The UNIVAC SYSTEM


UNIVAC

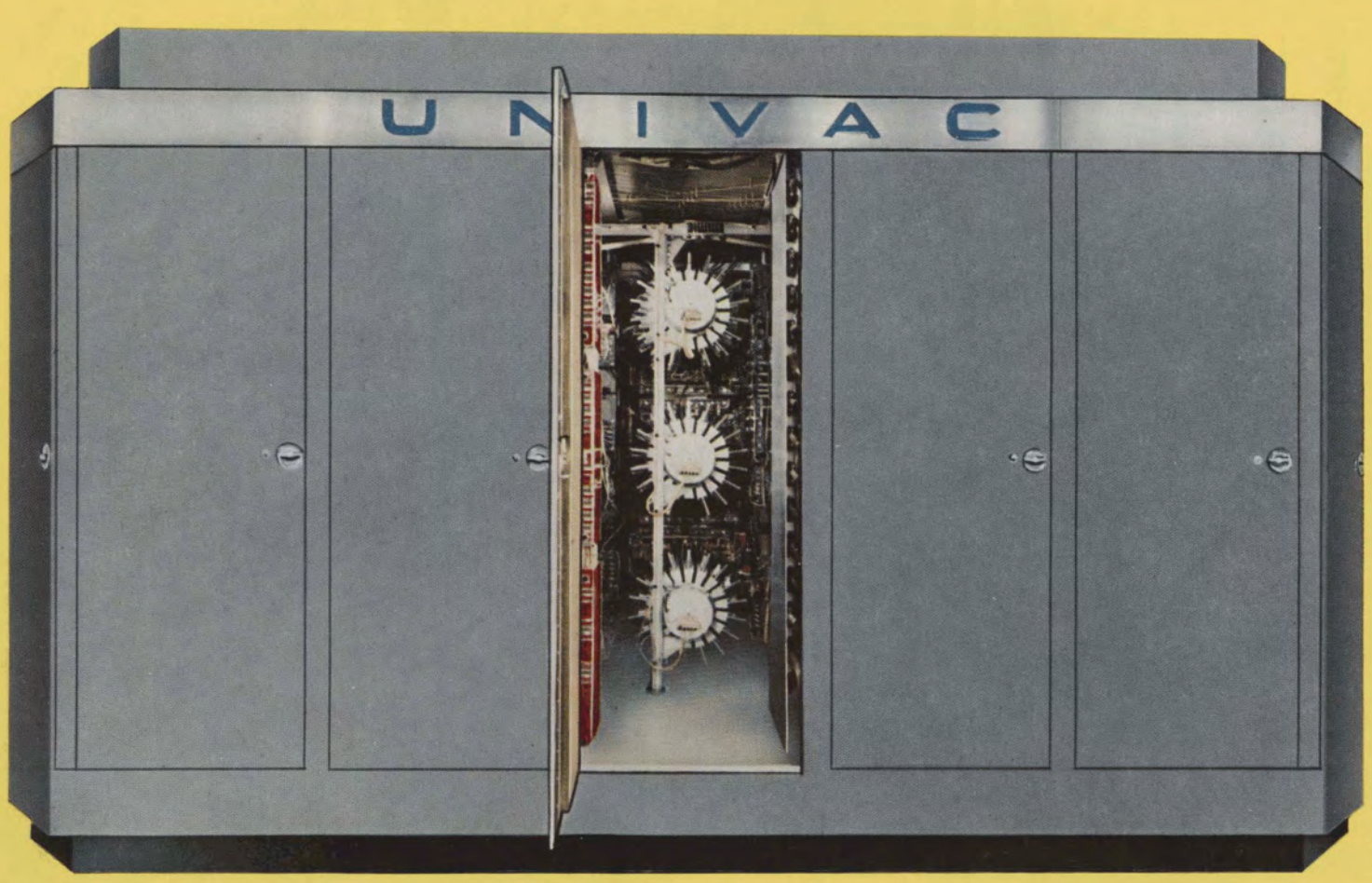
The Remington UNIVAC

FIRST CHOICE OF MODERN MANAGEMENT

First so-called "giant brain" on the market—first in large-scale production – first electronic computing system to satisfy the diverse needs of business management – Univac is the acknowledged leader in the electronic computing field.

Everyone has heard about the scientific computing marvels that this type of equipment is capable of performing. But less well known are the many equally important commercial routines which the Remington Rand Univac – and Univac alone – handles automatically and economically, with matchless accuracy, to achieve results such as these:

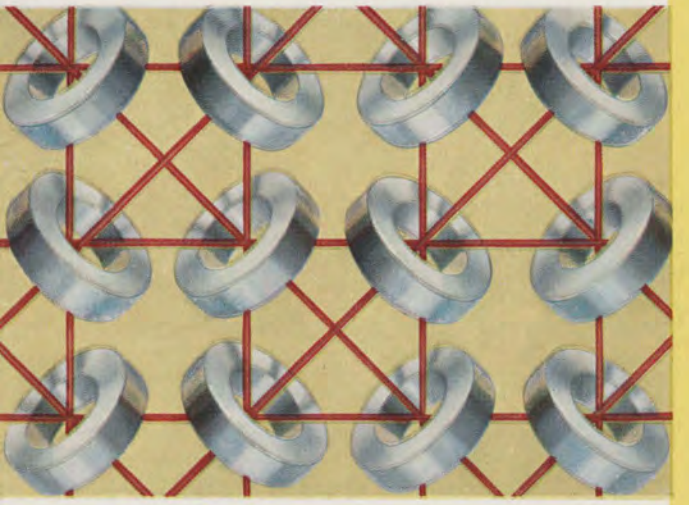
- Classifying survey results with time savings of 30 to 1 and dollar savings of 5 to 1.
- Performing, in 2 days, public utility rate studies which formerly required 21 man-weeks.
- Compiling, in 16 hours, actuarial statistics which would require *2 machine-months* with punched-card equipment.



the central computer...

This is the "heart" of the Univac System. All other equipment is designed either to feed information into the Central Computer as input, or get final results from it as output. Data-processing in this unit, and checking of results, are completely automatic. Nothing that takes place within the Central Computer in the solution of a problem requires human intervention.

The Univac checks important operating conditions by such means as fuse, temperature, and voltage monitors. This automatic voltage monitor checks all voltages once every two minutes while the computer is running.

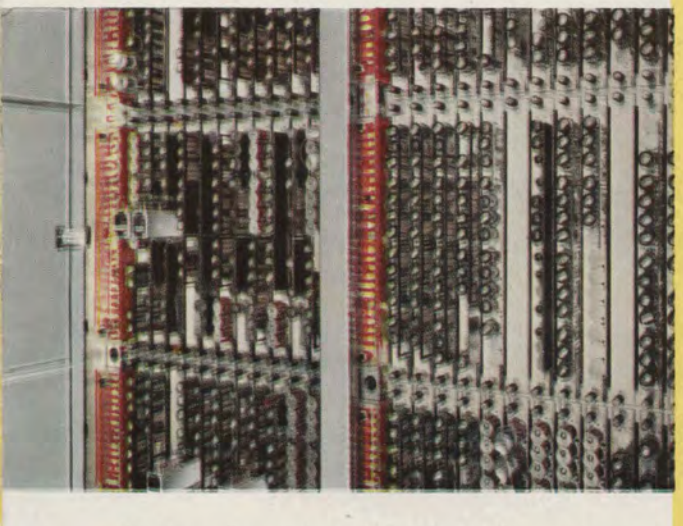


168,000 of these tiny magnetic cores go into each of the new Univac 24,000-character memories, with 5 times this capacity available if needed. A single core is approximately the size of the head of a pin.

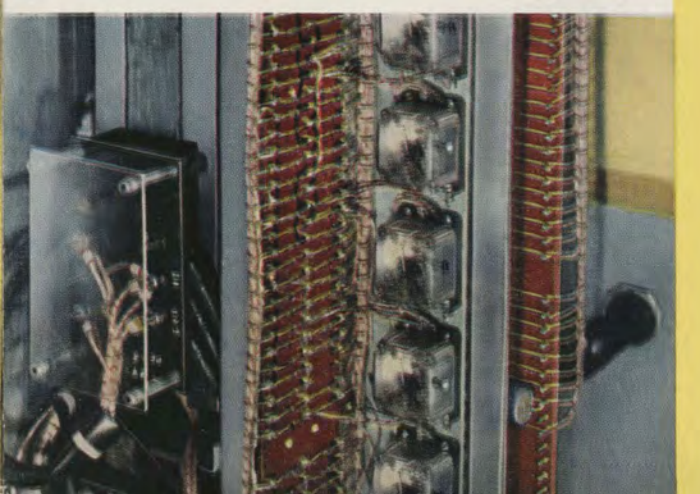
the supervisory control

The Supervisory Control is the "nerve center" of the system, giving the operator a continual picture of Univac's internal operation. The keyboard on the panel provides means whereby the operator can "talk" to the computer; a control printer permits the computer to "talk back" automatically.

Over 5,400 vacuum tubes are used in the Central Computer, as well as more than 18,000 crystal diodes. There are approximately 200 miles of electrical wiring used in the construction of a Univac System.



The internal operations of the Central Computer are continually and completely checked to ensure reliable results. These monitors detect overheating, signalling the location of potential trouble before it develops.



uniservos

As many as 10 Uniservos handle the magnetic tape which provides high-speed input and output for the Central Computer. The Uniservos convert data recorded on tape into electrical impulses, feeding them into the computer at the rate of 20,000 numbers or letters a second. Uniservos also produce a magnetic recording of output at this same peak speed.

UNIVAC input auxiliaries.

The input and output medium of the Central Computer Group is magnetic tape. These metallic tapes are prepared, and results taken from them, by auxiliary equipment.

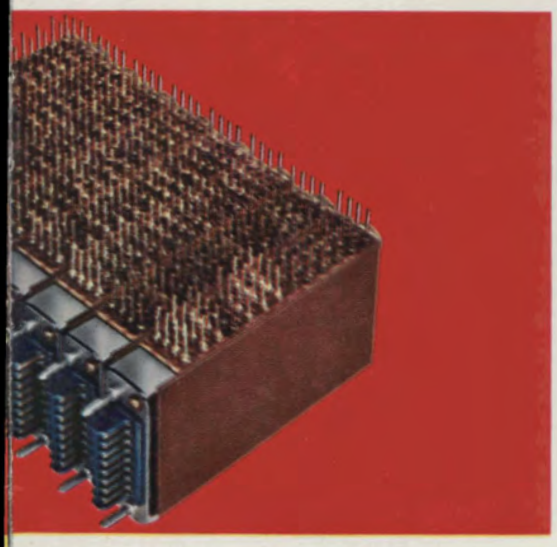
All input and output auxiliaries can be operated without interrupting the work of the Central Computer Group. Each unit of the System serves a special purpose in the series of operations that begins with raw data and ends with a processed result.

The Magnetic Core Memory of the Card-to-Tape Converter — *just ⅓ actual size*. Univac incorporates, throughout the System, the latest, most economical, and most efficient electronic developments.

card-to-tape converter

When the Univac System is integrated into an existing punched-card system, the Card-to-Tape Converter rapidly and automatically prepares an accurate duplication on tape of the information contained in the punched cards. Processing 240 cards a minute, the Converter reads each card twice and compares the second reading with the initial recording on the magnetic tape. If the two are not identical in every respect, the card is automatically ejected for special attention.

. . .



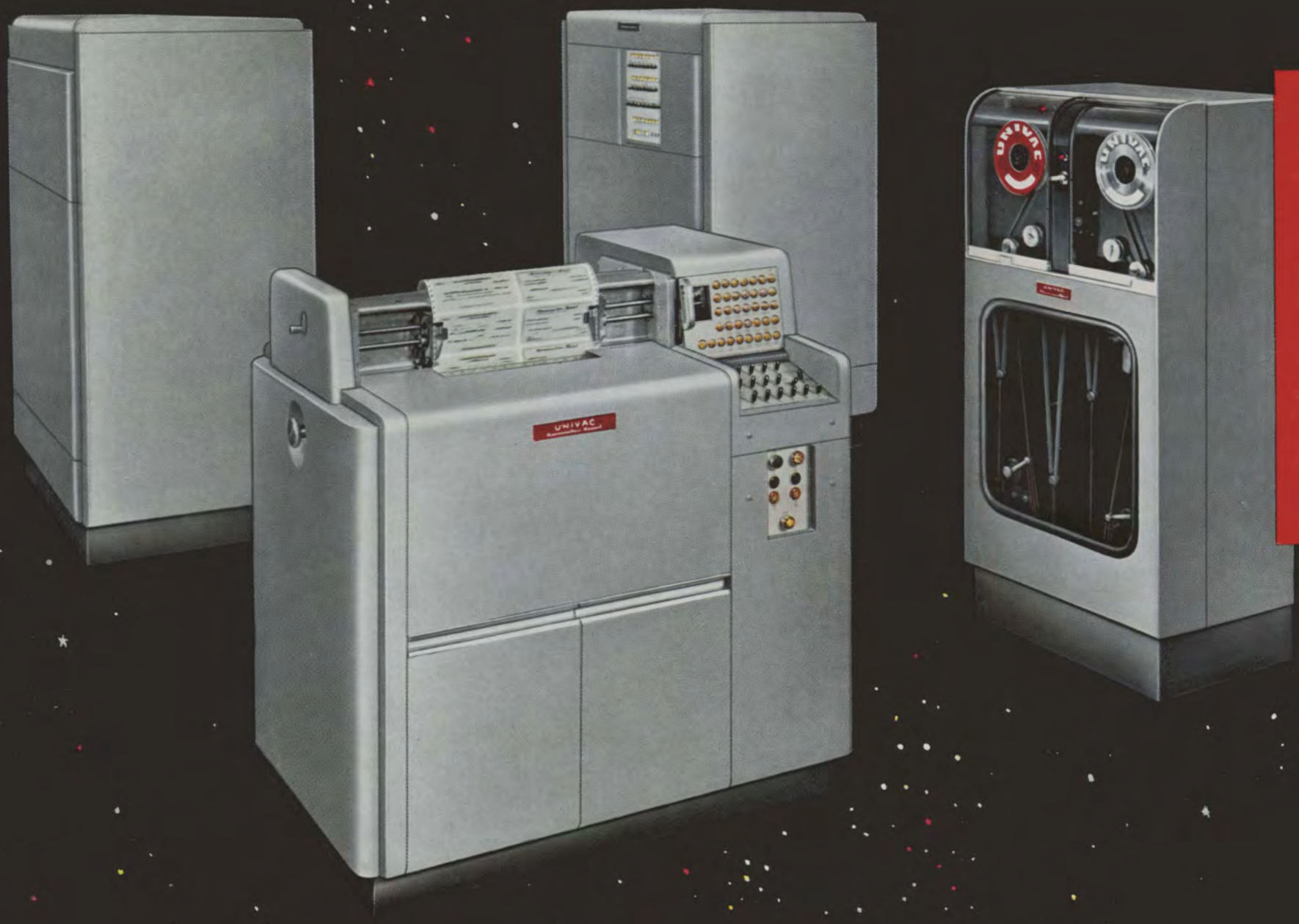
Data to be processed for the first time can be put on tape with a Unityper. The Unityper II is a modified Remington Electric Typewriter, equipped with electronic circuits which convert type strokes into pulse patterns, recording them on magnetic tape. This unit is compact, economical, and fast — can be operated by any typist.

The Univac Verifier is a versatile 3-purpose unit. It prepares tape input in the same manner as the Unityper II, it prints output from processed tapes at intermediate speeds, and it checks the accuracy of input tapes. Verifying is performed by re-typing the input data already on the tape. If the second typing is not identical with the first, the machine automatically locks. The operator may then erase the error, substitute the correct character, and continue typing.

unityper II

verifier

UNIVAC output auxiliaries.



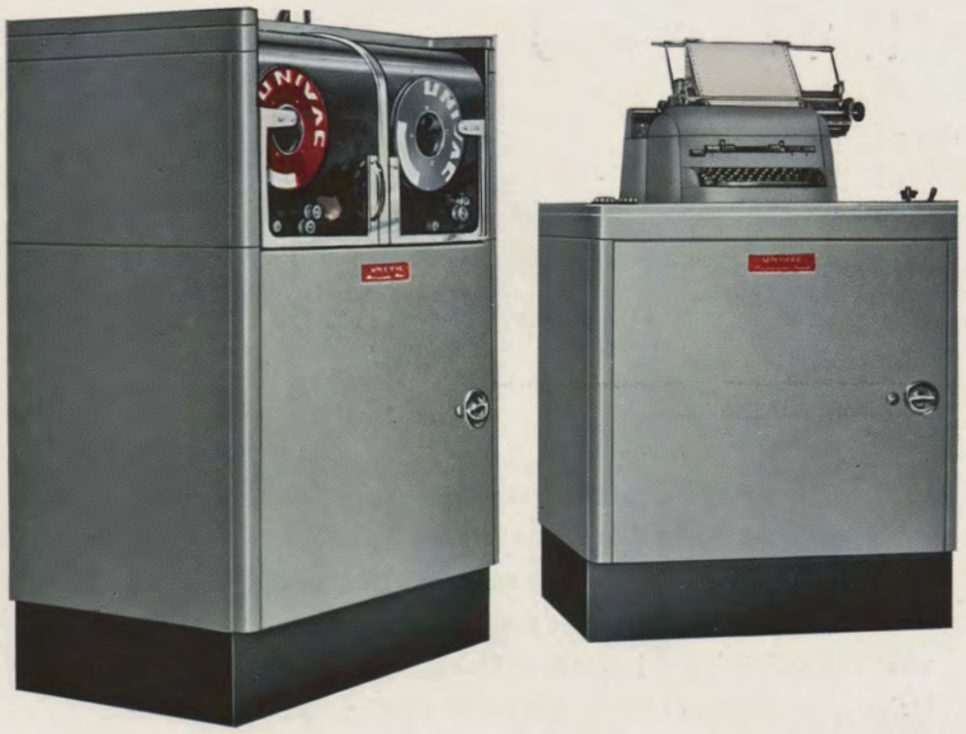
high-speed printer

THE UNIVAC HIGH-SPEED PRINTER PRINTS ON PAPER UP TO 78,000 CHARACTERS IN A SINGLE MINUTE – EQUIVALENT TO PRINTING THE CONTENTS OF THIS PARAGRAPH 60 TIMES A MINUTE. NOW, FOR THE FIRST TIME, IT IS POSSIBLE TO GET UNIVAC RESULTS PRINTED AT SPEEDS TO KEEP PACE WITH THIS FAMOUS COMPUTING SYSTEM. 7,500 PAYCHECKS CAN BE PRINTED, FOR EXAMPLE, IN LESS THAN ONE HOUR. OPERATING ON UNIVAC OUTPUT TAPE, THE HIGH-SPEED PRINTER OFFERS A SELECTION OF 51 CHARACTERS – LETTERS, NUMBERS, AND PUNCTUATION MARKS – ON A LINE 130 CHARACTERS WIDE. ITS EXTREME VERSATILITY PERMITS PRINTING, IN ANY FORMAT DESIRED, ON SPROCKET-FED PAPER – EITHER BLANK OR PREPRINTED – FROM 4 INCHES TO 27 INCHES WIDE, AND UP TO CARD STOCK IN WEIGHT. INTERCHANGEABLE PLUGBOARDS PROVIDE COMPLETELY FLEXIBLE CONTROL OVER THE PRINTED OUTPUT. ACCURACY IS ENSURED IN HIGH-SPEED PRINTER OPERATION, AS THROUGHOUT THE ENTIRE UNIVAC SYSTEM, BY EXCLUSIVE SELF-CHECKING FEATURES. THIS PHENOMENAL NEW UNIVAC AUXILIARY IS ALREADY AT WORK IN LEADING COMPANIES, PRINTING THE PAYCHECKS AND THE OTHER BUSINESS FORMS NEEDED IN COMMERCIAL DATA-PROCESSING. NOW, AT LAST, ELECTRONIC COMPUTING IS PRACTICAL FOR OFFICE ROUTINES.

Just one second to print this entire paragraph!

uniprinter

The Uniprinter types reports of Univac results, at intermediate speeds. When the output tape has been processed by the Central Computer, it is mounted on a Tape Reader which converts magnetic recording into electrical impluses. These impulses, in turn, activate a modified Remington Electric Typewriter which automatically types the processed data.



This equipment prints data from tape processed by Univac, at a speed compatible with that of the Central Computer. Offering a total of 51 *numbers, letters, and punctuation marks,* the High-Speed Printer produces 600 lines per minute on a line 130 characters wide, in any desired format. Exclusive self-checking features ensure the accuracy of printed results. In field use, the High-Speed Printer is at least four times faster than competitive punched-card equipment.

tape-to-card converter

Some applications require Univac results in the form of punched cards. These are produced by the Tape-to-Card Converter, at the rate of 120 cards a minute. Automatic checking circuits ensure that the data punched in the card is identical with that on the processed output tape.

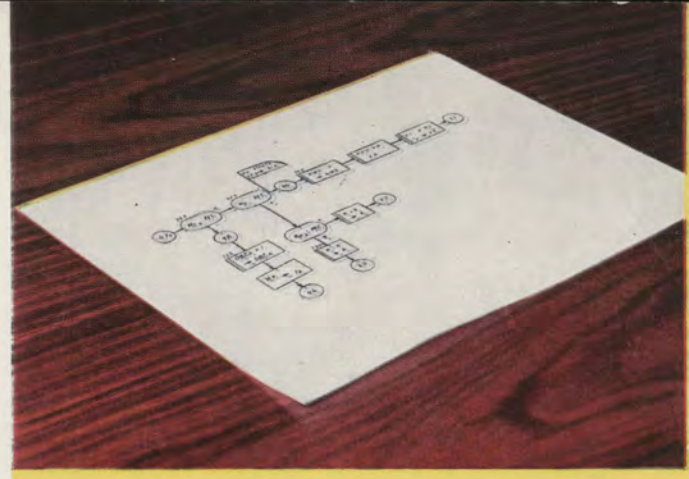
Electronic computers are not actually "giant brains," as they are popularly called; they are extremely efficient but totally unimaginative servants to those who use them. The efficiency with which they operate depends on the human intelligence planning the program of instructions which tells them what to do. This is not just true of Univac, but of *all* computing systems. Univac programmers have had many years of actual field experience in preparing instructions for a system of this type.

operating the system . . .

Univac has proven to be the prototype of the business computer of the future, and those who have pioneered in its many applications have acquired training unobtainable elsewhere. Others may have a groundwork in theory — our programmers have become experts through practical experience.

You and your company can profit from this experience in either of two ways: First, if you want to explore the possibility of purchasing or renting a computer for full-time use, Remington Rand offers a series of training courses in electronic computing equipment. Second, if you have an immediate application for the Univac System which can be handled by occasional use, Univac equipment and personnel are available through our Computer Center services. Operating 24 hours a day on a contract basis, these services are currently being used by business, industry, and government to solve all types of data-processing problems.

For information about training or services, write to the Electronic Computer Department of Remington Rand Inc., 315 Fourth Avenue, New York 10.



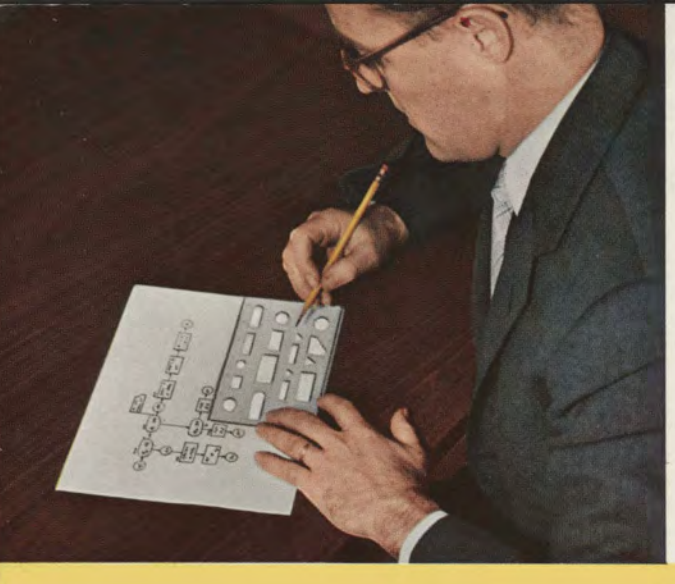
An experienced programmer reduces the problem to its major operations, analyzing the logical flow of steps to the solution. Using arithmetical and logical symbols, he prepares a flow chart of this over-all analysis.

The next step is to translate the flow-chart symbols into a code of instructions which Univac can follow. Code sheets give a complete listing, in language the computer understands, of all steps of the problem.

Code sheets then go to the Unityper, where the computer instructions are typed on tape as magnetic patterns. Below is an enlarged view of the magnetic tape, specially treated to make these patterns visible.

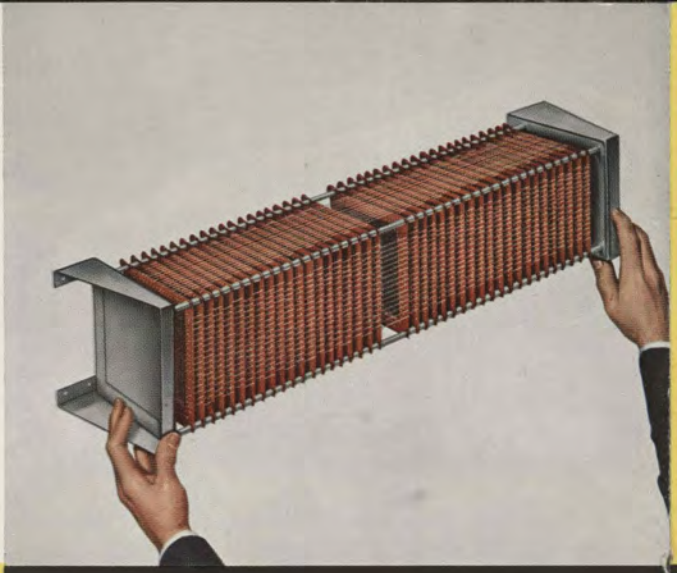
Training courses in the various Univac skills are conducted by Remington Rand experts. Here a typical class is being shown the interior complexities of the Univac System at the New York Service Center.


UNIVAC

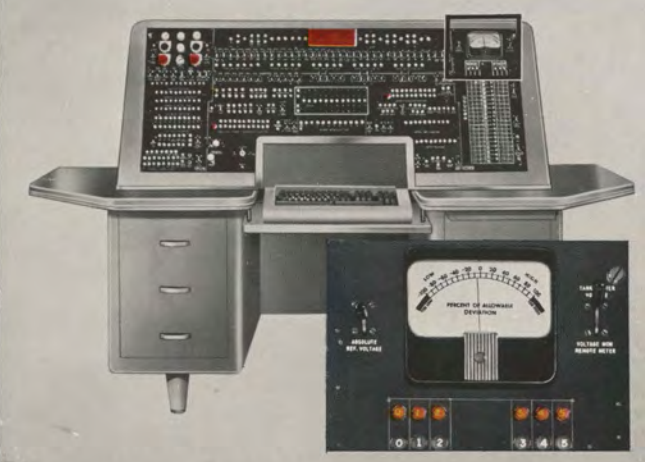


VERSATILITY–

The Univac System can process any problem that can be reduced to letters and numbers. Programs have already been set up and put into operation to serve the widely diversified needs of such organizations as the Bureau of the Census, the U.S. Air Force, General Electric, and U.S. Steel.

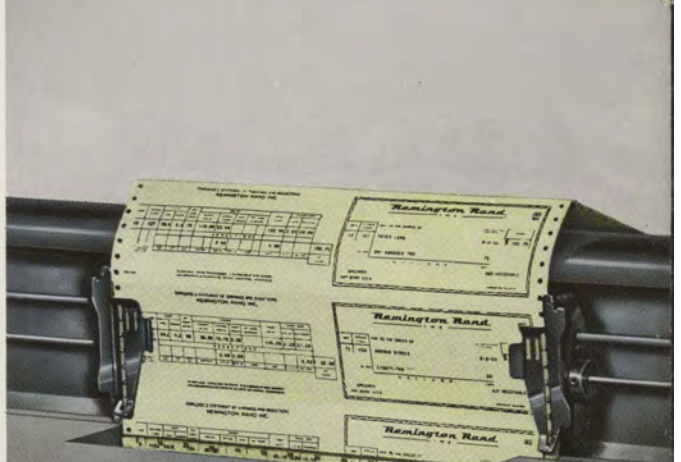


why UNIVAC is the acknowledged



ACCURACY–

30% of the Univac System is devoted to checking circuits and to the duplication of all processing circuits. These exclusive self-checking features ensure the reliability and accuracy which have established Univac as the most practical system currently available for commercial use.



RELIABILITY–

"The memory that won't forget" (magnetic core) is typical of the system's reliability. Univac offers so many servicing aids, such wide tolerance to operational deviations, so many facilities to reduce down-time, that any user can schedule his data-processing with assurance that all deadlines will be met.

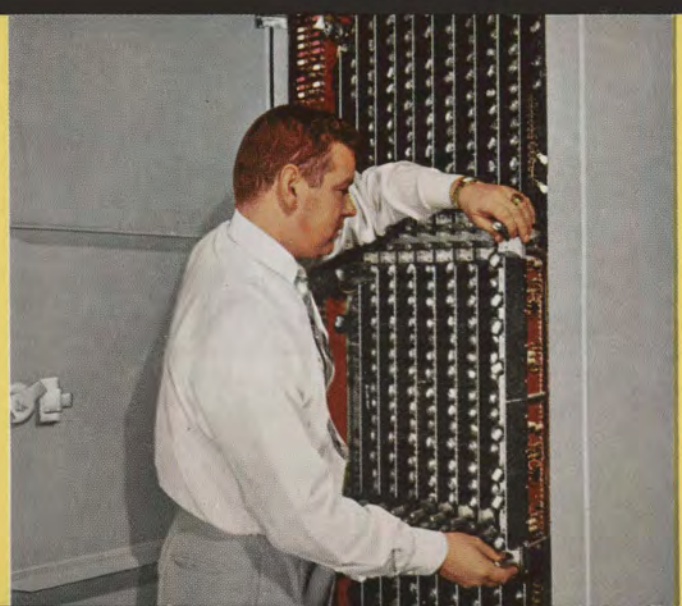
SPEED–

Not only does the Central Computer process information at electronic speed — magnetic tape also makes possible the practical use of this speed. Input and output are achieved at the rate of 20,000 letters or numbers a second, without interrupting operations, due to buffer storage within the computer.

leader in electronic computing . . .

ECONOMY–

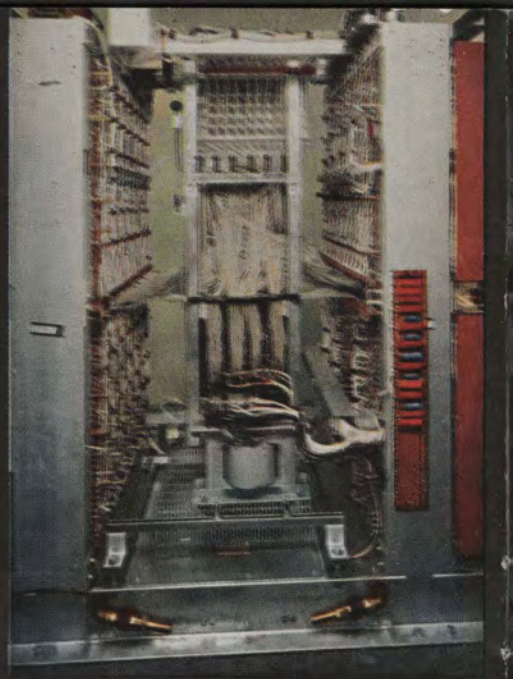
Automatic electronic data-processing, with high-speed output, enables Univac users to realize tremendous savings in time and money. The initial expense of a Univac installation is amortized more rapidly than that of any data-processing method capable of handling equivalent volumes of work.



SERVICEABILITY–

Univac is constructed of small, removable service units called "chassis," many of which are interchangeable. Marginal checks enable the operator to locate potential trouble before it has a chance to develop. Then, all that need be done is to replace the individual chassis. Actual repair can be done later.

Part of the complete plant facilities are allocated to the production and testing of major auxiliaries. Here several High-Speed Printers and Card-to-Tape Converters are undergoing final tests.



An example of the complex assembly required by Univac components. This is the memory unit of the High-Speed Printer, seen from the inside.

UNIVAC production

Production-line methods are used in assembling units and sections to form what is known as a bay. Intra-bay wiring and frame-mounted components are also installed at this stage. There are thirteen of these bays in a complete Central Computer.

Key to serviceability of Univac is its many removable service units, known as "chassis." These are fitted into sections, three of which form each bay. Experience has proved that women are best for this precision assembly.

Univac is the first large-scale electronic commercial data-processing system to be put into mass production.

There are 975,000 parts in each Univac, ranging from tiny crystal diodes to the sturdy beams that support the computer frame. This equipment is the most complex ever built, involving intricate scheduling of parts and careful coordination of complicated workloads. These problems and the layout of production and assembly areas have all been carefully worked out to enable Remington Rand to keep pace with the ever-increasing demand for Univac Systems.

Univac production facilities assure you that Remington Rand can deliver a complete Univac System the moment you are ready to use it!

The final stage in the production of a Univac is exhaustive checking. On the testing floor, three Univacs are shown in various stages of test and final assembly. After this stage, the computers are ready for delivery to the customer.

Rigid inspection checks every connection by resistance measurement. This extra step, this careful inspection of assembly procedures, ensures Univac's reliability, and is largely responsible for its excellent record of field usefulness.

Experienced craftsmen, using precision machinery, produce the memory components in a special assembly area. Here are wound and assembled the electric delay lines that augment the internal storage systems of Univac.

Similar precision techniques are used in manufacturing the magnetic-recording heads used on all Univac auxiliaries for tape reading and recording. The girl shown is checking one of the eight cores of a partially assembled head.

typical UNIVAC users

Remington Rand has created this new system of data-processing called UNIVAC. But, without the cooperation of companies which realized its benefits, today's paper-work revolution would never have gotten under way. New electronic techniques have been developed because these and other organizations have had the vision to foresee Univac's potential, and the practical knowledge needed to apply its savings to their own operations.

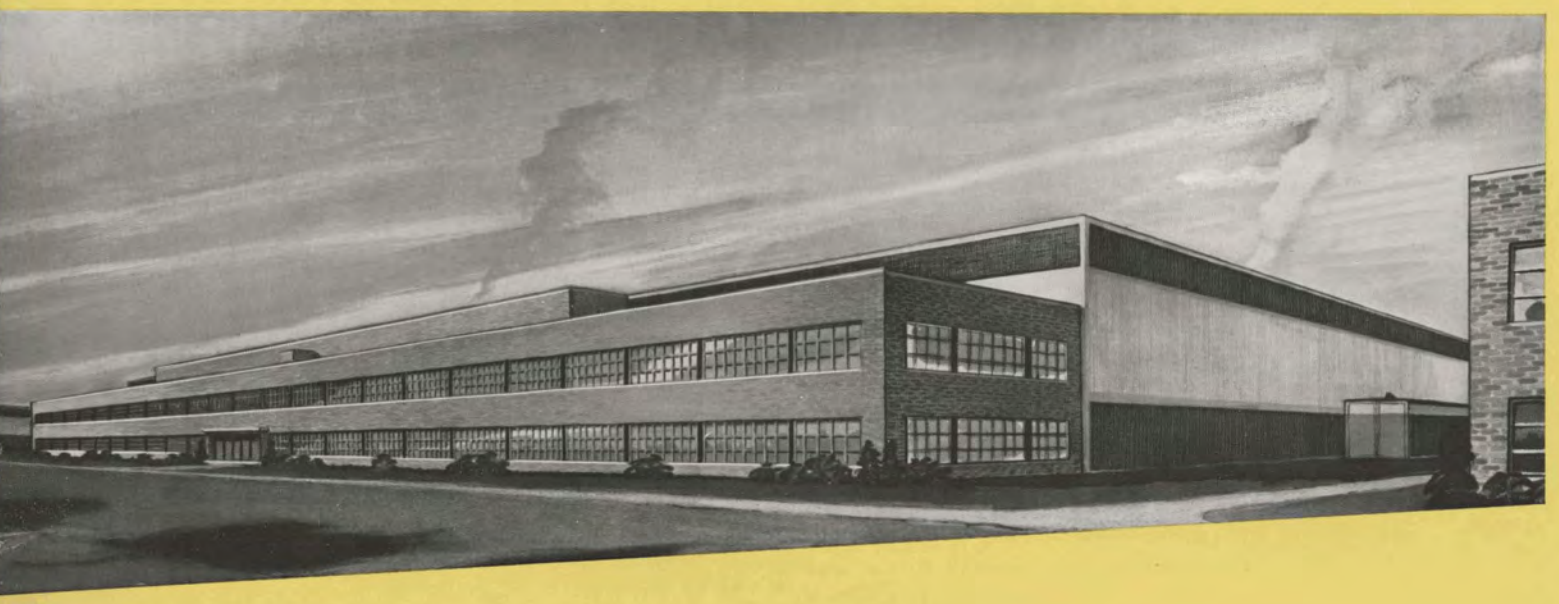
Thanks to these pioneers of electronic data-processing, programs which automatically handle many different types of commercial problems have been perfected and put into operation. Now that the system has been established and proved, it has received such widespread acclaim that, today, the complete list of Univac users reads like the "bluebook" of American industry.

U.S. Bureau of Census

The Bureau of Census uses the Univac System to prepare monthly reports on various economic trends. Here, Univac speed makes possible statistical techniques which previously could never be attempted because of the prohibitive amount of computation required. The Bureau's chief economic statistician estimates that, for seasonal adjustments of Time Series, one minute of Univac time is the equivalent of about 4,000 minutes of clerical time. Thus, 67 hours of calculation on this type of problem are compressed into sixty seconds. After the first Univac had proved its superiority through 4 years of use, the Census Bureau ordered a second to speed statistical studies in the completion of the Census of Business and Manufacturers. Testifying to Univac performance, before a Senate subcommittee hearing, a Census Bureau official said: "This equipment is remarkably accurate ... we have never found it in error."

The General Electric Company

GE acquired its Univac System at Appliance Park in Louisville, Kentucky, for a wide variety of applications: — payroll accounting, material control, production line balancing, budget analysis, and sales statistical analysis. This latter is a monthly series of five reports prepared from data contained in General Electric's invoices to its major appliance distributors. Reports include the general entry for sales and cost of sales, monthly sales report by distributor, gross margin report, warehouse shipment report, and a detailed summary of transactions. Preparation of this sales statistical material alone, requires only ten to fifteen hours of computer time a month. Yet, when run on the High-Speed Printer, the sales statistics, which the Univac system has compiled in these few hours, comprise *several hundred full pages* of printed matter.



The Franklin Life Insurance Company

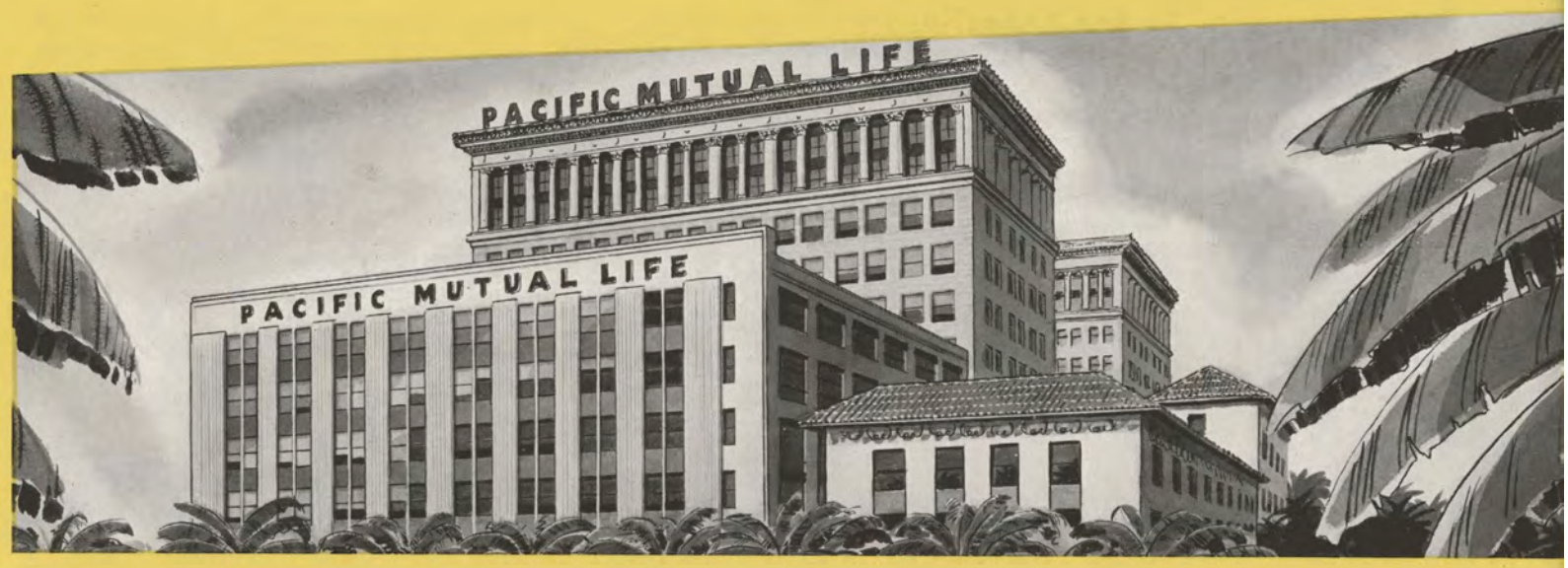
The Franklin Life Insurance Company uses the Univac System for premium billing and accounting, valuation, agents' commission calculating and accounting, and dividend accounting, with other applications planned for the future. In premium billing and accounting, the Univac maintains the master file, selects notices due, and prepares them so that they only have to be placed in a window envelope for mailing. The system takes care of the computation of reserve liability in valuation, and automatically handles necessary accounting in the other applications.

As a result of the studies made by Franklin Life, the company's president says, "We are convinced that the insurance field in general will not be able to keep up with the continued demand for its services without introducing electronic data-processing equipment to handle the heavy volume of paperwork which future expansion will bring."

Chesapeake And Ohio Railway

The problem of how to hitch the computer to railroad paper-work procedures on the C&O was undertaken by a balanced "computer team" made up of representatives of every C&O department. Experts in electronics, mathematics and methods and procedures teamed with the railroad men in finding the way. Preparation is still going on, and the Univac System will be put to work in the near future on freight revenue accounting, payroll accounting, and property and allied accounting, as its first applications on the C&O. Ultimate objective of the Univac on C&O is "one-shot paper work," according to President Walter J. Tuohy, "with all the data fed once on magnetic tape or punched cards into the computer and thence *available to every department.*"

Mr. Tuohy says, "An electronic brain will... simplify, improve and speed up complicated records and reports. C&O is the first railroad to contract for use of a Univac... This innovation in handling and largely reducing the billion pieces of paper which a railroad such as the C&O deals with in a year may well be the start of a revolution in railroad paper-work procedures."



U.S. Steel Corporation

The National Tube Division of U.S. Steel, at Pittsburgh, has installed the Univac System for computation and preparation of payrolls, and to include the processing of a complete labor accounting system. They are also turning over to Univac the compilation and reporting of order and shipment statistics, backlog statistics, and sales accounting and analysis. Many other accounting functions will be studied for Univac application.

U. S. Steel, like the Census Bureau, is another of several organizations which have shown their satisfaction with the Univac System by ordering a second for their plant in Gary, Indiana. As the company points out, the almost unbelievable speed of operation, together with Univac's ability to perform a long series of sequential steps, makes data-processing possible in areas which have never before been susceptible to such applications.

The Air Materiel Command

The Air Force's AMC is the largest business operation in the country, with total assets greater than the two largest private corporations combined, and with a stock inventory of 1,200,000 items — approximately six times that of a large department store. The Air Materiel Command has installed a Univac System at Dayton, Ohio, to solve its complex budgetary, maintenance, and management control problems.

The Fiscal 1956 budget estimate for airborne equipment spare parts, involving possibly half a million items, was computed in one day on a Univac from individual depot figures. The same problem had formerly taken several weeks to solve using punched-card machines. Another computation, which would have required seven machine-weeks and 250 man-hours with punched-card equipment, was completed in 21 minutes on a Univac.

In solving an average problem, Univac has proved to be 40 to 50 times faster than punched-card machines, and for certain types of problems even higher ratios have resulted from the Univac System's electronic speed.

UNIVAC—The FIRST Name in Electronic Computing Systems

Electronic Computer Department **Remington Rand** INC. 315 Fourth Avenue, New York 10, N. Y.

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