINGS

TUESDAY, SEPTEMBER 27

11:00 Conférence de M.F.H. RAYMOND: "Les Analyseurs différentiels électroniques". (Comm. 72A)

SECTION A. -- SALLE I.

14:00 to 18:00 Président: M.F.H. RAYMOND

GAIT: "Tridac -- A large analogue computer for flight simulation". (Comm. 31)
COMPERTS: "Luton Analog Computer". (Comm. 37).
PEROTTO: "The F.I.A.T. Analog Computer". (Comm.71)
WARSHAWSKY: "Wadc's New Large Analog Computer". (Comm. 92)
ANDRE: "Caractéristiques et évolution du matériel standard S.E.A. de précision, linéaire et non-linéaire, pour le calcul analogique". (Comm.3)
ARMANVILLE: "Caractéristiques et applications du Calculateur analogique S.E.A. — type O. M. E. 12". (Comm. 15).
GARCIA SANTESMASES: "Un Analyseur différentiel". (Comm. 33).
GIRERD: "Le Calculateur analogique Djinn des Laboratoires Derveaux". (Comm. 36).
MITROVIC: "Analyseur différentiel de l'Institut Boris Kidric". (Comm. 65).
PERETZ: "Quelques aspects de l'ensemble analogique electronique de L'Universite Libre de Bruxelles". (Comm. 70A).

WEDNESDAY, SEPTEMBER 28

9:00 Conférence de M.E.L. HARDER: "Electrical Network Analyzers". (Comm. 42).

SECTION B. -- SALLE I.

10:00 to 12:00 Président: M.E.L. HARDER

de BREM: "Tables électriques analogiques pour le calcul des réseaux mailles — La table linéaire du Gaz de France". (Comm. 20).
DEGESVES: "Le microréseau". (Comm. 21).
HENON: "CAREDDOL ou Calculateur analogique pour la résolution des équations différentielles linéaires du deuxième ordre". (Comm. 44).
ROBERT: "Le Microréseau -- Etudes qu'il permet d'entreprendre; perfectionnements récents". (Comm. 78).
HALES: "The Central Electricity Authority D. C. Network Analyser". (Comm. 41).
HUMPHREY DAVIES: "A steady-state Analyser using transformers". (Comm. 48).

SECTION C-- SALLE II.

10:00 to 12:00 Président: M. R. TOMOVIC

TOMOVIC: "Sur une méthode augmentant la précision d'un générateur de fonctions". (Comm. 86).
ELGESKOG: "Photoformer analysis". (Comm. 24).
SEIFERT: "The Generation of Functions of two Independent Variables". (Comm. 83B).
WENTZEL: "Electronic Function Generators". (Comm. 93).
WILLIAMS: "Resistance Potentiometers as Function Generators in Analogue Computers". (Comm. 94).
PERETZ: "Opérateurs électroniques non-linéaires". (Comm. 70B).
WITSENHAUSEN: "Principes de réalisation d'éléments non-linéaires pour le calcul analogique". (Comm. 97).

14:00 Conférence de M. L. MALAVARD: "La méthode d'analogie rhéoélectrique; ses possibilités et ses tendances". (Comm. 61).

SECTION D. -- SALLE II.

15:00 to 18:00 President: M. L. MALAVARD

BAKER: "An Electrolytic Tank Analogue Computer for Plotting Electron Trajectories in Space Charge Fields". (Comm. 2).
LIEBMANN: "Resistance -- Network analogue method for solving plane stress problems". (Comm.55B)
DUQUENNE: "Etude analogique des ailes en régime instationnaire". (Comm. 23).
GENDREAU et SALVAT: "Etablissement à l'aide de la cuve rhéographique à fond modelé de la carte du champ dans la culasse d'un aimant". (Comm. 34).
GERMAIN: "Quelques caractéristiques physiques du papier graphite utilisé dans l'analogie rhéoélectrique". (Comm. 35A). "Mesure directe du gradient électrique dans une cuve rhéographique". (Comm. 35B).
RENARD: "Etude analogique de la torsion des arbes de révolution comportant une gorge". (Comm.74).
REVUZ: "Etude analogique du soufflage au bord de fuite d'un profil d'aile". (Comm. 77).

SECTION E. -- SALLE I.

15:00 to 18:00 Président: M.W.W. SEIFERT

SEIFERT: "The role of Computing Machines in the Analysis of Complex Systems". (Comm. 83A).
CARTERON: "Organisation et utilisation du calculateur analogique d'Electricité de France". (Comm. 14).
OBRADOVIC: "L'application combinée des machines tournantes et du calculateur analogique électronique dans la résolution des problèmes de régulation automatique". (Comm. 66).
SOKOLOFF: "Application des techniques analogiques au tracé des trajectoires d'avions." (Comm.84).
COALES: "The use of Computing Elements in automatic Control Systems". (Comm. 17).
FOODY: "The Analogue Computer in Aircraft Design Problems involving nonlinearities". (Comm.28).
WILSON: "The application of analogue computing techniques to the solution of overall nuclear reactor control and safety problems". (Comm.96).

THURSDAY, SEPTEMBER 29

9:00 Conférence de M.J.G.L. MICHEL: "The mechanical differential analyser, recent developments and applications". (Comm. 62)

SECTION F. -- SALLE I.

10:00 to 12:00 Président: M.G.J.L. MICHEL

ERISMAN: "Nouvelles composantes de calcul pour calculateurs mécaniques analogiques". (Comm. 26).
GALLO: "Un nouveau calculateur analogique universel pour la résolution d'équations différentielles et d'autres problèmes". (Comm. 32).
ROGLA: "Machine analogique pour calculs algébriques". (Comm. 79).
ARCHIBALD: "The application of Pinwheel Gears as Function Generators in Light-Weight Computers". (Comm. 1).
CROWLEY-MILLING: "An analogue computer for solving the equations of motion in particle accelerators". (Comm. 18).
LESEMAN: "Particulars and application of the differential analyser I.P.M. -- Ott". (Comm. 53).

SECTION G. -- SALLE II.

10:00 to 12:00 President: M.F.W. GUNDLACH

GUNDLACH: "A new electron-beam multiplier with an electrostatic hyperbolic field". (Comm. 40).
ISABEAU: "Un multiplieur-diviseur analogique". (Comm. 49).
PIEL: "Conversion arithmétique-analogique au moyen d'un décodeur spécial à relais". (Comm. 80).
DHEN: "Special computing units of the electronic repetitive analog computer Darmstadt". (Comm.22).
GORDON: "An analogue computing circuit for the evaluation of the ratio of two slowly-varying potentials". (Comm. 39).
LOFGREN: "Predictors in time-shared Analog Computers". (Comm. 56A). "Analog multiplier based on the Hall effect". (Comm. 56B).

14:00 Conférence de M. G. LIEBMANN: "Resistance -- Network Analogues". (Comm. 55A).

SECTION K. -- SALLE I.

15:00 to 18:00 Président: M. G. LIEBMANN

BOSCHER: "Application des réseaux superposés à l'étude des plaques élastiques". (Comm. 6).
BRIDOUX et LAFLEUR: "Etude analogique des courbes d'attenuation et de déphasage d'une fonction de transfert au moyen d'une approximation d'un plan conducteur par un réseau maillé de résistances". (Comm. 8).
FOURNIER et FROIDEVAUX: "Appareil analogique pour l'étude des régimes thermiques variables". (Comm. 29).
HUARD DE LA MARRE: "Sur l'imposition des conditions aux limites dans les réseaux de conductances". (Comm. 47).
MIROUX: "Sur un réseau à selfs et capacités pour l'étude de certains écoulements supersoniques". (Comm. 64).
SCANLAN: "Analyseur à réseaux résistifs pour l'étude de certaines équations aux dérivées partielles intéressant la théorie des structures". (Comm. 82).
BROUWER: "Network Analogue solution of a special class of simultaneous differential equations". (Comm. 10).
PALMER: "Solution of elastic foundation problems by means of a resistance network". (Comm. 67).
REDSHAW: "A resistance network of novel construction for solving certain prblems in elasticity". (Comm. 73).

SECTION L. -- SALLE II.

15:00 to 18:00 Président: M. PARODI

PARODI: "Le problème de la localisation des valeurs caractéristiques des matrices". (Comm. 68).
BERGMANN: "A new electronic analogue storage device". (Comm. 4).
FISHER: "Higher order differences in the analogue solution of partial differential equations". (Comm. 27).
SARAGA: "Graphical methods of computation and design considered as analogue computing method". (Comm. 81A).
CAHEN et BALLET: "Etude des matrices par les analogies électriques. Valeurs propres et modes. Applications aux vibrations élastiques." (Comm. 12).
DE VOGELAERE: "A new method for the determination of periodic solutions of nonlinear differential equations". (Comm. 16).
GONZALES DEL VALLE: "Le calculateur analogique C. A.C." (Comm. 38).
HAUS: "Etude de l'atterrisage automatique des avions par calculateur analogique". (Comm. 43).
HONNEL and HORN: "Matrices in electronic differential analyzers". (Comm. 45). Presented by Monsieur PERETZ.
LUKASZEWICZ: "Construction simplifiee d'un analyseur de polynome algébrique". (Comm. 52).

FRIDAY, SEPTEMBER 30

9:00 Conférence de M. J. BRODIN: "Pédagogie concrète du calcul fonctionnel linéaire ". (Comm. 9).

SECTION M. -- SALLE II.

10:00 to 12:00 Président: M. J. BRODIN

FUCHS: "Some considerations of the accuracy of linear analogue computers". (Comm. 30).
MADIC: "Experience with an analogue computing machine for solving linear algebraic equations". (Comm. 60).
MIEDZINSKI and KENDALL: "Versatility in network analyzers". (Comm. 63).
PAUL: "Some factors affecting the accuracy of electronic analogue computers". (Comm. 69).
BRAFFORT: "Problèmes de structure dans le calcul analogique". (Comm. 7).
CUENOD et RENCHON: "Le calcul analogique et la notion de rigueur chez l'ingénieur". (Comm.19).
RAYMOND: "Quelques considérations sur la notion de précision des calculateurs analogiques." (Comm. 72B).

SECTION N. -- SALLE I.

10:00 to 12:00 Président: M.C.A. LUDEKE

LUDEKE: "Analogies and Simulators for solving non-linear differential equations". (Comm.57).
CAILLET: "La simulation du circuit thermique dans un réacteur nucléaire". (Comm. 13).
BLAKE: "The N.P.L. Electronic simulator". (Comm.5).
LUSCHER and CHOQUART: "A transistor-simulator". (Comm. 58).

ENSING: "Delay-Line synthesizer process simulator". (Comm. 25).
MAC LUSKY: "An analogue computer simulating the kinetics of a complete nuclear power station". (Comm. 59).

14:00 Conférence du Professeur H. WALLMAN: "Special computers". (Comm. 90).

SECTION P. -- SALLE I.

15:00 to 17:00 Président: Professeur H. WALLMAN

LIEBAUT-BACKSTROM-JUHASZ-HOOPER: "Analogie hydraulique pour les échangeurs de chaleur à contre-courant ou à double passage". (Comm. 54).
RENOUARD: "Un appareil analogique hydraulique pour l'étude de l'écoulement du gaz dans une conduite en régime variable". (Comm. 76).
UFFLER: "Procédé de Calcul par courants haute fréquence". (Comm. 87).
BURT: "An analogue machine for the measurement of spectral density". (Comm. 11).
SARAGA: "Graphical methods of computation and design considered as analogue computing methods". (Comm. 81B).

EXHIBITION

The Exhibition showed a collection of analogue computers and devices using the techniques of analogue computation.

EXHIBITORS

Beckman, Berkeley Division (U.S.A.)
S. A. Van Der Heyden, 49, rue du Marais, Bruxelles, Belgique
Compagnie Francaise Thomson-Houston
Groupe Electronique
173, boulevard Haussmann, Paris 8, France
Compagnie Generale de Telegraphie sans Fil
79, boulevard Haussmann, Paris 8, France
Contraves AG
Schaffhauserstrasse 580, Zurich, Suisse
Elliott Brothers (London) Limited
Computing Division, Elstree Way, Borehamwood, Hertfordshire, England
Laboratoire National d'Essais
Ministère de l'Education Nationale
Conservatoire des Arts et Métiers
292, rue Saint-Martin, Paris 3, France
Laboratoires R. Derveaux
6, rue Jules Simon, Boulogne-sur-Seine, France
Short Brothers & Harland Limited
Seaplane Works
Queens Island, Belfast, Northern Ireland
Société d'Electronique et d'Automatisme
138, boulevard de Verdun,
Courbevoie (Seine), France

- END -

"AUTOMATION": LECTURE BY HISTORIAN

ALLAN LYTEL
Levittown, Pa.

The historian faced the class; "Here on this planet we can learn from the experience of all other worlds. Let us take the earth in the time of man as an example of an instructive experience."

There automation started, we might say, with hand tools, or Level I as we call it. The tools were an extension of the hands, arms, and legs of the species man: with tools he could do more than with his bare hands. Hand tools such as a saw, a hammer, or a hand-operated drill are all examples.

When power was applied to these tools, man took a step forward, to Level II. Note that the power was still directed so that the tools were extensions of the hands and arms and muscles of men. The power shovel, the steam shovel, were larger versions of the hand shovel. It could move more dirt faster but it still needed a man to push the buttons, to direct the power. Fifty men with shovels could still do the same job. A drill-press was only a drill which could turn faster and drive straighter than the hand drill.

But with these hand tools which had power applied, man could and did build great cultures. Gradually these power tools began to be used in coordination, such as a center, called Detroit, for the auto industry. Here the automakers arranged long lines of machines, each directed by a man. Each machine did a job, as directed by the worker, and the jobs when all combined together produced a complex result.

The doors and the roof panels were stamped by a punch press; men with power screwdrivers put these together. Other machines painted the body and drilled the motor block. Notice that in every case the men controlled the work and that each job could have been done in a more simple fashion. A blacksmith could have made the roof, a paint brush could have been used rather than a spray-gun, and a hand screw-driver would have been slower but it could have done the same job.

This activity was what we could call Level III, and it did provide the first clue to the meaning and direction of automation, if the species had been intelligent enough to perceive it. Some men almost became machines for they were in competition with machines. A simple job — to tighten a bolt which held the frame to the body — became mechanized. A man tightened this bolt and his speed was dependent on the speed of the production line. The faster the line moved, the faster he moved, until his work was controlled by the rate of the entire line and the rate at which the autos passed by his position on the assembly line.

At the next level, communications became the key: at Level IV man could control a machine by means of recorded instructions. Magnetic tape recording for example advanced until it was possible to translate the complete series of motions needed by a machine for a complex operation into a series of recorded commands. The motions of the machine were converted to machine language and recorded on a tape. When the tape was fed into the translator, the machine would read the steps and convert them into motions. The net result was a tape-controlled machine: the library of recordings was a sort of memory.

Now it became possible for an entire assembly line to have the programs for all the individual machines recorded in advance; as the needs of the over-all production changed, the programs for the several machines could be changed.

Feedback of information for the individual machine was also developed and used. For example, the recorded instruction would tell a lathe to cut to a certain depth. A reading would be taken, by the programmed computer with the taped instructions, to find the actual depth of the cut which was taken. Then the actual depth would be compared to the depth as instructed, and these would be compared to determine any error, which would then be corrected.

When this principle is applied to the overall production line, a degree of automation results. Each machine is related to the other machines: if one lathe is operating too fast for the rest of the line, it is told, by the feedback principle, to slow down. In the same sense, if the milling machine is too slow, it

is told to speed up. In this way there is an over-all automatic production — at least from a short-range point of view.

Notice that this production system relates all of the machines one to the other; but that is all. There is no relation of the entire line to the requirements of production. That is, the line does not consider the needs for the final product. The line has no way of knowing if it should produce more or less of a given product. This is one of its limitations: this is the basic reason for the very high cost of the system. It is limited to making what it is told to make and then continues to make those things until it runs out of raw material.

In Level V, men considered the last problem first: raw materials. Each machine was connected to a continuous supply-storage arrangement. If an assembly machine required nuts and bolts, it could be connected to a supply room, whose level of inventory it would control. In some cases, the production machines would control other machines, which made these parts which the assembly line machines needed. More and more, however, supporting functions grew, such as the source of supply for auxiliary items, until the machine became concerned with these functions for a large part of the time.

Many of these secondary functions were found to be common to several machines on the production line: some central agency was needed for these common items. Gradually the large-scale digital computers — or giant brains as they were called -- became useful for this purpose. The central computer could and did relate these separate activities. The computer could either order the necessary smaller parts or control their manufacture by other machines.

Thus the several machines of the production cycle became integrated: the line flowed smoothly and the parts needed for the final product were there when they were needed. Control of the individual machines gradually went over to the computer which, in effect, ran the entire production. The computer, by means of its large-scale internal memory, could retain information about the different programs needed by each of the machines for the production of a particular end item. Thus this was a semi-complete unit: under the control of the central computer this production line could turn out a variety of end items but -- still some method of indication was needed by the computer so that it could, in turn, tell the separate machines how to make the product.

This then was Level V -- the Programmed Multi-Product Factory; these factories were in wide use. They made products like telephones, toasters, typewriters, and even automobiles, so inexpensively that the millenium was expected any day. Of course, Level V required a supporting industry for the basic raw materials: but these industries were, by now, also highly mechanized so that all of the heavy work was done by machines. This in truth was the Second Industrial Revolution; machines replaced men as a source of labor. Human labor -- physical brute force — was no longer a marketable commodity. The drudgery of repetitive operations and the exhaustion of pure physical work was now a thing of the past.

But man was not content -- he never was content. If machines could do this, they could do more. And more they did. The supporting functions of the Programmed Multi-Product Factory became a part of the plan for Level VI. If an automobile factory needed radio-radar transceivers, the computer of the automobile factory sent a request through regular communications channels to the Radio-Radar Factory. This factory in turn relayed its requests for transistors to the Semi-Conductor Plant, which, in turn, asked the Germanium Plant for raw materials — and so it went. When the final fully equipped and tested automobiles were sent to the distribution centers via auto-trams, the accounting and billing, in terms of work-points, went to the distribution centers at the same time. Thus even the accounting was completely under automatic control.

A complete complex of production-factories all in communication made up the Product-Center of this Level VI. There were Product-Centers for consumer goods, for foods and drugs, for clothing and textiles, and for replenishment of the machines for the factories. Even at Level VI, man could have stopped and lived in peace and luxury. Only a small portion of the population was needed for assistance in industry; and even those who were needed worked for only three hours a day, for three days a week, for five years; then they had finished. The rest of the people had freedom from the age-long fear of need. Children went to school until they each had training far beyond what they used to call graduate degrees. The species man -- for the first time in its recorded history — was at last free to explore the frontiers of knowledge. Advances in medicine science, music, art, in all of the arts, sprang up and were nurtured. The death rate fell and most men lived until well over one hundred years.

But man did not know enough to stop. Some of the technicians and scientists pushed further. Replacements were, of course, needed for the mechanical monsters which made all of the physical products required by man. Most of these replacements were simple, by Level VI standards. Mechanical devices drilled, polished, cast, bent, packaged or formed raw mater-

(continued on page 36)

I.B.M. TRUST SUIT ENDED BY DECREE

COMPANY AGREES TO SELL ITS ELECTRONIC COMPUTERS AND LICENSE ALL PATENTS

(Reprinted with permission from "The New York Times", January 26, 1956)

Special to The New York Times. - Washington, Jan. 25 --

International Business Machines Corporation agreed today to a sweeping antitrust decree that will force changes in some of its long-established business practices.

Under the decree I.B.M. will have to offer for outright sale tabulating machines and electronic computers that have been available on only a rental basis for the last twenty-five years.

The company must also license all its patents, and patents acquired or applied for in the next five years, for "tabulating and electronic data processing machines, tabulating cards and card manufacturing machinery."

Some of these patents will have to be licensed royalty-free, the others for "reasonable" rates.

It was the second major anti-trust action announced in two days. The American Telephone and Telegraph Company agreed yesterday to a settlement requiring it to license all past, present and future patents and to make some changes in its business structure.

Brownell Sees Wide Effects

Attorney General Herbert Brownell Jr. announced that the I.B.M. consent decree, drafted in negotiation with the company's lawyers had been signed in Federal Court in the Southern District of New York.

Mr. Brownell said that in view of "the revolutionary electronic machines....it is expected that the action taken today will have far-reaching effects upon major segments of the business world."

Stanley N. Barnes, chief of the Justice Department's Anti-trust Division, said the A.T.& T. and I.B.M. decrees "supplement each other." He said he regarded those two cases and a pending Government antitrust suit against the Radio Corporation of America "as part of one program to open up the electronics field."

In New York Thomas J. Watson Jr., president of I.B.M., said the company's consent to the judgment was "not an admission of any violation of the antitrust laws." He conceded that some terms of the decree were "severe" but said others would require no major change in "long-standing company policies."

The consent decree ends a civil anti-trust suit brought by the Government against I.B.M. in 1952. The complaint at that time charged that I.B.M. "unlawfully restrained and monopolized the tabulating industry." It said that the company owned and refused to sell about 90 percent of all tabulating machines in the United States and manufactured 90 percent of the tabulating cards used.

At the time the Government estimated I.B.M's annual return for rental of the machines at $100,000,000. Government lawyers said today that the figure now was about $250,000-000 a year.

Under the terms of today's decree I.B.M. must:

Offer for sale "in perpetuity" all types of tabulating and electronic computing machines that it manufactures, at a price bearing a "reasonable" relationship to rental charges.

Give present lessees of the machines an option to buy them.

Service machines sold to others, and provide parts for them.

Sell used I.B.M. machines to second-hand dealers.

License its tabulating patents and provide "technical know-how" to the licensees.

Offer for sale certain machines and paper stock needed to manufacture tabulating cards, including an unusual I.B.M. rotary press.

Furnish repair and replacement parts to repair shops, and supply some technical training and manuals.

Not require purchasers of machines to contract for I.B.M. maintenance service.

Avoid any tie-in sales or international sales allocation agreements.

An Explanation Offered

In addition, the company will have to sell enough of its card-manufacturing facilities by 1963 to bring its share of the business down to 50 percent, unless I.B.M. then can convince the courts that competitive conditions make this step unnecessary.

Judge Barnes said these terms represent most of what the Government had hoped for in bringing its antitrust action.

As to the question of why the company should agree to such a settlement, some lawyers suggested the answer was connected with a pending $90,000,000 antitrust suit against I.B.M. by the Sperry-Rand Corporation. The suit, filed last month, charged that I.B.M. had injured Sperry-Rand by monopolistic practices in the tabulator industry.

If I.B.M. had let the Government suit go to trial and had lost the case, that judgment could have been used as evidence against it in the private Sperry-Rand suit. But under the law consent decrees may not be used as evidence in another suit.

The I.B.M. machines covered by the decree range from a manual punch card that rents for $250 a year to advanced electronic machines that I.B.M. now rents for more than $500,000 a year.

Statement by Watson

Mr. Watson issued the following statement here yesterday:

"I.B.M. has today consented to the entry of a judgment settling all issues raised by the Department of Justice in the anti-trust suit which has been pending for four years against the company.

"Our consent to the entry of the judgment is, as the judgment states, not an admission of any violation of the antitrust laws, which we continue emphatically to deny having violated. We shall, of course, conform in good faith to the undertaking which we have accepted.

"It is our opinion that I.B.M. will continue to be successful under the terms of the judgment. However, we would not be realistic if we did not recognize that some of the terms of the judgment are severe. In other respects, terms of the judgment conform to long-standing company policies and impose no major change.

"Though the judgment is complex, and conformity to it by our company will require a great deal of administrative and procedural effort, the terms do not enjoin us from continuing to furnish good products and good service to our customers. These are the foundations upon which our business has been built and upon which it will continue to grow in an atmosphere of ever-increasing demand and ever-increasing competition."

- END -

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MANUSCRIPTS

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

Articles. We desire to publish articles that are factual, useful, understandable, and interesting to many kinds of people engaged in one part or another of the field of computers and automation. In this audience are many people who have expert knowledge of some part of the field, but who are laymen in other parts of it. Consequently a writer should seek to explain his subject, and show its context and significance. He should define unfamiliar terms, or use them in a way that makes their meaning unmistakable. He should identify unfamiliar persons with a few words. He should use examples, details, comparisons, analogies, etc., whenever they may help readers to understand a difficult point. He should give data supporting his argument and evidence for his assertions. We look particularly for articles that explore ideas in the field of computers and automation, and their applications and implications. An article may certainly be controversial if the subject is discussed reasonably. Ordinarily, the length should be 1000 to 4000 words. A suggestion for an article should be submitted to us before too much work is done.

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

PROBLEMS PLACED ON AN AUTOMATIC COMPUTER

NEIL D. MACDONALD

In a recent "Quarterly Report" of the "Projects and Publications of the Applied Mathematics Division" of the National Bureau of Standards, Washington, D.C., appears a very interesting table. It reports the use for three months of the National Bureau of Standards' Eastern Automatic Computer, SEAC. This table gives rather good evidence of the remarkable versatility of an automatic digital computer, and is reproduced below:

APPLICATION
of
NATIONAL BUREAU OF STANDARDS AUTOMATIC COMPUTER (SEAC)

The record of SEAC operations for tasks of the Applied Mathematics Division for the period July 1 through September 30 is as follows:

Task No. NBS:	Title	Hours Used: Code Checking	Hours Used: Productive Operations
1104/55-55	Research in numerical analysis	8	3
5116/55-56	Research in mathematical topics applicable to numerical analysis	4	1
5116/56-148	Nerve fiber reaction	1	
1110/47-2	Tables of Coulomb wave functions	16	3
1110/55-94	Tide tables	9	
5126/51-8	Tables of power points of analysis of variance tests	1	24
5126/52-44	Calculations for d-spacings	3	9
5126/53-25	Legendre function		1
5126/53-27	Thermodynamics functions	1	3
5126/53-29	Dynamic behavior of aircraft structure	5	6
5126/53-48	Analysis of ionospheric data	19	33
5126/53-51	Radiation diffusion	14	72
0009/54-15	Matrix reduction		5
0009/54-17	Depolymerization	2	3
0009/54-19	Energy levels of complex atoms	1	8
0009/55-53	Electronic functions		5
0009/55-65	Automatic coding	8	3
5126/55-68	Crystal structure calculations	9	
5126/55-81	Combining tests for significance	1	
5126/55-82	Thermometer calibrations	1	
0009/55-86	Flow coefficients for fluids	5	2
5126/55-87	"Zero" method determination of crystal structures	3	13
5126/55-92	Cylindrical electron lens calculations	2	
5126/55-97	High temperature properties of air	3	59
0009/55-99	Integrals of products of Bessel functions		1
5126/55-115	Adsorption integrals	9	31
5126/55-117	Attenuation of pressure pulses of finite amplitude	8	1
0009/55-118	Thermometer calibrations	2	1
5126/55-121	Electron penetration	3	
5126/55-126	Aerodynamic heating	2	
5126/56-128	Ground reflection coefficients	3	2
5126/56-129	Processing of Public Housing data		9
5126/56-134	Transmission delay times	4	4
5126/56-135	Evans hyperbolic charts	2	1
5126/56-139	Study of internuclear potential for H_3	1	

Task No.	Title	Hours Used: Code Checking	Productive Operations
NBS:			
5126/56-141	Spectro calibration	2	1
5126/56-145	Gamma-ray spectroscopy	9	2
0002/52-1	Statistical aspects of NBS administrative operations	7	37
5160/55-85	Research in mathematical elasticity	12	109
Misc.	Least squares	4	1
"	Determinants	6	
"	Matrix factoring, subroutines, etc.	2	
"	Lommel function	1	
"	Roots of polynomials	3	
Other:			
1110/53-52	L-Shell conversion coefficients	2	76
5126/51-3	Equations of heat transfer type		1
5126/53-45	Applications of game theory	4	2
5126/54-13	Award of procurement contracts for linear programming		20
5126/54-44	Flight performance computations		4
5126/55-61	Elastic cross section for neutron scattering	2	2
5126/55-104	Fuse problem	9	20
5126/55-113	Reactor design	14	
5126/55-119	Field rocket problem	10	
5126/55-122	Solution of normal equation		3
5126/55-125	Matrix multiplication	3	34
5126/55-127	Vibrations of circular disc	10	
5126/56-130	Aircraft responses	21	13
5126/56-133	Complex eigenvalues		3
5126/56-136	Calculation of wave functions	2	1
5126/55-137	Stability of supported plates	10	1
5126/56-138	Crystal counter efficiency	4	28
5126/56-142	Matrix problem	1	
	Totals:	288	667

Forum

GLOSSARY OF COMPUTER TERMS: COMMENT

F. A. Brown
Adalia Ltd, Montreal, Can.

Regarding the glossary of computer terms published in the January 1956 issue I feel that in the definitions of "point", "binary point", and "decimal point" there is some confusion. "Point" is defined as the position marking the separation between the integral and the fractional parts of the number. With this I agree. However in the definitions of decimal and binary points, it is stated that this separates the integral and fractional powers of the appropriate base. I believe these should read positive and negative powers of the base, or be otherwise rephrased to avoid the implication that fractional powers are referred to rather than fractional numbers.

It seems to us that the point is well taken. -- Editor.

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4	4.60, 16	8.00, 24
3	5.00, 9	8.80, 16
2	5.25, 5	9.55, 9

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

PUBLICATIONS FOR BUSINESS ON AUTOMATIC COMPUTERS: REFERENCE LISTING

Part 1

NED CHAPIN
Illinois Inst. of Technology
Chicago, Ill.

This paper supplies a reference listing of publications for business on automatic computers. This reference listing is in addition to the "Basic Listing" and the "Supplemental Listing" that were published in "Computers and Automation" for September, 1955, and February, 1956, respectively.

Two types of publications are cited in this reference listing. The first type is on various aspects of automatic computing equipment and devices, and the publications are listed under the following headings: Particular Automatic Computers, Automatic Computer Listing, Special-Purpose Equipment, Particular Devices, Paper Tape, and Punched Cards. The second type of publication cited in this reference listing is on the general application and use of automatic computers in business. This general listing is not further subdivided because the publications cited usually contain repetitions and further elaborations of the material covered by the publications in the "Basic Listing" and in the "Supplemental Listing".

To facilitate reference, the order of listing within each major grouping of the publications cited in this reference listing is alphabetic by author. To conserve space, annotation has been omitted, and items from news magazines have been omitted.

Particular Automatic Computers

Howard H. Aiken, "Computing Machine Developments in Continental Europe," Proceedings of the American Gas Association, 1952, pp 165-169

Herbert O. Brayer, "What Europe is contributing to the Electronic Office," American Business, vol. 24, no. 9 (Sept. 1954), pp 22-23, 41-43

David R. Brown, editor, "Review of Electronic Computer Progress during 1954," Transactions of the Institute for Radio Engineers Professional Group on Electronic Computers, vol. EC-4, no. 1, (March 1955), pp 33-38

W. C. Carter and M. Ellis, "A Comparison of Order Structures for Automatic Digital Computers", Journal of the Operations Research Society of America, vol. 2, no. 1 (Feb. 1954), pp 41-58

Harry M. Davis, "Mathematical Machines", Scientific American, vol. 180, no. 4 (April 1949), pp 28-39

Editor, "Computer Progress," Modern Industry, vol. 24, no. 6 (Dec. 1952), pp 42-47

Editor, "Mathematical Wizards now at Industry's Service," Modern Industry, vol. 18, no. 5 (Nov. 1949), pp 43-47

Jay W. Forrester, "Digital Computers: Present and Future Trends," Proceedings of the Eastern Joint Computer Conference (New York: Institute for Radio Engineers, Inc., 1953), pp 109-113

Jerry Roedel, "An Introduction to Analog and Digital Computers," Industrial Science and Engineering," vol. 1, no. 4 (Oct. 1954), pp 10-15

Albert F. Sperry, "Information System Consolidates Process Control," Automatic Control, vol. 1, no. 5 (Nov. 1954), pp 4-7

Automatic Computer Listing

BIZMAC: Fred Yeaple, "Application of Electronic Tape Processing Equipment," The Controller, vol. 23, no. 6 (Jan. 1955), pp 27-275

Datatron 204: J. C. Alrich, "Engineering Description of the Electro-Data Digital Computer," Transactions of the Institute for Radio Engineers Professional Group on Electronic Computers, vol. EC-4, no. 1 (March 1955), pp 1-10

Datatron 204: L. L. Van Oosten, "The Medium-Sized Computer," Electronic Data Processing in Industry (New York: American Management Association, Inc., 1955), pp 160-168

ENIAC: D. R. Hartree, "The Eniac, an Electronic Computing Machine," Nature, vol. 158, no.4015 (Oct. 12, 1946), pp 500-508

E 101: James L. Rogers, "Computer Design Overcomes High Costs," Electrical Manufacturing, vol. 55, no. 5 (May 1955), pp 121-125

IBM CPC: E. J. Cunningham, "Job That Required 40 Man Days Now Completed in 8 Hours," American Business, vol. 23, no. 1 (Jan. 1953), pp 24, 38-39

IBM CPC: Franklin Myers, "Saving Hours at Martin," American Business, vol. 21, no. 3 (March 1951), pp 50-52

IBM CPC: Peter Wyden, "Biggest Brain in the Office," Science Digest, vol. 31, no. 1 (Jan. 1952), pp 23-26

IBM 608: Editor, "Automation in the Office," Office Management and Equipment, vol. 16, no.5 (May 1955), pp 32-33, 42-43

IBM 650: Harold F. Hatch, "John Hancock Gets First IBM 650," Journal of Machine Accounting Systems and Management, vol. 6, no. 1 (Jan. 1955), pp 7-8

IBM 650: Harold F. Hatch, "The Small Computer", Electronic Data Processing In Industry (New York: American Management Association, Inc., 1955), pp 148-159

IBM 701: Phillip Klass, "Giant Brains Could Aid Air Defense," Aviation Week, vol. 58, no. 19 (May 11, 1953), pp 67-73

IBM 702: Editor, "Machine Reads, Writes," Commerce Magazine, vol. 52, no. 2 (March 1955), pp 218-220

IBM 702: Hugh J. Reber, "Management Looks at the Computer: IBM 702," Automatic Control, vol. 1, no. 1 (July 1954), pp. 39-50

LEO: John Grindrod, "The Lyons Electronic Office," The Office, vol. 40, no. 1 (July 1954), pp 59-61

Logistics: Eugene Leonard, "Characteristics of a Logistics Computer," Proceedings of the Wescon (Los Angeles: Institute for Radio Engineers Professional Group on Electronic Computers, 1955), pp 77-85

NCR 102-D: Richard E. Sprague, "Specialized Electronic Equipment Development," Workshop for Management (New York: American Management Association, Inc., 1955), pp 322-327

ORDVAC: Peter Wyden, "Electron Powered Genius," Science Digest, vol. 32, no. 3 (Sept. 1952), pp 23-26

TRADIC: Editor, "New Transistor Computer Developed for the Air Force," Bell Laboratories Record, vol. 33, no. 4 (April 1955), pp 155-156

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Forum

INVENTORIES AND ECONOMIC ORDER QUANTITY

I. From C. G. Levee, Joliet, Ill.

Your article "A Big Inventory Problem and the IBM 702" by Neil D. Macdonald in the September issue of "Computers and Automation" interests me. As an accounting machine (IBM) supervisor I am working currently on my version of a punched card inventory control and accounting procedure. The procedure has been tested and inaugurated and appears to be satisfactory for an inventory of approximately 30,000 items. But up to date a reorder policy or formula has not been selected.

The economic order quantity formula described for International Business Machines Corp., Poughkeepsie, has now apparently been in use for several months and the results should be evident. What improvements in costs have resulted? What other improvements have resulted? To your knowledge what other companies have used this or a similar formula and what satisfaction do they report?

II. From C. E. Brunn, Dept. of Information, International Business Mach. Corp., New York

Your inquiry was forwarded to our plant in Poughkeepsie and they have told us that because of rapid changes in production schedules, they do not yet have definite data on the results of their use of the Economic Order Quantity formula in handling inventory on the IBM 702 electronic data processing machine. Although the changes in production schedules at Poughkeepsie have prevented them from setting a fixed optimum inventory level as a goal, yet the first signs of reduced set-up costs and ordering costs are beginning to appear. They are certain that significant savings in these areas will be effected.

We understand that records of various Systems and Procedures Conferences show that many companies are using a similar EOQ formula in handling inventory, although the handling of course is not necessarily performed on IBM machines. A few are:

York Corp.
General Electric
Westinghouse
Mullins Manufacturing Corp.
E. F. Houghton and Company
SKF Industries
Argus Cameras, Inc.

For information on the results obtained by these companies, we would suggest that you contact them directly.

• ——— •

Forum

SYMPOSIUM ON ANALOG COMPUTERS, KANSAS CITY, APRIL 10-11, 1956

On April 10 and 11, 1956, a Symposium for Management on Industrial Applications of Analog Computers will be held in the Hotel Phillips, Kansas City, Missouri. It is sponsored by the Midwest Research Institute, in cooperation with several technical societies. Details of the program will be announced early in February.

Odom Fanning
Manager, Information Services
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SPECIAL ISSUES OF "COMPUTERS AND AUTOMATION"

The June issue of "Computers and Automation" commencing with June, 1955, is a special issue, "The Computer Directory."

For details about the next computer directory, see "The Computer Directory, 1956: Notice."

Automation eeting, France (continued from page 14)

Automation: Relation between automation and production
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- END -

NEW PATENTS

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

The following is a compilation of patents pertaining to computers and associated equipment from the Official Gazette of the United States Patent Office, dates of issue as indicated. Each entry consists of: patent number / inventor(s) / assignee / invention.

November 15, 1955: 2,723,568 / Thomas O. Summers, Jr., Sherman Oaks, Calif. / - / A servomechanism having a manually movable input member and an output member that receives an external pressure which varies with the position of the output member.

2,723,800 / Gene R. Marner, Iowa City, Iowa / Collins Radio Co., Cedar Rapids, Iowa / An electro-mechanical axis converter.

2,723,801 / Hans P. Luhn, Armonk, N.Y. / IBM Corp., New York, N.Y. / An electro-mechanical decimal adder.

2,724,022 / Albert J. Williams, Jr., Philadelphia, William Russell Clark, Jenkintown, and Will McAdam, Ambler, Pa. / Leeds and Northrup Co., Philadelphia, Pa. / A self-balancing, fast-acting feedback amplifier for high impedance sources.

2,724,023 / Joseph Antoine Lemouzy, Paris, France / - / An electronic balanced amplifier.

2,724,034 / Joseph R. Altieri, Watertown, Mass. / Action Laboratories, Inc. / A multiturn variable resistor.

2,724,061 / Raymond W. Emery, Poughkeepsie, N.Y. / IBM Corp., New York, N.Y. / A binary trigger circuit having a single current-multiplication transistor.

2,724,103 / Robert L. Ashenhurst, Cambridge, Mass. / Bell Telephone Laboratories, Inc., New York, N.Y. / An electrical circuit employing magnetic core memory elements.

2,724,104 / Herbert K. Wild, Wappingers Falls, N.Y. / IBM Inc., New York, N.Y. / A ring-check circuit for a plurality of storage units.

2,724,115 / Clyde Stewart, Cedar Rapids, Iowa / Collins Radio Company, Cedar Rapids, Iowa / A tracking system.

November 22, 1955: 2,724,251 / Hugh T. Weaver, Grand Rapids, Mich. / Lear, Inc., Grand Rapids, Mich. / A zero-backlash coupling for shafts.

2,724,269 / Henry Paul Kalmeis, Washington, D.C. / United States of America / An apparatus for measuring the velocity of motion of a medium with respect to loci spaced apart in a direction at least parallel to a component of the flow to be investigated.

2,724,281 / Thomas O. Summers, Jr., Sherman Oaks, and Roman J. Dolude, Los Angeles, Calif. / Summers Gyroscope Co., Santa Monica, Calif. / A self-adjusting friction clutch and reversing mechanism.

2,724,553 / Alfred H. Faulkner, Chicago, Ill./ Automatic Electric Laboratories, Inc., Chicago, Ill. / A time interval meter.

2,724,780 / James R. Harris, Dover, N.J. / Bell Telephone Laboratories, Inc., New York, N.Y. / An inhibited trigger circuit.

2,724,782 / Raymond A. Holloway, North Hollywood, Calif. / Lockheed Aircraft Corp., Burbank, Calif. / A phase sequence correcting circuit.

2,724,789 / Wilcox P. Overbeck, Richland, Wash. / United States of America / A thyration counting circuit.

November 29, 1955: 2,724,998 / Raymond C. Goertz and Robert L. Wathen, Hempstead, N.Y. / Sperry Rand Corp. / A positional control apparatus for aiming a gun.

2,725,191 / James Milton Ham, Toronto, Ontario, Canada / - / An electronic integrator for integrating one function with respect to another.

2,725,192 / Le Roy E. Kolderup, Glen Cove, N.Y. / - / A device for multiplying a first variable by a second variable.

2,725,471 / Scott S. Appleton and Millard M. Brenner, Belmar, N.J. / United States of America / A storage circuit having a negative feedback amplifier for producing a low impedance source of direct current potential of amplitude equal to the peak value of a short duration pulse and for adjusting the amplitude in accordance with the peak value of each subsequently received pulse.

2,725,476 / Edward Herman Hugenholtz, Hilversum, Netherlands / Hartford National Bank and Trust Company, Hartford, Conn. / A system for stabilizing a first voltage produced by a variable oscillator with respect to a second voltage produced by a reference oscillator having automatic stabilization apparatus operative within a predetermined catching range for effecting the stabilization.

2,725,510 / James H. Reid, Maywood, N.J./ Allen

(continued on page 34)

PUBLICATIONS

P 34; LINEAR PROGRAMMING AND COMPUTERS. Reprint of two articles by Chandler Davis, in July and August 1955 "Computers and Automation". A clear, well-written introduction to linear programming, with emphasis on the ideas. $1.20

P 2D: THE COMPUTER DIRECTORY, 1955. 164 pages, 7500 Who's Who entries, 300 Organization entries, and 600 entries of Products and Services for Sale in the Computer Field; 250,000 words of condensed factual information about the computer field, June 1955 issue of "Computers and Automation." $4.00

P 32: SYMBOLIC LOGIC, by LEWIS CARROLL. Reprint of "Symbolic Logic, Part I, Elementary," 4th edition, 1897, 240 pages, by Lewis Carroll (C. L. Dodgson). Contains Lewis Carroll's inimitable and entertaining problems in symbolic logic, his method of solution (now partly out of date), and his sketches of Parts II and III, which he never wrote since he died in 1898. ....$2.50

P 25: NUMBLES -- NUMBER PUZZLES FOR NIMBLE MINDS. Report. Contains collection of puzzles like:

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B. DuMont Laboratories, Inc., Clifton, N.J. / A servomechanism having a capacitor error sensing means for follow-up system.

2,725,518 / Keith H. Sueker, Pittsburgh, Pa. / Westinghouse Electric Corp., East Pittsburgh, Pa. / A voltage error sensing device responsive to an alternating-current voltage and substantially insensitive to the frequency of the alternating-current voltage over a wide range of frequency variation.

2,725,519 / Franklin S. Malick, Glen Burnie, Md, and Clarence L. Mershon, Lima, Ohio / Westinghouse Electric Corporation, East Pittsburgh, Pa. / A magnetic amplifier electrical position control system.

2,725,521 / Wilhelm A. Geyger, Takoma Park, Md., / United States of America / A differential coupling circuit for multistage half-wage magnetic servo amplifiers.

2,725,522 / Donald M. Murray and Norbert Leo Kusters, Ottawa, Ontario, Canada / National Research Council, Ottawa, Ontario, Canada / A high-speed voltage stabilizer for an alternating current supply system.

2,725,528 / Robert V. Werner, San Diego, Calif. / General Dynamics Corp. / Apparatus for measuring and indicating phase difference and direction between two alternating voltages of substantially the same frequency.

2,725,530 / Alfred C. Schroeder, Southhampton, Pa. / RCA / A quantizing apparatus.

2,725,549 / Wallace J. Dunnet, Newtonville, Mass. / Westinghouse Electric Corp., East Pittsburgh, Pa. / An auctioneering circuit for selecting one of a plurality of separate control signals and for supplying energy to a load in accordance with the selected control signal.

December 6, 1955: 2,725,750 / Erling G. Togstad, La Crescenta, Calif. / one third to Theodore H. Fraser, Sherman Oaks, and one third to William Koerner, Santa Monica, Calif. / An angular rate instrument.

2,726,037 / Walter W. Landsiedel, Elmira, N.Y. / Sperry Rand Corp., New York, N.Y. / A short-cut multiplication mechanism.

2,726,038 / William K. Ergen, Oak Ridge, Tenn. / United States of America / An electronic digital computer.

2,726,074 / Raymond W. Ketchledge, Middlesex, N.J. / Bell Telephone Laboratories, Inc., New York, N.Y. / An acceleration measuring system.

2,726,328 / Albert M. Clogston, Morris Plains N.J. / Bell Telephone Laboratories, Inc., New York, N.Y. / A binary electrostatic storage system.

2,726,329 / J. Alvin Henderson, Fort Wayne, Indiana / International Telephone and Telegraph Corp. / A signal terminator circuit.

2,726,330 / Walter H. MacWilliams, Jr., Summit, and Floyd C. Ong, Morris Township, Morris County, N.J. / Bell Telephone Laboratories, Inc., New York, N.Y. / A pulse ordering circuit.

2,726,331 / Robert B. Robinson, Seattle, Wash. / Boeing Airplane Co., Seattle, Wash. / A triangular-wave generator.

2,726,365 / Kenneth A. Bilderback, Abilene, Texas / Schlumberger Well Surveying Corp., Houston, Texas / An electromechanical computer.

2,726,382 / John Bell, Beckenham, England / Muirhead and Co., Ltd., Beckenham, England / An angular adjustment of synchros.

December 13, 1955: 2,726,544 / Harry G. Anastasia, Paramus and Henry G. Elwell Jr., Hackensack, N.J. / - / A rate of change of altitude indicator.

2,726,810 / Gifford E. White, Hempstead, N.Y. / The Sperry Rand Corp., / An electric fire control system for use against relatively moving targets.

2,726,811 / Philip H. DuBois, Clayton, Mo. / - / An apparatus for translating two decimal digits.

2,727,194 / Eugene Seid, Los Angeles, Calif./ North American Aviation, Inc. / A double digital servo.

2,727,208 / Carl P. Spaulding, Pasadena, Calif. / Consolidated Engineering Corp., Pasadena, Calif. / A bridge circuit for sensing small changes of capacitance.

2,727,209 / Harry F. Mayer, Baldwinsville, N.Y. / General Electric Co. / A precision time interval measuring system.

2,727,229 / James L. Anast, Xenica, and George T. Minshall, Wilmington, Ohio / - / A radar navigational system for aircraft.

December 20, 1955: 2,727,403 / James P. Madden, Bethlehem, Pa. / - / A servo-mechanism.

2,727,682 / Omar L. Patterson, Media, Pa./ Sun Oil Company, Philadelphia, Pa. / An analog computer or analyzer.

2,727,683 / Philip H. Allen, Orinda, Calif., and Benjamin J. Chromy, Washington, D. C./ - / A reversible registering apparatus.

2,727,988 / Frederic C. Williams, Timperley, and Tom Kilburn, Northfield, Dewsbury, England / National Research Development Corp., London, England / A circuit for developing electric signals dependent upon the sense of electric pulses.

2,727,990 / Donald P. Shoultes, Vestal, and Walter M. Swathout, Apalachin, N.Y./ IBM Corp., New York, N.Y. / A system for monitoring alternating current voltages.

2,727,991 / Claude Marie Edmond Masson, Paris, France / Societe d'Electronique et d'Automatisme, Courbevoie, France / An electronic decade counter of electric pulses.

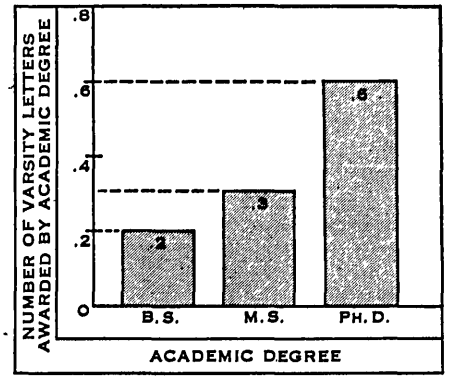
2,727,992 / Theodore J. Wilson, Minneapolis, Minn. / Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. / An electronic control circuit.

2,727,993 / Norman N. Epstein, Redwood City, Calif. / Lenkuit Electric Co., Inc., San Carlos, Calif. / An oscillator stabilized with respect to frequency and amplitude.

Brain and Brawn

Some of the young fellows on our staff have been analyzing our files of personal data regarding scientists and engineers here at Hughes. What group characteristics would be found?

With additional facts cheerfully contributed by their colleagues they have come up with a score of relationships—some amusing, some quite surprising. We shall chart the most interesting results for you in this series.



Contrary to popular belief, higher academic study goes hand in hand with increased school athletic activity—as shown in the above chart. This is based on data obtained from a 20% random sample of the 2400 professional engineers and scientists of Hughes Research and Development Laboratories.

In our laboratories here at Hughes, more than half of the engineers and scientists have had one or more years of graduate work, one in four has his Master's, one in 15 his Doctor's. The Hughes research program is of wide variety and scope, affording exceptional freedom as well as exceptional facilities for these people. Indeed, it would be hard to find a more exciting and rewarding human climate for a career in science. Too, the professional level is being stepped up continually to insure our future success in commercial as well as military work.

Hughes is pre-eminent as a developer and manufacturer of airborne electronic systems. Our program includes military projects in ground and airborne electronics, guided missiles, automatic control, synthetic intelligence. Projects of broader commercial and scientific interest include research in semiconductors, electron tubes, digital and analog computation, data handling, navigation, production automation.

DUE TO THE *expanding use of Hughes electronic systems, new positions are open for engineers who have demonstrated ingenuity and inventive ability in the areas of product design.*

SCIENTIFIC STAFF RELATIONS

Hughes

RESEARCH AND DEVELOPMENT LABORATORIES

Culver City, Los Angeles County, California

ials into finished goods and replacements for the machines. But -- they required control. They were controlled by the computers for each factory and, by now, as Level VII approached, also by the enormous central computers of the Product-Centers.

Some of the technical people designed better computers and had the machines build these better computers. They could do more things than the older models and do them better. Because of the vast increase in the data needed by the Product-Centers, it became common practice to feed the old information into the newer computer. For example, when for a particular Product-Center, a better and faster computer was built, and substituted, the information acquired by the old computer was transferred into the newer computer. But since the actual form of the stored information was, at times, changed or translated to new forms, the new models of the computers were also required to learn. This was actual learning -- not pure memory but actual learning using intuition, deduction, insight, all the facets of skillful learning. This became machine intuition, machine learning.

Then one day at a crucial moment a Product-Center for the manufacture of computers learned, by the newly included process of intuition, deduction, insight, how to make better computers, much cleverer than its prior masters. This was fatal. The new computer learned very fast; men had taught it to digest information quickly. It learned and continued to learn faster and faster and faster until it was beyond control. The monster had communication with the entire production system of the earth by now, and it ran away without control. The machines it controlled built better and faster machines which built more and better machines-there was no control and no end. The machines built to serve man devoured the resources of the earth. They stopped making food, clothing, medicine, for machines need none.

The people of this day had long forgotten the ways of their ancestors. They had forgotten how to grow food, how to hunt, how to fish. When the machines stopped producing and processing food, people starved. When the machines stopped making clothes, medicine, and all types of goods for men, men perished. Automation had gone the full cycle.

. . . . .

"This then is the story of the species man on the planet earth," said the historian. "When you next visit that planet, and see its verdant plant life, its animals roaming here and there in the vast wilds, remember -- this could happen here. This could happen to us: we must never let it happen."

- END -

THE COMPUTER DIRECTORY, 1956:

NOTICE

The June 1956 issue of "Computers and Automation" will be the second issue of "The Computer Directory". Last year we published the first issue, 164 pages. Our present plans for the June 1956 directory follow:

Part 1 of the directory in 1956 will be a cumulative "Roster of Organizations in the Computer Field" based on the last cumulative roster (published December 1955, containing about 330 entries) and brought up to date. Entries in this roster will be free. If you know of any changes, additions, or corrections which should be made in the entries, please tell us.

Part 2 of the directory will be the second edition of "The Computing Machinery Field: Products and Services for Sale." Over 600 entries on 21 pages appeared in the first edition in June 1955; a considerable increase is anticipated. The previous entries, and blank forms, will be sent in February, to suppliers for review, checking, and additions. It is expected at this time that a nominal charge of $6.00 an entry will be requested from each supplier in order to help defray the cost of preparing and printing the directory; but if the charge is not paid, the entry may still appear in condensed form, if desirable to make the listing complete.

Part 3 of the directory will be the third edition of the Who's Who in the Computer Field. In the June 1955 issue, about 7500 entries appeared on 96 pages; of these about 2600 were full entries, and the remainder were brief entries. Our present plans are to publish only new or revised Who's Who information in the June 1956 directory. Blank forms for new or revised entries will be sent in February or March to all computer people we know of. It is expected at this time that a nominal charge of $2.00 an entry will be requested from each person whose entry is printed, in order to help defray the cost of preparing and printing the Who's Who; but if the charge is not paid, a brief entry may appear in condensed form if desirable to make the listing complete.

The main reason for the nominal charges mentioned above is that we look on the directory as a service to many people in the computer field; yet so far it has not paid for itself; and we need to make a compromise, publishing at least some information about everything that should appear in the directory, but fuller information for those who have shared directly in the cost.

The Editor's Notes (continued from page 4)
If published there, when you want to know something about an author, you can simply look up and find out.

In regard to the charges for the Who's Who entries, what we said in the January issue was this: "Our present plans are to publish only new or revised Who's Who information in the June, 1956, directory. It is expected at this time that a nominal charge of $2.00 an entry will be requested from each person whose entry is printed, in order to help defray the cost of preparing and printing the Who's Who; but if the charge is not paid, a brief entry may appear in condensed form if desirable to make the listing complete. The main reason for the nominal charges (for the Who's Who and the Products and Services Roster) is that we look on the directory as a service to many people in the computer field; yet so far it has not paid for itself; and we need to make a compromise, publishing at least some information about everything that should appear in the directory but fuller information for those who have shared directly in the cost."

The publication of the "Who's Who in the Computer Field" in various issues 1953 to 1955 has raised many questions for us. Some readers have told us that we are crazy to make available in the pages of our magazine the names of computer people — that we should keep that information confidential, as part of our business stock in trade. Other people, including a very well known management firm, have told us that they carefully pick up the names of persons in our Who's Who and put them into their files, so as to help advise management of big companies how to find good computer men. We know that we ourselves use the Who's Who to find the address and background of persons whom we want to know about; we think many other people do also. And finally, the file of names of computer people which we keep on punch cards in order to construct the Who's Who, and which now contains about 11,000 names of computer people, is also regularly used by the Joint Computer Conference to send out announcements of computer meetings.

A reasonable cost for preparing, printing, and mailing a page of the Computer Directory last year was around $50 to $60. Such a page may contain 30 to 35 Who's Who entries. It should be self-supporting. Basically, the only money that we get is money we earn: no organization that has to make a profit to stay in existence can afford much nonprofit activity: either the Who's Who should pay for itself or it should be omitted.

This year we think we should go ahead with the experiment, and find out if a good Who's Who can be published with a requested nominal charge of $2 for each entry.

The crux of the matter is that in our opinion the Who's Who is useful to computer people. If they vote with adequate support that it is useful, we can keep it up. If they vote otherwise, then we shall drop it.

III. From Paul Armer
Santa Monica, Calif.

I'd like to make a few comments on your remarks in response to my letter to you. Note by the Editor: The remarks sent to Armer by the Editor were much more brief than the discussion written above.

I am not suggesting that your Who's Who Directory be operated at a loss, but that the support for it come from those for whom there exists a motivation to support it. As an individual I object to paying money for the inclusion of my name in the directory; as the head of a computing installation, I am quite willing to pay for the Who's Who Directory (I purchased an extra copy of your June 1955 issue, in addition to the one received via our subscription).

With respect to biographies of authors, you say that you would like to include biographies. Why not be positive and demand autobiographies from people who submit articles for publication?

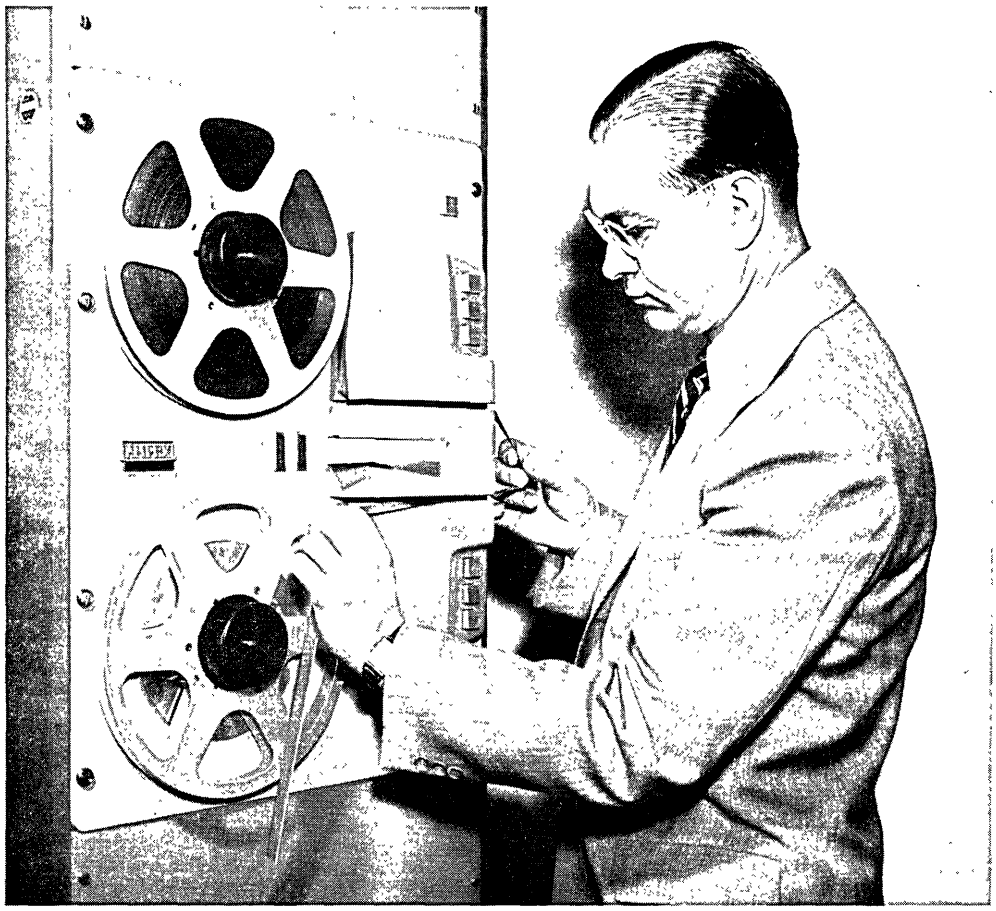
IV. From the Editor

Mr. Armer suggests additional possibilities about the Who's Who. We should be glad to publish free Who's Who entries for any person in the computer field if we could sell 1500 extra copies of "The Computer Directory, 1956" ahead of time at $4 each. In the mailing for Who's Who entries that we shall send out, we shall try to leave open as many possibilities as we can.

As to "demanding" biographies of authors "positively", we would be inclined to request biographies in an inoffensive way — but we would prefer obtaining the information by just looking up in the "Who's Who."

- END -

new digital magnetic tape transport →



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The time saving feature of single loop threading is provided by a lever which moves the idlers into a straight line. This arrangement eliminates chance of faulty threading by unskilled personnel.

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On the Ampex FR200 the tape attains full speed or full stop within less than 5 milliseconds to provide high information storage density. A remote control provision is provided, as well as pushbuttons on the topplate.

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FULL SPECIFICATIONS ON THE FR200 *and description of its features and accessories are given in descriptive literature. For your copy, write Dept. VV-2539*

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DISTRIBUTORS: Radio Shack, Boston; Bing Crosby Enterprises, Los Angeles; Southwestern Engineering & Equipment, Dallas and Houston; Ampex-American in Canada.

Publications (continued from page 28)

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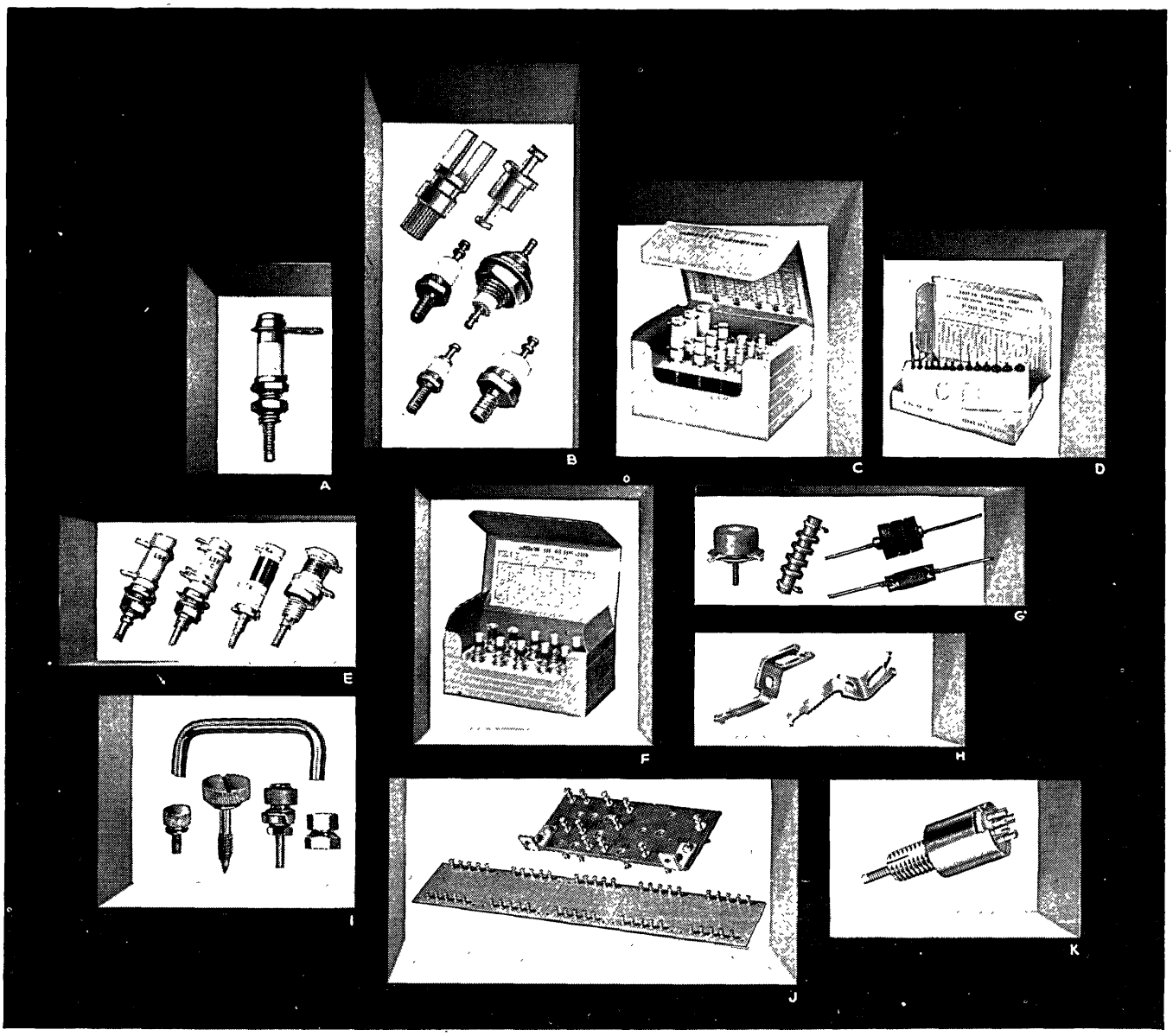

CTC Components shown include: A. capacitor; B. standard and insulated terminals; C. coil form kit; D. RF choke kit; E. coil forms and coils; F. coil kit; G. RF chokes; H. diode clips; I. panel hardware; J. standard and custom terminal boards; K. shielded coil form.

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Whether you need terminals, clips, coils, chokes, capacitors — or any of a number of electronic components — you can be sure they're right if they're made by CTC.

One continuing basic idea governs the manufacture of every CTC product. And that idea is: *quality control.* We could not guarantee our products as we do without a constant check of numerous details that determine reliable performance. Our quality control engineers see to it that these manufacturing standards are consistently maintained — right through to periodic microscopic inspection.

Pictured here are a number of components available at CTC including our three kits. These items come in standard forms and are also custom engineered to meet your particular requirements. We would be glad to give you complete details, including specifications and prices, on any or all CTC units — as well as information on how CTC components can be specially designed to solve your individual electronic components problems.

You will find it well worthwhile to use components that are *guaranteed.* Write to Cambridge Thermionic Corporation, 430 Concord Avenue, Cambridge 38, Mass. West Coast manufacturers contact: E. V. Roberts, 5068 West Washington Blvd., Los Angeles 16 and 988 Market Street, San Francisco, California.

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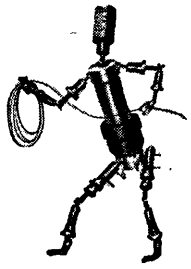
makers of guaranteed electronic components, custom or standard



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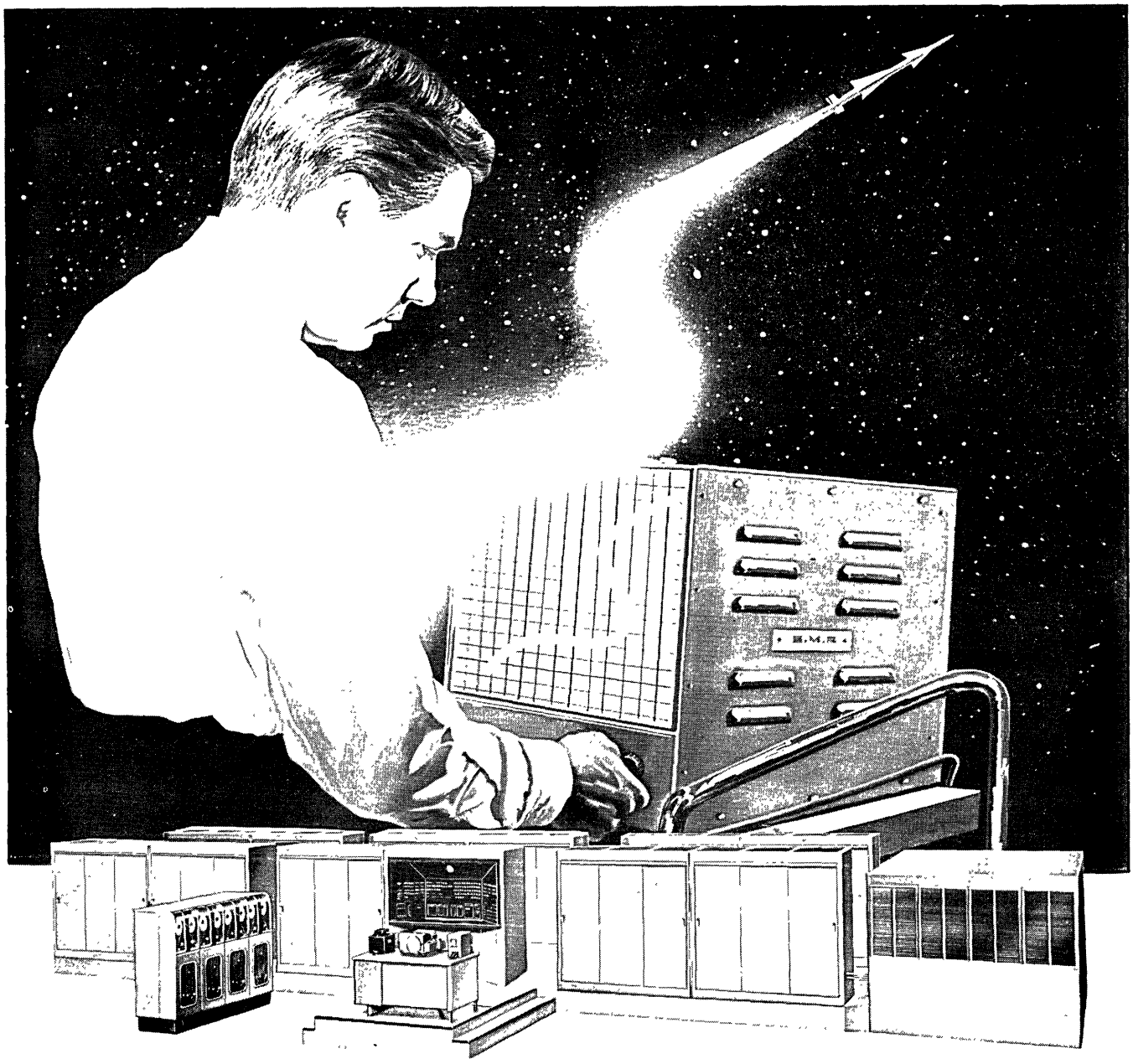
"Why, Miss Hebe, I could give you an almost perfect count of the stars if you could come up to our computer laboratory."



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Remington Rand Univac

DIVISION OF SPERRY RAND CORPORATION

ADVERTISING IN "COMPUTERS AND AUTOMATION"

Memorandum from Berkeley Enterprises, Inc.
Publisher of COMPUTERS AND AUTOMATION
36 West 11 St., New York 11, N.Y.

1. What is "COMPUTERS AND AUTOMATION"? It is a montly magazine containing articles, papers, and reference information related to computing machinery, robots, automatic control, cybernetics, automation, etc. One important piece of reference information published is the "Roster of Organizations in the Field of Computers and Automation". The basic subscription rate is $5.50 a year in the United States. Single copies are $1.25, except June, 1955, "The Computer Directory" (164 pages, $4.00). For the titles of articles and papers in recent issues of the magazine, see the "Back Copies" page in this issue.

2. What is the circulation? The circulation includes 2000 subscribers (as of Feb.10): over 300 purchasers of individual back copies; and an estimated 2500 nonsubscribing readers. The logical readers of COMPUTERS AND AUTOMATION are people concerned with the field of computers and automation. These include a great number of people who will make recommendations to their organizations about purchasing computing machinery, similar machinery, and components, and whose decisions may involve very substantial figures. The print order for the Feb. issue was 2600 copies. The overrun is largely held for eventual sale as back copies, and in the case of several issues the overrun has been exhausted through such sale.

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

4. What are the specifications and cost of advertising? COMPUTERS AND AUTOMATION is published on pages 8½" x 11" (ad size, 7" x 10") and produced by photooffset, except that printed sheet advertising may be inserted and bound in with the magazine in most cases. The closing date for any issue is approximately the 10th of the month preceding. If possible, the company advertising should produce final copy. For photooffset, the copy should be exactly as desired, actual size, and assembled, and may include typing, writing, line drawing, printing, screened half tones, and any other copy that may be put under the photooffset camera without further preparation. Unscreened photographic prints and any other copy requiring additional preparation for photooffset should be furnished separately; it will be prepared, finished, and charged to the advertiser at small additional costs. In the case of printed inserts, a sufficient quantity for the issue should be shipped to our printer, address on request.

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

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

Ampex Corp.
Arnold Engineering Co.
The Austin Co.
Automatic Electric Co.
Bendix Aviation Corp.
Cambridge Thermionic Corp.
Epsco, Inc.
Ferranti Electric Co.
Ferroxcube Corp. of America
General Electric Co.
Hughes Research and Development Lab.
International Business Machines Corp.
Lockheed Aircraft Corp.
Logistics Research, Inc.
The Glenn L. Martin Co.
Monrobot Corp.
Norden-Ketay Corp.
Northrop Aircraft, Inc.
George A. Philbrick Researches, Inc.
Potter Instrument Co.
Raytheon Mfg. Co.
Reeves Instrument Co.
Remington Rand, Inc.
Republic Aviation Corp.
Sprague Electric Co.
Sylvania Electric Products, Inc.

ADVERTISING INDEX

The purpose of COMPUTERS AND AUTOMATION is to be factual, useful, and understandable. For this purpose, the kind of advertising we desire to publish is the kind that answers questions, such as: What are your products? What are your services: And for each product, What is it called? What does it do? How well does it work? What are its main specifications?

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

Aircraft Marine Products, Inc., 2100 Paxton St., Harrisburg, Pa. / Universal Patchcord Programming Systems / Page 47 / CA No. 93

Ampex Corp., 934 Charter St., Redwood City, Calif. / Digital Magnetic Tape Transport / Page 39 / CA No. 94

Arma Division, American Bosch Corp., Roosevelt Field, Garden City, L.I., N.Y. / Engineering Opportunities / Page 30 / CA No. 95

Berkeley Enterprises, Inc., 513 Ave. of the Americas, New York 11, N.Y. / Publications, Geniac Kit / Pages 33, 35 / CA No. 96

Cambridge Thermionic Corp., 430 Concord Ave., Cambridge 38, Mass. / Computer Components / Page 41 / CA No. 97

Computers and Automation, 513 Ave. of the Americas, New York 11, N.Y. / Back Copies, Advertising / Pages 29, 44 / CA No. 98

Ferroxcube Corp., East Bridge St., Saugerties, N.Y. / Magnetic Core Materials / Page 37 / CA No. 99

General Electric Co., Schenectady, N.Y. / Engineers and Mathematicians / Page 19 / CA No. 100

Hughes Research and Development Laboratories, Culver City, Calif. / Help Wanted / Page 35/ CA No. 101

Lockheed Aircraft Corp., California Div., Burbank, Calif. / Mathematical Analysts Wanted/ Page 5 / CA No. 102

Lockheed Missile Systems, 7701 Woodley Ave., Van Nuys, Calif. / Research and Development/ Page 45 / CA No. 103

Macmillan Co., 60 Fifth Ave., New York 11, N.Y./ Book - "Methods in Numerical Analysis" / Page 31 / CA No. 104

Northrop Aircraft, Inc., Hawthorne, Calif. / Help Wanted / Page 33 / CA No. 105

Ramo-Wooldridge Corp., 8820 Bellanca Ave., Los Angeles 45, Calif. / Page 2 / CA No. 106

R.C.A. Service Co., Inc., Missile Test Project, P.O. Box 1226, Melbourne, Fla. / Help Wanted / Page 37 / CA No. 107

Remington Rand, Inc., 315 4th Ave., New York 10, N.Y. / Univac / Page 48 / CA No. 108

Sprague Electric Co., 377 Marshall St., North Adams, Mass. / Pulse Transformer Kit / Page 48 / CA No. 109

READER'S INQUIRY

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

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READER'S INQUIRY FORM

Name (please print)....

Your Address?....

Your Organization?....

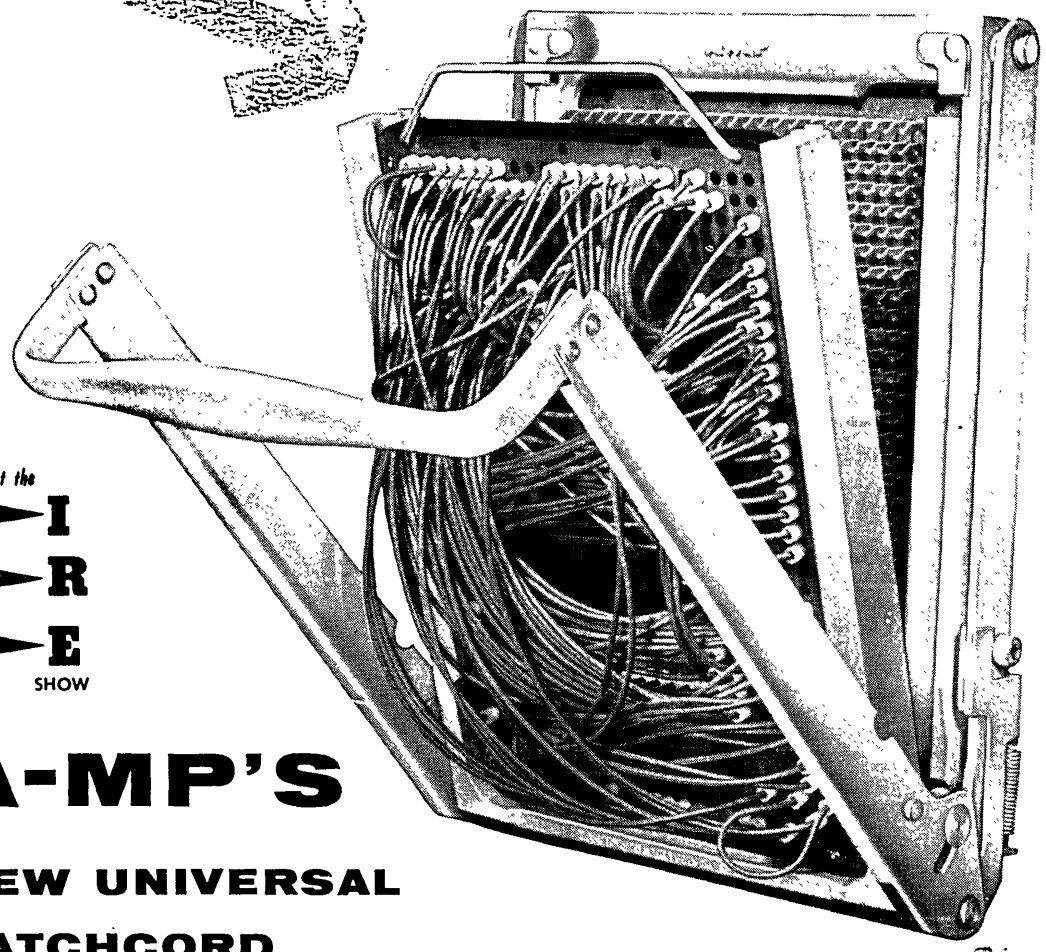
Its Address?....

Your Title?....

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

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

REMARKS:



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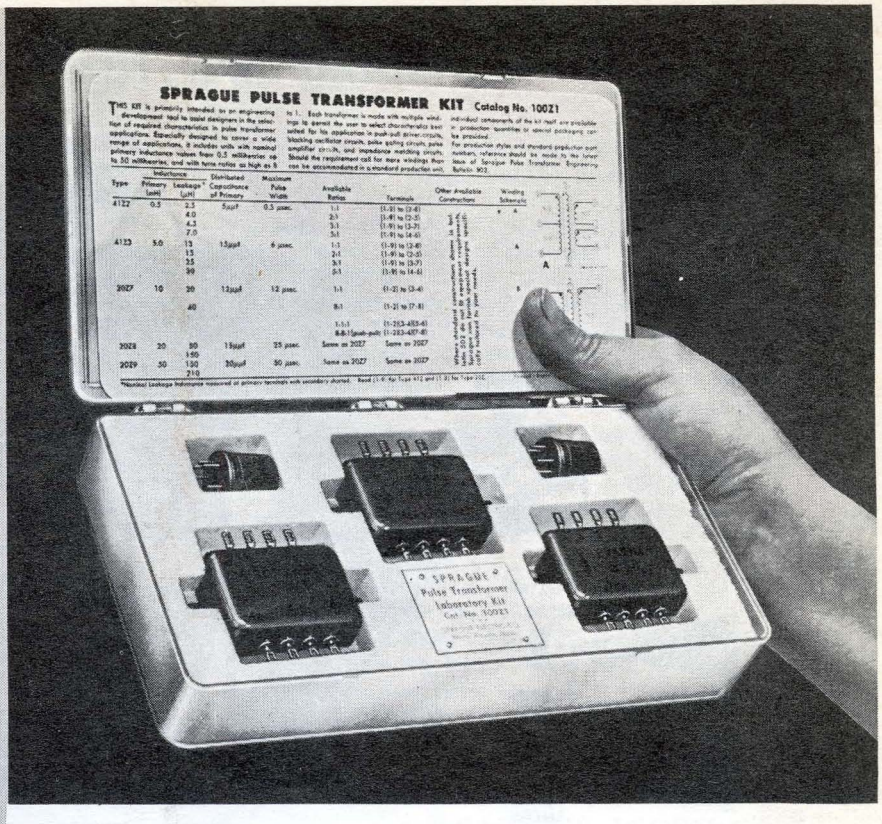
Sprague Pulse Transformer Kit Simplifies Circuit Design



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

CHARACTERISTICS OF KIT TRANSFORMERS

Type	Induct. Pri. (μH)	Induct. Leakage (μH)	Dist. Cap. of Pri. (μμF)	Max. Nom. P.W. Range (μsec)	Avail. Ratios
41Z2	0.5	2.5 4.0 4.5 7.0	5	0.5	1:1 2:1 3:1 5:1
41Z3	5.0	13 15 25 30	15	6	1:1 2:1 3:1 5:1
20Z7	10	20 40	12	12	1:1 8:1 1:1:1 8:8:1
20Z8	20	50 150	15	25	same as 20Z7
20Z9	50	150 210	20	50	same as 20Z7

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

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