DATAMATION 59

July/August

"PERHAPS NO GROUP ATTENDING ANY CONFERENCE EVER SO BOLDLY FACED SO MANY CHALLENGING PROBLEMS WITH SO GREAT A CHANCE OF SUCCESS AND WITH (SUCH) A POTENTIAL INFLUENCE ON SOCIETY AS A WHOLE AS DO MEMBERS OF THIS CONFERENCE" — H. AIKEN.

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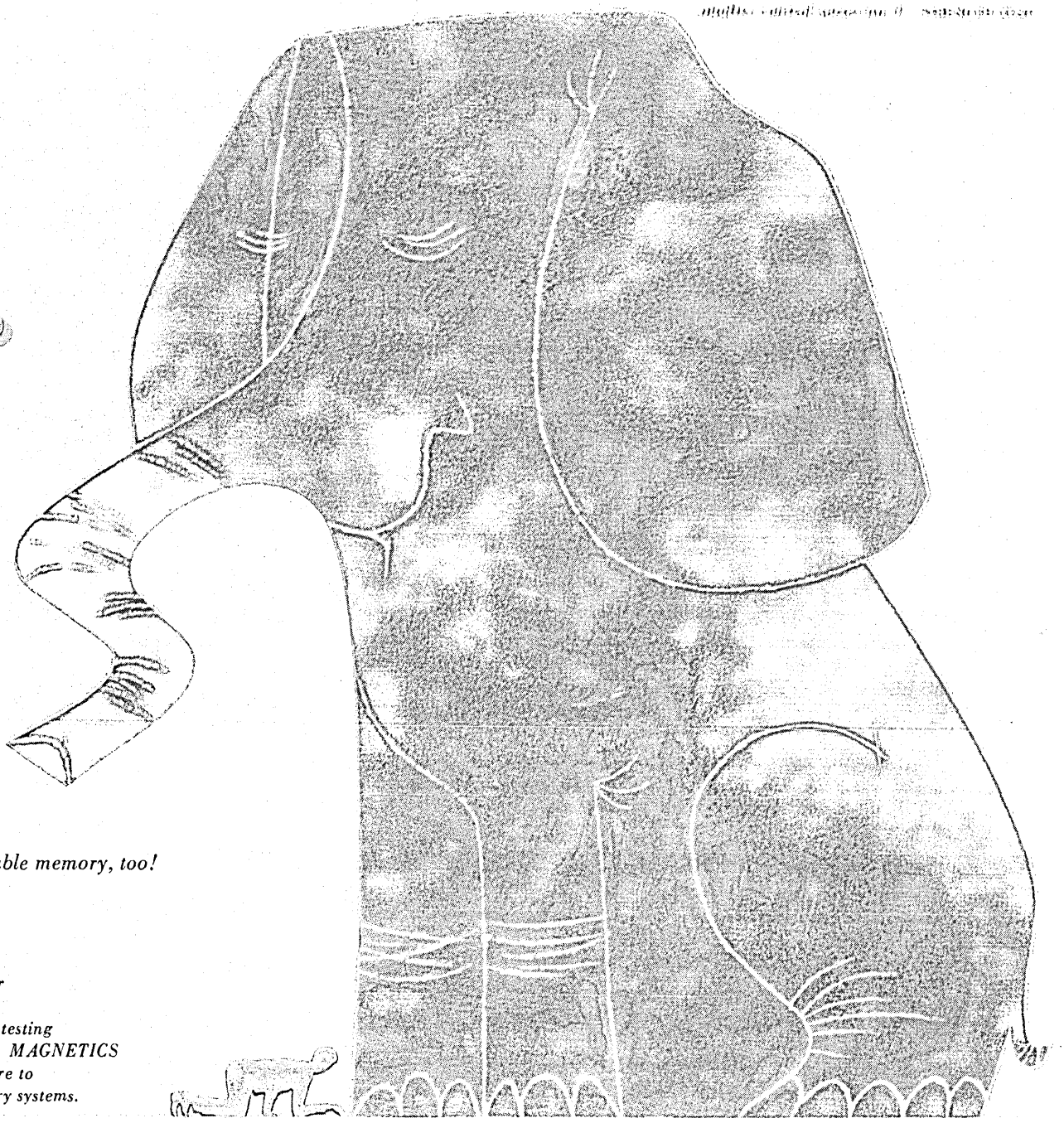

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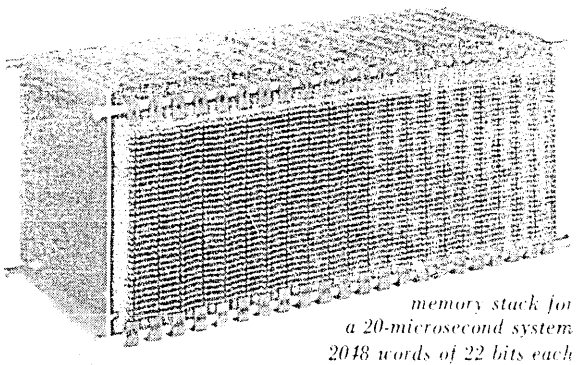

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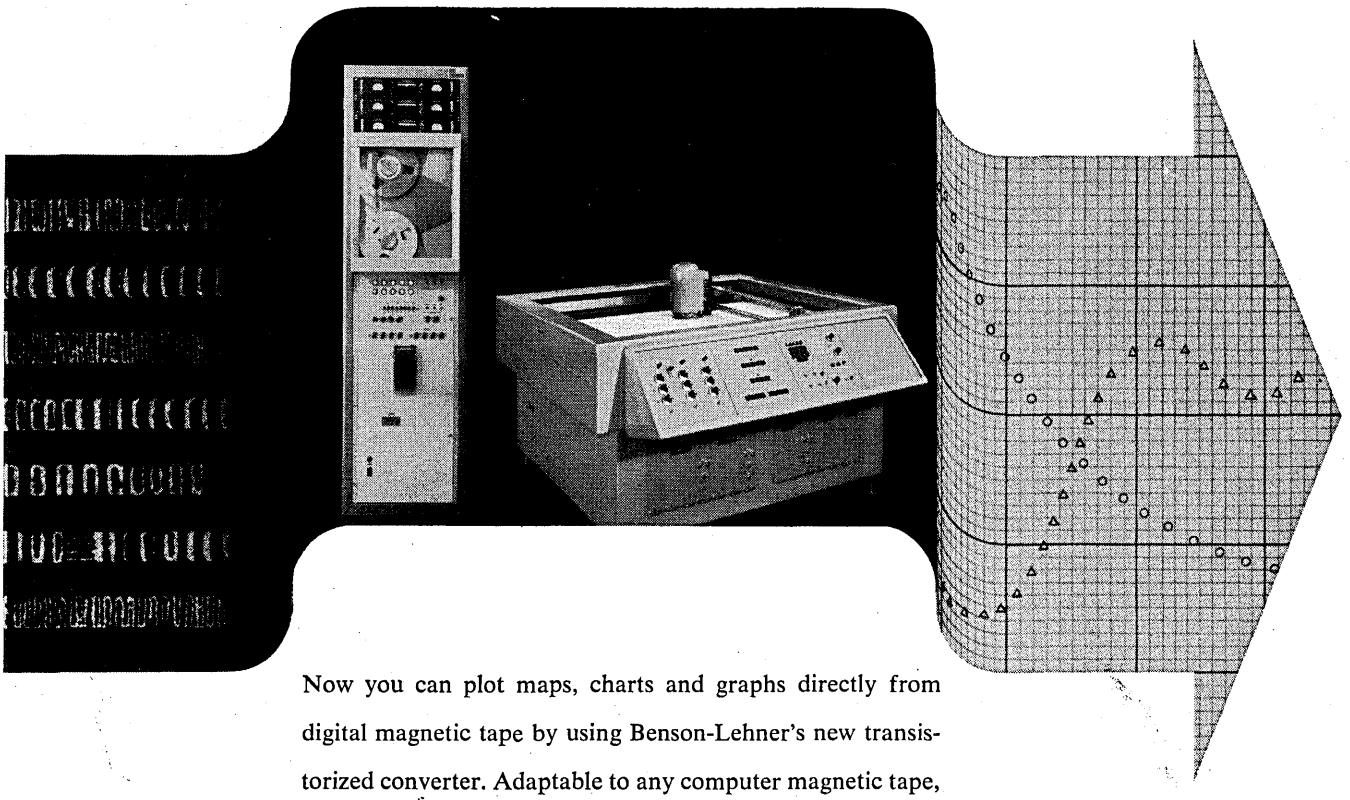

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from the editor . . .

A headline writer might title this piece, "Who's on Second, Is Bull on Third?" He would, of course, be heading a story concerning the developing controversy in the Computer League Standings.

IBM has been, and should continue to be in the forseeable future, THE first place club. But as to who is the second largest computer manufacturer in the world . . .

For years, everyone just assumed it was Remington Rand. Then, about a year ago, Burroughs Corp. laid claim to the No. 2 spot.

What was a neat two-way American argument turned into an international situation this year when not one but two British firms decided they liked the sound of "second." International Computers and Tabulators said they were just behind IBM as did Electrical and Musical Industries.

A slightly more modest Bull Machine Co. (France) decided to settle for the No. 3 position. They so stated in a world-wide news release in June. But if Bull is third, which of the four claiming second was also wrong about being No. 3. And who is in slots 4, 5 and 6.

Even if this debate could be settled, all of the firms concerned, including IBM, are probably mistaken in their claims. Surely, the world's largest computer manufacturer is in Russia.

If three of your 700-series computers and 7,000 reels of tape (the **correct** figure) burned up one day, would you be inconvenienced?

Certainly a lot of interest was generated, along with the heat, from the blaze in Air Force Colonel Marshall Gray's statistical services data processing facility in the Pentagon on July 2. A 704, a 705 and a 709 melted down and all those reels of tape went up.

The cause? Col. Gray: "Faulty wiring in the tape vault (our first estimate)." The cure? "Fireproof the tape vault." Three machines in one room again? "A must. Space limited." How are you surviving? "IBM moved in a 705 and a 709 within two weeks. Lots of 704 time available from other installations. In fact, more time available now than we ever had but this is a tough way of getting it." What about the info on the tape? "We should be able to reconstruct over 95% of the material." When will you be in operation again? "In 30 days."

Moral for the industry: Checked your extinguishers lately?

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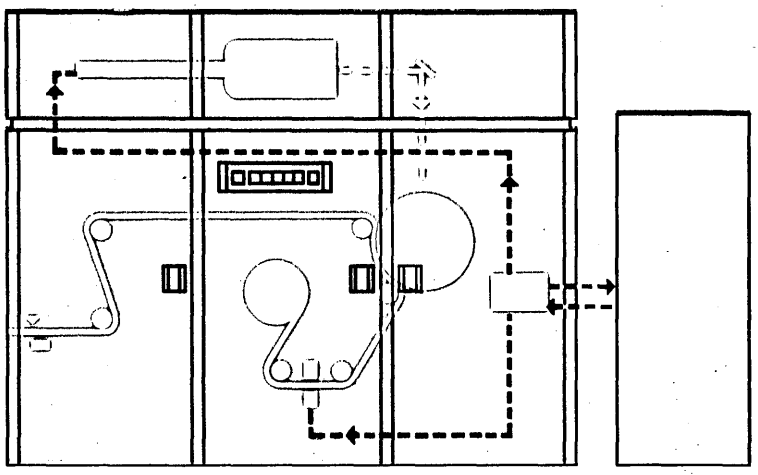

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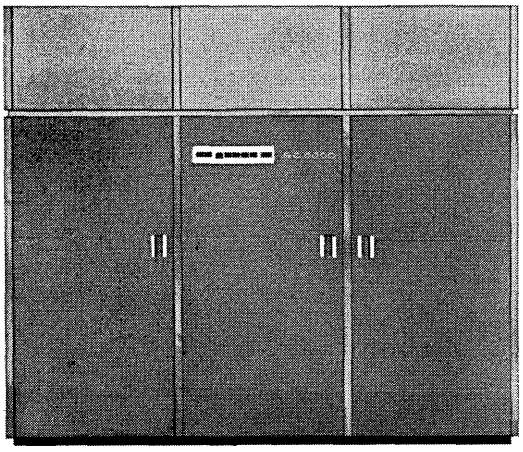

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DATAMATION 59

the automatic handling of information

volume 5, number **4**

ARTICLES

DEPARTMENTS

With the July/August issue we introduce two advisers to the editorial staff . . .

DANIEL D. McCRACKEN, author, writer and private consultant in computer programming, worked directly with computers (in many applications) for the GE Company from 1951-58. He is author of "Digital Computer Programming," (1957, John Wiley & Sons) and "Programming Business Computers," published this June by Wiley, and co-authored by Harold Weiss and Tsai-Hwa Lee. His latest book covers programming—from analysis to flow charting to coding—with special emphasis on its application to business data processing.

CRAVENS L. WANLASS, director of research at Computer Operations, Aeronutronic, a div. of Ford Motor Co., has been responsible for the design of a number of vacuum tube and solid state digital computers (mostly for military applications). He holds patents in digital computer techniques and basic computer elements and has authored a number of technical articles. Wanlass headed the computer dept. at Lockheed's Missile Systems Div., and directed computer component development programs at Ramo-Wooldridge and North American, prior to joining Aeronutronic.

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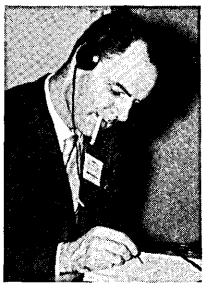
ICIP

Top—This is a general view of the ICIP opening session which was held in Paris' Sorbonne University amphitheater.

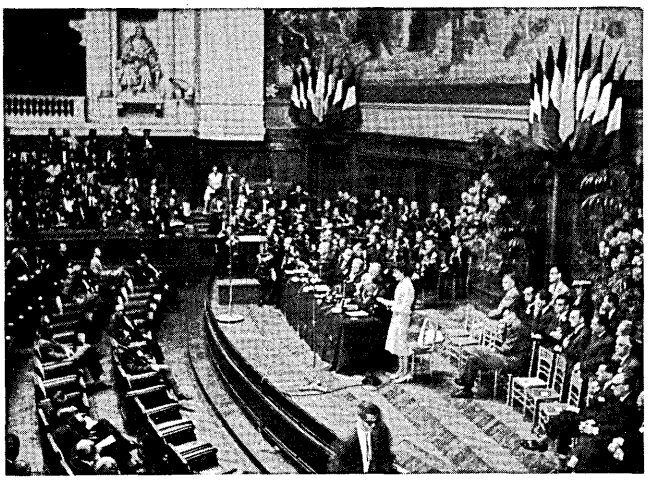
Center—ICIP delegates attended sessions in the new UNESCO buildings. Pictured is the plenary session auditorium.

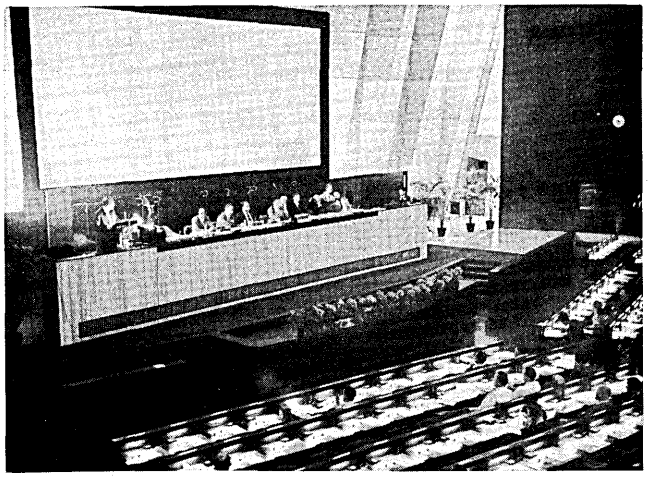
Lower left—One of the symposia is in session in another of the modern rooms. Note individual desks for spectators.

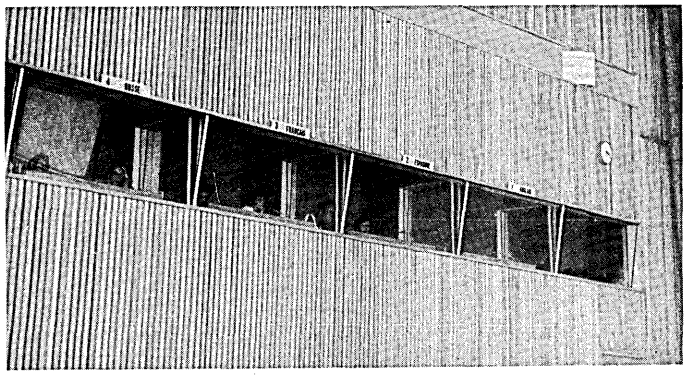
Lower right—This translation booth in full operation offered, simultaneously, Russian, French, Spanish and English translations of conference papers and addresses.



Editorial and pictorial coverage of the International Conference on Information Processing, as represented on these pages, was provided by DATAMATION's European Editor, Etienne J. Guerin (pictured in ICIP pressroom).







In looking back on the first International Conference on Information Processing (Paris, June 15-20), the most significant feature seems to be that it was held. "Finally held" might better express the feeling of many conference attendees who have long recognized the need for formal international cooperation in this ever-broadening field.

The United Nations Education and Scientific Organization lent its name and brilliant organizational techniques to this first gathering of nearly 1,800 data processing delegates from 37 countries and 13 international organizations. It is an understatement to say that UNESCO assistance insured the conference's success from the start. The conference site and facilities provided in the world organization's new buildings were, in that order, beautiful and excellent. One feature most appreciated was the simultaneous translation of papers and addresses to delegates made possible by the staffing of translation booths overlooking the main auditorium.

What seems to be a persistent computer conference complaint was heard at this gathering – technical papers offered nothing new or revealing. But this flaw was easily overshadowed by the many ICIP accomplishments.

Perhaps the most important result of the meeting was the creation, on June 18, of the International Federation of Information Processing Societies. (See page 8.)

Another striking feature of the conference was one that seems to be a persistent computer conference advantage. Major contributors to the computer field from all over the world re-established old friendships and made new friends at a rapid rate. The exchange of new ideas and new information privately probably exceeded that which took place at formal presentations.

Official inauguration of the ICIP was held in the amphitheatre of the Paris Sorbonne University, a short distance from the statue of Pascal, an originator of calculus.

Welcoming the participants, UNESCO acting director general, Rene Maheu, stressed the practical importance of the ICIP by declaring:

"It is impossible today to imagine a large plant, a large government office, or a large research laboratory without a computation service in which a few of these machines replace a large number of specialized (personnel). One cannot even say that these machines take the place of men because in fact they enable the performance of operations which would be practically impossible (without computers) because of the number of man hours they would require. Thus, man's intellectual power has been increased in an extraordinary manner by placing at his disposal inexhaustible memories and automatic calculation organs, capable of ultra-rapid consultation which can perform in a few seconds what once required weeks to accomplish."

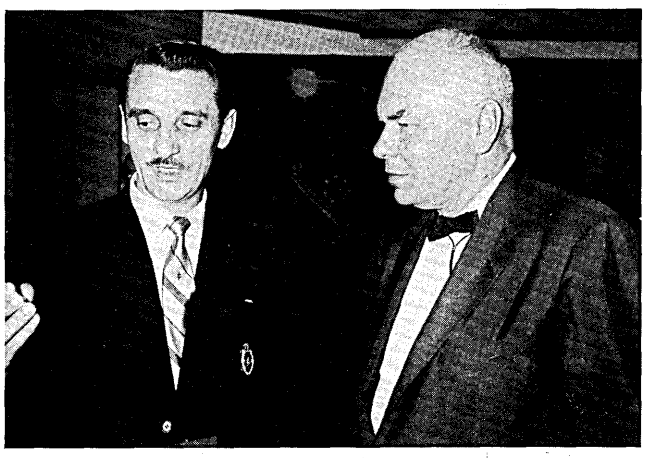
The audience then heard an address by Professor Howard H. Aiken of Harvard University, who traced the history of the electronic computer back to its early days, twelve years ago, when scientists were trying to construct any kind of a computer which would work while being given problems to solve on this computer posed by other branches of science. "Progress has been great and it will continue," he stated, "as long as faster machines of smaller bulk are required."

Andre Danjon, director of the Paris Observatory and president of the French Computing Association commented that the ambitious program of the IGY would have been "pure madness if we had not been certain of being able to analyze very rapidly all the data gathered from the entire surface of the earth."

Such a gathering as the first ICIP was badly needed to take stock of world-wide knowledge in the field of automatic information handling. If there was ever any doubt, this conference demonstrated that the science of computing has come of global age. ICIP participants can be proud of having been part of this epoch-making conference. Others will undoubtedly follow.

Top—During a taped broadcast recorded by UNESCO for distribution to the UN in New York and 50 networks around the world, issues regarding human values and computers were discussed by a panel composed of (left to right, clockwise) Sami de Picciolto, Italy; Bernard S. Benson, U. S.; Willem van der Poel, Holland; Gilbert W. King, U. S.; and Ritchie Calder.

Bottom—Howard H. Aiken, head of the Computation Laboratory at Harvard University receives the only Gold Medal awarded during the conference from Jacques Dursort of the Paris City Council. Medal honored Aiken's work in ICIP planning and his role as honorary chairman.



DATAMATION's tabulation of the ICIP attendance breaks down as follows:

Argentina	3	Finland	6	Israel	8	Sweden	87
Australia	4	France	504	Italy	83	Switzerland	26
Austria	10	West Germany	204	Japan	16	South Africa	3
Belgium	35	East Germany	11	Mexico	3	United Arab Republic	1
Brazil	2	Ghana	1	Netherlands	79	United Kingdom	165
Bulgaria	3	Greece	2	Norway	5	U.S.A.	406
Canada	5	Hungary	3	Pakistan	1	U.S.S.R.	38
China	2	India	3	Poland	18	Yugoslavia	6
Czechoslovakia	6	Indonesia	1	Portugal	3	Intl. Organizations	20
Denmark	14	Ireland	1	Spain	8	TOTAL	1,796

These men will head the provisional bureau of the International Federation of Information Processing Societies until IFIPS charter has been ratified by member countries.

Left—Yuri Iakovicevich Bazilievsky. Russia. vice-chairman.

Center—Isaac L. Auerbach. U. S.. chairman.

Right—Adrian van Wijngaarden. Netherlands. vice-chairman.

In sponsoring the ICIP, UNESCO acted to assist those persons and groups interested in information processing in establishing closer cooperation. On June 18, at the Paris conference, this cooperative spirit resulted in formation of the International Federation of Information Processing Societies, IFIPS. This body was established to sponsor future international conferences on information processing and to coordinate a world-wide exchange of information in the field. IFIPS will also establish international committees to undertake special tasks falling within the spheres of action of national member societies.

The Provisional Bureau, acting on behalf of IFIPS until the first quarter of 1960 was also formed until actual ratification will have been confirmed by the various countries. Representatives who decided upon the formation of IFIPS were highly placed individuals in their own countries and in the societies with which they are affiliated. In this capacity they were acting as private individuals until they can report back to their respective countries with a proposal for ratification of IFIPS statutes.

Sorbonne University Professor, Pierre Auger, Secretary General of the ICIP, heartily endorsed formation of IFIPS with this statement: "It is an absolute necessity that there be an international body to serve the needs of the science of information processing. There are already similar international organizations serving such sciences as geodesy, astronautics, radio, medicine, astronomy, mathematics, chemistry and physics. UNESCO has agreements for providing consultative services and cooperation to the international, non-governmental organizations representing these other sciences, helping them to widely express the views of their members and also receiving from them expert information, advice and technical operation.

"In sponsoring this current ICIP, UNESCO accepted responsibility only for convening the **first** international meeting . . . We had expected, and correctly so, that such a meeting would act as the catalyst for the formation of an international federation. We look forward to the possibility of an agreement, similar to the cooperative agreements with other international bodies representing other sciences, with this new IFIPS, which already appears to represent preeminent national organizations for this . . . science."

Chairman of the provisional bureau for IFIPS is Isaac L. Auerbach, representing the U. S. National Joint Computer Committee. He was elected unanimously by the international group until some time in 1960 when the Federation will hold its first meeting. Vice Chairmen will be Professor Yuri Iakovicevich Bazilievsky, subject to the agreement of the Academy of Sciences of the USSR, and Professor Adrian van Wijngaarden of the Mathematical Center, Amsterdam, representing the Dutch Computer Society. Jean Mussard, secretary of the ICIP, will be acting secretary of the Federation.

The next ICIP and associated technical exhibit will most likely be held in 1963 and will be sponsored by IFIPS. Each country represented in the provisional bureau – 18 countries in all – have been asked to propose a site for such a meeting.

At the moment, all activities will be coordinated by Auerbach (his address – Auerbach Electronics Corp., 109 N. Essex Ave., Philadelphia, Penna.) and through Jean Mussard (UNESCO, Palace Fontenoy, Paris, France) until the IFIPS seat is established in Brussels, next year.

Days of intensive effort were necessary before the IFIPS became a reality. One of the working sessions is pictured in full swing.

From June 13 to June 23, The International Exhibition of Digital Processing Units, which was known by the shorter name of AUTO MATH 59, attracted 10,000 spectators having a passing or lasting interest in information processing equipment.

About 1,500 ICIP participants toured the exhibit area – many of them several times. Displaying equipment in two halls (10,000 sq. ft) were 29 exhibitors from eight countries. It was the first time that data processing units from the Western Hemisphere, Europe and the Far East were exhibited together. Equipment from France, U.S.A., West Germany, Great Britain, Sweden, Italy, Belgium and Japan was shown.

One of the most talked about AUTO MATH features was the large display of Japanese equipment, much of which was seen for the first time in the West. Key Far Eastern personalities in the computer field claimed that Japan would soon be able to manufacture a considerable amount of computer equipment at stiffly competitive prices. They point out that their first market is a large one – the many countries in the Middle and Far East which have not yet been exposed to information processing.

In speaking of the trend toward the emergence of Japan as a major factor in computer production, the following points may be noted. A number of their technicians have been and are being educated in the West, and are returning home full of ideas. They are limited only by the size of the budget available to them. Prices will certainly be a key feature in the attractiveness of Japanese equipment. Speed might be disregarded to a certain extent but, of course, will not be completely overlooked. Some Japanese equipment is attempting to penetrate the U.S. market (see New Products) and in fact a few components used in U.S. equipment have been bought in Japan. But it will probably be some time before a real effort is made by the Japanese to invade Western markets.

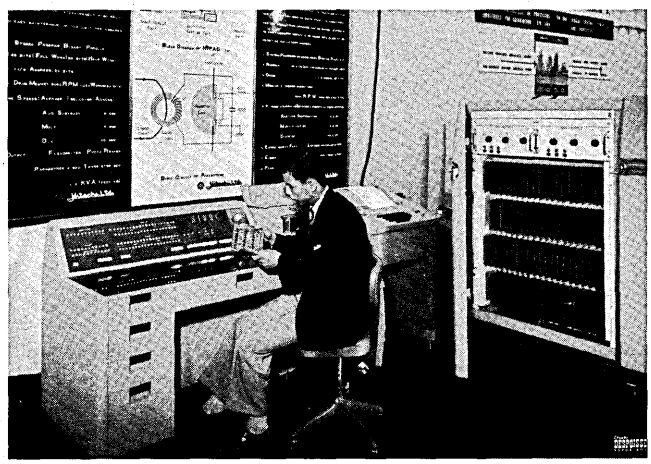
A discussion of equipment exhibited at AUTO MATH by many of the countries mentioned above will be featured in the next issue of DATAMATION.

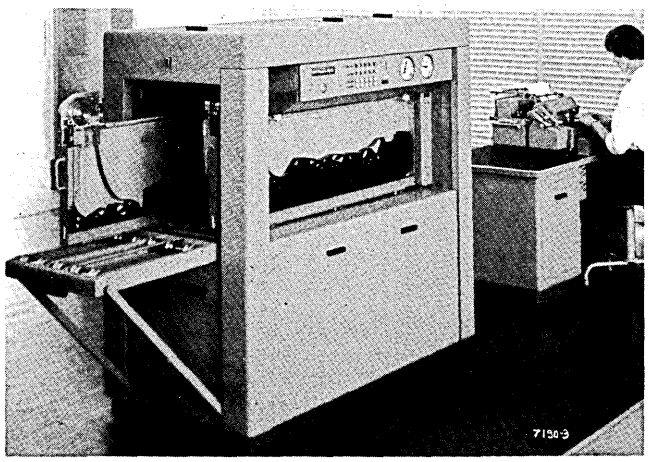
Top—Exhibited at AUTO MATH 59 was this HIPAC 101, manufactured by Hitachi Ltd. of Tokyo. HIPAC stands for HItachi Parametron Automatic Computer. It is a binary, fixed point machine.

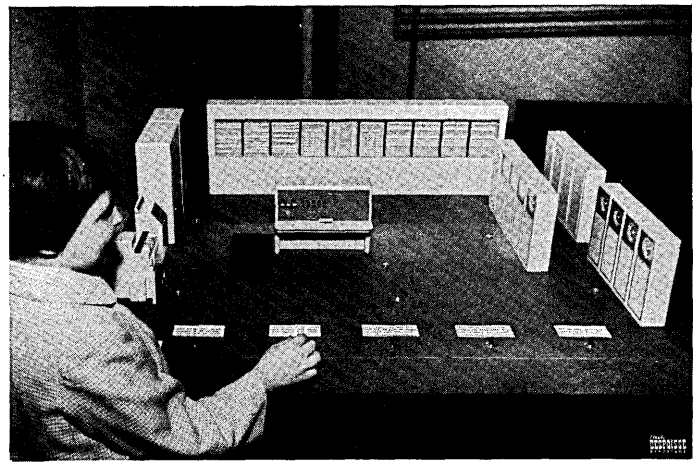
Center—This Belgian-made endless loop magnetic tape storage was also on exhibit in Paris.

Lower right—A binary, serial computer, the Stantec Zebra, was shown at AUTO MATH. It is made by Standard Telephones and Cables Ltd., an IT&T affiliate in England.

Lower left—On display was this mock-up of a Facit EDB installation using ECM-64 carrousel memories (right).







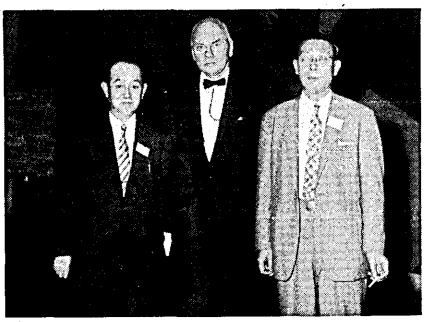
Left to right, Ahmed Mandzic, Tihomir Aleksic, and Jovan Petric. All are of the Institute of Nuclear Sciences "Boris Kidric," Belgrade, Yugoslavia.

Left, M. Lehman (Israel) of the Scientific Dept., Ministry of Defense, Tel Aviv, Israel. Right, Sorbornne University Professor, Pierre Auger, from France, acting as special advisor for ICIP and Unesco.

Jean Kuntzmann (left) of the Fourier Institute, Grenoble, France, and Manuel Sadosky (Argentina) of the Faculty of Sciences, Buenos Aires.

Left, Alston S. Householder (U.S.A.) of Oak Ridge National Laboratory, and Philippe Dreyfuss (France), Bull Machine Company.

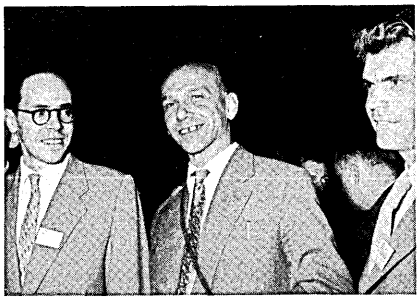
Left, Dr. Alwin Walther, 61, has been teaching for 31 years at the Darmstadt Technical University, West Germany, where he started the famous Institute for Practical Mathematics. Right, L. Biermann of the Max Planck Institute of Physics, Munich, West Germany.



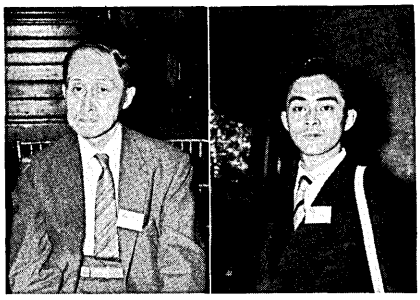
Left to right, Dr. Heido Yamashita (Japan), 70, who has been teaching electrical engineering at Tokyo University for 40 years; Prof. Howard H. Aiken (USA), Computation Laboratory, Harvard University; Dr. Hiroshi Wada, (Japan) Chief of Electronics Div., Electrotechnical Laboratory, Ministry of International Trade and Industry. Drs. Yamashita, and Wada, are pioneers in Japanese computers.

Left to right, Philip Rabinowitz (Israel), Chief Programmer, Weizmann Institute of Science in Rehovot, who will visit the US at the invitation of the National Bureau of Standards; Zwi Riesel, (Israel) Chief Engineer, Weizmann Institute; and Gordon D. Goldstein, (USA) Office of Naval Research in Washington and editor of DIGITAL COMPUTING NEWSLETTER.

Christofer Strachey (left), National Research Development Corp., London, England, and Maurice V. Wilkes (right), University Math Lab., Cambridge, England.



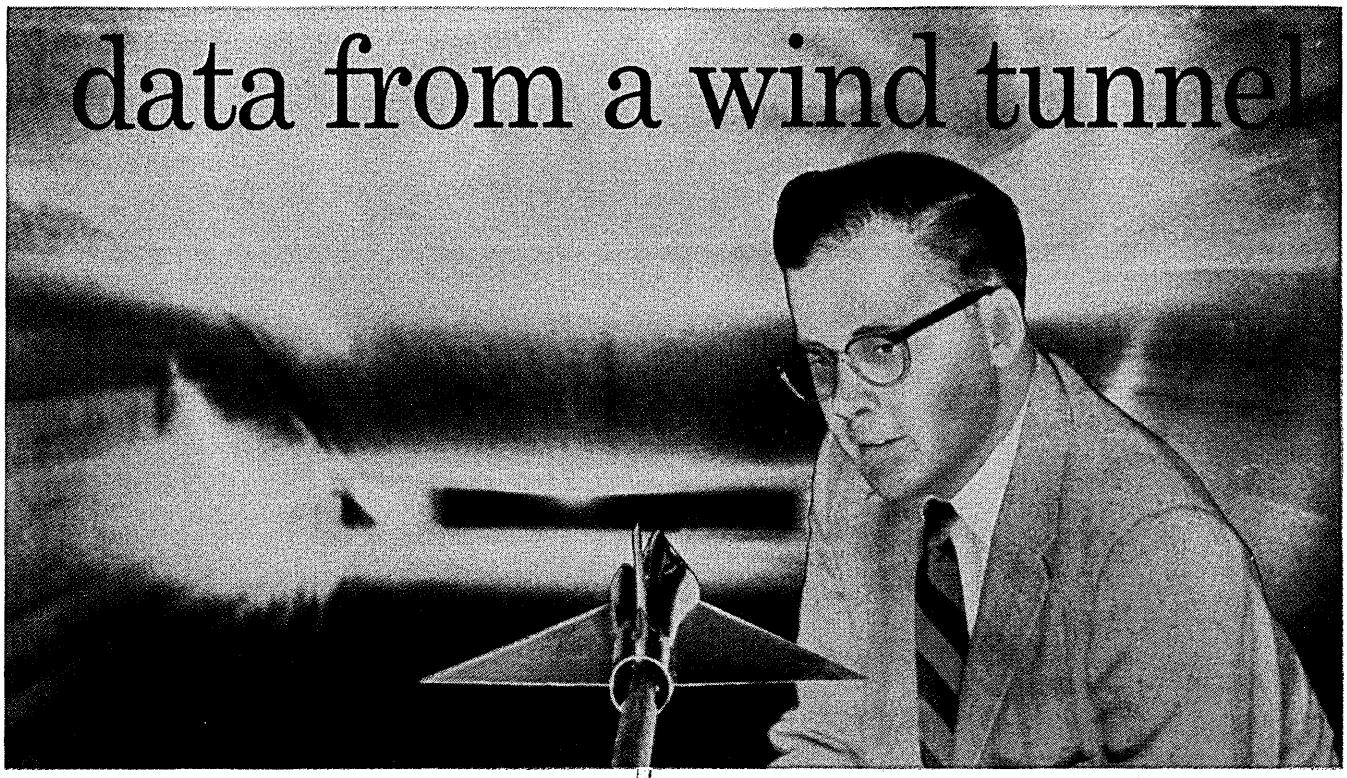
Left to right, Nikolai Birukov, Institute of Automatics and Telemechanics, Moscow; Anatoli Alexeeivitch Dorodnitsyn, Chief of the Computing Center, Academy of Sciences, Moscow; Paul Tikhonov, Academy of Sciences, Moscow, USSR.



Left, Motinori Goto of the Electrotechnical Laboratory, Tokyo, Japan—an ICIP scientific consultant, and right, Eiichi Goto of Tokyo, one of the parametron inventors.

Left to right, US panellists, Edward Cannon, National Bureau of Standards, Washington; Mrs. Ida Rhodes also of NBS; an unidentified participant; and Anthony G. Oettinger of Harvard University, Cambridge, Mass.

data from a wind tunnel



F-106 model in Convair's supersonic wind tunnel at San Diego, California.

MicroSADIC... Consolidated's new all solid-state data processing system... is now in action sampling, digitizing, and recording at the maximum speed of computer input. In one high-speed wind tunnel, 25 force mode channels and associated block gaps are recorded by this integrated system in less than 20 milliseconds. In the pressure mode sampling of all 125 data channels requires only 0.8 seconds. These are just some of the capabilities of this flexible automatic system . . . a system that can also be custom-tailored to rocket test, thermostructure, or telemetry data reduction. Full information is in Bulletin CEC 3020-X2.

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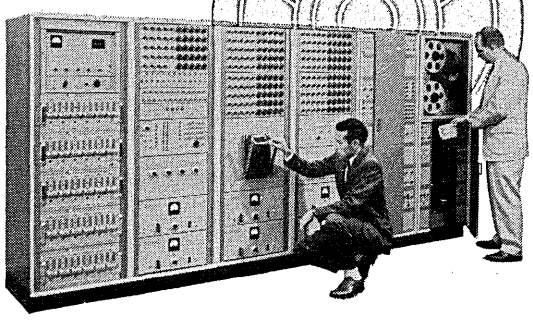

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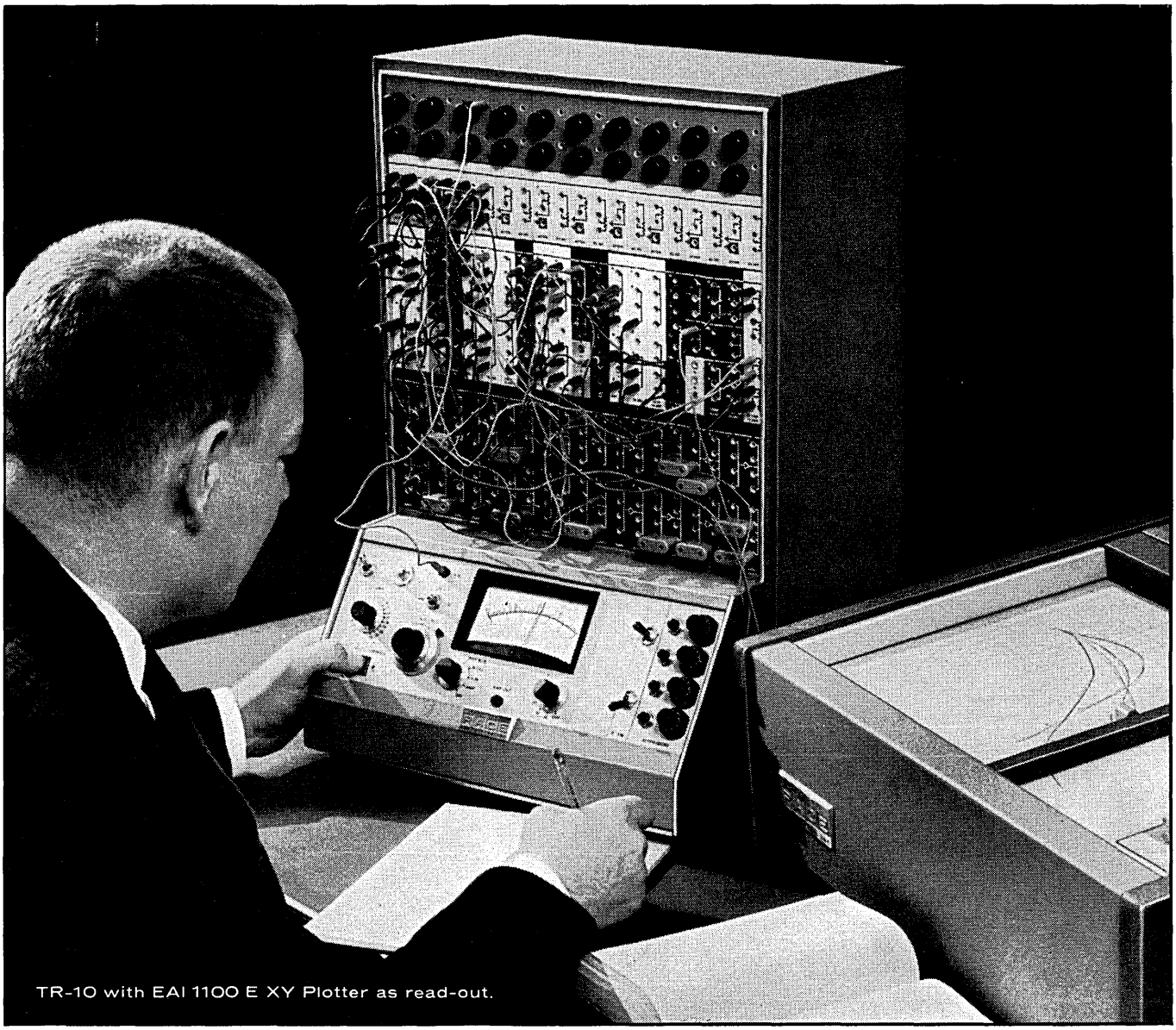

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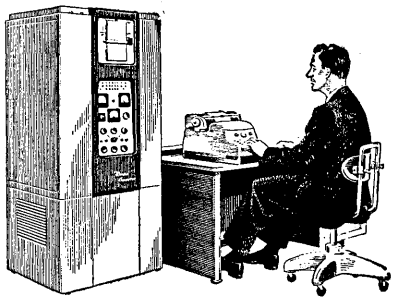

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AUTOMATIC PROGRAMMING IN THE SOVIET UNION

by A. P. ERSHOV
Chief, Theoretical Programming Dept.
Computing Center, Academy of Sciences of the USSR

as related to ETIENNE J. GUERIN
DATAMATION'S European Editor

Automatic programming can be defined as the use of a computer to perform automatically any part of the programming job. Early developments in this field in the USSR took place in 1954. And the greatest influence in programming methods can be attributed to Professor A. A. Ljapunov who in the years 1952-53 described the OPERATOR PROGRAMMING METHOD in his series of lectures "Logical Schemes of Programs" at Moscow University.

The main features of the operator method are that the program is considered as a complex operator acting with initial data, and consisting of elementary operators of various types. The main types of elementary operators acting with initial data are ARITHMETICAL OPERATORS performing direct, data transformation, and logical operators determining the next sequencing of computations. The conception that the operator should depend on some integer parameter—for instance the address of the indexed number depending on the values of these indexes —was also very important. Considered, too, were CONTROL OPERATORS not acting with initial data but dealing with the program itself. To be mentioned were the READDRESSING OPERATORS, (1) changing the dependent parameter addresses while the parameter value is changing, and (2) the RESTORATION OPERATOR restoring the dependent parameter addresses to their initial condition according to the initial value of the parameter. The detailed computing plan's record written as the sequence of the operators of various types is called the **operator scheme** of program (or **logical scheme** of program).

Ljapunov's operator method was very important in the development of automatic programming because:

(1) For the first time the program components—here called elementary operators—were formally classified according to their functions regardless of the problem programmed. In this way the language of the logical scheme program could easily be formalized, and it was made universal for writing problems to be solved.

(2) The language of logical schemes of programs was easy to algebraize, which fact was very important for the direct input of the program's logical scheme into the computer.

(3) The logical scheme of program as an intermediate result of the programmer's work successfully separates the programming process. The composition of the logical scheme corresponds to the "intellectual" work of the programmer while the laborious mechanical work becomes a transition from the logical scheme to the object program. Accordingly the stage of the programming process which is the easiest to automatize, was separated.

(4) Separating the whole problem as a sequence of separate operators permits the programmer to divide the programming process into programming of separate elementary operators, which makes the coding easier.

V. M. Kurochkin composed in the summer of 1954 in the Computing Center a program for BESM, permitting symbolic programming.

L. M. Korolev composed the first version of the program for BESM which carried out the programming of arithmetical formulas.

G. S. Bagrinovskaja from the Mathematical Institute described a project of the program for programming of readdressing operators.

E. Z. Lubimsky and S. S. Kaminin in summer 1954 constructed the programming program for the STRELA computer (designated as PP-1), performing the programming of readdressing, restoring and logical operators.

Such work was only experimental but was a necessary step toward the design of large programming programs.

the first programming programs

During Professor A. A. Ljapunov's seminar in October 1954, E. Z. Lubimsky and S. S. Kaminin described the first project of the programming program (designated as PP-2) which fully automatizes the transition from the logical scheme to the object program.

Source information for this programming program consists of (1) the logical scheme of the program and (2) the table of storage assignment. The logical scheme may include arithmetical and logical operators, readdressing and restoring operators and so-called non-standard operators presenting parts of the object program written in commands with symbolic addresses.

strela-3 programming program

The main result of the Computing Center's work in the field of automatic programming is the present-day programming program for the STRELA-3 computer which is installed in the Center. Work on the programming program for the STRELA-3 (designated as PPS) started in the fall of 1956. It was completed in the fall of 1957 and was performed by 6 staff workers of the theoretical programming department.

When requirements for the source information were developed, the following aims were sought: (1) The representation of the source information has to be close to the mathematical formulation of the problem. (2) The size of auxiliary and technical work not connected with the mathematical formulation has to be reduced to a minimum. (3) The source information must give full information about the structure of the object program. (4) Source information must be maximally compactable and presentable.

Source information prepared by the programmer consists of 5 parts. These are the program's scheme (the main part of information), the carried away operators, information about variables, information about storage blocks, and blocks. Some source information parts may be absent.

A few comments are in order concerning terminology used here. A **variable** is a letter symbol contained in the source information, which may denote some mathematical variable or constant, or in general, any machine word. A **storage block** means any group of locations which has to be placed in the storage one after another.

Regarding information about variables, all the variables requiring some additional information are written down. Such additional information may be a constant, if the variable represents a constant. Four types of constants may exist, such as decimal floating-point constants, binary floating point constants, commands with symbolic addresses and commands with real addresses. This additional information may also be an address, in case the location of the variable in storage is to be prescribed.

Blocks include any data placed into blocks and introduced into the storage by the object itself.

strela-3 program's scheme

In the program's scheme all operators of the object program are written down one after another and the order of placing the operators in the scheme corresponds to their place in the object program. The scheme may include operators of the following types:

Name of the operator	Symbol denoting the operator's type
1. Arithmetical	A
2. Logical	L
3. Restoring	V
4. Non-standard	H
5. Readdressing	P
6. Double-counting	DC

As a rule every operator is represented by a letter denoting the operator's type after which in parenthesis, information about the operator follows. The letter symbol and parenthesis may be omitted only for the arithmetical operators.

As part of the program's scheme it may be necessary to perform the cycle repetition of certain sequence of operators. For this purpose such a sequence is inserted into a loop. Besides this, special symbols may appear in the source information, denoting the command transmitting information between computer's parts, and transfers. Every operator may possess a number which is rendered by a letter denoting the operator's type as a subscript. Every operator can be carried away from the program's scheme into the second part of the source information. All the non-standard operators and some complicated arithmetical ones are carried away into the second part. In this case, in place of the operator carried away, a letter denoting its type with the number, is left in the scheme. The main reason that the source information is presentable and obvious is the successful solution of the problem of recording arithmetical formulas and the use of obvious symbolism.

arithmetical operators

The arithmetical operator fulfills the evaluation aided by the sequence of formulas as in

$$F\ (x_1, \ldots, x_n) \rightarrow y$$

where F is a superposition of operations from some fixed list of operations and $x_1, \ldots, x_n$ are variables and constants. In particular, this list contains all the operations of STRELA-3. y denotes the result of evaluating the formula. The constants in formulas are represented either by letters or by numbers. The variables may have any number of letter subscripts. In this case every subscript must be a parameter of some loop.

Here is the list of operations and their abbreviations used by the arithmetical operators:

Name	Symbol
Operations with two arguments	
Addition	+
Subtraction	−
Addition by modulo 2 (digit by digit)	+
Logical addition (digit by digit)	v
Multiplication	x or • (see below)
Logical multiplication (digit by digit)	∧
Operations with one argument	
Integer part	E
Fractional part	D
Absolute value	Mod
Sign	sign
Sinus	sin
Cosinus	cos
Arcsinus	arcsin
Arccosinus	arccos
Arctangent	arctg
Exponent	exp
Natural logarithm	ln
Binary to decimal conversion	Dec
Decimal to binary conversion	Bin
Logical negation (digit by digit)	¬

powers:

$$x^{-1}, x^2, x^3, x^{\frac{1}{2}}, x^{-\frac{1}{2}}, x^{\frac{\pm P}{2^Q}}\ (1 \leqslant P \leqslant 511, 0 \leqslant Q \leqslant 7)$$

The usual hierarchy of operations used in mathematics is used for the determination of the order of operation fulfillment. There is only one difference between the marked and non-marked multiplication (x and •), which is obvious from the following example in which arguments of the corresponding operations are underlined:

$$\underline{\cos 2x^2} + \sin\underline{(a+b)(a-b)} + \sin\underline{a+b} \times (a-b) - \text{-Mod}\ \underline{y^{-1}}\ \text{sign}\underline{(x+y)}\ a^2$$

Besides this, the following notation is allowed: $\sin^m x$, which denotes $(\sin x)^m$.

The Computing Center's experience shows that the only transformations of formulas which are necessary in the preparation of source information are: (1) the omitting of radixes and (2) the replacement of division by appropriate powers.

logical operators

A logical operator performs the verification of 1 of 5 standard logical relations which are:

$$a < b \quad a \leqslant b \quad |a| < |b| \quad |a| \leqslant |b| \quad a = b$$

where a and b are variable or constants.

In the program's scheme, logical operators are represented as:

$$L\ (a \sim b \left[\begin{matrix} N_1 \\ N_2 \end{matrix}\right.)$$

where N_1 and N_2 are operators' numbers a b is one of the 5 logical relations. Here is how the operator acts. If the relation a b is true, then we transfer to operator N_1, otherwise we transfer to operator N_2. If one of the operators' numbers is omitted, it means that we transfer to the next operator in sequence.

non-standard operators

A non-standard operator is any part of the object pro-

gram, written in commands with symbolic addresses. As said earlier the non-standard operator is always written down in the second part of the source information (carried-away operators). In the program's scheme the non-standard operator is represented by the letter H with the number of the operator. In the second part a "head" is placed before the non-standard operators, in the form:

N	n		50

where N is the non-standard operator's number, n is a number of words the operator contains.

loops in the strela-3 pp

A loop performs the repeated fulfillment of some sequence of operators for all given values of the parameter of the loop. In the program's scheme the loops are represented in such a form: $\{A\}$

where $\{$ and $\}$ are the opening and closing brackets of the loop, A is the sequence of repeated operators. The loop's parameter i and its initial value i_H, if it is not equal to zero, are placed under the opening bracket:

$$\underset{i=i_H}{\{} \quad \text{or} \quad \underset{i}{\{} \quad (\text{if } i_H = 0)$$

If the number of repetitions of the loop is determined by the final value of the parameter i_H then the letter is placed over the opening bracket:

$$\overset{i_K}{\underset{i=i_H}{\{}} \quad \text{or} \quad \overset{i_H}{\underset{i}{\{}}$$

In such a case the loop will be repeated from the value i_H up to the value i_K inclusive by the step of the size 1 ($i_H \leq i_K$). i_H and i_K are either variables or non-negative integer constants. If i_H and i_K are variables, then it is supposed that they are evaluated by the object program before the running of the loop as non-negative integer normalized numbers. It is also possible to set the number of the loop's repetitions by means of one of five logical relations a b.

readdressing operators

A readdressing operator is recorded in the program's scheme as: P (N, n, h),

where N is an operator's number, n is either a command number for a non-standard operator or a variable, h is either a variable or an integer constant. Here is how the readdressing operator is fulfilled:

If n is a command number for the non-standard operator N, then the readdressing constant h is added to the command.

If n is a variable and h is a constant, then h is added to all the addresses of the variable n in the operator N.

If n is a variable and h is also a variable, then it is supposed that the value of the h needed is evaluated in the third address of the location for h as an integer number.

restoring operators

A restoring operator is recorded in the program's scheme as: V (N) where N is an operator's number.

If there are some variable commands in the operator N which are transformed by readdressing operators, the restoring operator will transfer the initial values of these variable commands into their places in the operator N.

double-counting operator

While composing the program with the help of the PPS, computation control may be prescribed by means of double computations of separate segments of the program. Therefore the double-counting operators' symbols are arranged in the program's scheme. The computer will compute every segment of the program between two such symbols—following one after another—and accumulate all the contents of the internal storage. If the sums are equal, then the whole content of the storage is recorded on the magnetic tape, and the computation is carried on. If control sums are unequal, the computer stops and after a new start, it repeats the computation once more comparing it with the three sums already computed.

The following notation which denotes the transmission of information between the different computer parts is used: A B where A is the symbolic address of the start of the location from which the information is going to be transferred, B is the symbolic address of the start of the location where the transfer is going to be made, and n is a number of words in the information being transferred.

The unconditional transfer is denoted by $\overset{N}{\underset{N}{\sqsubset}}$ where N is an operator number to which the transfer will be made.

The conditional transfer is denoted by $\overset{N_1}{\underset{N_2}{\sqsubset}}$

If the signal for the preceding command is equal to 1, we shall transfer to operator N. Otherwise we shall transfer to operator N_2. For transfers to subroutines the following notation is used: $\overset{N_1}{\underset{N_1}{\sqsubset N_2}}$ which means to fulfill the subroutine beginning with operator N_1 and up to operator N_2 exclusively.

storage blocks in the pps

This information, at first, shows how many blocks should be in the storage and how long they should be. If necessary, it is possible to point out the position of some blocks in the storage. Such information about every block has the following form:

$$M_k, \lambda \text{ words}, v = \ldots$$

where k is the block's number, is its length and v is the address of the first location of the block (if given). Then information about the variables associated with this block is written down. If the address of a variable a or a_{ij} ... depends on parameters i, j, ..., it is recorded in such a form:

$$a(\text{or } a_{ij\ldots}) = H(\text{or } K) + \Delta + h_1 i + h_2 j + \ldots$$

where H denotes the start of the block (its first location) and K denotes the end of the block (its last location). Number Δ is a "shift" in Russian terminology, h_1, h_2 ... are the steps of readdressing according to parameters i, j, ... Δ and h may be either integer constants or variables.

If the address of the variable a from the block does not depend on any parameters, then the information about its place in the block is recorded by: $a = H\,(\text{or } K) + \Delta$.

If some variables appear in the program's scheme with different sets of equal numbers of subscripts, then the dependability of the address of the variable on the subscripts is mentioned in the information only once. For example, if the variables a_{isk}, a_{kli}, a_{ksi} appear in the program's scheme, then in the information about blocks only one row is written down

$$a_{ijk} = H(\text{or } K) + \Delta + h_1 i + h_2 j + h_3 k$$

That is all about source information.

We are now going to describe briefly the structure of PPS, the programming program for the STRELA-3 computer. The PPS as a whole consists of 30 separate blocks recorded on the magnetic tape. Every block is used only

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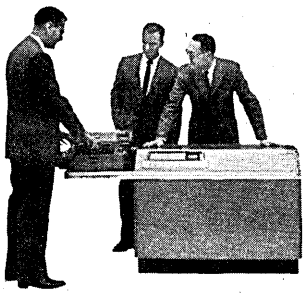

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once during the programming program's running. The information transformed is placed in the internal storage. Every block has a length of about 240 locations. A part of the storage—about 130 locations—is intended for some working materials, which the PPS works out and carries over from one block to the other. Thus the length of the simultaneously transformed information may reach up to 1,500 words. The blocks of the PPS change one after another automatically. The PPS punches on punched cards the finished object program and some additional information. Besides this, it is possible if desired to punch intermediate information.

PPS is able to discover automatically many formal mistakes in the source information.

As a conclusion to this section, let us consider an example of preparation of the source information. Suppose we have to integrate a parabolic partial differential equation

$$\frac{\delta z}{\delta t} = 0.75\sqrt{x(1-x)(t^2x+z)}\ \frac{\delta^2 z}{\delta x^2}$$

$$z(x,0) = 0;\ z(0,t) = 0;\ z(1,t) = t$$

from $t = 0$ to $t = T$, $M = h^{-1}$ and t are given (h is the step by x, t is the step by t).
The evaluation formulas are:

$$z_{0,n+1} = 0$$

$$z_{m,n+1} = z_{m,n} + t \cdot 0.75\sqrt{x(1-x)(t^2x+z_{m,n})}\ \frac{z_{m+i,n}-2z_{mn}+z_{m-1,n}}{h^2}$$

$$m = 1,2,\ldots,M-1$$

$$z_{M,n+1} = (n+1)T$$

$$n = 0,1,2,\ldots$$

Let us pick out one block of the storage, containing 1000 numbers for storing all the values of z for each layer of t. The new z shall be placed on the locations of the old ones with delay for one step, because the old values of z will be needed for the evaluation of the new ones. Each time three points z_m, z_m and z_m will be used, which correspond to $z_{m,\,n}$, $z_{m-1,\,n}$, $z_{m\ 1,\,n}$.

Here is how the source information appears:

1. The program's scheme*

$$\rightarrow M \rightarrow T\ DC(5)\left\{\underset{m=0}{\overset{M}{0 \rightarrow z_m}}\right\}\left\{nT \rightarrow t\left\{\underset{m}{\overset{M}{L(m=0\ \square_{N_1})}}\right.\right.$$

$$0 \rightarrow r\ \square_{N_2}^{N_2} L_{N_1}(m=M\ \square_{N_3})(n+1)T \rightarrow z_m\ \square_{N_4}^{N_4}\ \square_{N_3}\ mM^{-1} \rightarrow x$$

$$z_m + 0.75(x(1-x)(t^2x+z_m))^{1/2}(z_m^+ - 2z_m + z_m^-)M^2 \rightarrow r$$

$$\square_{N_4}\ s \rightarrow z_m^-\ \square_{N_2}\ r \rightarrow s\Big\}DC\Big\}^{t<T}\ \Big\{\underset{i=1}{\overset{M}{Dec\ z_i \rightarrow z_i}}\Big\}\ a \xrightarrow{1000} STOP$$

Here the logical operators are picking out the cases $m = 0$ and $m = M$, which are evaluated separately. The sign $\square$ is used to show the number of the next operator, if the letter does not possess a letter denoting the operator's type.

2. Carried away operators are absent.
3. Information about variables is absent.
4. Information about storage blocks is as follows:

$$M_1\ ,\ 1000\ words$$
$$z_m = H + 1 \cdot m$$
$$z_m^- = H - 1 + 1 \cdot m$$
$$z_m^+ = H + 1 + 1 \cdot m$$
$$a = H.$$

5. Storage blocks are absent.

**A "FORTRAN-like" expression of this program appears as appendix 1 at the end of the article.*

There are a great number of problems in automatic programming, but let us here select two types of problems:
1. The problems of the source information and
2. The problems of construction of new programming algorithms.

source information in the pps

This is a general designation for all problems whose solution simplifies the construction of the source information and brings its form closer to the mathematical expression of the problem, making use of all the wealth of modern mathematical symbolism. Natural development in this direction is the expansion of symbolism, acceptable to the source information, by the addition of some widespread mathematical terminology. The latter may include some sorts of mathematical operators, such as summation, the evaluation of multiplication, differential operators, etc., or some functionals, such min f(x) max f(x), f(x)dx and so on, some widespread special functions. And at last, we may want to include into the source information not only real scalar numbers but more complicated numbers such as complex numbers, vectors or matrixes and so on.

The method of subschemes (already used in some programming programs) may be used for decoding new symbols, which take place in the source information. The essence of this method is that a special block is added to the programming program which may "understand" new symbols in the source information. For every symbol of that sort, which denotes some mathematical algorithm D, this block constructs a subscheme which represents the record of the algorithm. This record is the algorithm D in terms of standard operators (arithmetical, logical and so on). The subscheme constructed substitutes the symbol, denoting the algorithm D, into the source information. After this, the transformed program's scheme which no longer contains special symbols, is again transformed by the programming program in a general way. Or to say it more briefly, this is the unification of the "programming program" programming method with the compiling program's method. And though the principal possibility of such a unification has been discussed for some time, there is little being done in this direction.

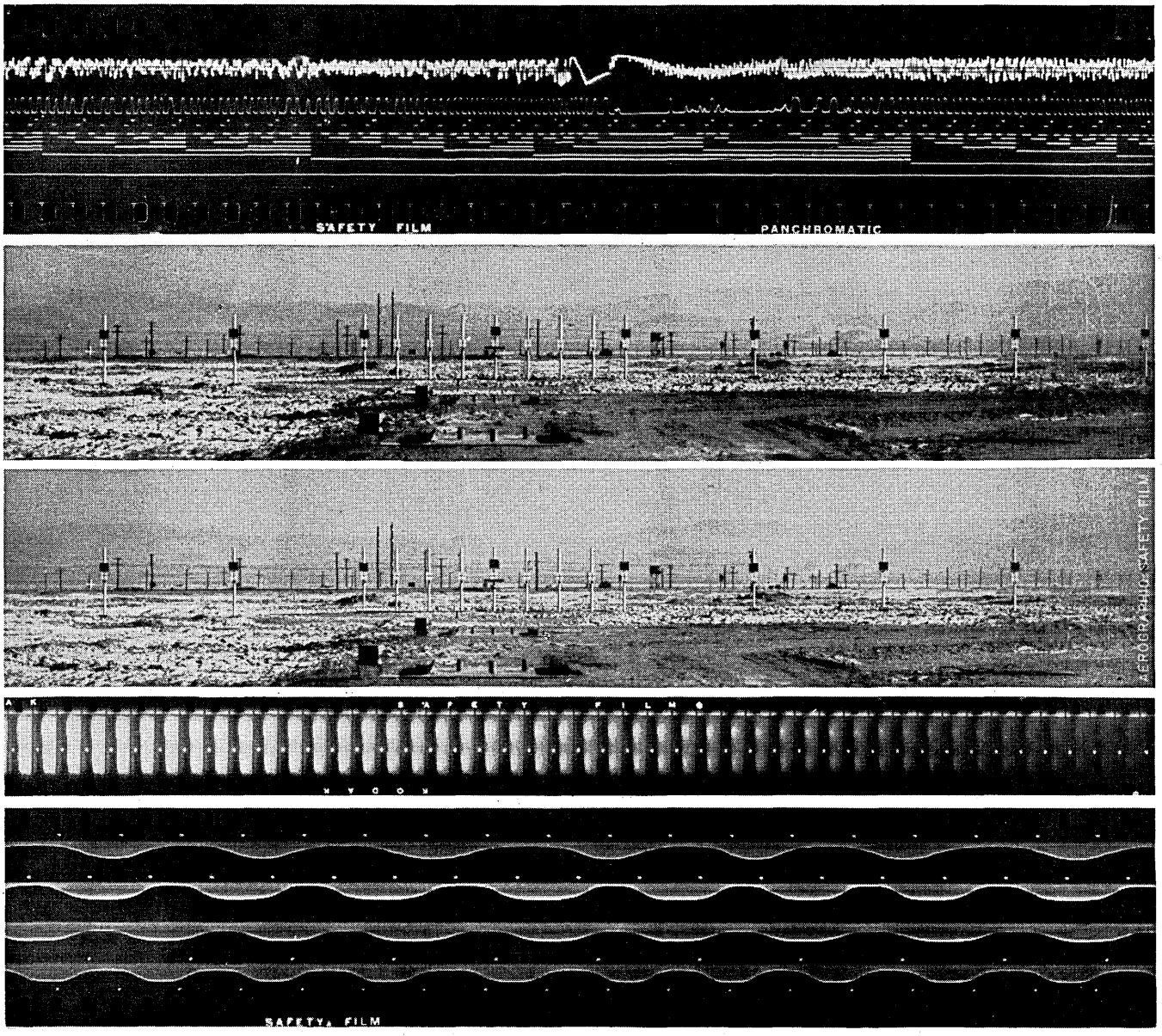
new programming algorithms

From the broad field of problems of this kind, we shall consider only two, which are probably the most important from a practical point of view. These are (1) The analysis and transformations of the program's schemes and (2) speeding up of the programming program's work.

1. The analysis and transformations of the program's schemes.

The term "analysis of the program's scheme" denotes the construction of algorithms capable of obtaining various information from the programs scheme about the interconnections between the operators forming the scheme.

Up to now, programming programs were constructed in such a way that every operator from the scheme was programmed as much as possible independently from the other ones. For example, the economy of commands during the programming of arithmetical operators is performed only in one operator. In the programming of loops, it requires that all variable commands, depending on the loop's parameter, are to be placed in the scheme between the first operator of the loop and the last one. The independent programming of various operators permits the simplification of programming algorithms but avoids opportunities of improving the constructed program. Here is an example



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of the improvement of the programming algorithms requiring an analysis of the program's scheme.

Let us suppose that in some arithmetical operators $A_1, \ldots, A_n$ we meet one and the same term $F(x_1 \ldots, x_k)$. It is obvious that in some cases, $F(x_1, \ldots, x_k)$ may be programmed in one operator only, while in the other operators the term $F(x_1, \ldots, x_k)$ is replaced by a symbol denoting the result of the term's evaluation. This may be done in the event that there is an operator A_i among $A_1, \ldots, A_n$, which is always fulfilled before the others and if $x_1, \ldots, x_k$ do not appear in the computation as the results between the work of operator A_i and A_j (A_j is one from $A_1, \ldots, A_n$). It is clear that it is impossible to discover the possibility of such a generalized economy of commands without an analysis of the program's scheme.

The problem of analyzing the program's scheme may be formulated in this particular case in a more exact way. To construct an algorithm which for any arbitrarily chosen two operators A_i and A_j from the scheme, determines which one of these possibilities take place

(a) A_i is always fulfilled before A_j;
(b) A_j is always fulfilled before A_i;
(c) A_i and A_j are not simultaneous, that is, if one is fulfilled the other is not;
(d) A_i and A_j can be fulfilled in any relative order.

The construction of such an algorithm would be very important for programming.

In connection with the inclusion of such notations as the summation term Σ and the multiplication term into the source information, there appears an interesting problem of the program's scheme transformation. Let us consider as an example the problem of evaluating the series

$u = \sum_{k=0}^{n} f(k)$ with some given accuracy.

It is obvious that if we substituted this notation directly by the subscheme

$0 \to u \left\{ u + f(k) \to u \right\}_{k}^{n}$, the object program would be very bad.

If we shall compute according to this program, we have to evaluate f(k) for every new k anew, and in most cases this would be quite unprofitable. In fact, the direct evaluation of f(k) is usually reduced to the evaluation of f(k) by using some recurrent relations.

For instance, the series

$$u = \sum_{k=0}^{n} \frac{x^k}{n!}$$

is always evaluated according to such a scheme

$$1 \to t, 0 \to u \left\{ u + t \to u, \frac{t \cdot x}{k} \to t \right\}_{k=1}^{n}$$

It seems possible to us to solve the following problem. For any arbitrary function f(k) of an integer argument represented by a combination of the exponent, power and factorial functions, finding an algorithm replacing the close notation f(k) by the recurrent relations. The realization of such an algorithm in programming program would permit the programmer not to do the preliminary work of finding the recurrent relations but to give this work to the computer. The programmer has only to write down the common number of the series or the multiplication in a close form.

In connection with the programming of loops, the following problem also concerning the transformation of the program's scheme is interesting. In many problems – particularly in the evaluation of tables – the following prescription appears:

"Evaluate the table of the values of the function

$$z = F(p, l, m, n)$$

(where p is a parameter) for all sets of the values of the integer arguments, for which

$$l_0 \leq l \leq l_k, m_0 \leq m \leq m_x, n_0 \leq n \leq n_x$$

(The number of arguments is of no importance and can be arbitrary).

It is very easy to write the program's scheme in such a form: $\left\{ \left\{ \left\{ F(p, l, m, n) \to z, \text{punch } z \right\}_{n=n_0}^{n_x} \right\}_{m=m_0}^{m_x} \right\}_{l=l_0}^{l_x}$

But if for instance, F(p, l, m, n) can be represented in such a way: $F(p, l, m, n) = \gamma(l, \psi(m, \xi(\zeta(p))))$

then the scheme

$$\zeta(p) \to u \left\{ \xi(n, u) \to v \left\{ \psi(m, v) \to w \left\{ \gamma(l, w) \to z, \text{punch } z \right\}_{l=l_0}^{l_x} \right\}_{m=m_0}^{m_x} \right\}_{n=n_0}^{n_x}$$

would of course be much more profitable. This is because, according to this scheme, only that part of the function F is being evaluated in every loop, which is essentially depending on the parameter of this loop. The evaluation of the left part of F is carried out into the external loops, more seldom repeated. Consequently, the program as a whole works faster.

In this case it is also probably possible to find an algorithm which would perform the transformation of the program's scheme mentioned above.

2. Speeding of the programming program's work.

The new programming program acquires more and more opportunities to improve the quality of the object programs by the expansion of the complication of the programming algorithms. But the increased complication and the size of the programming program have their dark side, which becomes an increase of the programming program's running time. When the running of the programming program takes much time, it reduces the benefit of using this programming program—and especially when the computer is unstable. It should therefore be stressed that while constructing new algorithms for the programming program, it is necessary to aspire in every possible way in increasing the speed of the algorithm's work.

Appendix 1.

```
READ        M, T
Double Count
Do K1   m = 0, M
Z m = 0
t = nT
Do K5   n = 0 to t < T
Do N2   m = 0, M
I F (m) N1, K2, N1
r = 0
Go To N2
I F (m-M) N3, K3, N3
Z m = (n+1)T
Go To N4
X = m/M
r = Zm + .75 √(x(1-x)(t²x+Zm)) (Z⁺m - 2Zm + Z⁻m) M²
N4      Z m = s
N2      s = r
K5      Double Count
        Do K6  i = 1, M
        Convert Zi to decimal
```

BURROUGHS TAKES SOLID STATE STAND

Major computer manufacturers in this country are unanimous in the gradual conversion of their design and production efforts to solid state computers. The one notable exception--Burroughs Corporation. Burroughs' ElectroData Division has made no announcements to date concerning specific plans for a transistorized system.

In answer to direct questions concerning inroads into this area, ElectroData released to DATAMATION the following statement made by James R. Bradburn, vp and general manager of the division.

> "Burroughs Corporation's ElectroData Division has elected to take a different approach to entering the solid state computer field.
>
> "When faced with a decision several years ago on the design approach to be taken on their model 220 computer, Burroughs chose to go ahead with vacuum tubes. At the same time they began development of an advanced high speed printer system which is fully solid state.
>
> "Using tubes in the 220 gave Burroughs about a year and one-half head start over other high-performance, medium-priced systems. The first shipment was made in October of 1958. By the time the competing solid state systems begin to be delivered in the spring of next year, nearly fifty 220 systems will have been completed and installed. From a practical business point of view, Burroughs management feels their decision was a wise one.
>
> "Burroughs points out that despite the glamour and very active promotion of the competing solid state machines, the 220 continues to sell well. Since the release of the IBM 7070 in September of last year, Burroughs has received orders for 29 220's, 19 of them during the current year.
>
> "The company attributes this, in part, to the performance of 220's already installed. During a recent eleven-week period the average 220 system up-time was 98.7% and the average system work week was 60 hours. Burroughs claims that the first generation of solid state systems will be hard pressed to surpass that kind of a record."

Burroughs ElectroData still isn't saying when its own "first generation solid state system" will be announced. The Pasadena firm holds off announcement of new equipment until it is ready to produce.

IBM WORKS ON COMMERCIAL TRANSLATOR

IBM has announced a translator for users of commercial data processing systems. This translator will reportedly be to the commercial field what FORTRAN is to the scientific field. According to published reports the translator tape will hold over 100,000 blocks of instructions when in its final form (1961). As new computers are designed, this commercial pro-

gramming language can be easily adapted to them with the use of an intermediary translating program. The program converts new commercial language into machine instructions. IBM is now preparing such programs for several of its more advanced data processing systems, the 705-III, 7070,709 and the 7090.

AERONUTRONIC BECOMES FORD DIVISION

Aeronutronic Systems, Inc., was merged with the Ford Motor Company, effective July 1st. It will operate as Aeronutronic, a division of the company. The merger was approved by both firms' boards of directors. To quote an official company statement, "The merging of Aeronutronic into the Ford Motor Company will permit more effective company support of Aeronutronic programs and thus will facilitate the undertaking of more extensive projects than have been feasible in the past." Translation--Aeronutronic has proved its capability and Ford will now proceed to pour a great deal of money into it's new division.

PHILCO CORP. BUILDING TRANSAC CENTER

On June 10th Philco Corporation broke ground for its multi-million dollar Transac computer center, which will be located near Willow Grove, Penna. The plant, with over 200,000 sq. ft. of floor space, will contain national sales offices and research, engineering and manufacturing facilities for producing the Transac S-2000. Occupancy is slated for November of this year.

REMRAND LISTS UNIVAC SOLID STATE ORDERS

Firms are ordering Univac Solid State 80's and 90's at a fast clip, according to Remington Rand. The 100 mark in sales has been passed and the company states that two of Detroit's Big Four automobile manufacturers have ordered computers. Among those scheduled to receive machines this summer are National Bank & Trust Co., Greenwich, Conn.; Kansas City Life Ins. Co., Kansas City, Mo.; Economic Labs, St. Paul; N. J. Turn-Pike Authority, New Brunswick; and Champlin Oil Co., Oklahoma City.

INDIANA STEEL, GENERAL CERAMICS TO MERGE

Indiana Steel Products Company and General Ceramics Corporation of Keasbey, N.J., have agreed on basic terms for a merger. The agreement is subject to approval by shareholders of both companies. General Ceramics originated square loop, ferrite memory cores.

RANDOM INDUSTRY INFORMATION

A nine-man team of European labor leaders recently toured the Michigan Blue Cross-Blue Shield head-quarters to see its Datamatic 1000 installation and hear the story of the organization's switch-over to datamated office procedures. The group is making a detailed study of automation and its impact on employ-ment throughout the United States. Members represent labor organizations in Austria, Belgium, Germany, Holland, Norway and England.

Lester L. Kilpatrick, Ronald D. Cone, Eugene Seid, Robert C. Morton and Eugene W. Beckmán have left Autonetics to set up their own company. The group has taken over management of California Computer Products, Incorporated, located in Downey, Calif.

Stockholders of Mid-Century Instrumatic Corp., N.Y.C., have approved a change in corporate name to Computer Systems, Inc.

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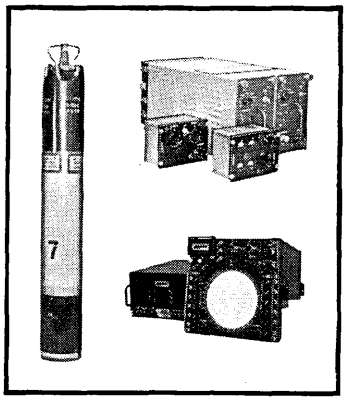

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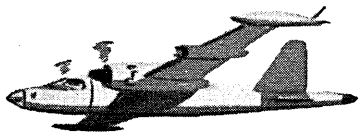

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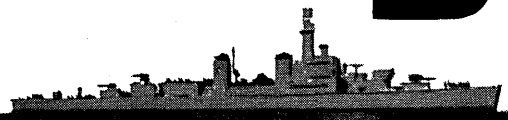

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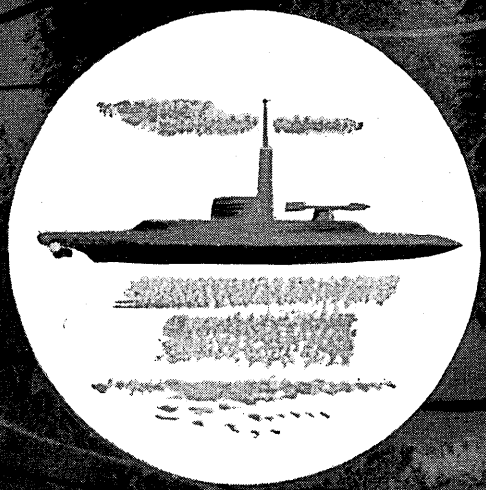

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IS IT OVERHAUL OR TRADE-IN TIME?

perennial professional society question worked over by computer specialists

It has been observed that the highlights of computing industry conferences are often the informal conversations which take place in hotel rooms and in conference corridors.

In 1958, on the day prior to the Western Joint Computer Conference, a group of people with strong feelings about the value of such conversations met at The RAND Corporation to discuss common problems in computing. This all-day session was tape recorded and a transcript was later produced for the attendees.

A second such session was held this year on March 2. It too was taped and printed copies of the transcript were sent to the gentlemen listed below. The section which appears here is a result of editing by the participants.

A part of the discussion concerned what many of those attending felt was a lack of any real unifying organization in the information processing field. They agreed that some good might be achieved by publication of their discussion of this subject.

Those attending the 1959 session were Herb Grosch, IBM; Morris Rubinoff, Philco; C. B. Tompkins, UCLA; Charlie Phillips, Dept. of Defense; Herb Bright, Westinghouse; Saul Gorn, Moore School; Al Zipf, Bank of America; E. E. Minett, Remington Rand; Don Madden, System Development Corp.; Ed Cannon, Bureau of Standards; Bill Gunning, Epsco-West; Fred Way III, Case Institute; Walt Bauer, Space Technology Labs.; Oliver Selfridge, Lincoln Laboratories; Jackson Granholm, COMPUTING NEWS; Paul Armer, Fred Gruenberger, and Willis Ware, RAND.

The views expressed in this piece are those of the individuals involved. They do not necessarily reflect DATAMATION's views or the views of RAND, ACM, IRE, AIEE, SIAM, AMA, NMAA, the Department of Defense, COMPUTING NEWS, The International Brotherhood of Teamsters, or the DAR.

As the participants resumed their discussion following lunch it was suggested that the next topic to be considered deal with the need for a glossary of computer terminology. The consensus of opinion is voiced in Dr. Grosch's opening statement . . .

Grosch: Isn't this really a sub-category of the larger question: what is wrong with our professional organizations? If we had a decent computer organization, this would be one of its functions and there wouldn't be any problem.

Rubinoff: All right, Herb, I'd like to hear you discuss that one . . .

Gorn: Would you say that this is a topic under Item 4 of the Agenda; namely, What Can Be Done to Increase the Effectiveness of our Professional Organizations?

Gruenberger: It would certainly increase the effectiveness for me.

Grosch: Many of the people who invent these terms don't belong to the IRE and don't see its publications, even those of the PGEC.

Rubinoff: Again, let me say, don't let's be one-sided in our approach. There are several sets of interests. We didn't even include the business users. I would imagine that the American Management Association will be coming out with their glossary one of these days and it will be quite different.

Gorn: Relating to Item 4, some questions have already come up in the council and in the editorial board. The question was raised in the editorial board about starting a review journal. Similar questions have come up in the council such as the social responsibility of computer people. My answer to all of these is, "we can't answer these questions until we find the function of the society and what it is supposed to cover." The question then becomes one of definition. What is the society supposed to cover? That ought to be our first question. If the society knows what it is, then it can increase its effectiveness.

Tompkins: Your point is well taken, Saul. When the ACM was founded there weren't any computing machines, and a handful of people put it together. Everybody tried to straddle the whole field. Ever since then it's been contesting with itself to the point where I lost interest in it completely for a number of years. As far as I know, it doesn't have any status goals that are adequate at the moment.

Gruenberger: Maybe it would be easier at this stage to list the things that it should not be interested in.

Gorn: Rather than worry about this particular society, let's consider the different functions and type of people in the whole computer area.

Rubinoff: I'd like to hear expressions of opinions because this problem is getting quite severe. The NJCC has an ad hoc committee set up to determine how on earth we represent computer-interested people in this country at the International Federation of Information Processing. Why should it be the NJCC? Why can't it be, for example, SIAM? Or the American Management Association, or, for that matter, the chemical societies? They have information retrieval problems.

Grosch: You might be interested to know that I tried to get something going inside IBM on this. John McPherson and I met twice to try to get a meeting going on it. We wanted to get a company position at least discussed if not established on the matter. I drew up a four page agenda of possible alternatives for discussion which was sent around to half a dozen high level types, and their comments were so divergent that McPherson decided to not even call the meeting.

Gorn: I was citing an example before, from the editorial board, where people have been pushing for the ACM to publish reviews. Let's say we know what the society is. What would we review, everything?

Grosch: There are a lot of pressing problems involved here. We can expect to have many more international meetings, and we ought to get the organization problem licked. Look at the list of the guys with interests: you have manufacturers with problems of standardization, terminology, and so forth; you have users who have organized cooperative groups; you have universities trying to find out what to teach, (all three of those groups have the problem of education on their hands); you have suppliers who are trying to feed components into the industry; you have professional programmers; you have information theorists and machine organization people. And all these groups do have a common interest; they're all interested in that big box of stuff sitting in the middle of the room.

Armer: It seems to me that never before in the history of

We are sacrificing our standard type and our usual make-up so that this transcript can be presented in two issues. These representatives of our industry seem to think that the need for considering this subject is urgent. We agree.

mankind has the situation which is about to come upon us existed. This is the pervasion of computers and computing into every other science field and discipline. We've always thought of mathematics as the queen of the sciences pervading every other field, but computing is going to go much farther than that.

Rubinoff: I object to the words "never before." It's happened before in the case of libraries and it's happened in the case of statistics. Now, I'd like to muddy the situation even more. There is an International Federation on Automatic Control; the IRE and the AIEE both have representation on that. Now, this group is set up with a subdivision relatively small called data processing.

Grosch: While we, of course, regard **their** business as a very small sub-category of **our** business!

Armer: Yes, in the latest issue of the Transactions of the PGIT, they are talking about the possible need for changing their goals to include information processing. Going back to your comment, Ruby, I don't think statistics is a fair example. In the first place, I don't think statistics has pervaded nearly as many fields; and in the second place, it's somehow different.

Rubinoff: Mathematical statistics has pervaded many areas, however. If you prefer we can talk about operations research, which pervades many areas as well.

Grosch: I think statistics is a sub-class of operations research and operations research is in danger of becoming stillborn. I would agree with the library comment, but I think libraries are just a sub-class of information retrieval devices.

Gorn: What you're really talking about is the theory and practice of formal communications, and that's why it is such a central thing.

Grosch: That's very well put, Saul. It seems to me that everyone is getting on the bandwagon now, under the banner of information processing.

Armer: Six months from now, information processing will be the O.K. word in this business.

Rubinoff: There's an alternative. We could invent an even newer term and see if people could catch up with us on that one.

Armer: I think we really need some generic terms, and information processing is just too damn long.

Grosch: Well, we could make up one. The word "radar" was invented; all we have to do is string together five letters with a lot of zilch.

Gorn: If information processing or information transforming won't do, then formal communication won't do, either.

Gruenberger: Whatever this word is that you make up, Herb, make sure that it appears first in the Glossary.

Granholm: We ought to put a Greek scholar to work on it and come up with some word like thelelatria, [1] which describes a phenomenon evident in a great many magazines.

Gorn: Cybernetics came about that way and it has something to do with communication between man and machine and we're interested in the communication side of cybernetics.

Grosch: If we had this name, it could then be in the title of the society, which would get it into general use, and then it could appear in the glossary which would be the first duty of that society and so forth.

Granholm: I'll propose the Meta-Computer society. That has a nice mysterious sound.

Rubinoff: What does the group think is the role of the NJCC?

Grosch: It fills a void.

* Which void?

Grosch: The void left by the ACM.

Bright: There was a deathless crack attributed to the president of General Electric quoted in Time, recently, to the effect that all committees are no good because they're just a means of spreading irresponsibility. Obviously, NJCC is just a big committee.

Grosch: I detect an opposite trend though, Herb, in the JCC guys; they're reaching for responsibilities which their charter really prohibits. At every meeting I've attended, there have been four or five resolutions passed, after each of which somebody like Willis has to say he's been reading the charter and the JCC can't do that! Most of the people who get in there really want more responsibility, but this is withheld from them by the nature of the committee charter.

Rubinoff: This is a serious problem, and it hurts the entire activity of the computer field. If you have many splinter groups you have all kinds of side pulling and all kinds of conflicts which don't get resolved because they lead to such interesting problems, such as what kind of magnetic tapes does a given computer use and how do you go from one computer to another?

Minett: Could I offer a thought here? Would it help in our organizing a proper computer society if there already existed a computer manufacturers' association so that problems which clearly belong to them could be left out? In most other businesses there is a definite industry association. Such an association can resolve the normal problems of standards and things like that; and it seems to me that in the ACM there has been an awful mixture of problems which hasn't helped it a bit.

Gorn: We differ from a society like the American Physical Society in that they are concerned with the research problem, pure and simple. They are not involved with questions of production, as well as research.

Minett: That's right. It leads to problems like trying to impose standards on an industry which lacks an industry association. This is always a losing task.

Grosch: You don't **impose** standards, you **register** standards!

Granholm: Maybe we could come up with a new sweeping organization that we could call the National Machine Accountants Association.

Grosch: Maybe we should be discussing something a little more practical—how we could strengthen the JCC or how we could strengthen the ACM and eliminate the JCC; or maybe junk both alternatives and start a brand new society.

Bright: We obviously have jurisdictional conflicts between these three groups. Each one of them, in a way which it piously hopes is gentlemanly and forward-looking is trying to cover some of the same ground as the other two. You have the same sort of conflict between the IRE and the AIEE themselves but it's fairly trivial because they don't intersect too much. In the JCC, the conflict is among the interested members of the three groups who have precisely the same interests. The three groups are trying to make believe that their interests don't conflict. This seems to me to be a very strange combination of unions. I wonder if much of the sterility of the organization can't be traced to the fact that each group is worried that its neighbor might be doing the same thing.

Granholm: This is partly a function of the nature of the professional organization you want. If you want a professional organization that has some force in it, then you ought to study the American Medical Association. This association gets this way because each member is required to kick in large hunks of money with which they can go out and hire a director who is no weenie and who gets a salary that is ripsnorting . . .

Bright: You're describing not only the AMA but also the International Brotherhood of Teamsters.

Granholm: That's right.

Minett: And, I don't think it would be that way if the drug manufacturers had a powerful association. That's why I was suggesting a manufacturers association so that their problems didn't get mixed in with our professional problems. For the moment, I merely postulate that there ought to be such an association and it ought to be separate from a professional society.

Granholm: Its publication will be the Journal of Applied Atrophy.

Gorn: Would it help any if we looked at just a small portion of the problem? Instead of looking at personnel, let's look at the editorial policies that are involved. It's not very hard, given a particular paper, to decide whether it's over the border on the SIAM side or over the border on the IRE

1. worship of the bosom

* signifies unidentified voice throughout transcript

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DATA PROCESSING DIVISION

side, or does really belong in ACM. For example, if a paper on numerical analysis is concerned with truncation error analysis it belongs in SIAM, if it concerns how the procedure is effected and controlled, it belongs in ACM. On the other hand, look at questions of logic; if the question is how does this affect programming, then it belongs in ACM, if the question is how does it affect components and hardware then it belongs in IRE.

Rubinoff: What does this leave for AIEE?

Gorn: I don't know how to place AIEE.

Rubinoff: It publishes the same material as IRE and I'm on the editorial board of all three. This makes some interesting problems for me. If a paper is submitted to me in my capacity with Society X then I'm going to place it in the publication of Society X. But, actually, the man really doesn't know where to send it, because we haven't defined what is going to be published.

Gorn: When you reject it, do you suggest to him that he re-submit it to one of the other groups?

Grosch: **I couldn't care less** who publishes some abstract scientific paper! What I want to know is how do we pull together a hundred thousand warm bodies that are working on the outskirts of the computer business, give them a high priced executive director, lots of advertising, a whole series of technical journals; in other words, organize a real rip-snorting profession? Whenever somebody starts worrying about which journal what paper should be published in, we get bogged down in an academic cross-fire we've been in for ten years.

Gorn: The problem is too large. So we started to look at just one small piece.

Grosch: Well, look, it would have been mighty hard to build up the American Medical Association or the American Chemical Society in ten years. But on the other hand, we're a lot smarter than they are.

Bright: After all, if a group we may christen the American Computer Society is going to publish all these journals, who cares? A central editorial board can make this trivial decision.

Rubinoff: Now, is this the role of NJCC? Isn't there an ad hoc committee to consider just this question? Aren't you a member of it, Paul?

Armer: Yes, there is a JCC committee, consisting of myself, Ed Harder and Norm Taylor.

Gorn: Isn't the Huskey committee in the ACM, working on that, too?

Rubinoff: No, this problem is much broader than that. I repeat that one of the things that causes a splintering is just this problem of having to decide where a given paper should be published.

Bright: Oh, now it comes out. What you're driving at, Morris, is just exactly the sort of thing that Fred [Gruenberger] was telling me about last night in regard to the use of coding forms and flow chart symbols and so on. Every single person pops up and says, "Obviously it doesn't make any difference what way you do it, so do it my way." What you're suggesting now is that the NJCC wants an answer that fits the present pattern of the NJCC. Each of these organizations wants a solution which fits the area which it has carved out for itself, which overlaps the other areas. You've reached a real impasse here.

Rubinoff: That isn't right. NJCC doesn't want that at all. NJCC is recognizing that being the only over-riding body that identifies itself with computers, they may have done the country a disservice and the committee may come up with a recommendation that NJCC is not the representative body. What would you do? Supposing the decision were yours to make, Herb, what would you recommend? How do we advance the field of computing best? Maybe the suggestion that there be a manufacturers' association is a good one. Let them take care of that end of the computer field.

Grosch: Our professional business is that of organizing information. Now, if we can't organize ourselves to organize information, we look rather silly. If you want a one sentence objective, I would say that we need a society that will provide professional and public leadership (by which I mean leadership in the eyes of the public) ...

Tompkins: The job of the American Institute of Physics was simple because they had a whole bunch of societies that were more or less remote, like the American Acoustical Society, that were beginning to get all messed up with each other. We, of course, started out all messed up with everything. This doesn't mean that we have to discontinue the Association for Computing Machinery or anything else. Something like the Joint Computer Committee simply has to be accorded some power to act.

Grosch: What is quite possible here is a simple evolution from what we have now into an Institute for Computer Sciences or Information Processing Sciences, or what have you. Maybe we ought to draw in our business friends for example. I don't know what the reaction of a group like the NMAA would be to all this; maybe we're going to have to dangle some sugar cubes in front of their noses.

Gorn: How about the word you just used, Herb, Institute of Communication Sciences?

Grosch: The trouble with that is that it sounds like somebody trying to make money. Maybe an O.K. word is American; we might try for American Institute of Communication Sciences, that sounds like a non-profit organization.

Gruenberger: I want to see this first meeting of the Association of Computing Manufacturers with IBM and Royal-McBee sitting side by side.

Grosch: We won't settle for anything less than 90% of the votes! Fred has put his finger on a weakness of such an organization, though—that we don't have the balance that exists in other groups. IBM is such an important part of this business, that we'd probably be afraid to join.

Granholm: You could louse things up worse by abstaining, though.

Grosch: We're kind of caught there. If we join it, we wreck it; if we don't joint it, we wreck it.

Gruenberger: You'd have to run it with a Senate and a House. In one part, everyone gets one vote, and in the other part votes are allocated according to size.

Grosch: But we have to consider the consent decree which specifically prohibits us from doing many things that might make good sense in normal business.

Minett: But, this might be different because trade associations are a respected part of the American scene.

Gruenberger: But, again this might be different because of the wide disparity in size.

Granholm: Oh, I don't know that there's such a disparity in size. When you take into account the total business—shavers and so on—of the various competing organizations, IBM is not the world's largest.

Armer: I don't think those other things carry any weight.

Minnett: Legally, it does, because of the net size of each of the companies involved.

Grosch: Well, couldn't we sum it up by saying that this discussion indicates it's not quite as simple as it sounds ...

Minett: Then, you are arguing that the manufacturers should form such an association.

Rubinoff: That's correct. As a matter of fact, something like that is already going on in the Electronics Industries Association, regarding input/output equipment.

Gorn: How did it happen in the automobile industry around the turn of the century? They standardized and yet they were in competition. My answer is that it isn't in spite of the competition, but because of it.

Grosch: They did it through Zenith carburetor in the same way we do it through Minnesota Mining and Manufacturing. But look, fellows, I'm not really much interested in this even though I know it's important. I'm looking for a front organization. I'm not nearly so worried about who builds six channel tape and who builds seven channel tape, as I am about having someone who is Mr. Computer; someone who can go down and testify before Congress if need be. There may be complaints that manufacturers aren't hiring back all the men they lay off due to automation, and it's all the fault of the computer; at that time we need a spokesman.

Granholm: Is it possible, Herb, that you have a candidate for the job of director?

Grosch: It depends on the salary.

Rubinoff: Where does the NJCC fit into your thinking?

Grosch: It seems to me that the best way to do this, not necessarily the cleanest way or the neatest way, but at least the easiest way would be to reconstitute something that would take the place of the JCC with much more power

(Continued on page 30)

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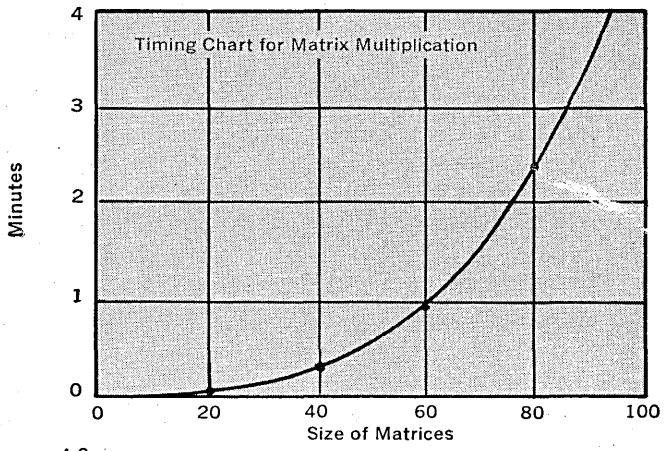

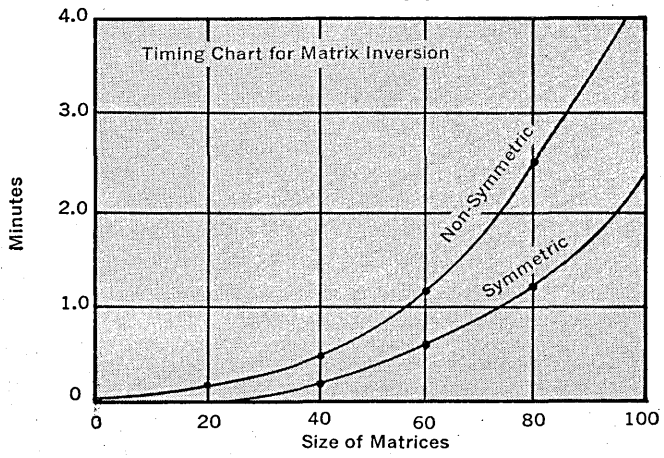

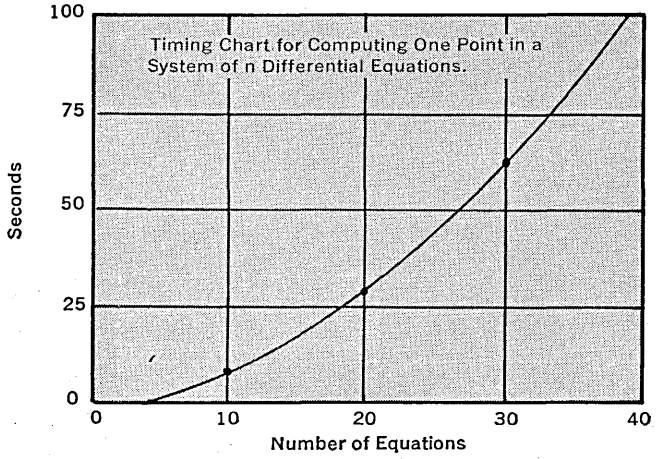

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given to it by the societies. With that as a start, you invite in all the other outfits. They don't have to be chopped up, and they don't have to be told that they must reorganize themselves. You simply offer them the right number of votes and invite them in. Then you can try to reshape things a little. At one end, you start a standardization effort; at the other end you might start a morality committee to establish that you shouldn't swipe more than 20% of your competitor's people per year. The only things we need aim at right away are the matter of international conferences and the problem of hardware standardization. If the latter topic is being taken care of elsewhere, fine. We could drop that. . . .

Bright: I'd like to go back to Tommy's discussion of the American Physical Society and the analogy he was drawing with our situation now. The difference it seems to me, was that for them they already had distinct societies, each with its own council, which were welded together into a master organization. The point is that there was such a thing as the Acoustical Society. There wasn't an audio professional group of the IRE, a sound group of the AIEE and perhaps a cat's ear group of the Medical Society. We seem to have in our case a bunch of unions vying for the same labor. In some cases, we have people who are members of all three. It seems to me that we have an impossible jurisdictional mess. They pretend to be working together when actually they're fighting each other tooth and nail.

Granholm: It seems to me that the NMAA ought to be willing to go along with this, because they already have a fairly clear cut organization.

Grosch: I think they would be willing to appoint someone fairly high up in their echelons to attend meetings and maybe vote once in a while. And if he got sick of it to the point where he could go back home and say, "these guys aren't doing anything for us," maybe they could pull their membership out. I'm not sure this is the right approach.

Gorn: Maybe we could do this by elimination. If we want professional societies that could, for example, represent the computing profession before Congress, they would want to know first of all that it is not representing a commercial interest. Therefore we can say that our professional society must not have an industrial tinge to it. Similarly, we can eliminate things from other angles here and simply see what is left.

Grosch: What I'm saying is that it might take us two years at that rate to define our objectives and get a rough draft of a constitution. And I think something ought to be done in the next few months.

Rubinoff: Let me indicate another problem. When the NJCC was formed by the three societies, it was agreed that when national conferences were held they would be sponsored jointly by the three societies. I would say that this has worked remarkably well; everyone has pitched in and cooperated. Now, let me talk AIEE because I have a problem there . . .

Grosch: Let me interrupt, Morrie, to point out that the ACM kept its annual meetings going. They really shouldn't have, in the context of what you just said.

Rubinoff: The AIEE has a membership of about 50,000 (similarly the IRE). Of these, some two to three thousand have indicated that their primary or secondary interest is in computers. But, that leaves some 47,000 engineers who could use computers and who should be made aware of computers if only someone would only take the trouble to do it. But, they're not going to the computer conferences because they haven't been educated. The primary objective of the AIEE in the last few years has been to do that job of education. As a result, in the power industries, for example, there has been a big increase in the use of digital computers in the last few years. This is because we in the AIEE went hammer and tongs at the problem of educating the power engineers to the use of computers. The question now is, "how do we maintain that kind of activity in a national organization?"

Gorn: I'd say it's dangerous to allow another society to take over the educating part or the acquiring of new blood into the organization. I've seen other societies, (SIAM, for example) avoiding contact with university groups from which new members might be expected to come, which are dying on the vine as a result. In the same vein, ACM should concern itself with university chapters or it too may die out.

Tompkins: I don't understand what the word "chapter" connotes.

Gorn: It connotes a mechanism whereby local activities can be handled and new membership can be received.

Rubinoff: Incidentally, in ACM they had to be bludgeoned into allowing local chapters.

Armer: Even today, the ACM does not officially recognize student chapters, but, we've got 'em!

Grosch: Fellows, we're back in this same grove again: worrying about who is going to publish what paper and whether or not there should be student chapters and so on. This is small stuff; it's interesting and it's important in its own right, but it's small stuff. We have a tool in our hands which is going to completely remodel society. And we're piddling along worrying about whether we should have student chapters. That just isn't the real problem. Consider the Institute of Physics, about which I know something. All the people involved in the physics disciplines, the acoustics people, the optics people, had branched off into separate small societies and were willing to come home again. But this isn't true in our case. We have accounting types, electronic types, astronomy types, and they just aren't going to want to come into a central organization unless we have something awfully attractive.

Rubinoff: This whole topic came up at the NJCC because of a request to consider inviting SIAM to join NJCC. There isn't a thing in the constitution of the NJCC which would allow them even to think about how to start to go about it. If that one had gone smoothly I had two more for them to consider—the DDA Council and the Simulation Council. These groups obviously have an interest in computers but they are not represented on the NJCC. There are even other groups to consider, like the AMA. This is a mountainous problem, and we're only playing with the foothills when we talk about student chapters and things like that. Questions regarding publications and the mechanics of representation —these things are secondary to the primary question of how we can represent information processing to the world. And how do we get all the people involved in it represented to each other. This is part of what we were discussing this morning. If we can get the public to understand what it is we are doing, we'll get more support and more funds.

Gorn: Then we must present to the public a representative and respectable body of doctrines which doesn't exist yet.

Rubinoff: And there must be a vehicle for it.

Granholm: There's one thing you shouldn't overlook here. In many instances, the men who control the funds are members of the NMAA.

Grosch: One way such an organization might get started might be to approach an outfit like the Ford Foundation. They could put up enough scratch to float you for a year or two. I don't mean to imply that it would be simple—that all you would have to do is ask for it.

Gorn: What are we asking for?

Grosch: That's the point. Without a set of objectives you have, in fact, nothing.

Minett: Essentially, we're talking about a body that can stimulate research on, and use of, the techniques we've been talking about. It's a body which can effectively stimulate at the right level. If it should turn out three years from now that carburetor manufacturers should be stimulated then it should be a body that can provide that stimulation. Now, this body does not necessarily have to be a membership body. As Herb has pointed out, there are many disciplines that can enter into this organization, and it can be highly effective without being a membership body. We should be thinking in terms of a council-type operation. Thus, respectability would arise not from large and complete membership but from representation on the council. We certainly couldn't expect to speak with authority for the many thousands of IRE members, nor could we expect that several thousand of them would transfer membership to the new organization. Rather, the knowledge which could be brought to bear by the thousands of IRE members who are interested in computing could be done through a representative on the council.

Tompkins: What you're saying is that the IRE belongs, but not the individual members. I think this is almost obvi-

ously clear; it is the only thing that could possibly work. The NJCC was put together (unrealistically, undoubtedly) with just this idea in view.

Minett: The reason I bring it up is that whenever a new organization is proposed, the first question asked is, "couldn't an organization like the ACM be greatly expanded and strengthened?" But I agree with Saul's point that it would be well worth while to record what the society should **not** be. I am suggesting for example that it should definitely not be a member organization.

Gorn: Then it will not be able to grow.

Minett: I doubt that. Look at the trade associations which are excellent examples of non-member groups.

Gorn: But they're not considered professional societies and what we're proposing must be a professional society.

Tompkins: Well, then look at the American Institute of Physics. It's a non-member organization.

Grosch: One trouble with talking about the Institute of Physics is that it is the only organization that the individual societies subscribe to. That isn't wholly true, but generally it is. The prime loyalty of the Optical Society for example, other than to its own members, is to the Institute of Physics. This would not be true of the IRE for a while; say, ten or twenty years.

Tompkins: Couldn't we specifically suggest that the NJCC expand and pick up some authority?

Ware: Remember that the NJCC is not an organization in its own right. It is only a committee.

Grosch: It's an inter-society committee to put on shows, that's what it amounts to. We could go back to those societies and ask them to set up an inter-society council to do something else, only we need to define what; that's the trouble. Here today we have an important group, and small enough so that we can talk to each other, and we haven't come up with any clear statement.

Tompkins: That's because it's a real complicated problem and we have not deliberated reasonably on it with a view toward creating a precise concise statement. If we were to do this, we should point out to this inter-organizational committee the need for them to become, say, an inter-organizational council and the need to get the word computer out of their title and information in their title; we couldn't define all of its objectives but we could define some of them. We could point out to them, for example, that educational standards are not being set and that there is gross misunderstanding as to what constitutes a course. Terminology is not well understood and it is not standard from field to field. There are publication problems; this council could provide unification in publications if asked. It looks to me as though it would be relatively easy to establish the need for such a council and recommend setting up some sort of continental congress to get it into action.

Grosch: Do you suppose we could establish some sort of **ad hoc** committee, really an expansion of the present NJCC with other societies invited in, which would be a sort of Continental Congress—a federation which would evolve a constitution at a later date?

Gorn: The words that Tommy just used read like a preamble, and you could start it off that way. What Tommy didn't cover was the thing you mentioned a while ago, Herb: what do you do to bring into existence a professional society when that society cuts across almost all other professional societies?

Granholm: Saul is talking about horizontal and vertical lines again.

Grosch: And I think that a lot of the silence we now have around the table is due to our thinking of a lot of professional societies that would resist any such movement.

Gorn: And that, in spite of their all agreeing with the preamble as Tommy gave it.

Tompkins: And so it reduces to a selling job. Obviously, no one is going to join the outfit if it won't do some good.

Grosch: It's an umpteen-step process. The first thing you need to do on an informal basis is to get some sort of agreement on objectives. Then you find some support. It might be manufacturers, it might be rich societies, it might be the Ford Foundation. After that you get some people working full time on the job. These people can go around to different societies and find out how they did it, then come in and draft lots of preambles. After all that, you can hold a constitutional convention and everyone can get together and tear the whole thing to pieces. (Then you can disband, and you're right back where you started!)

Tompkins: I think it can be done more hopefully than that. First you need a group of societies with a common interest. They must be large enough and they must profit somehow by their banding together. I think that such a group of societies probably exists now. All you need to add is some broad general objectives, and if that weren't true the NJCC wouldn't exist now.

Gorn: A lot of societies will not recognize that they belong to that objective even if they do. Take for example mathematics departments in universities and their attitude toward computing.

Tompkins: I'll grant that, but I claim that there are enough people who do understand that they could profit from it for a going concern to be built.

Gorn: All right, let's ask Morris. Would IRE and AIEE join such a group if it were something more then the Joint Computer Committee?

Ware: I can answer for the IRE, I think. There is a mechanism whereby the IRE can do this internationally. Therefore, I suspect that the mechanism either exists or could be established to do it domestically.

Gorn: But I'm talking about whether or not they would have the will or the interest or would they be afraid to?

Rubinoff: Speaking for the AIEE, and I'm sure Willis will agree for the IRE, the answer is yes. After all, they went into the NJCC. Don't you agree, Willis?

Ware: Very likely you are correct.

Minett: We have listed four or five organizations that would logically be a part of this. There are somewhere around a dozen that ought to be approached.

Grosch: There are, of course, other possibilities. One thing that could be tried would be a giant mailing to all the members of these societies. You could send the ballots to the entire membership of the IRE, and AIEE, the NMAA, and ACM asking the individual members if they would like to be represented at a constitutional convention. Ask them to return the other half of the ballot if they are interested and would like further information, and you wind up with 50,000 names, raw material who are interested in the formation of an all-inclusive federation of information sciences, or whatever you want to call it. From here, you go on to delegates and super-delegates who meet and draw up a constitution and a preamble which is eventually ratified and you wind up with a large new organization of individuals.

Rubinoff: If we can hold this constitutional convention in Bermuda, I'm all for it. I would like to indicate something of what has been done in other countries on this problem. In Germany, they established a special organization for applied mathematics and mechanics. In Japan, they simply embedded it in the Japan Electronic Industries Development Association, which has certain governmental overtones. In Sweden, they are making use of the Swedish Board for Computing Machinery, which only recently came into existence, primarily because they knew that the International Federation was going to come to pass. In the Soviet Union, the Russian Academy of Sciences will be the representatives to the International Federation.

Grosch: I'd like to have librarians, even microfilm experts, get into this thing. Anyone who has information to be stored, to be processed, to be retrieved, to be broadcast . . . Let me say again why I thought this giant constitutional convention was different from the other approach. The obvious difference is that an individual can have multiple loyalties. You can be an IRE man and an ACM man and an astronomer and an opticker and love them all. But, a society can have only loyalty to itself, and possibly upward to a federation like the Institute of Physics. If you start a brand new society, you can ask 50,000 **individuals** to join it and each of them can still continue his loyalty to ACM or other societies he previously belonged to.

Gorn: And then 50,000 people will say to themselves, "should we join another society?"

Grosch: I agree that most of them would say, "let's not." Although we here agree that the need is pressing, I must admit that many of the 50,000 would not see it.

Tompkins: Why do you say that a society can't have two or more loyalties?

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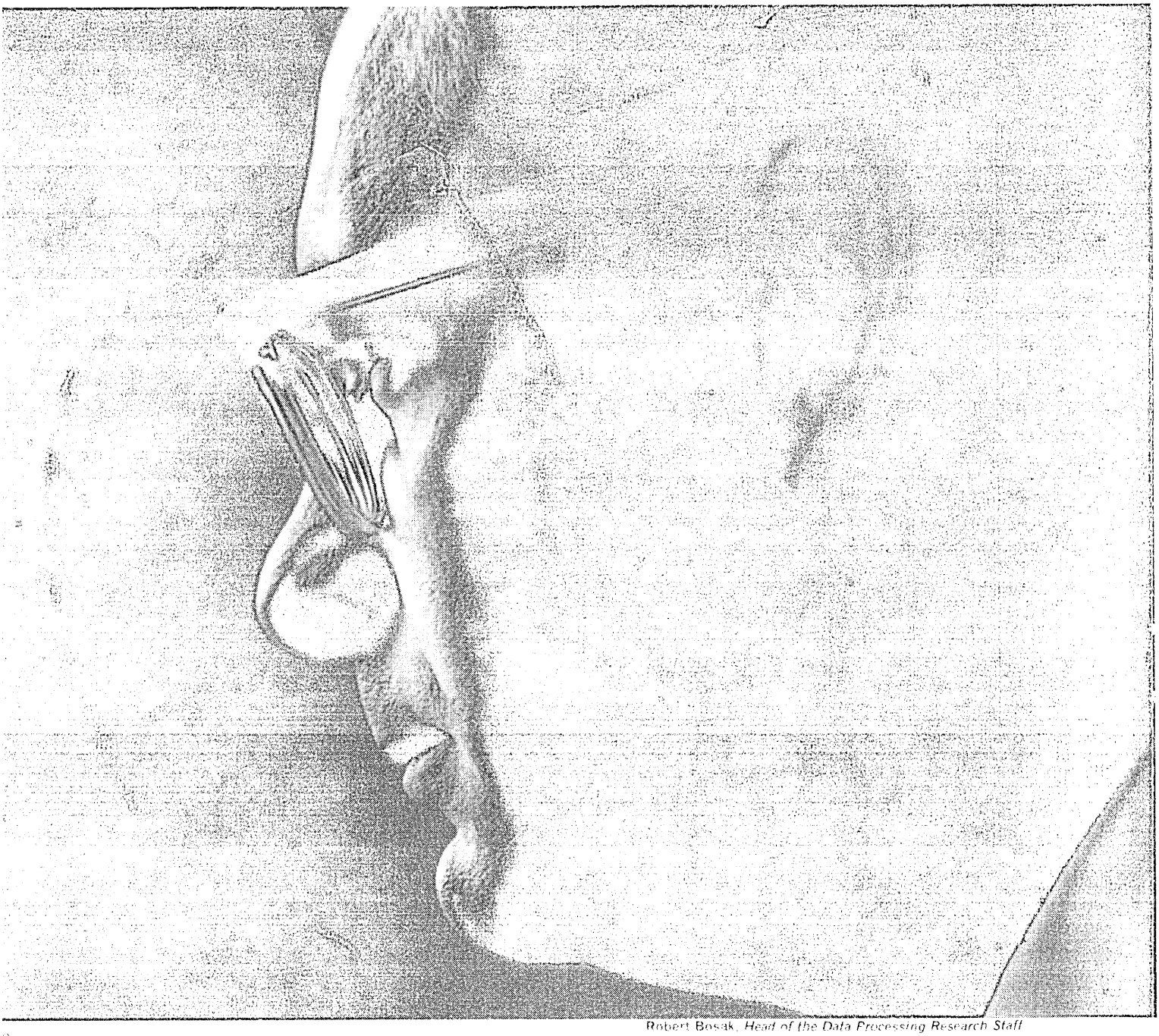

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Grosch: It seems to me that organizations should have single objectives, whereas people have multiple objectives.

Gorn: The answer, Tommy, is that the council will flounder whenever it gets a specific action to consider.

Armer: I don't want to kill the international issue, but with respect to NJCC, there's a domestic issue as well. Part of this is the question of size. If the JCC meetings get any larger there will be damn few places where they can be held just because of their size.

Grosch: Yes, but this is true also of the chemists and the doctors. Look at the IRE meeting. I think a lot of big cities are aware of this and are building facilities to take care of big outfits.

Minett: There might be a possibility of having your cake and eating it. There are people who are interested in associations on a local basis, on a chapter level. Related societies could be represented with these local chapters on a national council. You could probably get several thousand people who would be interested in being members-at-large, either through their other memberships, or in addition to them.

Gorn: Are we plotting the super state?

Grosch: Saul, I don't think so. I think the point is there's a lot of dissatisfaction in some groups and very little in others. I don't know NMAA very well; I talk to them all the time, but I'm not one of them. But I would guess that on the whole they're a pretty well satisfied group. On the other hand, with ACM, I think there would be a lot of people who would join and drop their ACM membership.

Ware: There is precedent for some of these things; for example, the IRE's PGAC. It belongs, in the name of the IRE, to the AACC which is tangled up with two or three other U. S. organizations and in turn belongs to the International Federation for Automatic Control.

Grosch: Think of the complications when the international group, whatever it is, tries to take action which requires ratification from this new super group, whatever it is; at best, as the child of a dozen other societies, some of which in turn belong to other groups—oh boy, this can get complicated!

Gorn: When the goals were small and the groups were small, we were able to get somewhere, but when it gets big like this we're having trouble in trying to act. The International Algebraic Language (IAL) agreement came about because there were few people involved and the thing they were trying to do wasn't too big.

Grosch: You sound like you're for it. I think that thing was bootlegged!

*In spite of the ACM.

Rubinoff: I'll put it differently. If the societies that exist today don't provide the services that their members require then there will be more societies. That's why there's a Simulation Council and an International Federation on Automatic Control (IFAC). It accounts in part for the formation of SIAM. It gets to be a real problem to decide who in the IRE or the AIEE should be a representative to the AACC (The American Automatic Control Council), who should be a representative on the NJCC and why. There isn't any real answer to why, it's just an historical development.

Minett: One conclusion we could certainly draw. If the organization we're talking about is the organization of organizations, it certainly should be open-ended. In this way, it can handle new interests as they arise, and we certainly have seen a lot of new interests arise in the last few years.

Armer: If anyone is interested, the committee's report with respect to the International Federation on Information Processing will simply ask the participating organizations to join the NJCC, in terms of associate membership or something like that. Each of them would have just a vote with respect to IFIP. With respect to domestic matters it is felt that they should be allowed to slide for a while. Domestic matters should be discussed in the presence of these people but, for a while at least, they wouldn't have a vote.

Gorn: The higher the level of abstraction of this society, the longer it will take to act on any particular issue. Each action that it might want to take will have to filter down to all the member organizations who will then have to decide whether or not they like the action.

Rubinoff: That all depends on the constitution, Saul.

Gorn: Sure, if you make it too strong, they won't join; if you make it too weak, you won't get any action.

Tompkins: So, you've got to make it just right.

Grosch: Here's the biggest cancer in our whole racket and we've just thrown up our hands and said, "that's too bad, we can't do anything about it."

Gorn: I don't think so. I think Tommy's preamble is a marvelous thought.

*Are you following the law which says: "Any problem that can be solved can be solved in an hour."?

Grosch: I'm thinking that any problem that can be solved can be stated!

Gorn: I'd suggest that the preamble be circulated and from that, decide on the next step.

Gruenberger: Isn't this logically the province of the JCC, itself?

Tompkins: Probably not.

Grosch: The whole thing comes about because the ACM is so impoverished in its thinking. They had the opportunity ten years ago and fumbled the ball.

Gorn: Right at the beginning, there were attempts to blow up in that direction, but people get frightened at Ed Berkeley's giant brain concept. Essentially, you're talking about something much bigger; something that even Ed Berkeley didn't recognize.

Grosch: A lot of people were scared in more ways than one. But there were clear clues later of what should have been done, long after the earliest birds had been prevented from doing any further damage. We had, for example, the first announcement of LEO's success in England. Then there were the early attempts to get UNIVAC's and 701's working on business problems. It was perfectly obvious that there would be a great deal of experimentation on using machines for business problems, and yet the Alts and the Householders brushed it all aside and made it quite clear that they couldn't care less.

Gorn: Well, at least now the Alts and the Hammings and the Householders are beginning to feel the way we do.

Grosch: Yes, but they're improving at the rate of 1 month per year and the world is going ahead at the rate of 12 months per year.

[There was a comment from Gorn at this point, essentially disagreeing, arguing that some significant progress was being made.]

Armer: You attended the last council meeting and you can still make that statement? What did they do? They appointed a Think Little committee!

Bright: Whether or not you approve of the results, a group from the ACM did go to Europe to work on IAL. Now, the ACM is almost refusing to let anything good happen from it.

Gorn: That's nothing to worry about. If IAL works properly everyone will hear about it and eventually ACM will have to accept it.

Armer: You're essentially saying that "murder will out" and I don't believe it.

Rubinoff: I think Saul is right. Something will come of it: there will be two more organizations.

Grosch: If IAL flies it's almost **prima facie** evidence that it's no good. I'm just that bitter about the whole business. We seem to do everything out of phase these days; there's been a curse on it from the very beginning. Whenever we get something good going, some character with a personal interest in some divergent direction goes running off with it. I think IAL, which a lot of narrow professional interests have become excited about, just showed the weakness of a lot of organizations already in the field.

Rubinoff: You mean it's been a good thing that they did it, but a bad thing that the organization did not do it.

Grosch: That's right.

Granholm: Paul had a good expression for it, but I think there's an old Oklahoma expression that describes it even better and that's, "If you think like a weenie, you are a weenie."

*Maybe we ought to impeach the Council.

Grosch: Well, I came very close to proposing that. I was going to ask for the mailing list!

(Concluded next issue)

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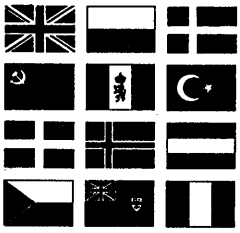

DATAMATION *abroad*

WHICH WAY IS LE BULL GOING? UP!

A trend away from word mincing seems to be in evidence among computer manufacturers these days and last month from over the waves the outspoken bellow of the Bull could be heard. Compagnie des Machines Bull in Paris claims to be the largest manufacturer of electronic computers in Europe and the third largest in the world. Two English firms would challenge the first claim and there are at least three firms in two countries who would take exception to the second (see "from the editor . . .").

Since 1950, Bull equipment has been exported to this country under the label of Remington Rand. Over $2,000,000 worth of Bull components was exported to the American firm in 1957 alone. Bull's contract with RemRand expires in August 1960 and, according to a New York Times article (June 14, 1959) Bull has made it clear that they will not renew under existing terms. Georges Vieillard, Bull general manager, came to the United States in February and May of this year "to explore possibilities" with Remington Rand. Again according to the Times, Bull proposed full partnership so that if a new agreement were drawn up with RemRand all Bull products marketed in this country would bear a nameplate which would read "Remington Rand--Bull." The Times states that the French company is not irrevocably committed to a Remington Rand partnership. They are reportedly currently dickering for a contract with Burroughs and other U.S. computer manufacturers. Burroughs now has an agreement with Bull for selling the French firm's magnetic tape units.

As the result of Vieillard's interest in the punch card patents of a young Norwegian engineer, Frederic Bull (from whom the company took its name), the firm was established in 1931 with a capitalization of $4,000. Although Vieillard was soon offered a purchase price from America, he sought French help in maintaining his young firm. He received it from the Callies family, who control roughly 70% of the stock at present, although the company is now a public one.

ICC, ROME, WILL GET TWO MACHINES

From declarations made by observers of several countries, it appears that the Convention establishing the International Computation Centre in Rome, Italy, has a good chance of becoming a fact, soon.

Under these conditions, the Preparatory Committee decided to accept the offers of two manufacturing suppliers, Olivetti-Bull and IBM-France, to install computers free of charge at the Centre before the end of 1959, under short-term agreements providing for the operation of these machines on a share basis. It will thus be possible for the Centre to install more modern equipment at a later date. The contracts will be signed as soon as the countries interested in the Centre have undertaken committments giving sufficiently firm assurance for the financing of its activities in 1960.

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Electrical engineers or physicists experienced in design and/or development in the following areas:

- Advanced Digital Computer System Design
- Digital System Logical Design
- Digital System Design & Research
- Digital Data Handling Systems Design

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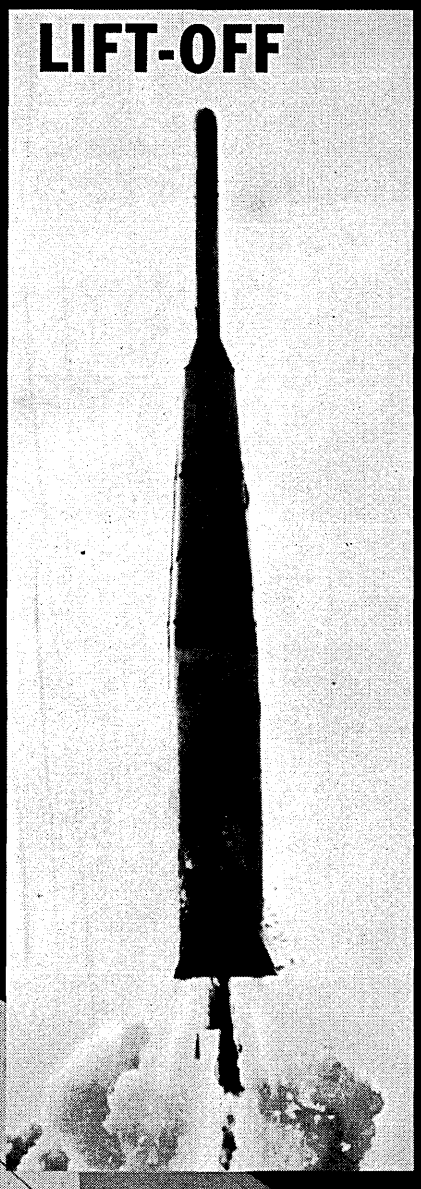
Sometimes forgotten during the thundering ascent of a space probe rocket are months of meticulous analysis, engineering and planning. The staff of Space Technology Laboratories is now engaged in a broad program of space research for the Air Force, the National Aeronautics and Space Administration and the Advanced Research Projects Agency under the direction of the Air Force Ballistic Missile Division. For space probe projects STL provides the total concept approach, including preliminary analysis, sub-system development, design, fabrication, testing, launch operations and data evaluation. The total task requires subtle original analysis in many fields as well as sound technical management.

The STL technical staff brings to this space research the talents which have provided system engineering and technical direction since 1954 to the Air Force Ballistic Missile Program. Major missile systems currently in this program are Atlas, Titan, Thor and Minuteman.

The scope of STL's responsibilities offers creative engineers, physicists and mathematicians unusual opportunities to see their ideas tested in working hardware. Inquiries are invited regarding staff openings in the areas of Advanced Systems Analysis, Rocket Propulsion, Space Flight Mechanics, Dynamics, Structural Analysis, and Aerodynamics.



Space Technology Laboratories, Inc.
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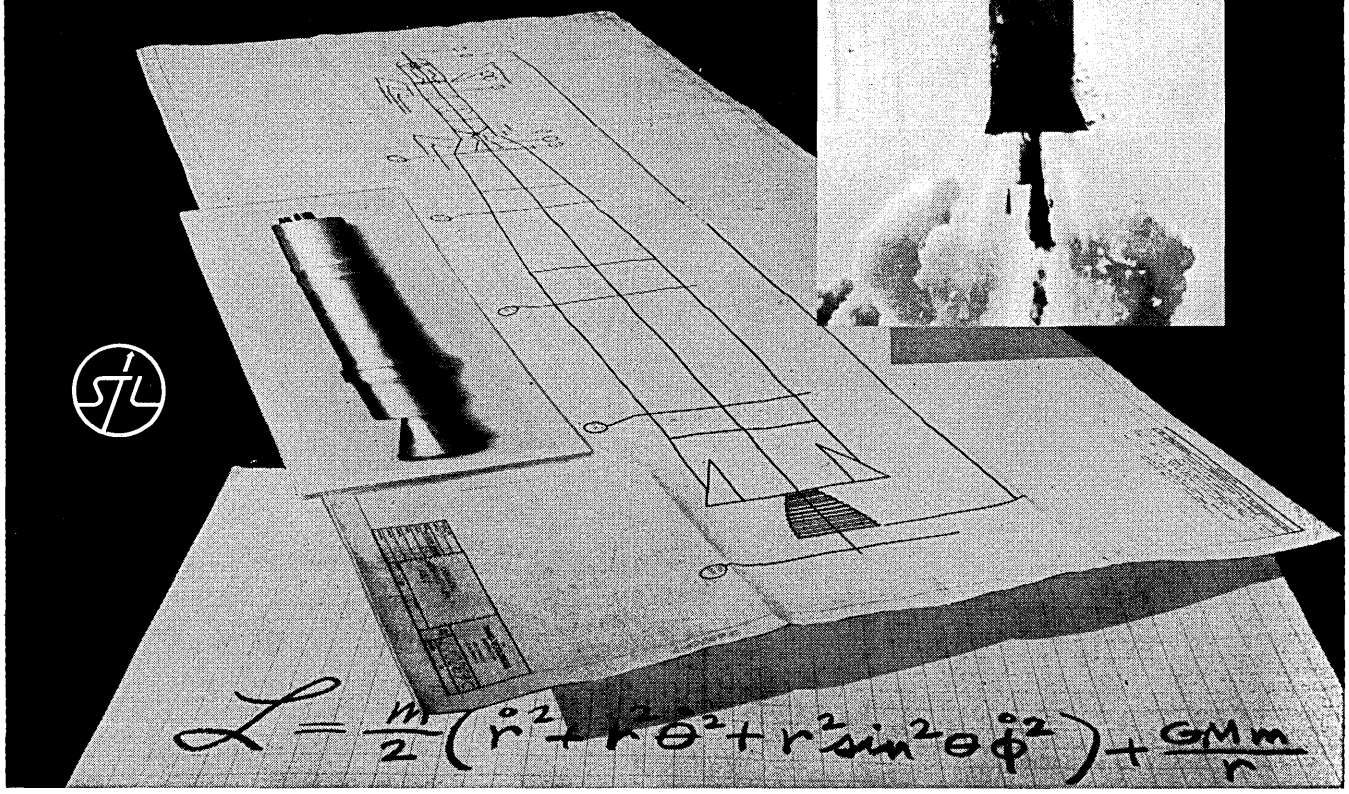

new products in DATAMATION

computer transistors

Eight types of alloy germanium computer transistors – consisting of four P-N-P and N-P-N pairs – have been in volume production by the manufacturer for more than one and one-half years. All available production capacity had previously been furnished to the IBM Corp. for use in their computer programs. Production capabilities have expanded to the point that these alloy computer transistors are now available to the entire industry. All eight transistors feature emitter to base voltages of 25 volts and collector to emitter voltages ranging from 15 to 25 volts for the four complementary pairs. The collector to base voltage for P-N-P series is 30 volts and for the N-P-N types, 25 volts. All transistors also highlight a 300 ma collector current, 300 ma emitter current and a total device dissipation of 150 mw. For information write TEXAS INSTRUMENTS INC., P.O. Box 312, Dallas, Texas, or use reader card.

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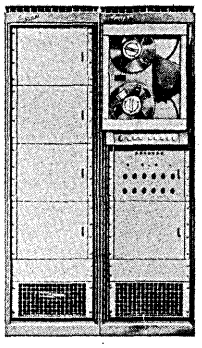
digital data systems

Soon to be marketed is a recently completed line of standardized digital data systems. Included are the RATE



series automatic telemetry systems (FM/FM-to-digital, PAM-to-digital, PDM-to-digital systems), Model RS-104 direct computer entry digital recorders (pictured), ADDAVERTER analog-digital computer linkages and DATAVERTER computer language translators. For information write EPSCO, INC., 275 Massachusetts Ave., Cambridge, Mass., or use card.

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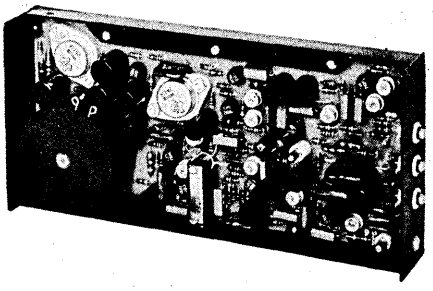
amplifiers

These low-noise, completely solid-state amplifiers have a frequency response exceeding —3 db at 200 KC,



100 meg input impedance, gain accuracies to ± .002%, linearity at .005% minimum and less than .01% noise peak-to-peak, from any source. Each unit is completely self powered. For information write PACKARD BELL COMPUTER CORP., 1905 Armacost Ave., Los Angeles 64, Calif.

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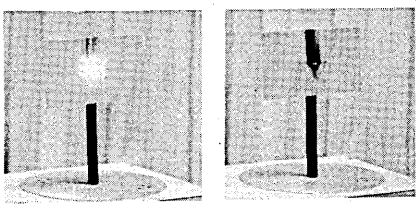
laminated plastic

EP-37 was developed to reduce the risk of fire in computer printed circuits. A new adhesive is used to se-



cure the copper to the base laminate so that EP-37 also offers resistance to plating solutions. Pictured left, a resistor was intentionally overloaded until it burst into flame. After the resistor burned out (right) the flame had caused no damage to EP-37 other than the slight charring noted. For information write FORMICA CORP., 4614 Spring Grove Ave., Cincinnati 32, Ohio, or use reader service card.

Circle 203 on Reader Service Card.

diode

A pinhead-size electronic device similar to a standard low-power transistor is known as a tunnel diode. It has potential applications as a memory element in ultrahigh-speed computing systems. The diode is fashioned of a

videograph

A high-speed electronic process capable of translating computer language and printing or displaying the resulting information at the rate of up to 20,000 letters, numbers, and symbols per second has been developed by A. B. Dick Company, 5700 West Touhy Ave., Chicago 31, Ill.

The system which has been named the Videograph process can read and translate binary pulses directly from a computer or from magnetic tape, paper tape or directly from punched cards. It can either print the translation or display it on a television screen.

Computer or facsimile information can be reproduced on cards, labels or sheets up to legal size for distribution or filing.

The new system has been under development since early 1955, when A. B. Dick Company began sponsorship of a research program at Stanford Research Institute. The research resulted in a special cathode ray tube called an electrostatic printing tube, a basic instrument of the printing device.

The equipment is able to print material at a number of different geographical locations from a single sending source. It is also capable of reproducing graphic material and computer information simultaneously and print them on one printed form.

When used to print or display computer language, the brain of the system is an electronic device known as a character generator, which translates the pulse language into television-type signals representing alphanumeric symbols. These are then fed into the electrostatic printing tube or an ordinary television receiver, which converts the video signals into a printing record or a visual display.

The electrostatic printing tube makes possible remote reproduction of pictorial and graphic information, when units are connected by a coaxial cable or microwave link.

Circle 204 on Reader Service Card.

tiny piece of germanium crystal only 3/1000 of an in. in diameter. The experimental unit has been operated in the laboratory at frequencies higher than 1,000 megacycles – 1 billion cycles per second – with a potential range in the future to beyond 10,000 megacycles, according to the manufacturer. The device employs a principle known as negative resistance. For information write RADIO CORPORATION OF AMERICA, David Sarnoff Research Center, Princeton, N.J., or use reader service card.

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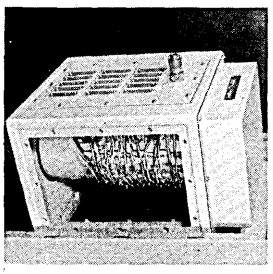
magnetic drum

A custom-designed magnetic storage drum with a capacity of 360,000 bits total storage uses 240 storage chan-



nels, each of which contains 1,500 bits. The drum is 5 in. in diameter and approximately 12 in. long. Operation is at 96 pulses per inch and 3,600 rpm, giving a pulse repetition rate of 90 kc. The drum has two mechanical clock tracks, one of which has 1,500 bits and the other of which is a one-bit index. For information write BRYANT COMPUTER PRODUCTS DIVISION, Box 620, Springfield, Vermont, or use reader service card.

Circle 206 on Reader Service Card.

delay line

Model 71-50 is a relay operated, dual channel delay line, designed to obtain coincidence between two signals of different time and a third reference signal. Some characteristics – delay is 1 to 1.5 usec., independently variable in each channel in increments of 0.05 usec., impedance – 1000 ohms; output rise-time – 0.06 usec. per channel; dimensions – 8 x 4 x 4 in. For information write ESC CORP., 534 Bergan Blvd., Palisades Park, N.J.

Circle 207 on Reader Service Card.

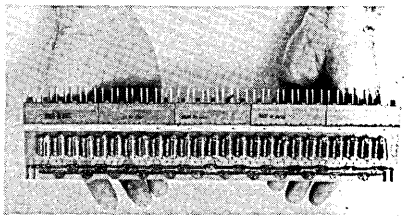
control chassis

Rapid acquisition of data and its storage and translation are key features of Model K-111 control chassis. The unit translates binary-coded inputs into decimal or binary-coded outputs, and upon command stores the input information for remote readout. The new control chassis has been designed to utilize transistor storage of encoder data and combines this buffer storage input with relay output. The unit is capable of three modes of operation: as required it will store only, follow only, or follow and store on command. For information write DATEX CORP., 1307 S. Myrtle Ave., Monrovia, Calif., or use reader card.

Circle 208 on Reader Service Card.

logic-memory device

The Paramistor is a module composed essentially of 25 bi-stable elements, known as Parametrons, which are ca-



pable of self-limiting amplification. By eliminating the need for additional amplifying and amplitude-limiting circuits, the Paramistor substantially

simplifies computer circuitry, according to the manufacturer. The manufacturer also claims that its basic element, the Parametron ferrite, has demonstrated long-term reliability exceeding that of such devices as relays, vacuum tubes, diodes and transistors. It can be used in AND, OR or NOT logic circuits, and in binary counter, clock, binary adder, binary multiplying and parallel-to-serial converting circuits. For information write KANEMATSU NEW YORK, INC., 606 S. Hill St., Los Angeles, Calif., or 150 Broadway, New York 38, N.Y.

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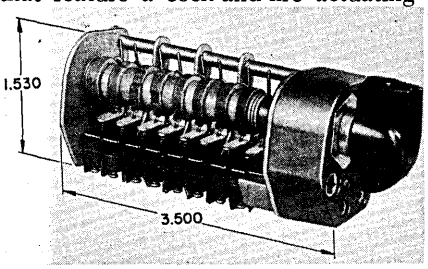
switch assemblies

Data sheet 162 describes a new series of rotary selector switch assemblies that feature a cock-and-fire actuating

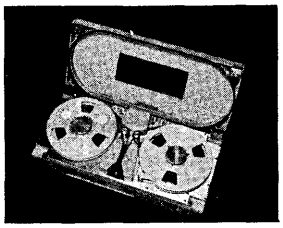


mechanism and non-tease circuitry. Series 28AS assemblies are for use on computer panels and other areas where mounting surface is at a premium. They can be provided with 2 to 8 plastic enclosed, single-pole, double-throw, basic switches. For information write MICRO SWITCH, Freeport, Ill., or use reader card.

Circle 210 on Reader Service Card.

instrumentation recorder

Displacing 1.6 cubic feet, this instrumentation recorder, the AR-200, affords its user seven to thirty-two re-



cording tracks of data depending upon the recording technique selected. For highest frequency response (up to 100,000 cycles at 60 inches per second) there is direct recording. For greatest amplitude accuracy, frequency modulated carrier recording preserves signal amplitudes over a frequency range of from dc to 10,000 cycles per second. For recording the maximum number of data samples, the AR-200 can record digital information at input rates up to 576,000 bits per second. For information write AMPEX CORP., Instrumentation Division, 934 Charter St., Redwood City, Calif., or use reader card.

Circle 211 on Reader Service Card.

mag tape amplifiers

Model 921 family of write/read amplifiers affords a wide choice of characteristics. Tape speeds from 1 in/sec. to 150 in/sec. can be accommodated with a response to minimum signal levels as low as 150 micro volts. Designed for compatibility with existing return to zero and non-return to zero recording systems, this amplifier equipment offers a choice of DC level or pre-selected pulse width for output use. DC level or pulse is also acceptable for input to write amplifier. For information write POTTER INSTRUMENT CO., INC., Sunnyside Blvd., Plainview, N.Y., or use reader card.

Circle 212 on Reader Service Card.

register and driver

Production of Model CTR-400 magnetic shift register element (one core per bit) and compatible shaper-

NEW PRODUCTS

driver element, Model CTD-400 has been announced. CTR-400 output signal has a 50:1 one/zero ratio. Designed for ease of transistor driving, the shift register has a tape voltage drop on the shift line of 0.4 volts for a ONE. The output signal can be either a positive or a negative twelve-volt pulse for a ONE. Terminals are available as solder lug, plug-in and printed board mounting. For information write DI/AN CONTROLS, INC., 40 Leon St., Boston 15, Mass.
Circle 213 on Reader Service Card.

switching transistors

The manufacturer has made available a switching transistor sampler pack which will enable designers of computer equipment to obtain delivery on small quantity orders. The new packages contain three each of six NPN types designed and tested for Beta stability, reliability, uniformity and other characteristics important to computer applications. Included in the pack are types 2N356, 2N357, 2N358 with 100 mw dissipation and types 2N377 and 2N388 with 150 mw dissipation (base internally connected to case for added dissipation). For information write SYLVANIA ELECTRIC PRODUCTS, INC., 1740 Broadway, New York 19, N.Y.
Circle 214 on Reader Service Card.

random access memory

Series RB memories will accept pulses or levels of either polarity, and input may be changed at any time during operation. Either binary or binary coded decimal addressing is possible or the units may be utilized in a sequential nonregenerative mode. The new memory-buffer units are available in capacities from 128 to 1,024 computer words or from 4 to 24 binary bits per word. These units operate at a 200-kilocycle rate, loading or unloading a word in 5 microseconds. For information write TELEMETER MAGNETICS, INC., 2245 Pontius Ave., Los Angeles 64, California.
Circle 215 on Reader Service Card.

NEW DATAMATION LITERATURE

TELEMETRY BROCHURE: The MARK I basic short delivery automatic PDM-to-digital computer format telemetry data system, is described in a four-page illustrated brochure. Some features include, accuracies in excess of 0.1%, conversion of PDM information to direct digital magnetic tape in exact computer format, accepts any IRIG PDM input signal in "real time" or twice "real time," accepts any arbitrary time code. Specifications and block diagrams are included in the brochure. For copy write EPSCO, INC., 588 Commonwealth Ave., Boston, Mass., or use reader service card.
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TAPE SIGNAL DROPOUTS: "Reduction of Dropout Errors in Magnetic Recording Systems," is the title of a four-page bulletin, No. 37, which discusses methods of reducing signal dropouts in magnetic tape. For copy write MINNESOTA MINING & MANUFACTURING CO., Dept. E9-200, 900 Bush Ave., St. Paul 6, Minn., or use reader service card.
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LINEAR PROGRAMMING: A six-page pamphlet outlines this company's linear programming service. Included is an explanation of the technique, results which may be expected and examples of linear programming and other operations research techniques applied to business and industrial problems. For copy write C-E-I-R, Inc., 1200 Jefferson Davis Highway, Arlington, Va., or use reader card.
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PUNCH UNIT: How to increase the efficiency of electronic data processing with the use of programmatic add-print-punch units, is described in two single page illustrated leaflets, BS-8 and BS-9. For copies write CLARY CORP., Systems Division, 408 Junipero St., San Gabriel, Calif.
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TUBES MANUAL: The 11th edition of a technical manual lists the characteristics and ratings of over 1,800 electron devices manufactured by

this company — including technical data on 110 transistors and 138 crystal diodes. For copy send $3 to SYLVANIA ELECTRIC PRODUCTS, INC., 1740 Broadway, New York 19, N.Y.

CHARACTER SENSING: A 24-page booklet, G22-8500, describes company's series 1200 character sensing equipment for banks. Incorporating the recommended specifications of the American Bankers Assoc., this brochure includes details on the 1201 proof inscriber, 1202 utility inscriber, 1210 sorter-reader, 1220 sorter-reader control and 729 II magnetic tape unit. For copy write INTERNATIONAL BUSINESS MACHINES CORP., 590 Madison Ave., New York 22, N.Y.
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TAPE EQUIPMENT: A 12-page, illustrated catalog, CAT 4-59, introduces this company's complete line of transistorized tape transports, read-write heads, record-playback amplifiers and accessories. Descriptions and specifications of each unit is included. For copy write — on company letterhead — POTTER INSTRUMENT CO., INC., Sunnyside Blvd., Plainview, N.Y.

CORE STORAGE BUFFER: No. AD-14, four-page leaflet entitled "Increasing Computer Capacity and Flexibility by Magnetic Core Buffering," describes how the application of this company's core storage buffers extended the scope of a UNIVAC computer to make a powerful data processing system. For copy write TELEMETER MAGNETICS, INC., 2245 Pontius Ave., Los Angeles 64, Calif., or use reader service card.
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ANALOG/DIGITAL RECORDER: Eight-page catalog 35-1541 describes shaft-input device that converts and records analog values in digital binary-decimal punched tape form and at the same time provides digital values in electrical form for telemetering or other purposes. For copy write FISCHER & PORTER CO., 151 Jacksonville Rd., Hatboro, Penna.
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USER REPORT: S-509, is a paper by Paul Seligmann, R & D Laboratories, Portland Cement Assoc., decribing the problems that led to their acquisition

of an LGP-30 small digital computer, the uses it has been put to and the benefits derived. For copy write ROYAL McBEE CORP., Port Chester, N.Y., or use reader service card.
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PLOTTER: Reprints of a technical article describes an electronic function plotter. The plotter combines analog and digital electronic techniques to achieve curve-plotting accuracy of 0.01% for frequencies ranging from 3 cps to over 400 KC. For copy write COMPUTER EQUIPMENT CORP., 1931 Pontius Ave., Los Angeles 25, Calif., or use card.
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MAGNETIC TAPE: Multichannel magnetic tape system for laboratories, test cells, telemetering recording and other precision applications, is described and illustrated in a new 24-page catalog, DC-3171. For copy write MINNEAPOLIS-HONEYWELL REGULATOR COMPANY, 10721 Hanna Street, Beltsville, Md.
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CONNECTOR CATALOG: A 24-page comprehensive catalog covers a wide variety of printed circuit connectors which accommodate 1/16 in., 3/32 in., or ⅛ in. printed circuit cards. Included in the illustrated catalog are complete specifications, outline dimensions, general information and suggested applications. For copy write DEJUR-AMSCO CORP., Electronic Sales Div., 45-01 Northern Blvd., Long Island City 1, N.Y.
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FLIGHT COMPUTER: Four-page bulletin 500 gives details and applications on the Model 500 Jet Aircraft Flight Computer . . . an analog computer designed to preselect the optimum flight path for a jet aircraft on a domestic, overseas, or charter route. For copy write COLORADO RESEARCH CORP., Broomfield, Colorado, or use reader service card.
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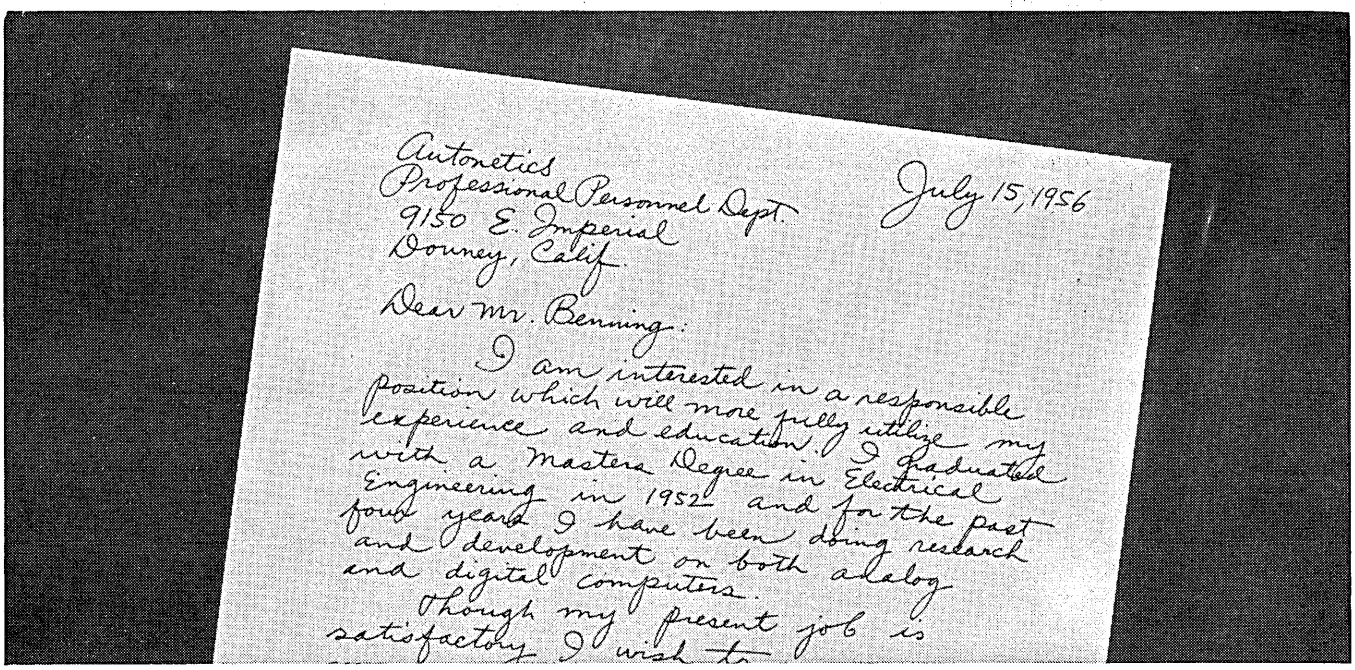
SYMPOSIUM PROCEEDINGS: Proceedings of the 1958 Computer Applications Symposium, October 1958, including 14 papers and transcripts of panel discussions is now available. For copy send $3 to ARMOUR RESEARCH FOUNDATION, Main Files: CA-5, 10 W. 35th St., Chicago, 16, Illinois, or use reader service card.



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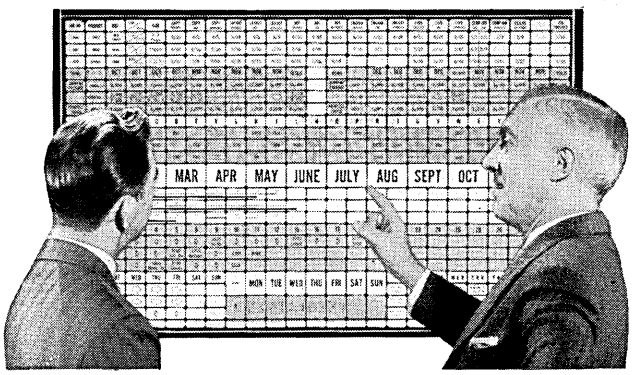

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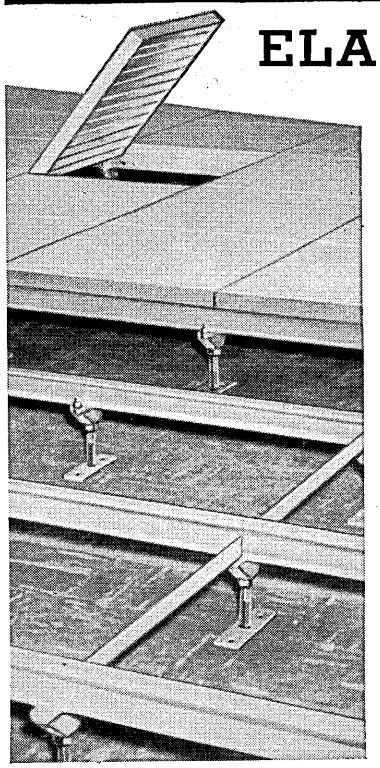

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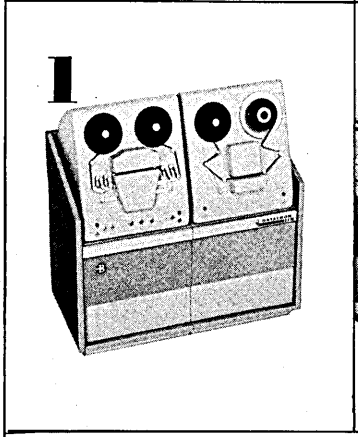
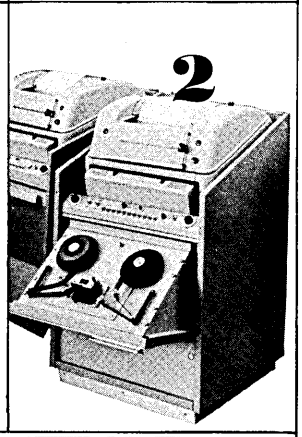
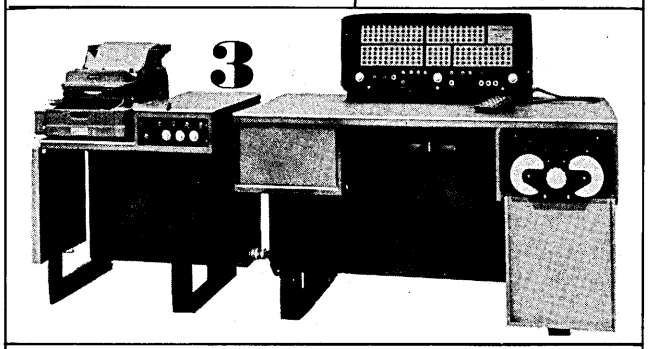
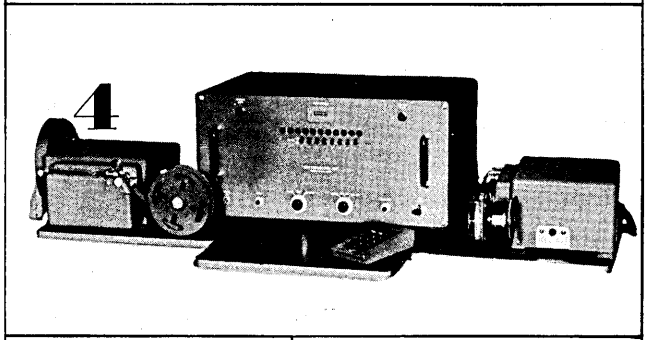
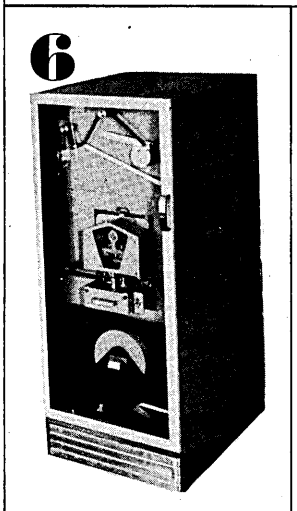
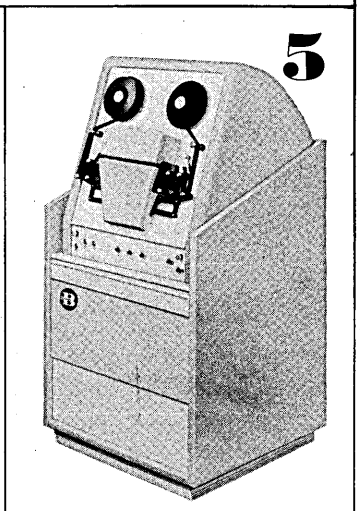


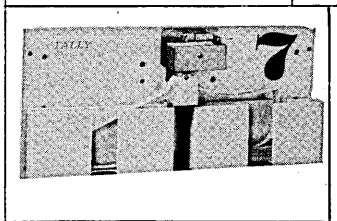


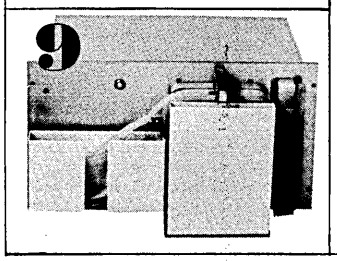


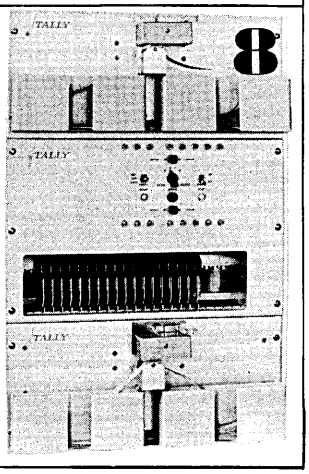












ALL ABOUT

This is the second half of a survey article covering paper tape equipment. DATAMATION asked appropriate manufacturers to furnish us with pictures and information covering their complete lines of paper tape readers, perforators and associated equipment. Last month we presented the products of nine manufacturers. Eight firms are represented on these pages.

BURROUGHS

1 Paper tape punch model 470 punches at 60 characters/second and has a paper tape feeding rate of 6 in./sec. Its reel size is 8 in., and the tape handles 10 characters/in. It has a 7-level code (046-1 character/frame). The unit includes as automatic features alphabetic, bi-decimal translation, reeling and rewinding, parity generation and selective zero suppression.

Circle 101 on Reader Service Card.

2 Photoreader Model 440 reads tape at 1,000 characters/second. Tape is fed at 100 in./second. It stops on a character and has a 5 millisecond start time. Seven-level code and a 40,000 characters/reel storage capacity are standard. Automatic features include emergency reel braking, rewind, program "float in" with B-register modification, and termination of reading by word count or by control information from the paper tape.

Circle 102 on Reader Service Card.

3 Burrough's photoelectric reader provides input to a computer at a rate of 540 digits/second. Operation is controlled by computer commands or commands punched in the tape itself. Loading of information from tape into the computer may be intermittent.

Circle 103 on Reader Service Card.

4 Model 454 tape preparation system punches, verifies, and duplicates input paper tapes for the 205 computer. The system consists of a control unit, a decimal keyboard, a motorized tape punch and a motorized tape reader. Using the 205 6-channel code, the 454 will produce tapes which contain a parity punch on a seventh channel.

Circle 104 on Reader Service Card.

5 Developed as an input device for the 220 edps, the 58187 photoreader is a capstan drive, reel-type machine which reads perforated tape photoelectrically at 1,000 characters/second. It has rapid start time and the ability to stop positively on the stop character at all operating speeds. Within 5 milliseconds after initiation of the restart signal, the character immediately following a stop character can be read.

Circle 105 on Reader Service Card.

6 The high-speed punch operates through the control console to reproduce output information from the 205 computer in 6-channel computer code at a rate of 60 digits/second. Paper tapes so produced can be used sequentially as input to the Flexowriter or to the computer via the photoelectric or mechanical reader.

Circle 106 on Reader Service Card.

PAPER TAPE

Burroughs also has available for use with E101, tape input, output and duplex units. All operate at 20 characters per second and all can handle up to 8-channel tape. The company also manufactures a manual tape punch.

Circle 146 on Reader Service Card.

TALLY

7 Model 424 paper tape reader is a self-contained bi-directional asynchronous reader designed for any standard perforated tape of 5, 6, 7, or 8 levels. It is available in two models – panel (424) and console (424C). Speed range is for any reading speed up to 60 characters/second. Tape holes are sensed by star wheel actuated contacts which are SPDT configuration. The drive motor requires 105-215V AC 60 cps at 0.4 amperes.

Circle 107 on Reader Service Card.

8 Model 161 tape verifier is designed to compare two punched paper tapes, bit by bit, and to stop if any differences are found. The tape verifier consists of two model 424 tape readers and a comparison buffer using logic switches. Comparisons are made at a rate of 60 characters/second, except that blanks or delete codes are skipped over at 30 characters/second. Five, six, seven or eight level tape may be compared.

Circle 108 on Reader Service Card.

9 Model 420 is a self-contained high-speed paper tape perforator. Designed to accept paper tape of varying widths from five level to eight level, the perforator is available in two models: a panel mounted unit designated 420PF if equipped with fanfold tape handling, or 420PR if equipped with reels. Each punch in the perforator has an individual wire clutch which is controlled by a small electro-magnetic actuator.

Circle 109 on Reader Service Card.

CTI

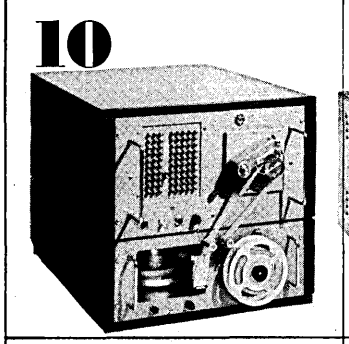
10 Tape handling unit model 194, manufactured by California Technical Industries accommodates 1 in. wide tape up to 200 feet in length. It has separate wind and unwind motors, controlled by feeder arms. Tape is fed as needed. Maximum speed is 15 in./second. The tape handling unit is pictured with the tape reader.

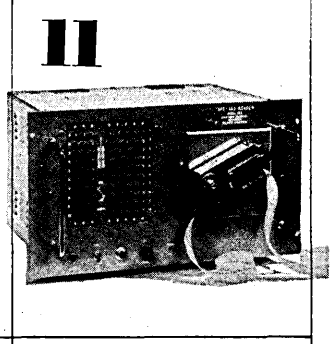
Circle 110 on Reader Service Card.

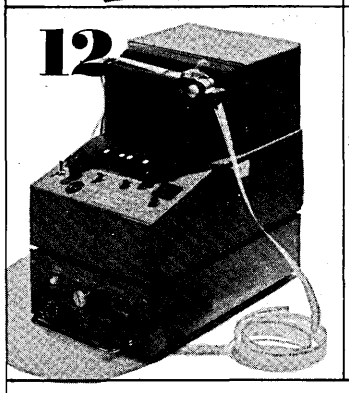
11 Tape-ard readers read 10 traverse rows of 8-holes each in a perforated tape. The unit can supply 80 bits of information for each event without the use of memory circuits required by single-line readers. The reader accommodates 1 in. tapes with holes on 1/10 in. centers. A verifier panel of neon lamps duplicates the 8 x 10 hole pattern of an entire frame and is used to rapidly check newly punched tapes. To advance the tape to a new frame requires 35 milliseconds.

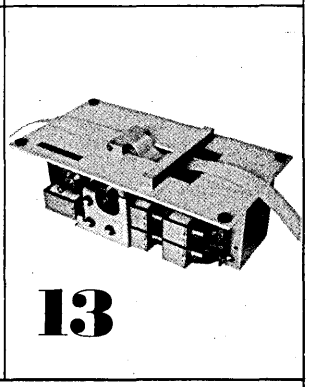
Circle 111 on Reader Service Card.

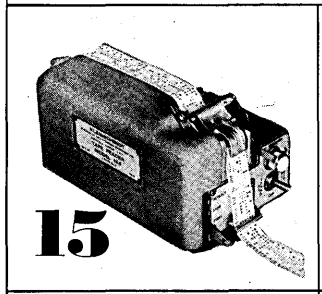
12 CTI also manufactures a tape punch and tape duplicator. Electrically powered, the punch allows the operator to set up an entire 8-hole line on push buttons which illuminate when pressed. The line can be

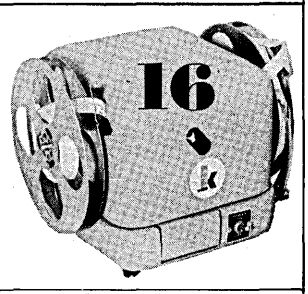


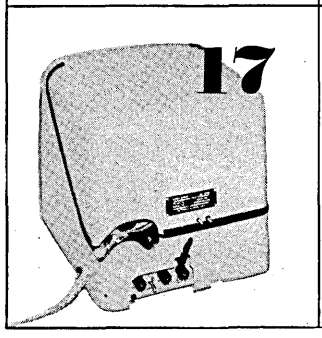


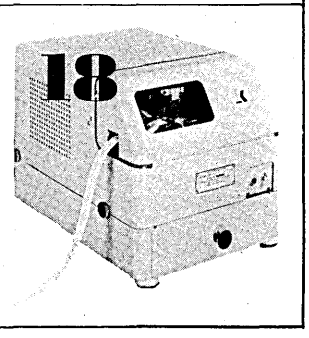


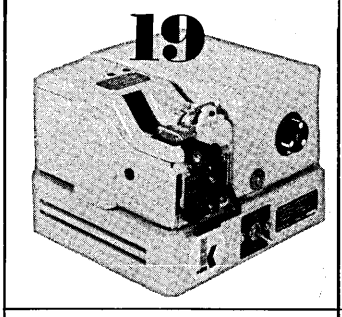


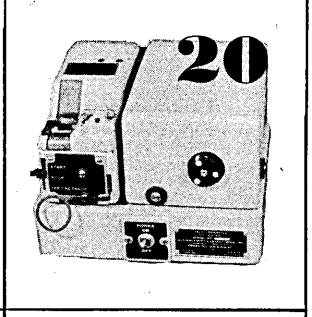


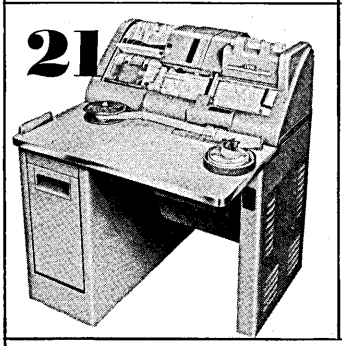


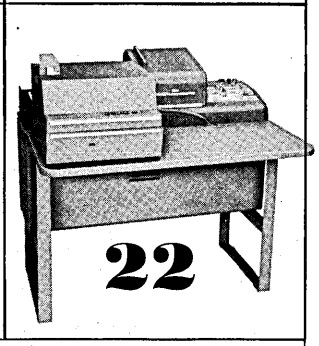


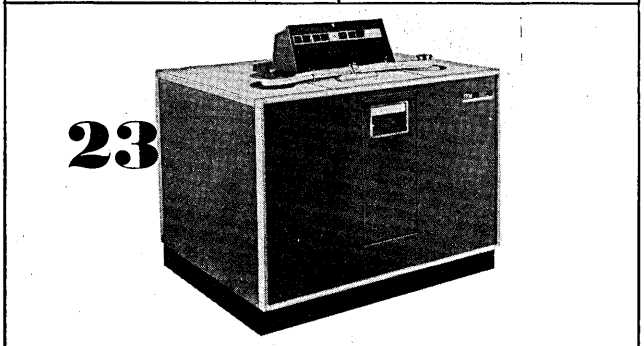


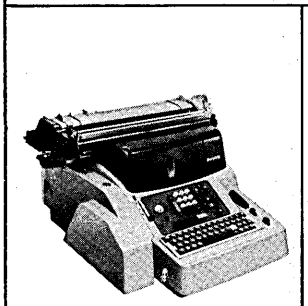


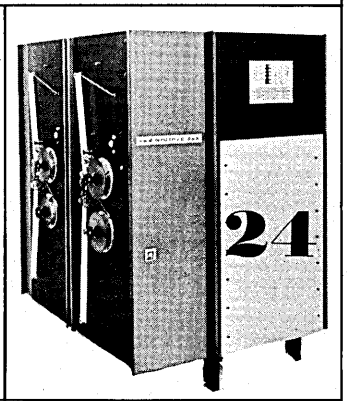


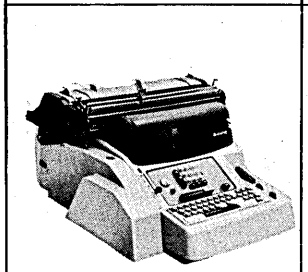


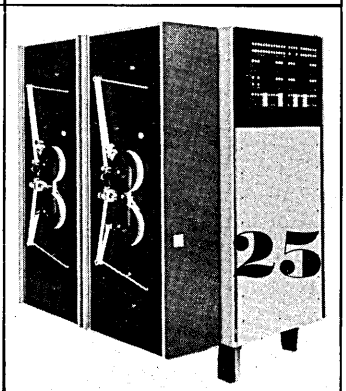


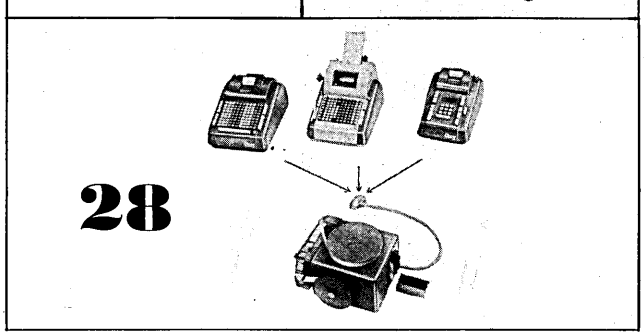












changed or corrected before the command to punch is given. The tape advances when punched, and a counter indicates the number of lines that have been completed. The duplicator automatically reproduces copies of tapes by co-ordinating the punch with the reader. Punching continuously at over 900 lines per minute, the device is extremely useful for making tapes for use at several stations and for quickly editing and revising old tapes.

Circle 112 on Reader Service Card.

PRECISION SPECIALTIES INC.

13 This motorized tape punch is operated on a single cycle basis and can be operated at any speed up to 27 cycles/second. The standard punch is supplied with feedholes in line with the code holes. The standard location of the feedhole is .394 in. from the guide edge of the tape. Standard voltage input is 48v DC. Two auxiliary cam actuated contacts are provided as standard equipment. Optional additional equipment includes tape supply, take up, and additional cam actuated contacts.

Circle 113 on Reader Service Card.

KLEINSCHMIDT

14 Model 120 is a high-speed typing reperforator and tape transmitter for sending and receiving information in the form of standard tele-printer signals. A tape transmitter, typing reperforator and keyboard transmitter are combined in this unit. In addition to reception and transmission of messages in perforated tape form, the 120 permits tape reproduction, tape editing, tape preparation or manual keyboard transmission.

Circle 114 on Reader Service Card.

15 Model 144 tape reader is designed to read 5-channel perforated tape. The unit senses perforated tape and translates code combinations into 5-wire parallel electrical impulses. It may be operated at speeds up to 25 characters/second, depending on the frequency of the controlled pulses. This reader may be operated on a character by character "demand" basis or repetitively pulsed to supply a continuous flow of data.

Circle 115 on Reader Service Card.

16 Model 122 perforator converts information received in the form of simultaneous electrical signals over 5-channels into perforated tape for retransmission or storage. The unit receives simultaneous signals and punches a group of holes according to a 5-unit code at any speed up to 20 operations per second. Punching operations are controlled by positive type clutch.

Circle 116 on Reader Service Card.

17 Reperforator, Teletypwriter TT-107/FG, TT-108/FG and TT-109/FG are fixed plant, receiving-only typing reperforators designed for the reception and monitoring of messages in communication centers.

Circle 117 on Reader Service Card.

18 Model 195 is a high-speed typing perforator which punches and prints on ⅞ in. width tape at rates from 60 to 750 wpm. The unit receives either sequential or simultaneous signals in the Baudot code. Transistorized circuits distribute and select internally the signals as received and are also used for complete control of the mechanical punching and printing unit.

Circle 118 on Reader Service Card.

19 Model 143, a tape reading markable transmitter distributor, consists of tape transporting and tape sensing mechanisms with associated levers and distribution mechanisms for transferring mechanical positions to electrical contacts. Reading action is controlled by magnetic clutches which may be externally activated. Thus the tape reading function and the distributor function may be separately controlled.

Circle 119 on Reader Service Card.

20 Model 140 is a high-speed tape transmitter for sending information in the form of sequential electrical signals over a pair of wires. This unit incorporates "Semi-Rev" operation which reduces maintenance and increases the sets effective life, according to the manufacturer. It transmits neutral or polar signals.

Circle 120 on Reader Service Card.

IBM

21 Type 46 tape-to-card punch and type 47 tape-to-card printing punch read alphabetical or numerical information from a punched paper tape and convert it to cards at the rate of 17 to 20 columns per second. An additional ¼ second is required to feed a new card into punching position. All or part of the information contained in the tape may be punched into the cards.

Circle 121 on Reader Service Card.

22 Type 63 card-control tape punch reads alphabetic and numerical information contained in punched cards and perforates this information into five channel telegraphic tape. The machine consists of a card reading unit and a tape punching unit. The tape punching unit and all machine operations are governed by control panel wiring.

Circle 122 on Reader Service Card.

23 Model 382 paper tape reader is an input unit to the RAMAC 305 data processing system that can be used separately or in conjunction with card input. Tape is read at a rate of 20 characters per second.

Circle 123 on Reader Service Card.

OLIVETTI

24, 25 Conversion of punched tape to either punched cards or magnetic tape is effected by an electronic reader-converter group, with the converter operating from punched tape to punched cards (CBS – No. 24) or from punched tape to magnetic tape (CBN – No. 25). Reading is by means of dual photodiode reading heads operating alternately to eliminate loss of time. The reading is 800 codes/second. One feature – automatic programming of the widest variety of card layouts, independent of data sequence on tape.

Circle 124 on Reader Service Card.
Circle 125 on Reader Service Card.

26, 27 This manufacturer's data collecting machines consist of an accounting machine (Audit 722 – No. 26) when the initial document requires simultaneous posting and calculating, and a special typewriter (Audit 930 – No. 27). Both machines are equipped with an automatic tape punch designed as an integral part of them. The design of the machines guarantees complete identity between what is written on the document and what is punched simultaneously on the six-channel tape. No supplementary operation is necessary as the punching instructions are automatic and issue from the program bar.

Circle 126 on Reader Service Card.
Circle 127 on Reader Service Card.

CLARY

28 Programmatic Add-Print-Tape Punch equipment is an outgrowth of earlier tape-perforating models. A choice of three types of input is provided plus a tape-perforating unit with plug-in cartridge programming of format and control codes, parity-checking, plug-in diode board, take-up-reel and cable-connection allowing remote location of the punch when silencing is desired. Any five to eight channel code can be punched; and the plug-in diode board permits one punch to prepare tape for different codes and computing equipment. Input units available are 10-key adding machines of eight or 10 column capacity, full-keyboard adding machines of eight or 12 column capacity, and special form-producing devices.

Circle 128 on Reader Service Card.

COMPETITION—IT'S WONDERFUL!

middleweight battle first in industry

In this highly competitive industry of computers and information processing, there has been a complete and somewhat surprising absence of direct machine competition. Before June, 1959, there was never a computing system which could be immediately replaced by another system with anything other than a huge outlay in time, effort and expense.

However, with the announcement that their Univac Solid State computer now has 80-column capabilities, Remington Rand has come up with an impressive first in terms of competition.

RemRandmen make no bones about the fact that they are going after the IBM 650, or, more accurately, the 650 market. And the facts would seem to indicate that this may well be a highly successful invasion.

ITEM — The SS-80's 80-column reader and punch provide compatibility with present 80-column installations.

ITEM — The SS-80 has the same instruction word format as the 650 and a similar instruction vocabulary.

ITEM — SS-80 users may obtain a simulator for the 650 so that present 650 codes can be run with little or no change. A SOAP assembler is to be made available and a 650-to-SS-80 translator is in progress.

It would be surprising if these facts, together with the figures listed below, are not providing some IBMers with thoughtful moments.

IBM 650 Model IV	USS-80
Rental $5800 per month (including 407 printer and alphabetic device).	Rental $6950 per month.
4000 words of drum storage	4000 words of drum storage 1000 words of rapid access storage
96 microsecond word time	17 microsecond word time
Average waiting time for operand	
2400 Microseconds	425 microseconds for 1000-word memory
200 cpm card reader (250 or 150 cpm reader optional extra)	450 cpm card reader
100 cpm punch (250 or 155 cpm reader optional extra)	150 cpm reader-punch
150 lpm printer	600 lpm printer
Semi-buffered Input/Output	Input/Output buffered to overlap computing
Disk file memory optional extra	No disk file memory announced
Alphabetic Input/Output	Alphabetic Input/Output standard
Three index registers optional extra	Three index registers standard
15 kc tape drives optional (up to 6)	25 kc tape drives optional (up to 10)
67,500 BTU/hour	35,000 BTU/hour
Direct floating point available.	Floating point through interpretive programming.
Control panels on all Input/Output devices.	Input/Output control accomplished by internal stored programming.

Circle 129 on Reader Service Card.

Circle 130 on Reader Service Card.

DATAMATION NEWS BRIEFS

G-E ANNOUNCES TUNNEL DIODE

Computer designer joined the rest of the electronic industry in exhibiting great interest in a G-E announcement, on July 23, that a radically new component has been developed – the tunnel diode.

Dr. Guy Suits, G-E vice president and research director, credited Drs. Jerome J. Tiemann, Robert N. Hall and Henry Ehrenreich (General Electric Research Lab, Schenectady) with adding greatly to scientific understanding of the device. Tunnel diode development was first reported last year by Leo Esaki, a Japanse scientist.

Important properties of the tunnel diode claimed by G-E are extreme speed (from 10 to 100 times faster than the fastest transistor), wide temperature adaptability, low power supply requirements, low noise level, low heat generation, light weight and small size.

The tunnel diode has operated at frequencies higher than 2,000 megacycles and frequencies of more than 10,000 are expected to be achieved in the future. Used as a switch, the diodes respond in a fraction of a millimicrosecond.

Smaller than a transistor, the new component is expected to shrink to a fraction of its present size, ultimately because of its simple structure.

Just now emerging from the experimental stage, the tunnel diode will be made available in developmental work samples in September or October.

Circle 131 on Reader Service Card.

REPORTS OUT ON PERCEPTRON

Two reports on the Navy's Perceptron, the "discriminating machine" that represents a first attempt toward perfection of an electronic brain, have just been released for sale to the public. The volumes, prepared by Frank Rosenblatt of Cornell Aeronautical Laboratory, Inc., designer of the system, are available from the Office of Technical Services, U.S. Department of Commerce, Washington

25, D.C. They are, "The Perceptron: A Theory of Statistical Separability in Cognitive Systems," 272 pages, $4, Order PB 151247, and "Two Theorems of Statistical Separability in the Perceptron," 46 pages, $1.25, Order PB 151247.

SIL. TRANSISTOR SALES TO RISE

Silicon transistor sales are expected to increase at a faster rate than overall transistor sales during the next four years, a Hoffman Electronics Corp., market survey indicates. James T. Parry, marketing research manager for the company, predicted in his report that silicon transistors, which accounted for only 5% of all transistors sold in 1957, will represent about 24% of total sales in 1962.

Parry estimated 1962 sales of silicon transistors at 69.6 million units. In most demand for computer purposes are high speed and high frequency switching types, while power, power switching and audio signal types are in most demand for missile applications. Most desired feature for both computer and missile applications is switching performance. Engineers also mentioned low reverse current as being important for computer applications.

DP TALKS SET FOR WESCON

At the WESCON show, beginning August 18 in the Cow Palace, San Francisco, two of the technical sessions will be devoted to the computing industry. Under the heading Computers 1, (Session 4, August 18, 10:00 am to 12:30 pm, Room D) three papers will be presented: "Transistor Circuit Techniques for a Core Memory with 500 Millimicrosecond Cycle Time," "A Versatile Character Generator with Digital Input," and "An Error Correcting Encoder and Decoder for Phone Line Data." Another three papers will be presented at Computers 2 (Session 9, same date and room, from 2:00 pm to 4:30 pm), entitled "Megacycle Magnetic Rod Logic," "Evaporated Films and Digital Computers," and "BIAX High Speed Magnetic Computer Element."

PRINTER UPDATES FOR SS

Social Security Administration's Bureau of Old-Age and Survivors Insurance headquarters have put into operation an electronic microfilm printer for updating earnings records of the 130 million people to whom social security cards have been issued. Designed to Social Security's specifications, the printer was built by Special Engineering Products Division of IBM. It converts data coded on magnetic tape directly to printed, readable records on 16 mm microfilm. The machine can print at approximately 3,000 lines a minute, each line containing 120 characters.

Circle 132 on Reader Service Card.

SCHLUMBERGER LTD. BUYS COMPUTER SYSTEMS STOCK

Schlumberger Ltd. has acquired an 80% stock interest in Computer Systems, Inc. of New York City. Under the stock acquisition plan announced jointly by Pierre Schlumberger, President of Schlumberger, Ltd. and Robert K. Stern, President of Computer Systems, Inc., an amount of over $3,000,000 will be invested in expanded production facilities, additional personnel and furthering of Computer Systems' research and development program.

ADVERTISERS' INDEX

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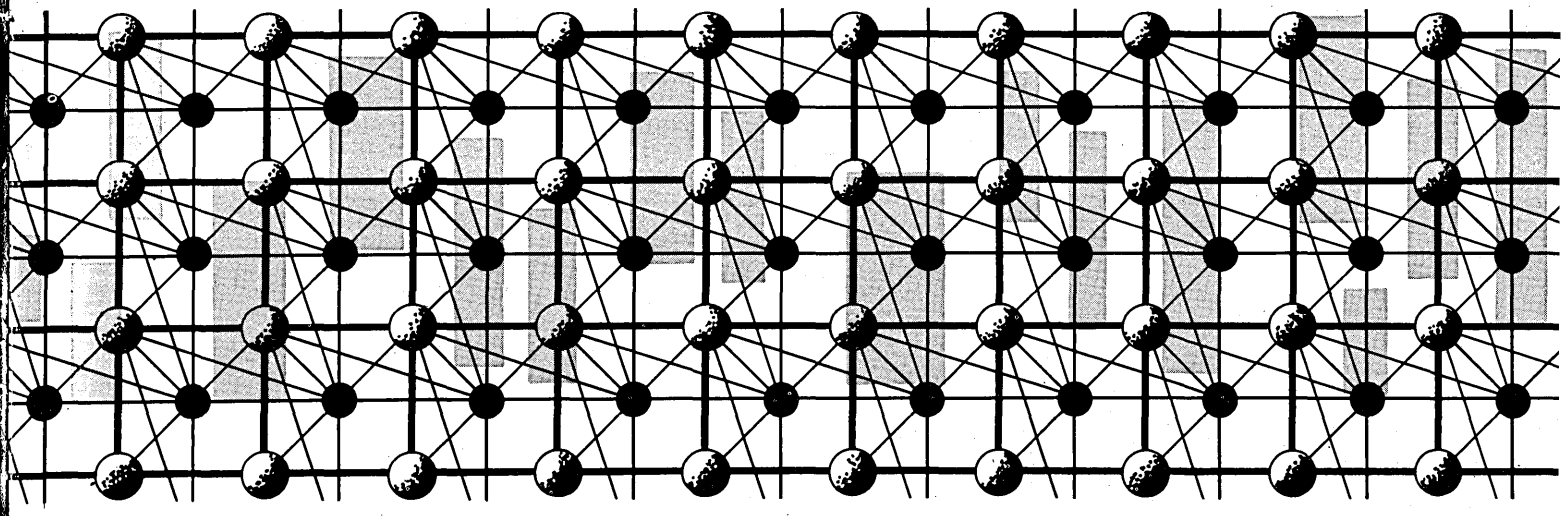

ITT Laboratories, the domestic research organization of International Telephone and Telegraph Corporation and long a leader in advanced electronics research and development, has been engaged for some years in digital computer engineering.

The Digital Systems Laboratory is engaged in projects of wide scope and magnitude embracing both commercial and military applications. Research and development centers on high speed, stored program machines; data switching and control; and commercial data processing applications. These developments incorporate major advances in machine organization and digital techniques. Prominent among the major projects in this Laboratory are the development of a worldwide communication and control system for the U. S. Air Force, and a solid state computer which will handle personal credit for a major New York City bank.

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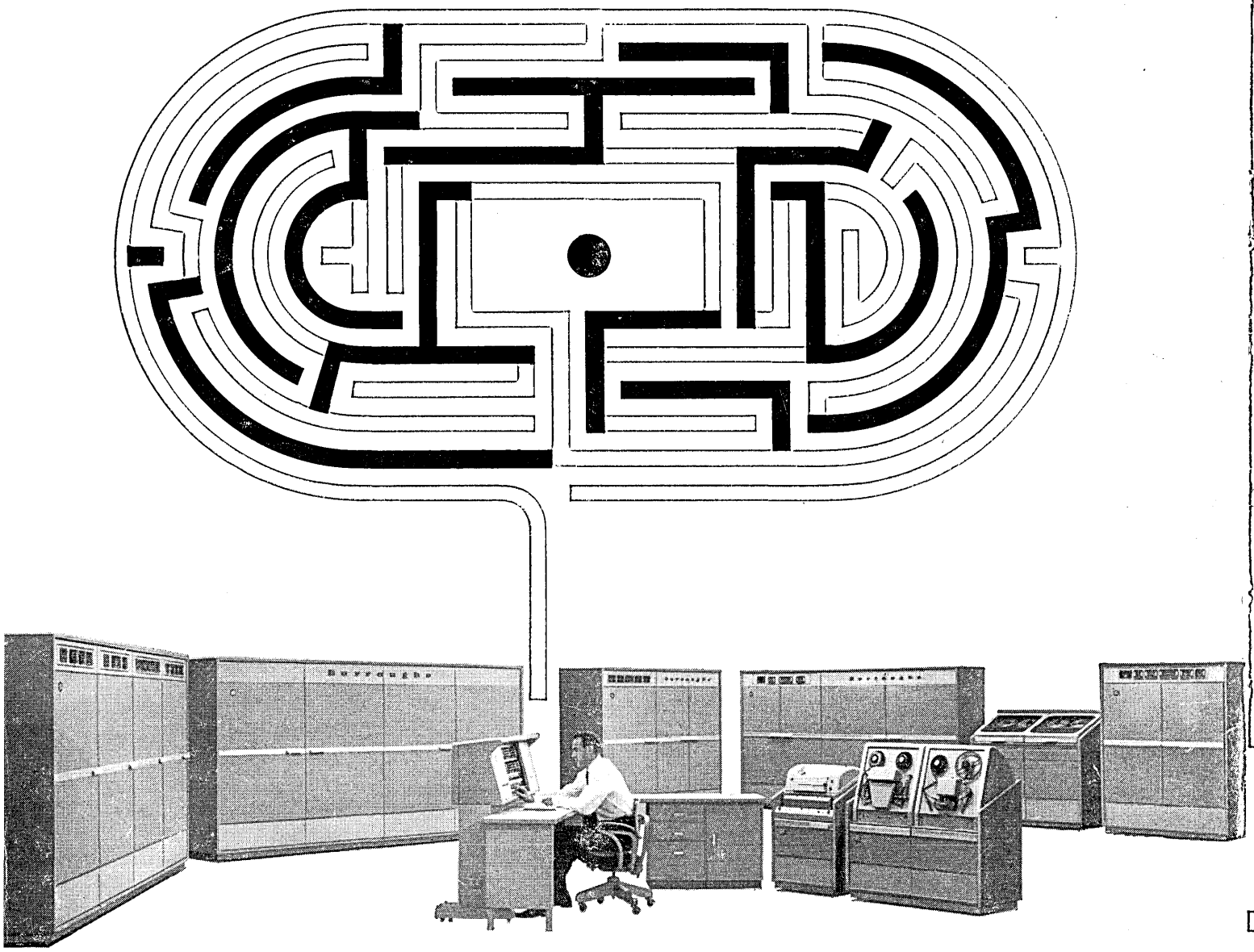

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