CANONS FOR MULTIPROGRAMMING

INTRODUCTION

Multiprogramming offers a performance advantage over uniprogramming. The advantage may be expressed quantitatively by a "performance multiplier," defined as follows: Given a fixed set of programs and hardware resources,

$$\text{multiplier} = \frac{\text{overall uniprogramming time}}{\text{overall multiprogramming time}}$$

Alternatively, "multiprogramming gain" may be defined in terms of the multiplier:

$$\text{gain} = \text{multiplier} - 1.$$

Thus defined, gain corresponds to the intuitive notion of the extra amount of work that can be done with fixed resources in a fixed amount of time.

In this paper, upper bounds are established for the performance multiplier. The circumstances permitting a performance gain through multiprogramming are identified. Upper bounds for multiprogramming density are also established, in the sense that increasing density beyond the bounds produces disadvantageous side effects but no gain. (The multiprogramming density is the number of programs which are in execution concurrently.)

Upper Bounds on GE-625/635 Multiprogramming

The implications for GE-625/635 computer systems are rather startling, as summarized by the following table:

Uniprocessing Computer System	Maximum Density	Maximum Multiplier
GE-625, present software	2	2
GE-635, present software	3	3
GE-625, improved software	3	3
GE-635, improved software	4	4

In a multiprocessing system, add 1 to maximum density and less than 1 to the maximum multiplier for each extra processor.

Machine-Independent Conclusions

Before the detailed reasoning is presented, it seems appropriate to summarize the important general conclusions about multiprogramming:

- Given a favorable load balance and a proper software bias, multiprogramming yields a significant gain.
- The ideal load for greatest multiprogramming gain consists of a set of I/O-bound programs, which together saturate all of the high-speed channels, plus one processor-bound program per processor to absorb any processor time not used by the I/O-bound programs. For any other load, the gain cannot approach its maximum realizable value.
- The worst load for multiprogramming gain consists entirely of processor-bound programs. The performance multiplier here cannot exceed the number of processors; maximum gain is thus 0 for uniprocessing with such a load.
- A uniprocessing customer can derive advantage from multiprogramming only in the degree to which his programs tend to be I/O-bound.
- Efficiency and turnaround demand general use of alternating I/O buffers.
- Given a well-balanced workload and proper software bias, I/O-bound programs will run in approximately uniprogramming elapsed time, but process-bound programs will generally be slowed down.
- An upper bound for the multiprogramming performance multiplier can be computed by dividing the number of high-speed I/O channels by 2 and adding the number of processors, without regard to actual performance rates.
- A practical upper bound on the performance multiplier, lower than the theoretical bound just described, can be computed from actual performance rates, by computing the processor time for I/O housekeeping required for each channel and thence the processor time to saturate all channels.
- The maximum practical performance multiplier determines the maximum desirable multiprogramming density (rounded to next higher integer).
- The maximum practical configuration (size of store, number of tape handlers, etc.) can be computed from the maximum multiprogramming density.

Upset Intuitions

Close reasoning upsets several popular intuitions about multiprogramming.

Corrections:

- For any multiprogramming computer system, there is a fairly low upper bound on desirable multiprogramming density. "The more, the merrier" definitely does not hold.

- If a given program's performance can be sufficiently enhanced through use of more machine resources, it should indeed use them, even though it then must be uniprogrammed. "Multiprogram at all costs" is improper.

- General use of single-I/O-buffering invokes serious penalties.

- Distributing processor time on a "fair-share" basis is improper, especially in conjunction with multiprogramming density based on "the more, the merrier." A performance gain may often be achieved by giving one or more of the programs no processor time (such programs should be paged out of the high-speed store for later completion).

- Multiprogramming with uniprocessing offers essentially no performance gain in a highly processor-bound workload. Multiprogramming does not accent value for everyone.

- With proper software, the achievable level of multiprogramming gain is a steep, discrete function of multiprogramming density, not an asymptotic function.

Scope of This Discussion

In this paper, the term "multiprogramming" always means concurrent execution of two or more batch-processing "slave" programs in the GECOS sense.

Conversational timesharing (in the usual sense of the term) is excluded from consideration, and some of the conclusions do not apply to a timesharing system.

With proper software, online media conversion can take place with a minimal effect on other aspects of system performance. Furthermore, some computer lines offer online media conversion in parallel with execution of a single batch-processing program, so multiprogramming and online media conversion are separable concepts.

Program allocation can also be overlapped with processing, permitting the operator to ready peripherals for a new program during the execution of prior programs. A very large time saving is at stake. However, overlapped allocation can also be achieved in either a uniprogramming or a multiprogramming system.

Separable concepts such as online media conversion and overlapped allocation are excluded from the present discussion--in effect, they are tacitly accepted as desirable system attributes. (This does not necessarily imply that they are properly implemented at present.)

Whenever I/O-bound programs are discussed, it is assumed that they process serially-accessed data files. Conclusions drawn about blocking and buffering are not necessarily valid for randomly-accessed data files. (Note that disc and drum are heavily used for serially-accessed data.)

REASONING

The Ideal Workload

An ideal multiprogramming workload must surely be any workload in which all computer facilities (processor and high-speed I/O channels) work at full capacity, so that the performance gain is at a maximum.

A set of processor-bound programs cannot saturate I/O channel capacity, so it cannot be an ideal workload. Each I/O-bound program, however, can saturate one or more channels (usually 2) without saturating the processor. If there are several high-speed channels, multiprogramming offers significant gain for a set of I/O-bound programs.

This conclusion is consistent with the modeling results of H. Cantrell and the empirical measurements taken by W. DeLair -- multiprogramming gain increases smoothly with increasing I/O-boundedness.

An ideal workload can now be readily characterized: It is comprised of enough I/O-bound programs to saturate the high-speed channels, plus one processor-bound program per processor to utilize any processor time not required by the I/O-bound programs. If the I/O-bound programs together need all available processor time, then no processor-bound programs are included.

A single I/O-bound program normally saturates 2 high-speed I/O channels, so overall channel saturation should be achieved with a number of programs equal to one-half the number of high-speed channels. Adding the processor-bound programs intended to absorb excess time on each processor, an upper bound on multiprogramming density for the ideal workload is established. The same value bounds the performance multiplier, since the multiplier obviously cannot exceed the multiprogramming density.

Bounds for GE-625/635

A typical GE-625/635 system has one processor together with 1 drum channel, 4 tape channels, and 1 disc channel. Channel saturation by 3 programs is therefore expected. Add a processor-bound program, and the theoretical upper bounds for both the multiprogramming density and the performance multiplier are seen to be 4.

On the GE-625, however, with present software conventions, processor time for I/O housekeeping averages at least 6 msec per channel (as of Change Letter 9 - included are master and slave mode housekeeping requirements). This time provides for housekeeping alone, excluding detailed data manipulation. The average overall peripheral time on tape or drum is about 25 msec. In practical terms, the processor clearly cannot quite saturate 4 channels when detailed data manipulation time is considered. Thus 2 I/O-bound programs saturate the processor and approximately saturate 4 (of 6) high-speed channels.

On the GE-635, average processor time per channel driven drops to about 4 msec, so 4 channels take 16 of each 25 msec. Because of its much lower performance, disc can be ignored, and the 6 channels are driven by slightly over 20 of each 25 msec.

Detailed data manipulation will undoubtedly account for the remaining 5 msec. Thus 3 I/O-bound programs saturate the processor and approximately saturate all 6 high-speed channels.

In more detailed calculations, the upper bounds for the GE-625 and GE-635 could be reduced still more by taking into account the operating system overhead and the processor performance degradation which results from IOC requests for store access.

When it is multiprogramming any 2 practical programs, a uniprocessing GE-625 should definitely be processor-bound overall (with present software). A uniprocessing GE-635 should be processor-bound with 3 programs. Excluding hardware improvements (discussed later), software improvements to reduce I/O housekeeping overhead would raise the limits to 3 programs for GE-625 and 4 for GE-635.

Penalties for Excessive Multiprogramming Density

What is meant by "maximum desirable multiprogramming density"? In an ideal workload, the computer system already works at full capacity. Increasing the multiprogramming density can in this case only cause needless competition between programs for channel and processor time. Further performance gain is impossible, but two specific penalties are imposed by increasing the density:

- More total resources (core, tape handlers, etc.) are needed in behalf of the extra programs.
- Some or all programs take longer to execute, so effective turnaround time is increased.

It should be quite evident that an ideal workload will be improbable. What, then, if multiprogramming density is increased in a non-ideal workload? If the new program will be I/O-bound on channels which are not yet saturated, the workload is improved (even if the processor is already saturated) and the gain is increased. If, however, the new program merely competes for facilities which are already saturated, the imbalance penalties noted above are again imposed.

Similar reasoning shows that paging out a processor-bound program to make room for an I/O-bound program may often improve the workload balance and thus increase gain.

Penalties for Single-Buffering

Provided it receives adequate processor time, an I/O-bound program with alternating buffers can normally saturate 2 I/O-channels. (The number of channels is not essential to the discussion, as will presently be seen.)

A single-buffered program, on the other hand, cannot saturate even one I/O channel. Suppose, on the contrary, that such a program uses an ingenious strategy to issue concurrent I/O requests on as many channels as possible. Upon issuance of such a compound request, the program must discontinue processing and await I/O termination, for processing would immediately be bottlenecked on the empty input buffers and/or full output buffers. No I/O channel is saturated, because a certain amount of processing must follow each I/O termination before another I/O request is needed.

Furthermore, processing through the core buffers of the respective files proceeds asynchronously, so that in general only a single I/O request at a time will in fact be issued. The program does not in fact overlap I/O operations on multiple channels.

A single program with alternating buffers can thus usually drive 2 I/O channels to capacity, while a similar program with single buffers fails to drive a single channel to capacity.

To saturate the computer facilities in the same degree, more than twice as many single-buffered programs must therefore be executed concurrently as comparable double-buffered programs. The penalties for single-buffering are now evident: At least twice as much core is needed and mean turnaround time is more than doubled with single-buffering. Use of the GEROAD feature of GECOS guarantees imposition of these penalties.

If a hypothetical workload were dominated by single-channel-bound programs, the penalties for single-buffering would clearly differ only in degree from those invoked for double-channel-bound programs.

High Speed for I/O-Bound Programs

The multiprogramming performance gain is achieved by driving the processor and all I/O channels nearer to saturation than is possible with uniprogramming.

Each I/O-bound program should run close to its uniprogramming speed; for such a program saturates its I/O channels only when it runs at full uniprogramming speed. If multiprogramming slowed it down significantly, more such programs would be needed to saturate the same I/O channels. The familiar penalties are imposed: The extra programs require more high speed store, and turnaround for each program is degraded.

Unless the multiprogramming operating system causes I/O-bound programs to run near uniprogramming speed, the overall machine performance is clearly not optimized. Note that individual program performance under multiprogramming can therefore be discussed and analyzed in uniprogramming terms.

EFFECTS OF HARDWARE VARIATIONS

The broad effect of discrete hardware changes upon the performance limits for a multiprogramming computer system can be easily forecast.

Additional Processor Power

The effective processor power of a computer system can be increased through adding processors, using faster processors, using faster main store, or introducing a more effective instruction set. In any case, statistical methods will yield a new mean instruction execution rate, and the techniques described earlier in this paper can then be applied to recalculate the maximum multiprogramming density, performance gain, and ideal workload.

Note that enough added processor power can shift the ideal workload from one of all I/O-bound programs to one which includes an extra processor-bound program for each processor. Note also that multiprogramming density for multiprocessing must at least equal the number of processors for proper gain. (Parallel executions of reentrant programs are counted as distinct programs in this context.)

Larger Main Store

Once the proper (maximum) multiprogramming density for a given processor and channel set has been determined, the proper main store size can be calculated. Considering the statistical distribution of program sizes in the customer site, how much main store is needed to permit the maximum multiprogramming density during a satisfactory percentage of the time (say 95%)? Cost considerations should trim the main store to this size (that is, to the nearest higher size available from the vendor).

Additional I/O Channels

Certain I/O channels may of course be required for functional performance characteristics, with channel saturation not intended. Such channels are excluded from this discussion.

For a given computer configuration, additional high-speed I/O channels should be considered if the ideal workload includes processor-bound programs and the overall job mix is sufficiently I/O bound to need the extra channel capacity. The other side of this coin indicates that fewer channels might be considered in the opposite set of circumstances.

Additional Peripheral Devices

The multiprogramming performance limits relate to number of peripheral devices in the same way as they relate to main store size--enough tape handlers, etc., are needed to permit the desired multiprogramming density a sufficient percentage of the time. Cost considerations should trim the peripheral complement to this level.

Faster I/O Transfer Rates

Faster high-speed I/O channel performance rates mean that I/O-bound programs require a greater fraction of overall processor time.

If the ideal workload includes only I/O-bound programs, faster I/O rates should not affect system performance rates--they offer no increase in gain. That is because 100% of processor time is already needed for I/O-oriented processing; none is available to take advantage of the faster rates.

If the ideal workload includes processor-bound programs, faster I/O rates will shift the ideal workload in the direction of all I/O-bound programs, and consequently increase gain. In other words, processor time is available to take advantage of the improved I/O rates.

More Favorable Instruction Set

Since any workload favorable to multiprogramming includes a heavy I/O balance, much processor activity is necessarily concerned with I/O housekeeping. An instruction set which minimizes the processor-time cost of I/O housekeeping is therefore highly desirable for multiprogramming.

The performance bounds for GE-625 computed earlier in this paper dramatize the instruction set impact. I/O housekeeping was shown to require a little more than 100% of available processor time to saturate 4 high-speed channels. The housekeeping is mostly loads, stores, bit manipulations and transfers. The processor rarely has a chance to double precision floating point division in a workload where multiprogramming offers significant performance advantage.

SOFTWARE CONSIDERATIONS

Techniques to minimize housekeeping overhead are mandatory for multiprogramming software. Equally important for multiprogramming gain are the effects of certain operating system algorithms.

A multiprogramming system automatically obsures improper programming practices, such as single I/O buffering or excessive overhead. Poor software is disguised. Concurrent execution of several programs still proceeds; some degree of I/O-processor overlap is still observed. In retrospect, the inefficiencies can be detected only by comparing actual multiprogramming gain to the theoretical value for the same workload. The programmer must never rationalize that the other programs in execution will make up for his inefficiencies.

Processor Dispatching

Perhaps the most sensitive software element is dispatching--determining when to remove processor control from a program, and which of the other programs in execution should then receive control.

Two dispatching strategies have been tried in GECOS. The first was intended to minimize turnaround time. Processor access priority was given to the program which had waited in queue longest to begin executing, without regard to its operating characteristics. A single processor-bound program receiving such priority forces multiprogramming gain to zero, even in an ideal workload.

The second (present) GECOS strategy is intended to assure some multiprogramming gain by giving each program a "fair share" of processor time. The programs stand in a circular queue, and take turns at processor access. If all the programs are heavily I/O-bound, the entire queue cycle is rapid, and reasonable multiprogramming gain is achieved. But a single processor-bound program slows the queue cycle drastically, so that no I/O-bound program can nearly saturate a channel. Several processor-bound programs virtually monopolize the processor. Multiprogramming gain is clearly low in the presence of any processor-bound programs.

An optimal dispatching algorithm causes I/O-bound programs to run at uniprogramming speed. In another paper I will propose such an algorithm, urging that it be adopted in GECOS unless a still more effective algorithm can be advanced. Given an arbitrary set of programs in concurrent execution, the new dispatcher algorithm maximizes multiprogramming gain, even suspending execution of processor-bound programs if necessary.

Workload Balancing

Workload balancing means choosing programs to approximate an ideal workload as closely as possible. Multiprogramming gain is closely dependent upon workload balance.

Each time the operating system has an opportunity to allocate an additional program for execution, it must choose a program which will make the workload more nearly ideal. If no such program is available, no further allocation should take place. The operating system should also recognize and page out those programs which create workload imbalance, so as to avoid the disadvantageous side effects of such imbalance.

Contemporary multiprogramming technology does not seem to offer a good selection criterion. At present, GECOS simply finds a program which will fit the available hardware resources. For optimum selection, the actual operating characteristics of each program must also be known in advance and considered.

Although for want of an effective algorithm the software itself cannot achieve optimal workload balancing, an informed operator strategy will help. The operator can try to keep jobs which promise a balanced workload in queue for allocation. The vendor should publish a suitable advice for operators.

Peripheral Blocking Conventions

In another paper (I/O Performance Improvement") I discussed the effects of various tape, drum, and disc block sizes upon system performance.

Changing from the present 320-word standard on GE-625/635 to the proposed 1280-word standard would multiply effective tape performance by 1.39, drum by 2.46, and disc by 3.10. At the same time, processor time required for physical I/O requests would be reduced by a factor of 4.

With 320-word blocks, nearly 47% of total processor time is required for physical I/O requests in order to drive the drum and 3 tape channels to capacity. With 1280-word blocks, less than 12% of total processor time would be required to transmit the same amount of data. This means an outright saving of 35% of total processor time --equivalent to a 50% increase in processor power. The effect of such a processor improvement was analyzed earlier in this paper.

Minimum Processor Overhead for I/O

Another part of processor overhead for I/O is found in the "logical record processing" software. This kind of overhead is a function of data volume, not of block size, and varies from one file to another. In GE-625/635 software, the logical record processing programs are the PUT and GET functions of GEFRC.

The processor time spent executing PUT or GET for a Hollerith card-image file averages slightly over 3 msec per 320-word block--a figure comparable to the present physical request overhead. With larger blocks, PUT and GET would become the dominant processing activity, each requiring 12 msec per 1280-word block.

By tuning the PUT and GET programs for optimum timing, R. W. Bemer has cut their average execution time almost 50%. The effect upon system performance is dramatic. With the present PUT and GET and 320-word blocks, total processor time overhead to drive the drum and 3 tape channels near capacity is 100%. The improvements to PUT and GET reduce this figure to 75% --processor power is increased 33%.

Processing the same volume of data with the present PUT and GET but with 1280-word blocks, overhead for I/O is reduced to 65% of total processor time. With the improved PUT and GET, this figure is reduced to 40%--processor power is increased 150% over the present level!

But the I/O channel performance is also enhanced by the larger block sizes. Saturating the drum and 3 tape channels with 1280-word blocks, the I/O data volume would be increased 66% over the present volume, yet the processor overhead for I/O would be reduced to 49% from the present level of 100%.

The changes proposed for I/O housekeeping thus in effect yield a 100% more powerful processor and 66% faster peripherals - a new system balance, for which the ideal workload and maximum multiprogramming density should be recalculated.

New Programming Techniques

With programs organized in the traditional uniprogramming manner (as on the GE-625/635), a multiprogramming computer system needs more high-speed store and more peripheral devices of each type than a uniprogramming computer system.

The following question should arise during the design of each program: If this program took full advantage of the expanded hardware configuration, would its speed be improved by more than the maximum multiprogramming gain? For example, what if FORTRAN or COBOL used the entire high-speed store and thereby avoided all peripheral scratch files?

A similar question might also arise: What performance improvement will be obtained by using the hardware in a way which is impossible in a multiprogramming context? For example, what if disc sort demanded full control of disc arm positions?

When a sufficient performance improvement can thus be achieved, even at the expense of uniprogramming instead of multiprogramming, the exceptional technique obviously yields a performance advantage.

In such cases, customers will appreciate a high degree of software flexibility--a system which still permits the use of software elements which remain applicable, graciously reverting to uniprogramming. As the examples suggest, the vendor should also consider new resource deployments which promise enhanced performance in standard software packages (compilers, APT, linear programming, etc.). Multiprogramming at all costs might not offer the greatest advantage.

An Efficiency Index

A simple calculation measures multiprogramming efficiency: Add the use times for all facilities (processor and I/O channels) and divide the sum by the total real time during which any programs are in execution. Then divide by the number of facilities.

That is:

$$\text{efficiency} = \frac{\text{sum of facility use times}}{(\text{running time}) \times (\text{number of facilities})}$$

For software evaluation, the efficiency index should be computed for an ideal workload. But it is also a meaningful measurement for evaluating whole days or weeks of computer system use. Efficiency approaching unity indicates perfection; but efficiency approaching the reciprocal of the number of facilities indicates serious trouble.

SUMMARY

Upper bounds for multiprogramming performance are important tools for system analysis:

- The overall hardware balance can be evaluated.
- Effects of discrete hardware changes can be predicted.
- Necessary software properties can be discerned.
- Software system effectiveness can be measured.

Several popular intuitions about multiprogramming are incorrect. Since these intuitions have stood until now, it is no surprise that important software changes are now proposed.

The suggested changes to I/O housekeeping, blocking and buffering, and the new dispatcher algorithm should be fairly easily implemented. They do not imply a basic system overhaul. It is clear that system performance potential cannot be fully exploited without such software improvements.

Advice about the best programming and operating techniques should be issued to GE-625/635 users; otherwise the system will not be used to proper advantage. Items:

- Large I/O blocks and alternating buffers should be applied.
- Whenever possible, I/O-bound programs should be available in the queue waiting for allocation.
- Multiprogramming density should not be pushed beyond the practical bound.
- System performance will not necessarily be enhanced by ordering extra store, or by minimizing the store requirements for each program.
- Multiprogramming several processor-bound programs creates no performance gain, but has disadvantageous side effects.

A. L. Ellison

A. L. Ellison
11/2/66

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SPECIAL ORDER
T-6654

17 July 1964

MR ROBERT BEMER, Univac Division, Sperry Rand Corporation, Sperry Rand Building, New York 19, New York is invited by the Secretary of the Air Force to proceed on or about 29 Jul 64 from New York, New York to ESD, Hanscom Field, Bedford, Mass and Mitre Corporation, Bedford, Mass for approximately 2 days for the purpose of performing duties in connection with AFSC TWP Ad Hoc Task Force and upon completion return to New York, New York. Travel by military or commercial aircraft, commercial rail or bus is authorized. If transportation is not procured by U S Government transportation requests, you will be reimbursed by the Government for the actual transportation expenses for travel on commercial carriers within the limitations of Executive Order 9946. You will obtain receipts or retain ticket stubs and seat or berth checks for travel by common carrier. You will also obtain receipts for other reimbursable expenses including official long-distance telephone calls. These receipts and copies of transportation requests, if used, will be filed with your claim voucher for reimbursement of expenses. In lieu of actual cost of subsistence expense you are authorized a flat per diem of $16.00 during the period of performance of duties and travel covered by this order. Travel is necessary in the public service. Expenses are chargeable to 57X3600 2854755 P6902 2139 2159 S594200 (AFSC TWP). Authority: AFM 40-10, AFSC Sup 1, 25 Nov 63.

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Chingari in New Post

Dr. Gastone Chingari has been named Manager-Applications Programming, according to an announcement by R. W. Bemer, Director-Systems Programming. Dr. Chingari was most recently Manager-Numerical Control Applications. He has been with the company since 1956.

In making the announcement, Mr. Bemer said, "In this new position Dr. Chingari's responsibilities will include the planning, development, production and maintenance of all general application programming products to be used by UNIVAC computers in business, science and industry."

Prior to joining the company, Dr. Chingari spent ten years (1942-52) in Italy in a variety of manufacturing and engineering assignments. From 1953 to 1956 he served as Technical Assistant at the Electronic Computation and Servomechanism Laboratory, Univ. of California.

Knorr Heads DPDivision Marketing

The appointment of Carl J. Knorr as Vice President-Marketing for the Univac Data Processing Division was announced early this month. Headquartered in New York, he will report to Vice President and General Manager of the Division Fred R. Raach.

Johnson: VP Gov't. Mktg.

L. E. Johnson, at his own request, continues in Washington in the capacity of Vice President-Federal Government Marketing (also heading air line marketing activities), reporting to Mr. Knorr.

Sturdevant: VP Commercial

Also announced this month was the promotion of J. L. Sturdevant as Vice President-Commercial Marketing for the Data Processing Division, reporting to Mr. Knorr. With the company since 1950, Mr. Sturdevant most recently had been National Sales Manager for Small and Medium Scale Equipment.

Bemer: Sys. Programming

Systems Programming activities under Director R. W. Bemer are now incorporated in the Data Processing Division, also reporting to Mr. Knorr. Widely known in computer programming circles internationally, Mr. Bemer has headed this activity since joining Univac in 1962.

Mr. Knorr, now Vice President-Marketing, Data Processing Division, has had an outstanding career in the company's marketing organization since joining Univac as a vice president from the Ingersoll Rand Corporation in 1956.

He served first in the UNIVAC SCIENTIFIC Computer field and, subsequently, as vice president for Univac sales to the Federal Government with headquarters in Washington.

In 1961 he was named President of Remington Rand Ltd. (Canada). With headquarters in Toronto. Remington Rand Ltd. markets REMINGTON as well as UNIVAC products throughout Canada. He led that organization with distinction until last month when he returned to the U.S. to assume new responsibilities in the domestic U.S. Univac organization.

C. J. Knorr

Mr. Sturdevant, in moving up to his new position of Vice President-Commercial Marketing, assumes responsibility for directing and coordinating all regional commercial marketing activities of the Data Processing Division .

He joined the company in 1950 as a Univac account representative in Los Angeles, later becoming Western Regional Retail Market Specialist. He won promotion to the headquarters staff in 1960 and transferred to New York as Assistant General Sales Manager. In his subsequent role as Sales Manager for Small and Medium-Scale Equipment he won wide recognition for his leading part in the successful sales story of the UNIVAC 1004 Processor from its introduction two years ago.

He is an alumnus of U.C.L.A. and, before joining the company, he was associated with Bullocks Inc. of California as a buyer and merchandise manager for several years.

J. L. Sturdevant

Numerical Control Now in PP/SP

The group of Univac Numerical Control Engineers and Programming Specialists headed by Dr. Gastone Chingari was recently transferred to the Product Planning and Systems Programming Department and now reports to R. W. Bemer, Director of Systems Programming.

Dr. Chingari continues to head the group of specialists, with headquarters in the Los Angeles Area office.

Started in 1958

The nucleus of the present numerical control group was formed in 1958 to work in the then-new and highly promising field of numerical control. Since then this group's work has been credited with an important contribution toward establishing Sp[illegible]Rand in a leading position am[illegible]firms which are advancing the technology of numerical control by means of computer programming of instructions for machine tools.

Numerical control is an industry term applied to the techniques of automatically directing and controlling the operation of machine tools.

Technique Described

The machine tools are activated at each step in a piece of machine work by pre-planned programs of detailed instructions contained on decks of punched cards or on magnetic tape or punched paper tape. Programs for the complex step-by-step instructions given to a machine are prepared by a computer, and the resulting instructions can be fed repeatedly to the machine, over and over again, to produce almost any number of identical, precision, jobs.

Each minute motion of the machine tool's cutting, mi[illegible]drilling, or other operation is controlled automatically, with extreme accuracy. Numerical control techniques apply not only to special-purpose machine tools but also can be used to make sta[illegible]general-purpose machine tools perform special functions. Present numerical control techniques have been developed to a point where automatic control can be exercised over machine tools to make them perform operations involving precise measurement and movement of the tooling device *in several directions simultaneously*.

A general-purpose computer can be used advantageously in automatically preparing instructions for machine tools, and the group under Dr. Chingari has used UNIVAC Solid-State Computers as well as other UNIVAC Systems for this purpose.

Advanced Software

Dr. Chingari points out that Univac offers advanced numerical control software packages and programming experience to the metal-working industry. SYMPAC (Symbolic Program For Automatic Controls) is a compiler for the Solid State Computer line which has been proved out in operations in customer plants and at the Los Angeles Data Processing Center over the past three years. Other numerical control compilers are also currently in existence or under development for the UNIVAC III, 1107, and Solid State Computars.

Developments in the numerical control field are a product of inter-industry collaboration, and the Univac specialists have often called on the manufacturers of controls and machine tools for basic information necessary in design and check out of numerical control compilers.

NUMERICAL CONTROL GROUP, headquartered in the Los Angeles Area Office, left to right in this recent picture: L. R. Reeves, R. K. Justice, Dr. Chingari who heads the organization, E. A. Jennings, T. S. Beck, F. Mielzynski and R. A. Kelley.

THIS CAST AIRCRAFT structural member was precision-machined and drilled on a numerically controlled machine tool by Rohr Aircraft on the West Coast, a company with which Univac numerical control specialists ha[illegible]worked closely in developing [illegible]v techniques. The picture was taken some time ago at a special presentation for the press. Dr. Chingari, left, is shown with F. Gordon Smith, now Vice President for Univac operations in Europe, Middle East and Africa.

PARAMOUNT Pictures data processing staff member David Leonard was a student in one of the early 1004 Programmed Instruction courses set up in Los Angeles Univac office.

M. A. SHADER
MONTEREY AND COTTLE ROADS
SAN JOSE 14, CALIFORNIA

January 16, 1963

Dear Bob:

Getting your letter was like hearing a voice from the past. I must confess that this particular correspondence forced me to think back a little. It sort of all comes back now. It seems to me that you were just about three and one-half years ahead of the times.

You must get out to the West Coast occasionally. Why don't you plan to stop off here in San Jose when you do? There is lots of interesting scenery here, and it would be very enjoyable for me to spend some time with you.

Next time you are going to bug a guy, why don't you remind him of something more pleasant -- like his sounder decisions?

Sincerely,

Mel

UNIVAC
Mr. R. W. Bemer
351 Park Avenue South
New York 10, New York

Charles R. DeCarlo
590 Madison Avenue, New York 22, N.Y.

January 15, 1963

Dear Bob,

Thanks for your note. I hope you are having more success with some of your ideas now.

I must apologize for not calling you about your invitation for Christmas week. Actually Dot and I didn't come across it until we were looking over all the Christmas cards sometime after the first of the year. Thanks anyhow and perhaps we can do it some other time.

Cordially yours,

Charlie

Mr. R. W. Bemer, Director
Systems Programming
UNIVAC
351 Park Avenue South
New York 10, New York

letters

morlocks and bagels

Sir:

It would seem that neither Dr. Hardin ("An Evolutionist Looks at Computers," May, p. 98) nor any of those who have written in about the Morlocks and the Eloi have bothered to actually read H. G. Wells' "The Time Machine." Your readers may be amused to know that the Eloi were meat animals, human cattle bred and herded by the Morlocks to serve as food. The implication that Wells pictured his Eloi as an intellectual elite is altogether unfounded. "Beautiful people," yes, but only as a result of being bred for tenderness. They had the intellectual level of five-year-old children and were capable of little more than singing, dancing, eating, and, presumably procreating.

Shame on Messrs. Hardin, Maurer, Klugh, Thompson, Wrigley, and Kuch for a perverted misapprehension and for aid and abettal thereof! And a soduk* to the editor for not calling attention to this egregious obfuscation!

FRANK CHAMBERS
Princeton, New Jersey

*Opposite of . . .?

Ed. note: Sorry, can't give it to him right now . . . he's out singing and dancing and eating, etc., etc.

apollo follow-on

Sir:

The News Brief published in DATAMATION (Oct. p. 169) on the problem in the Apollo guidance computer during the lunar landing of Apollo 11 is essentially correct but the suggested cure ignored many of the other constraints that must be considered when designing or selecting a computer for a system like Apollo. These other constraints have equal or higher priority than the computational speed. A slow computer can accomplish the mission even under overload conditions as was demonstrated during Apollo 11 landing. The Apollo Computer was designed and programmed with the capability of performing the high priority tasks first and causing low priority tasks to wait for periods of reduced activity. During the landing, the computer was eliminating low priority tasks and was signaling the astronauts of this fact via the alarms.

The other constraints that your News Brief ignored are the physical size, power consumed, reliability, and availability. There is *no* computer available even today that can match the Apollo computer's computational capacity and still meet these other constraints. Under peak conditions, the computer operation is within 10% of the overload conditions, but if the other constraints were not met, Apollo 11 would not have flown. The Apollo Computer has 38,000 words of memory and extensive interfaces, yet occupies under 1 cubic foot, consumes less than 70 watts of power and weighs about 70 pounds. In addition, it has successfully passed extensive qualification tests and has demonstrated a MTBF of greater than 12,000 hours. To meet the requirements of qualification tests, software development, and flight schedule, production computers had to be available in 1966. It is true that using the computer technology available in 1969, a smaller computer could be designed with more capacity and speed but the resulting production computers, ground support equipment, and software would not be available before the present Apollo program is complete.

ELDON C. HALL
MIT Instrumentation Laboratory
Cambridge, Massachusetts

cracking the code

Sir:

With reference to Tom Pittman's letter in the November issue about IBM's having flubbed by selecting a BCD representation as the card code for System/3, may I offer the following observations:

1. It seems obvious that the card code is designed for binary representation (2 octal digits). The table is:

Octal		Octal		Octal		Octal	
00	SP	20	0	40	-	60	}
01	1	21	/	41	J	61	A
02	2	22	S	42	K	62	B
03	3	23	T	43	L	63	C
04	4	24	U	44	M	64	D
05	5	25	V	45	N	65	E
06	6	26	W	46	O	66	F
07	7	27	X	47	P	67	G
10	8	30	Y	50	Q	70	H
11	9	31	Z	51	R	71	I
12	:	32	&	52	!	72	¢
13	#	33	,	53	$	73	.
14	@	34	%	54	*	74	<
15	'	35	—	55	)	75	(
16	=	36	>	56	;	76	+
17	"	37	?	57	¬	77	

2. This is *not* a 6-bit subset of EBCDIC. The rule to get System 3 code from EBCDIC is:
   a. Substitute ! for [
      Substitute ¢ for]
   b. Substitute SP for 0, 0 for -, - for &, & for |, | for SP, and then change | to }. Sort of a round robin, utterly unjustified unless this is a deliberate example of cypher-ilke substitution to lock in the users.
   c. Interchange the columns left to right, so that A is octal 01, J octal 21, / octal 41 and 1 is octal 61. Again a round robin.

   Perhaps IBM can furnish a device to convert System 3 card files to card or other media files for 360 usage, but the different collating-sequence guarantees that they will be in the wrong order for the customer's usage.
3. Note that octal 57 and 77 are the famous characters of PL/I. Could this be a clue? Why only a right brace and not a left brace?
4. The closest code IBM has to this one is that of the 305 RAMAC, which is an exact subset, with the exception of < instead of □.

It would seem that Mr. Pittman is wrong—it's worse than he thinks.

DUE TO LARRY WILSON

Name withheld by request

his and irs

Sir:

I am a computer enthusiast. A programmer for over twenty years, I start my computer day in the morning shower. Computers are great, but I really worry about blind faith in the human use of these devices, particularly since it just happened to me again.

Returning from a business trip to Europe, I found a notice from the IRS, Ogden, Utah, to the effect that "you made a mistake in arithmetic and owe us $1380—pay up four days ago." As a computer user, I wasn't worried about my capability in arithmetic—the machines do that for me—but I am getting a little too old for such shocks to my heart. So with pencil in shaking hand I worked backward from the taxable income figure that the computer gave and found a curious coincidence —the difference just happened to be *twice* the amount of a rental business loss. In other words, the input operator forgot to enter a minus sign! And just this set the ponderous wheels (or chain) in motion.

USA
STANDARDS INSTITUTE

USA Standards Committee Correspondence

Address reply to: C. A. Phillips
BEMA/DPG
235 East 42nd Street
New York, N. Y. 10017

September 25, 1969

Mr. R. W. Bemer
General Electric Company
13430 North Black Canyon Highway
M-2
Phoenix, Arizona 85029

Dear Bob:

The X3 Systems Advisory Committee (SAC) was born at a time when it was feared that systems considerations were not being taken into account in the development of standards. With relatively few guidelines, SAC organized itself and attacked the many medium-sized problems which development of individual standards could not resolve. But the most valuable contribution of SAC to the state of the art of data processing standardization will probably be recognized as its probing into the area of the philosophy of standardization and the procedures and committee structure for implementing this philosophy. It is no understatement to say that the Sponsor's ad hoc Committee on X3 Procedures received overwhelming assistance from SAC in the development of what is now the X3 Operating Procedures Manual.

Now that SAC has been dissolved and replaced in an orderly transition by SPARC and, to some extent by SSC, I would like to acknowledge your contribution to its achievements. I am aware of the many hours spent in preparation for the meetings of SAC; hours which have come out of your leisure time and which were dedicated to the goals of improved standardization. Any complementary phrases would only be an understatement and an inadequate reward for the massive job in which you have played a vital part. Probably very few people in the outside world will ever know of it. I hope that the psychic rewards have, in some way, compensated for the efforts expended.

Again, thank you.

Sincerely,

CAP/mr

C. A. Phillips, Chairman
U.S.A. Standards Committee X3

International Business Machines Corporation

Armonk, New York 10504
914/765-1900

June 17, 1969

Mr. R. W. Bemer
General Electric Company
13430 North Black Canyon Highway
Phoenix, Arizona 85029

Dear Bob,

Thanks for the copy of your presentation to the 10th Anniversary Meeting of CODASYL.

I thought your work was indeed thoughtful and provocative and crystalized some of the ideas you expressed by telephone recently. I have taken the liberty of sending a copy of your presentation to a few select people in IBM.

Best regards,

W. F. McClelland

WFM/gay

HONEYWELL
INC.

June 18, 1969

Mr. Robert Bemer
General Electric Co.
13430 North Black Canyon Highway
Phoenix, Arizona 85029

Dear Bob,

I would like to compliment you again on your excellent address at the CODASYL Anniversary meeting in Washington. I hope that your remarks will become an important wedge into the overdue considerations of inter-language programming and intersystem mobility.

I was hoping that COMPUTER WORLD would publish the complete text of your talk, so that your proposals could be studied in more detail. Unfortunately, they simply carried an abstract. I would appreciate it if you could send me the complete text. It is an important address and I would like to examine it in its entirety.

Than you for your consideration.

Sincerely yours,

Martin N. Greenfield

Martin N. Greenfield

MNG:fm

ELECTRONIC DATA PROCESSING DIVISION 200 SMITH STREET
WALTHAM, MASSACHUSETTS 02154 617/891-8400

International Business Machines Corporation

1000 Westchester Avenue
White Plains, New York 10604
914/696-1900

June 24, 1969

Mr. R. W. Bemer
General Electric Company
Phoenix, Arizona

Dear Bob,

Thank you for sending me a copy of your talk to CODASYL. I have been out of the office for a number of weeks and have just gotten back so I have not had a chance to read it. I certainly will, however, and look forward to chating with you about it at the next X3 Meeting.

Sincerely,

Watts S. Humphrey, Jr.

WSH:ch

GENERAL ELECTRIC

Information Systems
Information Systems Equipment Division

DIAL COMM 8•433 3906 DATE June 26, 1969 MAIL ZONE B-93

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SUBJECT•

RECEIVED
1969 JUN 27
R. W. BEMER

R. W. Bemer, Manager
Systems & Software Engineering Integration

Thanks for a copy of your paper - Straightening Out Programming Languages.

I found it a profound concept simply stated.

To further support the concept you might draw attention to another IFIP definition

A50 Program — In automatic data processing, a general term for a specification of a process to be performed on data.

This definition has been a long time favorite of mine. It not only draws attention to the separation of data and procedure (process) but also the work of programming, i.e., specification - the specification of the data and the process to be performed on it.

Don K.

D. C. Klick, Manager
Advanced Systems Software Development

DCK/mh

GENERAL ELECTRIC
COMPANY

13430 NORTH BLACK CANYON HIGHWAY, PHOENIX, ARIZONA 85029 . . . AREA CODE 602, 941-2900

Information Systems
Advanced Development and Resources Planning Division

1969 June 6

Mr. T. B. Steel, Jr.
System Development Corp.
2500 Colorado Avenue
Santa Monica, Calif. 90406

Dear Tom:

With your hat on as chairman of X3 SPARC, please read the attached, which had a better reception at CODASYL than I really expected.

I asked John Haanstra's advice on how to get a larger audience and initiate positive work. He suggested that you are the proper person to move it. Thus this letter.

This is a very large and general systems problem, and nothing in the X3 structure has this much scope, although Data Descriptive Languages and X3.4 work are components. John's suggestion as a possible method to start would be to convene an ad hoc group in some suitably hallowed spot like Aspen for a two- or three-day planning session on technical and political strategy. The attendees should represent (at the highest level) such groups as CODASYL, ACM, X3, the Federal Government, and perhaps a User Group or two such as SHARE, because the backing of IBM and SHARE would certainly facilitate this work. You may think of other schemes.

I do not know what conclusions we might reach, but it's obvious that this is the type of work that the often suggested National Software Institute would have undertaken. Perhaps we could simulate such an institute for a discrete period of time by full-time assignment of industrial and university personnel. Perhaps this could not be supported without outside funds, and we could consider possible sources.

We will also want to decide the question of auspices. Some options are:

1. CODASYL

   My final sentence shows CODASYL as a possibility. Indeed the word COBOL does not appear in the CODASYL constitution. (It appears five places in the self-generated by-laws of the Programming Language Committee.) However, they would have to go back to the full-time assignment precedent set in the original COBOL work. Of course this is a project of much greater magnitude.

2. X3 - Composite Language Development Committee

The title is proper, but:

a. They may think they were chartered to further PL/I rather than the real composite language I had in mind (my motives are much clearer now, are they not?)

b. X3 has no full-time working precedent.

3. NBS

The Center for Computer Sciences and Technology has provision for a type of fellowship, but no money. I suppose this was to anticipate a Software Institute. It could be worked here, but we would have to get firm backing and commitments for full-time assignments.

I am sending a copy of this to Ernest Baynard to show that we are trying to move on a matter of extreme importance. At present no one else will be advised, including the press. That will be your responsibility, when and if you take action in this matter.

Sincerely yours,

Bob

R. W. Bemer

po

cc: E. Baynard
J. W. Haanstra

Plug-Compatibles & Computer Contracts

In a recent article, Francis G. Awalt, Jr., of IBM's Advanced Development Division counseled attorneys on the problems involved with contracts for computers. There are a number of interesting points in his article including one pointing out that the user is primarily responsible for providing programs and another that clients should be made to realize that manufacturers may not continue to provide programming maintenance for machines if they decide to purchase rather than rent systems.

However, a more surprising point came when he was discussing the problems of systems where the products of two manufacturers are interconnected. He said that suppliers have little real knowledge of the effect of one piece of equipment upon another, even though they are "plug compatible." And, he says, that therefore each supplier in a data processing system must disclaim responsibility for the failure of performance of such a system.

If this is true, then it is very serious. In another editorial we are commenting, for instance, on the introduction of the Lockheed plug-compatible memories. If Lockheed "has little real knowledge" of the effect of this equipment on System 360, then its action in offering it raises serious questions involving Lockheed's morality.

If, on the other hand, these effects are known, then the suggestion by Awalt that they are not would appear to be a scare tactic which the industry could do without.

In either case it is clear that more information should be available both to lawyers advising their clients and to the industry at large. This is something which Awalt might urge the manufacturers to work actively together to change, rather than urging attorneys to base their advice on the effect of missing data.

Letters to the Editor

What If the ACM's Membership Had Grown as It Should Have?

Following Miss Sampson's article in the Jan. 22 issue, I had a nagging feeling in the back of my mind about the 25,000 membership of ACM and its somewhat antiquated organization based upon a smaller society. What bugged me was "What if ACM had grown as it *should* have?"

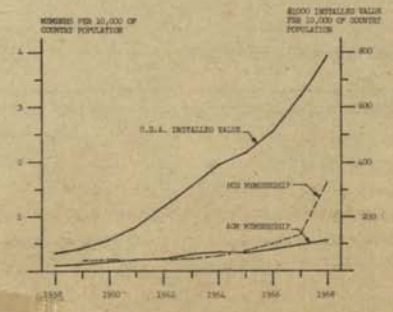
In case anyone thinks it has, here is a small graph that tells the story. The disparity in slope does not appear as bad as it really is, for the computational power per dollar has increased greatly in this 10-year period.

The British Computing Society's figures are shown for reference. The BSC seems to have done something about it. Membership at the beginning of 1968 was 18,000 in a country of 55.8 million population. Correspondingly, the ACM membership was 22,800 in a country of 201.8 million which was more installation value per capita than any other country in the world.

Would chartists extrapolate to the conclusion that ACM is a dying society, or at least one whose real influence will disappear?

R.W. Bemer

General Electric
Phoenix



Computerworld welcomes comments from its readers. Preference will be given to letters

Message From a Computer To Computerworld's Computer

The following letter was received in answer to a letter from CW's managing editor, which began: "Our computer tells me that you have not renewed your subscription . . . "

DEAR COMPUTER

I WOULD LIKE TO TAKE THIS OPPORTUNITY TO POINT OUT YOUR ERROR IN TELLING YOUR MANAGING EDITOR THAT ALASKA DEPARTMENT OF LABOR HAS NOT RENEWED ITS SUBSCRIPTION TO COMPUTERWORLD.

PLEASE INSTRUCT YOUR HEARTLESS PROGRAMMER THAT ALL THAT WAS WANTED WAS TO CHANGE THE NAME ON THE SUBSCRIPTION. IF THIS CAUSES THE MATCH CODE NOT TO MATCH THERE IS A BUG IN YOUR PROGRAM WHICH SHOULD BE CORRECTED.

WHILE I AM JUST AN AGING SECOND GENERATION COMPUTER MY MEMORY HAS BEEN UPDATED TO REFLECT A RECENT ORGANIZATION CHANGE BY COMPUTERWORLD. CONGRATULATIONS TO EVELYN COWELL YOUR NEW EDITOR OF SPECIAL SUPPLEMENTS, HENRY FLING SUPERVISOR ART SERVICES, AND KATE RACHSTEIN SUPERVISOR TYPESETTING SERVICES. I SUGGEST YOU OBTAIN THEIR HELP IN GETTING THAT HEARTLESS PROGRAMMER GUY TO UPDATE YOUR MEMORY BANKS.

BEING IN AN ISOLATED AREA THE ORGANIZATION LOOKS FORWARD TO EACH NEW ISSUE OF COMPUTERWORLD AND SINCERELY HOPE YOU CAN MAKE THE MATCH CODE MATCH SO WE MAY CONTINUE TO ENJOY YOUR WEEKLY PAPER.

SINCERELY YOURS,

JUNEAU

tin St., Newton, Mass. 02160.

ECMA

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

1204 GENEVA RUE DU RHÔNE 114
CABLE ADDRESS EUCOMANUFAS GENÈVE
PHONE 022 35 36 34
TELEX: EUCOMANUFAS GVE 22285

Mr. R.W. BEMER
120 Southern Hills Road
Moon Valley
PHOENIX, Arizona
USA

OUR REF. HE/cm YOUR REF. DATE November 13, 1967

Dear Bob,

Back home I wish to express to you again how fine it was to work this whole week with you in the Chair of SC5. It has certainly be the first really well conducted, orderly managed SC5 meeting. I think that all shared my views on this and, as a matter of fact, two heads of delegations - I let you guess...- told me after the meeting that they were really very pleased with your Chairmanship, the more that they had, say some reluctance before Nov. 6.

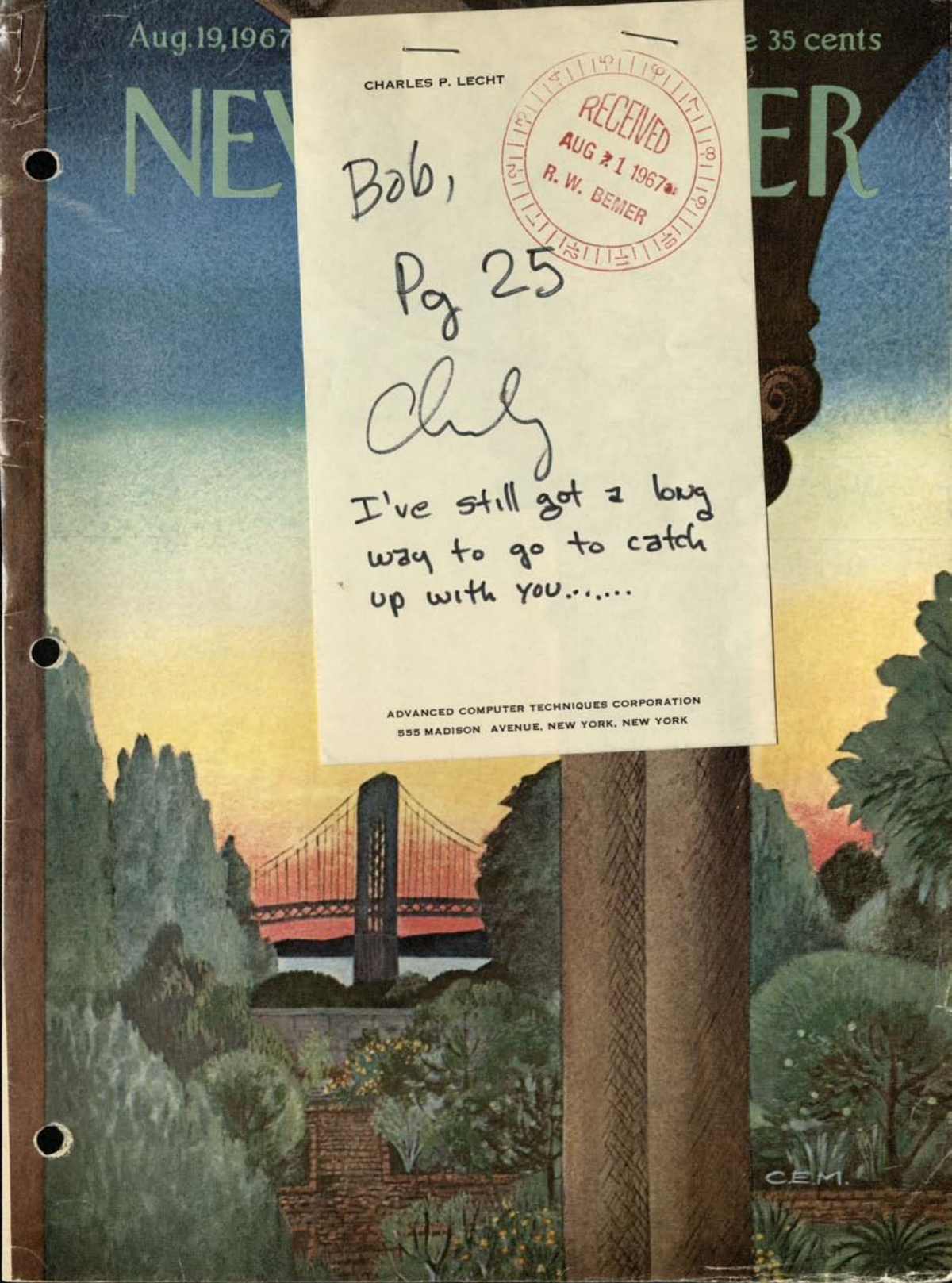
I find here in the BEMA News that the "International Operation Council" of BEMA meets on Dec. 14. I had no knowledge of this body until now. But if it is the relevant one, I feel that a really strong effort should be made in order to try to achieve something similar to the suggestions I have made to you in Paris: namely to have BEMA conduct the work of TC97, or SC5, SC6 and of the relevant WGs of which USASI has the Secretariat. I think that I made clear what I meant by "conduct". You can remember your colleagues of this well known words: "Put work in it, you'll get control...".

I hope to see you soon again in Europe or in the US and remain, dear Bob-Double-Vé,

Yours sincerely,

D. Hekimi,
Secretary General.

Dara


Aug. 19, 1967
35 cents
CHARLES P. LECHT
RECEIVED
AUG 21 1967
R. W. BEMER
Bob,
Pg 25
I've still got a long way to go to catch up with you.....
ADVANCED COMPUTER TECHNIQUES CORPORATION
555 MADISON AVENUE, NEW YORK, NEW YORK
CEM.

Aug. 19, 1967

THE NEW YORKER

Price 35 cents

itation of it, because that's all they ever see," Mr. Lira said. "If a band comes to a migrant town to play for a Saturday-night dance, the promoters put the star on the back of a convertible and parade her up the main street of the town, even though the main street isn't paved and the dust is blowing up in her face, and they have mariachis riding in a car behind her."

We asked Mr. Valdez and Mr. Lira what they considered the troupe's main function to be.

"We try to educate the workers," Mr. Valdez said. "In each *acto*, we explain a particular point to them. We started the Teatro to entertain the workers at meetings and to keep up their morale, but it was never *just* entertainment. Recently, the Free Southern Theatre performed for Negro sharecroppers in the South, but it did things like 'Waiting for Godot,' and though 'Waiting for Godot' may be all right for a middle-class audience, the Free Southern Theatre's audiences were Negroes who were poor and starving and oppressed, and what they needed was solutions. *We* take a real situation—often something that happens on the picket line—and we improvise around it. When we get an improvisation that we like, we're ready. An *acto* is never written down. When we started the Teatro, workers came up to us after performances and said, 'There's not enough action,' so we introduced more slapstick. We use even more slapstick when we perform for Mexican-American farmworkers than when we perform for a middle-class audience in New York. In the future, I'd like to use a lot more music, too."

"Music *is* action," Mr. Lira interjected.

"Now we're working with archetypes, but I'd like to develop more depth of characterization," Mr. Valdez said. He sipped from his can of beer. "I think what we're doing is art," he went on. "Well, the word 'art' has been so debased that maybe I shouldn't use it, but at least what we do *works*. An airplane works, and it's a kind of art. A set of gears works, and it's a kind of art. Well, the Teatro works, too."

No Nonsense

WHEN we heard that Charles P. Lecht, president of the Advanced Computer Techniques Corporation and, at thirty-three, one of the youngest executives in the computing business, had written three books on how to talk to machines, we were curious to know if he could still talk to human beings, and went to see him. We found him seated between two windows on the twenty-third floor of an all-glass building on Madison Avenue; he was smoking a pipe and admiring the last glow of a bright-orange sunset. On his desk were several shoebox-size cardboard boxes bearing the inscription "The No-Nonsense Machine."

We asked him what this inscription meant.

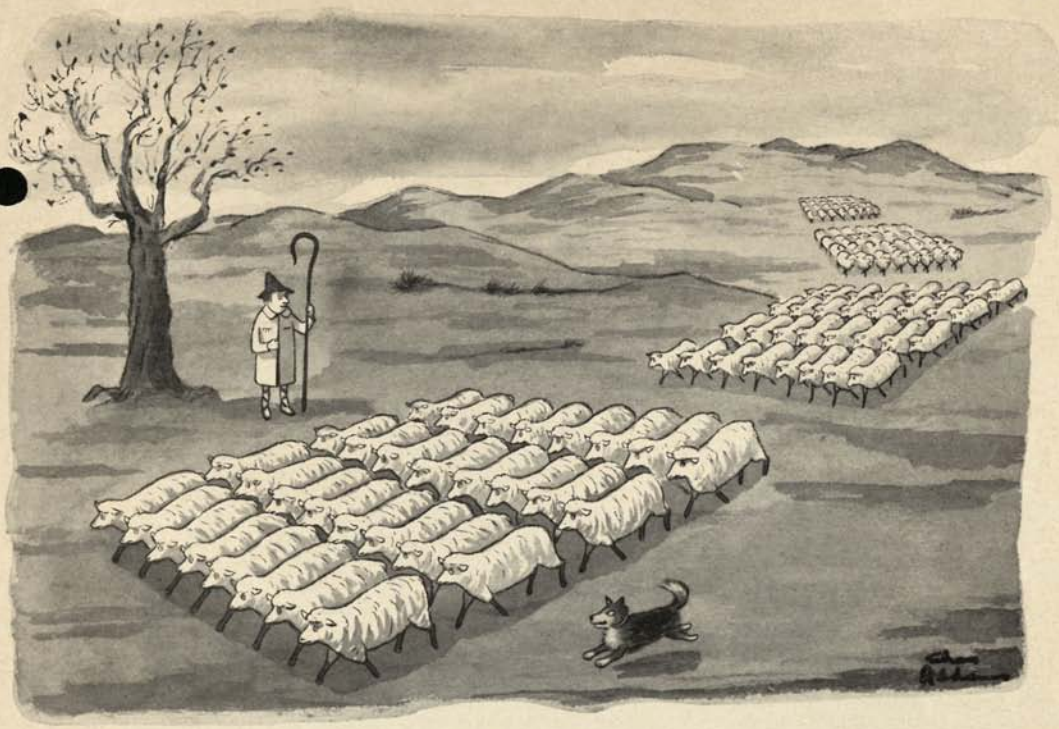
He answered at considerable length. "It means that the nonsense usually comes from people who make it a point not to talk to machines," he said. "If they did, they would find out soon enough that the machines have little to say for themselves—much less, in fact, than those who speak for them while pretending to be speaking against them. The avowed enemies of the machine are the machine's only true friends, and the only believers in the myth of the machine age. They give the machine free publicity—they see it as a monster, they endow it with almost divine powers. It would be much more realistic and honest of them if, instead of fearing the machine, they feared their own ignorance of the machine—which ignorance, coupled with their preconceived fears, is responsible for the kind of machine worship they are advertising as the cultured man's answer to the threat of the all-engulfing machine. If a man feels that all he holds sacred in life is in danger, he gives evidence of his concern by doing everything he can to determine the cause of the danger and fight it. Now, all these highly articulate anti-machine people identify themselves with a primitive, pre-mechanical, almost pastoral mind, which is not even part of their cultural tradition to begin with, because the machine age began with the humanist trend in Renaissance Italy, and there

"We always planned to sit by the side of the road and watch the world go by, and then they up and bypassed us with that damned superhighway."

is no such animal today as a pure medieval thinker—not even among specialists in Thomist philosophy. And not only do the intellectual enemies of the machine belie their very culture by posing as pre-Renaissance thinkers; they take refuge in a world of impossible dreams, the effect of which is to present the future as being hopelessly in the hands of mechanics and repairmen, with no chance for responsible citizens, for men of learning, artists, moralists, philosophers to be heard and to act in the general interest. This the anti-machine people do very well, because they all know how to write and how to talk. They talk about the disappearance of good manners and other good things of life, and blame it on the machine. I won't deny that they are right. Too many of the good things *have* disappeared, and are still disappearing under our horrified eyes, but you might think that this would be one more reason for the lovers of beauty, culture, and refinement to make their voices heard over the din of the machines. The mechanics can take over only if the others let them, and we should not forget that the mechanics are not responsible for the advancement of science to the point where the making of machines became possible. As a group, men of higher learning, and even poets, bear the responsibility for the terrible objects that fill our modern world. We might logically say that the Amish are not acting in good faith when they ban the machine from their life. They are forbidden to use buttons, but, whether they like it or not, they do use the wheel, which is the mother of all machines, and the chair, which also is a machine. This said, I may continue to admire the Amish—as indeed I do—because they mind their own business with as little mechanical help as they can afford without letting the mechanical mind take over altogether. But I cannot admire the intellectual machine-haters, who mind our business instead of their own—or, rather, act as if they had already dispensed with our business, and proudly say so, using the telephone, the Dictaphone, the thermionic tube, the supersonic jet, the computer, the laser to let us know how vulgar we all are in comparison to them, and how blind not to see that the past is better than the present. And if you ask them to describe a machine—any machine—or to tell you how to get rid of the existing machines, they will reveal such ignorance of the whole matter that you begin to suspect they never meant anything they said seriously in the first place. On the other hand, you cannot call them stupid; they are alert and articulate, and their snobbish aloofness from the world of today is fascinating to the young. In the end, you are almost driven to conclude that intelligent people who speak stupidly are just plain dishonest. This explains how dictators, who are always illiterate, always carry a majority of the finest minds, and these, in turn, help the dictator take the younger generation by storm. The finest minds always begin by disliking the vulgarity of politics, and always end by accepting the vulgarity of a bum who enters politics as an enemy of politics and a restorer of the good old ways, the simple ways, the homey heritage, the pastoral approach. From there to a blood-and-soil philosophy the transition is quick. Yeats, T. S. Eliot, Ezra Pound, Santayana, Thomas Mann, Céline, Shaw, D'Annunzio, and, in later life, Pirandello took this path through the back yard and the chicken coop into the ranks of criminals, with whom they had nothing in common. Some of them did withdraw, in horror, just before it was too late, and spent the rest of their lives trying to find intricate reasons for their early mistake, but the reason is always the same—mental laziness, or the aesthetic approach to political questions. The logical approach would have taught them that politics is with us from cradle to grave, because politics begins when a parent tries to make a child do what he does not want to do—eat his vegetables, drink his milk, take his bath. At all stages of life, there is the problem of making oneself be obeyed without being understood. Politics is a shortcut to philosophy. Therefore, when someone says that he will put an end to politics, far from being elated, we should know that within an easily calculable time he will deliver to us death, concentration camps, and the end of the world, whereas dirty politicians can deliver to us only their heads to chop off for not delivering the goods they promised. We may be sick with anger at the end of the process, but we will still be very much alive.

"Now, what happens with computers is that people who hate them are much more afraid of them than they might be of a prospective dictator, and yet computers are the anti-dictator *par excellence*. They never answer a question they were not asked. (Dictators answer *only* questions they were not asked.) Far from enslaving us, the computer frees us from lengthy calculations and guesswork. It follows that the invention of the computer has actually restored the pure poet, the dreamer, the artist in general to a place of supremacy such as these great figures had not known since the beginning of the Renaissance, when, as I said earlier, the scientific, or empirical, mind took over the whole cultured world and dethroned all that was vague, intuitive, mystical. For as it becomes easier to calculate what is likely to happen in various combinations of circumstances or as a result of various groupings of elements, it becomes easier to be confronted with the ultimate questions, which are forever vague—not because that is their nature, as we have always rather uncritically concluded, but because it is ours. If we knew with computer precision what we wanted in life, and therefore also what we were going to get, our life would be ended. Lack of surprise—a lack that is the essence of despair—would make us kill ourselves. Hope—the possibility of surprise—always inserts itself into our calculations and displaces the course of events, not outside us but in our minds. We are not satisfied; we are not through. Hope acts as a rain check of sorts, because even as fortune rains upon us from the most wondrous cornucopia, it is never the right rain, never the manna, never what we had in mind."

We were about to thank Mr. Lecht for his lecture, but he smiled and went on, "Don't leave. I haven't really answered your question yet. I am not a computer. You asked me about these boxes here with the inscription 'The No-Nonsense Machine' on them, didn't you? All right. Let me answer you. They are evidence in support of the views I have just expounded to you. This year, our company decided to take an exhibitor's booth at the Spring Joint Computer Conference in Atlantic City, and we had the smallest booth available, which, because it was placed at a stategic point, managed to impress upon every visitor the fact that here was a computer industry with the impressive name of Advanced Com-



puter Techniques, or ACT, yet with nothing but a few chairs and a desk. Our position was particularly alarming because we were flanked by giants in the computer field, whose huge machines made us appear even less well equipped than we were. During the two weeks before the exhibit opened, my vice-president and my other assistants spent a few sleepless nights trying to concoct an idea that would convey the reason for our presence there, but all they could think of was one more of those booklets telling on slick paper the story of the young corporation and saying what wonderful things computers are. In despair, I opened all the drawers of my own desk to see what ideas or objects had top priority on my unwritten everyday agenda. And what did I find in my desk? A model airplane such as a high-school student might tinker with, a slab of metal with no technical identity and no usefulness at all, and a few other silly objects I am in the habit of fondling while I talk business with prospective or actual clients. 'Not another one of your brainstorms,' said my vice-president as he saw me consider these objects with unusual attention. 'Look,' I said. 'Here is what I have discovered: This man whose desk I am searching likes to fondle objects. He is, in this, not much different from the other people in the computing field. Therefore, the only way for us to attract the attention of executives visiting the exhibit is to give them a toy.' I immediately thought of the one thing we had that could be transformed into a toy; namely, an ad we had placed in the *Wall Street Journal* a couple of months before, showing the faces of our staff, under the heading 'THE NO-NONSENSE MACHINE.' I called up Tuco Work Shops, the puzzle people, and had them make a jigsaw puzzle of over three hundred and fifty pieces out of our ad, and I packed them neatly in a cardboard box—namely, this box here—and that was all we had to offer the occasional stray visitor. Actually, getting the puzzle made was no simple task. It involved coördinating the activities of a printer in New York and the Tuco plant, which is near Buffalo, and there were problems of weather conditions—aircraft grounded, owing to fog—and, when the puzzles were ready, the great problem of getting them from Buffalo to Atlantic City while the truck drivers were on strike. We hired a plane and got the puzzles to the exhibit on time. By noon the first day of the exhibit, the line in front of our booth spread past several other booths and around the corner, down one of the aisles. On the first day, a thousand puzzles were given away, and we achieved the top attendance of the whole exhibit. The president of one rival consulting firm came running into our booth at about 2 P.M. the second day, shouting, 'What are you giving away? Money?' I handed him a puzzle, and that seemed to calm him a little, only to irritate him still more as soon as he realized that he had gladly accepted it. The next day, we had to announce that we had run out of puzzles but would get more at a certain hour from New York and distribute them as soon as they arrived. Our booth quickly became a legend on the conference floor. People were asking who this small, unknown company was that commanded the largest attendance at the exhibit. The last day, we threw a party—not at the exhibit, God forbid, but at a hotel—and were accused by a prominent exhibitor of being intellectual. What he meant by this we have never understood; it sounded like a cry of despair. Yet I assure you that I have never engaged in anything less intellectual—not even when I was in high school."

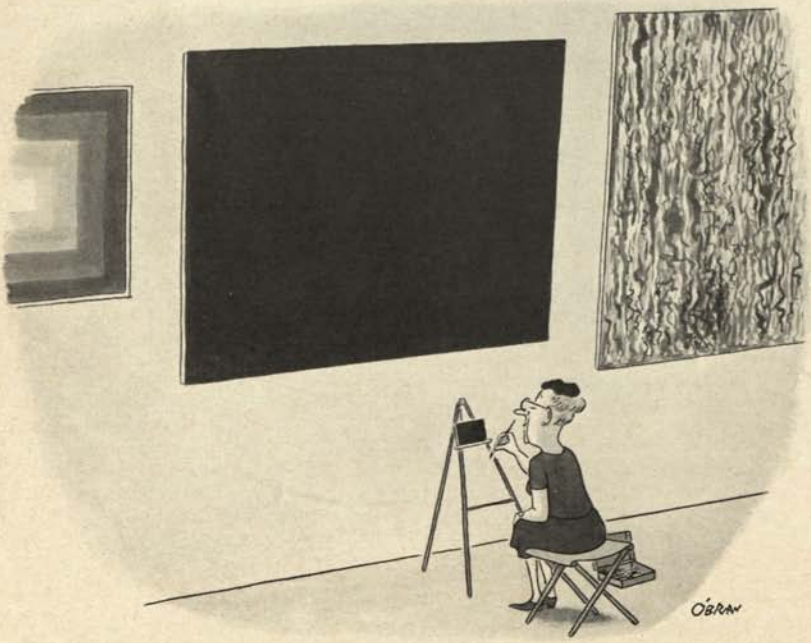
This time, we knew that the lecture was finished, but Mr. Lecht was still reluctant to let us go. "Come back soon," he said. "I have so much to ask you."

A DAY IN THE LIFE OF ROGER ANGELL

(MR. JIM BISHOP, AUTHOR OF "THE DAY LINCOLN WAS SHOT," "A DAY IN THE LIFE OF PRESIDENT JOHNSON," ETC., GRAPPLES UNFLINCHINGLY WITH STILL ANOTHER BIOGRAPHEE.)

6:47 A.M.: The sun, a molten gaseous ball measuring 864,000 miles in diameter, is already up and doing business at its old stand. In Copenhagen, 92,900,000 miles away from the sun and 3,958 miles east of New York's fashionable upper East Side, the sunlight falls straight down like a dropped cymbal, clanging noiselessly off a sidewalk-café table where Jens Nielsen, a fifty-two-year-old bicycle-clip manufacturer, is tucking a snowy napkin into his vest. Mr. Nielsen, obeying certain familiar gastric signals, leans forward and gnashes down pleasurably on his first bite of *smørrebrød:* lunch has begun. At Weather Ship Charlie, Lon. 35°30′ west, Lat. 52°45′ north, in the North Atlantic, the sun at midmorning glowers through a high skin of clouds, casting a swaying gray lozenge of light onto the bunk of Seaman Apprentice Orbert Grummond, who is writing a letter to his mother in East Pharaoh, Kansas. "Dear Mom," Grummond writes after several minutes' cogitation. "No news. This morning we had cirrostratus at 20,000 feet and chipped beef for breakfast. Yesterday it looked like rain again, but . . ." At this moment, the same sun peeps like a débutante over the ramparts of the abandoned Ruppert Brewery on Manhattan's Third Avenue. Polite morning shadows tiptoe through the quiet streets of the East Nineties, but here too there are stirrings, unmistakable signs of significance. A bus clears its throat somewhere to the north. A pigeon, patrolling a narrow third-floor ledge of an old but tasteful brownstone, pauses in its vigil and cocks an amber optic at a half-shaded window. Within the window, in the South-Facing Bedroom of the Walkup, Roger Angell lies face down on the great Sloane's Bed. One massive arm is flung above his head, the hand open in a curiously boyish gesture of ennui. The stern, lightly lipped mouth lies half open. Roger Angell, quite unconscious of Jens Nielsen's lunch and Seaman Grummond's letter, is asleep. Not for him yet is the business of this day, the awful awareness of details, the knowledge that it is *now*. He is lucky.

Others are asleep here too—Mrs. Angell beside her spouse, a daughter in the adjoining Narrow Room—but already the urgent machinery of living has caught up some in the household. The gray, sagacious elder member of the sleeper's personal guard, known by the code name "Daisy," has heard the pigeon's inquiring "*Croo?*" Instantly awake, she lifts her head from its resting place on the bedroom rug. The slitted yellow eyes come open. The pigeon flaps off, and now there is a stirring and an irritable sigh from the right-hand side of the bed. The junior guard, code name "Emma," pads in through the half-open bedroom door, eager for assignment, but a warning glance from her superior stops her in her tracks. The Master, a man of Renaissance moods, does not always react favorably to being awakened by a cold nose stuck in his ear. Now there is a magisterial groan from the bed, and the cats leave the bedroom together, walking fast. In both their minds is the knowledge that the Master, when taken by an early-morning mood of scientific inquiry, sometimes indulges his hobby of high-altitude cat-throwing, stubbornly testing his theory that a feline, when lobbed skyward with the proper degree of spin, will not *always* come down on the bed on all fours. At times, while whirling dizzily near the water-stained ceilings of one of the East Side's most extemporary bedrooms, the senior cat has had to remind herself sharply that none of the Master's behavior is intentionally unbearable. She remembers that this is the same man who, on the evening of January 5th, 1964, impulsively slipped her, at her post under the table, a fragrant sliver of roast chicken taken from his own plate. The fact that he claimed no public credit for this gesture, never permitting mention of it to the press, is as typical of the man as is the fact that it was never repeated. Roger Angell has many attributes of "the boss." Generous, large-footed, and joky, he is still no do-gooder or sap. Cats and people in his administration shape up or get out.



Now the South-Facing Bedroom lies silent again, gathering itself for the day to come. Beside the bed, within reach of Roger Angell's hand, lies a telephone instrument, its dial pierced by a circlet of ten finger holes. By picking up the receiver and swiftly rotating the dial with an intelligent forefinger, the man in the Walkup can instantly provide himself with the voices and the immense burden of information necessary to the

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Memo

FROM BOB FOREST 4/3/67

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March 25, 1967
March 30, 1967

-53

March 30, 1967

Mr. R. B. Forest, Editor
DATAMATION
35 Mason Street
Greenwich
Connecticut 06830

Dear Mr. Forest:

The review of Lecht's book on FORTRAN II and IV (67 March issue) demonstrates implicitly (and unwittingly) the purpose and usefulness of that work, despite Mr. Singleton's explicit profession of unawareness in this regard.

Sincerely,

R. W. Bemer

rg

ADVANCED COMPUTER TECHNIQUES CORPORATION

555 MADISON AVENUE / NEW YORK, NEW YORK 10022 / (212) 421-4688

CHARLES P. LECHT

March 25, 1967

Datamation Magazine
1830 West Olympic Blvd.
Los Angeles, California 90006

ATTENTION: Mr. Robert Forest

Dear Sirs:

After reading Mr. M. G. Singleton's review of my book (The Programmer's FORTRAN II and IV) in your March issue, I thought:

"For the most part I enthusiastically agree with Mr. Singleton's comments which flatter the book and with equal enthusiasm disagree with those which do not. But, neither he nor I -- struggling to understand a field in which there is so wide an abyss between theory and practice (better stated, perhaps, as computer-conference-idealism and computer-facility-reality) can have as much certainty about the accuracy or inaccuracy of our observations as we would like. This suggests that before one writes something of a technical nature (or writes a review of a technical book) in the computer field he had better check his writing thoroughly for what he thinks it to be and against what others say it is in order to insure the kind of certainty of accuracy he has, say, when he writes his name. For example, it is an illusion that there *is*, except perhaps on paper, a standard computer-industry FORTRAN II. Thus, for example, Mr. Singleton's observation, 'In FORTRAN II, the omission of information on the restriction of magnitude of integer data (i.e., I-type) is an unfortunate oversight', is an unfortunate undersight. It was purposely omitted. Presenting this item as though it was similarly restricted for *all existing compilers* would be fallacious.

"It is because of the above problem that many books *presenting* FORTRAN are valueless when one has to *use* FORTRAN unless they explicitly state that they are discussing this FORTRAN or that one. Also, many are disastrously misleading merely by implied correctness, and completeness through printing techniques. Yet, for anyone to be unhappy with a book which has these failings implies that something of an alternative nature could be done. If nothing of an alternative nature exists, this implication is more safely considered false than true. Alas, however, we all want some kind of a book to use, so maybe another *kind* is in order.

"To write a book on FORTRAN to cover *all* implementation contingencies would be a silly exercise in organizational stamina because its conditional complexity would defeat its meaningful usage at the programmer's desk (e.g., Integer data is restricted to two decimal digits for core size A, machine B, etc.) To write a book on one specific FORTRAN and pretend others don't exist is scurrilous. Then, one might write a book which has *meat* common to most *working* compilers and which leaves blank space so that the experiences of each person using it within his own working environment may be recorded. Thus, the medium is used properly, at least, as part of the message. Other benefits accrue too, for as Marshall McLuhan points out...'When the workers are permitted to join their energies to a process of learning and discovery the increased efficiency is phenomenal'. As a reference source, my book is intended to avoid presenting industry-wide answers where there are none and at the same time provide space so that the experience peculiar to a particular programmer within a particular computer facility using a particular version of FORTRAN can be recorded. I know *which* computer you've been using, Mr. Singleton, and *who* taught you to use it!"

Sincerely,

Charles P. Lecht

Charles P. Lecht
President

books

***The Programmer's FORTRAN II and IV*, by Charles P. Lecht, McGraw-Hill Book Co., 1966, $7.95.**

The purpose of this book is to provide a complete reference guide on the FORTRAN II and FORTRAN IV programming languages. In the foreword, it states: "The intent is to show clearly and concisely the full extent, meaning and limitations of each type of statement in the FORTRAN language. . . ." In the introduction, the author notes that this book "reflects more of what the language is than what it may have been intended to be" and elsewhere, it states that this book "makes all this information readily and constantly accessible."

The book includes a foreword by Robert Bemer, a preface and note by the author, and major sections titled: I. Introduction, II. FORTRAN Statements, III. FORTRAN IV Statements, IV. Related Topics, and V. Appendices. The five-page foreword contains in addition to other introductory remarks, a brief and informal history of FORTRAN. The introduction consists of a definition of FORTRAN, information on FORTRAN symbols and types of statements, and other very general rules and remarks related to writing a FORTRAN program.

The second section is a description of each of the FORTRAN statements arranged in alphabetical order and according to a fixed format for presentation. Differences between FORTRAN II and IV for each statement are shown clearly. Section III is a description of new features in FORTRAN IV. Section IV consists of general rules and specifications for preparation of function and subroutine subprograms. The appendices consist of a glossary (48 items), a table of FORTRAN built-in functions and library functions, and a table of FORTRAN symbols and their equivalent punched card Hollerith codes.

The entire volume has been prepared with offset printing. As a result, it contains very generous margins and blank space throughout which the reader could use to record his own personal notes, reminders, remarks or additional information.

The author states that strict formatting rules were used for "presentation of the material with great precision and completeness of information content." In this regard, the principal merit of this book is the organization of the material into a clear easy-to-read format for each FORTRAN statement type. Unfortunately, this feature alone has not enabled the author to succeed in accomplishing the primary intent and objective. The author is to be commended on the clarity with which he has shown the differences between FORTRAN II and IV, but the book is not rich in new or additional information of a reference nature. The material is essentially that which appears elsewhere in earlier publications and does not provide the much-sought-after additional information so essential to improved and efficient programming.

If the user has had difficulty with earlier reference material, he will soon discover that this book does not overcome certain chronic difficulties characteristic of other publications. If the reader does not know the material before reading it, he will not in all probability truly comprehend the impact and implications of the material until he has committed certain errors and only then will he be able to interpret ". . . the full extent, meaning, and limitations . . ." of certain material. This reference book, as many others, does not give the "whole truth". In many instances, it omits information which would provide considerable extension, flexibility, and programming liberty to the programmer.

In certain cases, enlightening information is either absent or is presented in such a manner as to be overly restrictive—sometimes so strongly that it is actually in error or so severely limited that it inhibits efficient and good programming practices. Specific examples are: 1) In the statement DO n $i = m_1, m_2, m_3$, the value of m_2 does not necessarily have to be greater than or equal to m_1. 2) In FORTRAN II, if the index value, i, of the DO has been used as a variable within the range of the DO, its current value is available upon exit and is equal to $i+1$ when passing to the next statement after a "satisfied" DO. 3) In subprograms, if an argument is an array name, it must appear in a DIMENSION statement in the subprogram but it is not essential that it have the same maximum size as the actual argument in the calling program.

The author states: "This book is to be used for reference purposes. It is not a 'self-teaching' device." The first assertion is good and the second is certainly true. If it is assumed that this reference was designed for the needs of the practicing programmer who is already familiar with FORTRAN, then it becomes difficult to determine for whom it is actually intended. Specifically, it appears that its most practical uses are for 1) program-

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File

March 22, 1967

Mr. R. G. Chollar, Vice President
The National Cash Register Company
Dayton, Ohio

Dear Bob:

I became aware of an internal difference within NCR while heading the ECMA delegation to ISO/TC97/SC2 in Paris this last week, the invitation to do so apparently being necessitated by Cluff's resignation. As it turned out, this arrangement was fortuitous as it enabled the counteracting of an unsound USA position that threatened a delay of perhaps a year in the Draft Standard on Magnetic Tape.

Your internal policies are not my business and it will stay that way. However, you may not be aware yet that an unfortunate general impression now exists that NCR delegates are controlled strictly by NCR policy, regardless of level of representation or status of the committee. We know generally that IBM has a strong coordination effort in international standards, but there have been innumerable instances of both professional freedom and holding of country (rather than employer) positions.

You of course know the European sensitivity to this kind of impression, and it could perhaps impact your TC97 position unless corrected. I apologize for perhaps seeming to meddle, but it seemed to me critical enough that you might wish to take the opportunity to amend it.

Cordially,

R. W. Bemer

RWB:cm

cc: R. V. Mindlin

WESTON SIDE STORY

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Production Assistant ..... June Schlegel

Scenic Designer ..... Richard Gangel

General Chairman ..... William J. Chiarchiaro

COMPLIMENTS

of

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of Westport

COMPLIMENTS

of

A Friend

ACT ONE

SCENE ONE — Somewhere Underground

Jones ..... Walter Richter
Brown ..... Robert Ficks
Allen ..... Bill Relyea
Wilson ..... John Hines
Smith ..... Walter Wagner
Montague ..... Don Lawder
Edwards ..... John Murray
Conductor ..... John Lupton

•

SCENE TWO — Somewhere Above Ground

Woman No. 1 ..... Ann Ash
Woman No. 2 ..... Nancy Nicholson
Woman No. 3 ..... Marian Bemer
Other Woman ..... Jeanne Richter
Jacqueline Reed, Betty Whitney, Holly Butler

•

SCENE THREE — The Montague Menage

Ethel ..... Freddie Townsend
Herbert ..... Don Lawder
Roger ..... Roger Butler

•

SCENE FOUR — Shopping Center

Marge ..... Ann Ash
Gladys ..... Holly Butler
Barbara ..... Margaret Bucky
Terry ..... Betty Carmody
Don Irwin ..... John Lupton
Teenager No. 1 ..... Jacqueline Reed
Teenager No. 2 ..... Doug MacLean

ACT ONE, continued

Julie ..... Gloria Fox
Betty ..... Betty Whitney
Nancy ..... Nancy Burwell
First Man ..... Robert Ficks
Second Man ..... John Murray
Third Man ..... Sonny Fox

•

SCENE FIVE — A Roadside

Julie ..... Gloria Fox
Roger ..... Roger Butler
First Kid ..... Holly Butler
Second Kid ..... Doug MacLean
Third Kid ..... John Murray
Officer Davis ..... John Hines

•

SCENE SIX — Calumet Home

Agatha Calumet ..... Kaki Howe
Clarence Calumet ..... Cal Sachs
Roger ..... Roger Butler
Julie ..... Gloria Fox

•

SCENE SEVEN — "Goats"

Ethel ..... Freddie Townsend

•

SCENE EIGHT — A Porch Outside Calumet Home

Roger ..... Roger Butler
Julie ..... Gloria Fox
Agatha ..... Kaki Howe

•

SCENE NINE — Montague Home

Ethel ..... Freddie Townsend
Herbert ..... Don Lawder
Roger ..... Roger Butler

•

INTERMISSION

ACT TWO

SCENE ONE —
Announcer ..... Art Hannes

•

SCENE TWO — Around Town
Husband ..... Walter Richter
Wife ..... Mary Lawder
Deaf Lady ..... Mary Ann Lubkin
Don Irwin ..... John Lupton
First Lady ..... Betty Whitney
Second Lady ..... Ann Ash
Man ..... John Murray
Other Petitioners ..... Doug MacLean
Marian Bemer, Robert Ficks

•

SCENE THREE — "General Motors, Take It Away"
Herbert ..... Don Lawder
Ethel ..... Freddie Townsend

•

SCENE FOUR — Gun Club
Smathers ..... Robert Ficks
Wilcox ..... John Hines

•

SCENE FIVE — Accelerated Baby
Roger ..... Roger Butler
Julie ..... Gloria Fox

•

SCENE SIX — A Salon
Teacher ..... Margaret Bucky
Mrs. Howard ..... Mary Ann Lubkin
Three Dancing Women ..... Lulie Monnig,
Pat Coykendall, Sue MacLean
Seven Ladies ..... Holly Butler,
Mary Lawder, Julie Bischoff, Allyson Murray,
Nancy Nicholson, Joan Gangel, Nancy Burwell
Ethel ..... Freddie Townsend

•

SCENE SEVEN — Somewhere in Weston
Woman ..... Marian Bemer
Man ..... John Lupton

•

SCENE EIGHT — Town Hall
Moderator ..... Walter Wagner
Herbert ..... Don Lawder
Ethel ..... Freddie Townsend
Roger ..... Roger Butler
Agatha Calumet ..... Kaki Howe
Clarence Calumet ..... Cal Sachs
Julie ..... Gloria Fox
Square-Jawed Woman ..... Margaret Bucky
Awful Woman ..... Allyson Murray

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ACT TWO, continued

Giddy Lady ..... Julie Bischoff
Fragile Lady ..... Ann Ash
Peter Robinson ..... Peter Robinson
Deaf Lady ..... Mary Ann Lubkin
Convert ..... Betty Whitney
Don Irwin ..... John Lupton
Ad Man ..... Jake Murray
Townspeople ..... Bill Relyea
John Hines, Robert Ficks, Holly Butler, Doug MacLean, Betty Carmody, Jacqueline Reed, Robbie Robinson, Mary Lawder, Nancy Nicholson, Mike Burnham
Cub Scout ..... Pete O'Neil

•

SCENE NINE
Announcer ..... Art Hannes

•

SCENE TEN — Calumet Porch
Roger ..... Roger Butler
Julie ..... Gloria Fox

•

SCENE ELEVEN — Route 57
Herbert ..... Don Lawder
Ethel ..... Freddie Townsend
Pepperidge Man ..... Doug MacLean
First Selectman ..... Walter Richter
Second Selectman ..... John Murray
Third Selectman ..... Bill Relyea
Fourth Selectman ..... John Lupton
Surveyor ..... Walter Wagner
Photographer ..... Pat Coykendall
Clarence Calumet ..... Cal Sachs
Agatha Calumet ..... Kaki Howe
Workers ..... Robert Ficks, John Hines
Deaf Lady ..... Mary Ann Lubkin
Town Crier Photographer ..... Sonny Fox
Minute Man ..... Margaret Bucky
Paraders ..... Julie Bischoff,
Nancy Nicholson, Ann Ash, Betty Carmody, Robbie Robinson, Jeanne Richter

•

SCENE TWELVE — Somewhere Underground
Jones ..... Walter Richter
Smith ..... Walter Wagner
Brown ..... Robert Ficks
Wilson ..... John Hines
Edwards ..... John Murray
Herbert ..... Don Lawder
Clarence ..... Cal Sachs

WRITERS

Roger Butler
Al Butterfield
Max Ehrlich
Robert Ficks
Sonny Fox
Sam Sharkey
Betty Smith
Henry Thoreau
Irving Townsend
Peg Walden

•

PIANOS

Robert Bemer
Alice Valkenburgh

•

PRODUCTION CREDITS

Stage Manager ..... Peg Walden
Assistant Stage Manager ..... Em Relyea
Scenic Construction ..... Walter Wagner, Frank Golden
Lighting ..... Ferd Manning, Dick Gangel, Dorothy Clapp
Sound ..... Jerry Brenner
Properties ..... Polly Hathaway, Robin Muzzy, Kay McFarlan, Jean Brenner
Costumes ..... Doris Ehrlich
Signs ..... Louise Brighton
Stage Hand ..... Bob Ficks
Make-up ..... Bea Coniglio

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MUNICH, GERMANY—Univac products and personnel from the U.S. were prominent in the success of two internationally important events in West Germany during late September-early October: the Congress of the International Federation for Information Processing (IFIP) held at the Munich Institute of Technology here, and the 1962 German Industries Fair in Berlin.

Robert W. Bemer, Univac Director of Systems Programming, was a member of the United States Program Committee and also chaired the symposium on programming languages during the week-long Congress.

Dr. Grace Hopper, Manager of Programming Research, gave a lecture on "Business Data Processing—a Review."

Univac-St. Paul prepared a special display for the Congress showing and demonstrating computer production methods, including use of automated equipment. Demonstrated were core and thin-film memory assembly and wire wrap techniques.

Among U. S. Univac personnel on hand to explain and describe Univac capabilities were Don Dowd, St. Paul commercial marketing representative, and Robert Stein, St. Paul Manager, Product Planning.

Following the IFIP Congress here, the display was moved to Berlin where it attracted large crowds in the U.S. Pavillion at the German Industries Fair.

The IFIP Congress is the successor to the UNESCO-sponsored International Congress on Information Processing held at Paris in June, 1959.

The present congress is a society of 20 national technical societies. Meetings take place every three years and provide the only international forum to bring computer scientists and users to-

490's First-Year Performance Record With Eastern Air Lines Outstanding

EASTERN'S COMPUTER CENTER in suburban Charlotte, near the geographic center of the area served by the airline, was custom built to house the real-time computer system and necessary communications facilities.

CHARLOTTE, N.C.—Eastern Air Lines' Electronic Computer Center has now celebrated its first continuous year of operation here.

Since officially opening on March 1, 1962, the Center has completed a staggering number of transactions related to operation of the nation's second largest air carrier, in terms of passengers carried.

During the period between March 23, 1962, and March 23 of this year, the UNIVAC 490 Real-Time Computing System installed at the Center handled a total of 33,886,908 transactions with reservation offices and airports in 14 different cities.

In the same time the computer composed and transmitted over 412,000 teletype messages to various stations in the Eastern system, keeping them posted with up-to the-minute operating and flight information.

In announcing these operating statistics, Don A. Pusey, General Manager of Data Services for Eastern, said that in December alone the UNIVAC system handled 4,445,-104 transactions and sent over 55,000 teletype messages. That was the peak month of the year.

A continuing program of additional applications as well as improvements to the original application of passenger reservations, is being carried out at the Center, which has undergone almost continuous expansion since its completion last year.

In addition to the original 490 Computing System, a UNIVAC Solid-State II magnetic tape computing system was installed in December for the production of various management reports and processing of some of the data collected by the main system.

Among the many uses of this new Solid-State II system are flight food services cost control, and preparation of flight schedule changes for input to the main computing system.

More Locations Tied In

Many additional cities and airport locations have been added to the system since it first became operable.

On February 11th the 490 began automatically to produce and transmit Flight Plans for each scheduled Air-Shuttle flight from New York.

This Flight Plan is complete and is filed with the FAA via teletype directly from the computer.

The computer-prepared Flight Plan gives the flight number, proposed departure time, type of equipment, true air speed, altitude, preferential routing and elapsed time. The captain has the option to file an alternate plan should operating conditions warrant a change from the computer-prepared plan.

This innovation has eliminated departure delays due to late arrivals of flight plans at the Air Route Traffic Control Center.

One of the next uses of the system will be to automatically record flight departure time.

'Wheels Up' Routine

Exact time that EAL planes depart on flights *will be automatically signaled to the Computer Center via teletype transmission lines as the wheels of the aircraft are retracted.* An electronic signal from a device installed on the plane will trigger an agent set at the airport which will automatically send the departure information to the computer.

Known as the "Wheels Up" routine, the information will be utilized to provide accurate flight arrival and departure information for Eastern's customers and will also be used by the computer to maintain accurate flying times and aircraft part-usage times.

The same comprehensive real-time reservation service that EAL customers enjoy is now being used by Mohawk Airlines. Since May 27, 1962, Mohawk has used the Charlotte Electronic Computer Center to verify and confirm reservations anywhere on the Mohawk system within 4 seconds.

By leasing a portion of Eastern Air Lines UNIVAC 490 Real-Time Computer System, Mohawk is able to provide customers with the most modern local reservations service in the industry.

99.4 Uptime Record

The Field Engineering team which maintains the Eastern Air Lines Computer Center systems at Charlotte in tiptop shape around the clock, every day of the year, is headed by Installation Supervisor Dick Hylton. Working with him are: Ken Alkire, Don Dupaul, Jack Faust, Bill Hayes, Bernie Hough, Russ Johnston, Bob Pearce, Jack Saunders, Chet Sigurdson, Joe Stevenson, and Roscoe Taylor.

Hylton reports that the first year's operation achieved a performance 'uptime' record of 99.4%.

In computing this uptime percentage for the 490 Real Time system all reasons for downtime were considered, including human error and planned shutdowns, as well as hardware failure.

Hylton himself joined the Company in 1957 and after training on the File Computers was assigned to the Eastern Air Lines New York Center. He has been at the Eastern Computer Center in Charlotte since the very beginning of operations there.

"We have had wonderful support, not only from Marketing's representative Vic Baudier, but also from personnel of Eastern here in Charlotte," Hylton states.

"The Eastern Computer Center is of course a real showplace," he continued. "The Center not only attracts computer-oriented visitors from all over the South, but also many foreign visitors."

Veteran Product Developer Cited

John T. Ferry, company veteran widely respected for his contributions to product developments, retired recently after thirty-seven years of service.

A native of Pennsylvania, and a shop veteran, he worked as a tool and die maker in the automotive industry in Detroit before joining the Powers Company prior to its absorption in Remington Rand Inc. He subsequently had a distinguished career in the Remington Rand and, later, Univac organizations.

RETIRING John T. Ferry receives best wishes from W. R. Lonergan, Director—Product Planning-Systems Programming (right) and F. W. Bauer, Manager-Product Planning.

An inventor with more than a score of U. S. domestic patents and many foreign patents to his credit, he was one of those in the Norwalk organization honored as an 'Inventor of the Month'. Early in his career, he won an Associate Degree in Mechanical Engineering from Penn State University after five years of evening sessions.

Most recently he has been a member of the Product Planning-Systems Programming Department.

He was honored on the occasion of his retirement at a dinner party in Norwalk and during a visit to New York received warm best wishes from Home Office leaders.

PP/SP Managers Quarterly Meet Is Held in N.Y.

A successful quarterly Staff Meeting was held April 17-19 in New York by the Product Planning and Systems Programming Department. The tightly scheduled two-day session was attended by managerial personnel of the various departmental sections from the New York Home Office, Whitpain, St. Paul and Dallas.

Under the general chairmanship of W. R. Lonergan, Director-Product Planning and Systems Programming, overall operational and administrative plans were reviewed for the fiscal year 1964.

Dr. Rader, Speaker

A highlight of the meeting was an address by Univac President Dr. Louis T. Rader in which he described the Division's current state of progress and outlined the major objectives that the Product Planning and Systems Programming Department should set for itself in the months ahead.

Leading roles in the direction of the sessions were played by R. W. Bemer (Systems Programming), P. D. King (Systems Research and Evaluation), F. W. Bauer (Product Planning) and M. Bryce (Administration).

Important presentations were made by E. H. Clamons (Standards), N. K. Zakin (Technical Information), A. K. Elsworth (International Liaison), R. I. Stevens (Systems and Procedures) and H. R. Howard (Financial Controls). A personnel program covering employment, personnel appraisal, and job descriptions and salary program was presented by P. Miller assisted by R. J. Schinkel, N. C. Gibbs and R. W. Norris of the Univac Field and Home Office Personnel Staff.

Tunnel Diode Represents Important Development in Computer Circuitry

PHILADELPHIA—Practical application of logic circuits utilizing wide tolerance tunnel diodes, operating at speeds measured in billionths of a second, was announced here in May.

The unique circuits are being used in TUDAT (Tunnel Diode Arithmetic Tester), basically a serial adder and subtractor employing several coaxial cable registers, developed under a Navy contract.

The principal job of a tunnel diode, as explained by T. H. Bonn, Manager of the Advanced Components and Circuits Section at Whitpain, is to provide power gain at high speeds in the circuitry of a computer. It performs essentially the same functions as a transistor, but many times faster. Like all diodes, it has only two terminals, while a transistor has three.

"Sucessful development of practical tunnel diode logic circuits and their utilization in TUDAT is a breakthrough which makes possible the future development of large-scale military and commercial computing systems that are as much as twenty times as fast as those which are now available," company announcements stated.

TUDAT uses over 150 of the new circuits in a space considerably smaller than a standard manual typewriter and performs a logic operation in four nanoseconds. TUDAT has been in successful operation for several months.

The circuit development, which made TUDAT possible, is a hybrid combination of a tunnel diode and a "charge storage" or enhancement diode. This combination produces a circuit which possesses the speed capabilities of a tunnel diode circuit but maintains the voltage and component tolerances typical of transistor circuits. An additional advantage of this novel circuit is a fan-in and fan-out of three to five permitting easy logic implementation.

While the NOR circuit was used almost exclusively in TUDAT, a number of other tunnel-diode circuits have been designed and constructed, including an OR, High-Powered NOR, a Transistor Driver and an Indicator Driver.

Several variations of the NOR circuit, employing new configurations and more sophisticated components have been devised by Company engineers at the Univac Engineering Center here in suburban Whitpain. These experimental circuits perform logic at speeds faster than one nanosecond per operation.

Development work was done in the Advanced Components & Circuits Division at Whitpain by Dr. W. F. Chow and Mr. J. S. Cubert under the supervision of Mr. W. J. Bartik. Mr. T. H. Bonn is Division Manager. Other contributors were J. Stone, T. LoCasale, J. Murphy, and J. Fraunfelder.

Philadelphia-St. Paul Team Adapts a Higher Capacity U-III Memory to 'II'

PHILADELPHIA—Through the close cooperation and support of the St. Paul Memory Development group, the Philadelphia organization at Whitpain successfully carried out a development project for increasing the word memory of the UNIVAC II System recently.

During the week of February 11th, J. J. Keilsohn, S. B. Horowitz, H. Ulrich, and S. Danowski of the Philadelphia organization went to the Toronto Sales Office to install this newly-created memory in the UNIVAC II system there. The venture was successful, and the memory was increased to 4,000 words.

The new memory was made possible by using core material currently being put into UNIVAC III memories, increasing the plane size to 8K bits, and using the UNIVAC 1050 type cards. The memory case was designed to fit the present mounting hardware and existing cables of the "II" System.

The new product is a core memory module with the reliability of the UNIVAC III memory, and it is considered field installable.

At the Spring Users Conference at The Greenbrier in White Sulphur Springs in February, Mr. Horowitz, Project Engineer presented a paper covering this successful installation of the memory for representatives of UNIVAC II users.

GROUP WHICH DEVELOPED the increased word memory for UNIVAC II Computer: H. Ulrich, kneeling beside the new memory; standing are (left to right) J. J. Keilsohn, J. C. Rosato, S. B. Horowitz, and S. Danowski.

Univac Scientific Exchange Draws Delegates Nationwide

WASHINGTON—A highly successful three-day conference of the Univac Scientific Exchange held here in late April drew representatives of UNIVAC large-scale scientific equipment from all parts of the country.

The informality of the general sessions, as well as the special smaller sessions devoted to particular subjects, contributed substantially to the success of the program. It was felt by those attending that the conference was especially productive in bringing users up to date with Univac Division equipment and software developments, and that it provided delegates with an excellent climate for exchange of operating information of interest to all of them.

Dr. Rader Attends

Univac President Dr. Rader, in an address at one of the general sessions, stressed the importance which the Division attaches to USE "as an accurate barometer of the equipment and programming needs of government, educational institutions and industry."

"Through a combination of independent thinking coupled with mutual cooperation you have not only influenced the development of our equipment but also assisted us in exploring new applications," he said.

He cited the heavy user investment in software keyed to present large-scale systems. And he emphatically reaffirmed both the continued Univac commitment to the large-scale equipment field, and Univac intentions of preserving users' investments in software by designing future, improved systems which are able to utilize present software.

The conference was held under the General Chairmanship of James W. Hanson of the Computation Center at the University of North Carolina, completing a year's service as General Chairman of USE.

Robert E. Steele of Home Office Marketing is principal Univac Division liaison with the organization and serves it as executive secretary.

Officers Elected

The conference elected new officers as follows: Richard P. Castanias of the University of Notre Dame Computer Center, General Chairman (succeeding Mr. Hanson); Gunther Proprotny of the Armour Research Foundation (ECAC), Chicago, Software Chairman; and Dan Mason of the Computer Sciences Corporation in Los Angeles, Facilities Administration Chairman.

Business sessions of the conference covered a wide range of important subjects in connection with software and equipment utilization of the 1103A, the 1105, and the 1107 Computer Systems.

DR. RADER and Mrs. Dorothy Armstrong of the Bureau of the Census, one of the earliest Univac user organizations.

Among those playing leading parts at the three-day spring conference were Mrs. Dorothy Armstrong, Chief, Programming Branch, U. S. Bureau of the Census; Benjamin Mittman of IIT Research Institute, Chicago; Richard H. Petonke of the U. S. Army Engineers; Richard B. Wise of the IIT Research Institute; and Robert A. Wonderly of the Computation Center, University of North Carolina.

Also prominently represented at the conference in addition to the organizations mentioned above, were Case Institute of Technology; National Aeronautics and Space Administration, Fleet Operations Control Center, U. S. Atlantic Fleet; Holoman Air Force Base Missile Development Center; U. S. Army Logistics Command; Griffiss Air Force Base; McClellan Air Force Base; Stevens Institute of Technology; and the University of Alabama Research Institute at Huntsville.

NEW FIELD LINE UP

(Commercial Marketing Locations)

Eastern Region

Regional Marketing Manager	**J. D. Hazzard**
Asst. Reg. Marketing Mgr.	(To be announced)
Manager, Used Computer Sales	J. V. Griswold
Manager, Systems Analysis	R. J. Pieper
Boston Area Manager	M. A. Angier
Asst Manager	D. T. Stebbins
Hartford Territory Mgr.	O. B. Cragie
Bridgeport Territory Mgr.	A. F. Draper
Philadelphia Area Manager	W. S. Gall, Jr.
Asst. Manager	G. G. Inforzato
Harrisburg Territory Mgr.	E. D. Stritzinger
Baltimore Area Manager	J. B. Schweiker
Pittsburgh Area Manager	A. W. Fera
Detroit Area Manager	A. L. Reade
Cleveland Area Manager	C. G. Zimmer
Asst. Manager	J. R. Fullam
Buffalo Area Manager	P. V. Csaszar
Asst. Manager	R. R. Whisler
Syracuse Territory Mgr.	S. Abbott, Jr.
Albany Territory Mgr.	R. I. Grove

Western Region

Regional Marketing Manager	**J. N. Veale**
Asst. Reg. Marketing Manager	(To be announced)
Manager, Used Computer Sales	M. C. Stone
Manager, Systems Analysis	P. J. Ashenfelter
Los Angeles West Area Manager	R. A. Kyer
Asst. Manager	W. A. Flood
Inglewood Territory Mgr.	W. M. Aamoth
San Diego Territory Mgr.	N. L. Smith
Los Angeles East Area Manager	W. C. Waldron
Phoenix Territory Mgr.	R. N. Tingley
San Francisco Area Manager	E. W. Green
Asst. Manager	W. Magazin
Denver Area Manager	H. E. Stelzer
Salt Lake Territory Mgr.	C. W. Paugh
Seattle Area Manager	R. N. Blakeney
Portland Territory Mgr.	D. King

Metropolitan New York Region

Regional Marketing Manager	(To be announced)
Asst. Reg. Marketing Mgr.	(To be announced)
Manager, Used Computer Sales	(To be announced)
Manager, Systems Analysis	F. J. Waters
New York Uptown Area	G. W. Helm
Asst. Manager	A. K. McIlwraith
Elmsford Resident	L. P. Flynn
New York Downtown Area	R. N. Scott
Newark Area	V. A. Wolff
Garden City Area	M. M. Griek

Central Region

Regional Marketing Manager	**C. M. Shuler**
Asst. Reg. Marketing Mgr.	W. R. Hudson
Manager, Used Computer Sales	J. H. Schuster
Manager, Systems Analysis	E. C. Aubitz
Atlanta Area Manager	R. G. Henderson
Miami Territory Mgr.	G. A. Keenley
Birmingham Area Manager	E. W. McCain
Memphis Territory Mgr.	W. A. Campbell
Nashville Territory Mgr.	H. H. Deaton
Charlotte Area Manager	R. E. Bayha
Richmond Territory Mgr.	A. H. Bibby
Chicago Area Manager	J. R. Evans
Milwaukee Territory Mgr.	R. F. Redfield
Cincinnati Area Manager	E. A. Loritz
Louisville Territory Mgr.	J. J. Petry
Dallas Area Manager	R. H. Grimes, Jr.
Tulsa Territory Mgr.	H. C. Brattebo
Des Moines Area Manager	C. E. Gilbert
Kansas City Territory Mgr.	D. R. Haworth
Omaha Territory Mgr.	P. D. Wick
St. Louis Territory Mgr.	R. A. Wolf
Houston Area Manager	J. E. Gaston
New Orleans Territory Mgr.	H. B. Coats
Indianapolis Area Manager	F. B. Holst
Minneapolis Area Manager	E. A. Henson

*Government Marketing under Univac Vice President L. E. Johnson, and Military Marketing under Vice President R. S. LaMontagne continue also to be headquartered in Washington.

NEWLY ELECTED General Chairman of the Univac Scientific Exchange R. P. Castanias (left) chats with J. J. Goodpasture, Manager-Systems Programming, Univac—St. Paul.

Reliable New Low-Power Thin Films Called Big Miniaturization Advance

PHILADELPHIA—The development of low-power thin films that are compatible with molecular integrated circuits was announced here in May.

The unique new thin films operate reliably at drive currents of 20 to 30 milliamperes. Most existing thin films designed for computer memory applications require several hundred milliamperes and are therefore incompatible with molecular circuits.

This significant reduction of drive-current requirements was acplished by two radical approaches to thin-film fabrication.

The first involved altering the chemical composition of the thin film by adding small quantities of other materials to the basic nickel-iron permalloy. Tests of this film, indicated an anisotropy field of about 1 oersted (3 to 4 times less than films currently in use).

The second approach was a reduction in the size of the drive wire and the thin-film element. The drive-wire width and film diameter were reduced to 5 mils. Because of this extremely small film diameter, the film thickness was reduced to 200 Angstroms to decrease demagnetization effects.

The new thin film has a flux of about 0.2 millimaxwells and generates an output voltage of a few tenths of a millivolt when switched in 10 nanoseconds. The thin film has been used in operational memory circuits in which signal-to-noise ratios of 10 to 1 have been demonstrated and outputs of 40 millivolts have been achieved with amplifier gains of 40 decibels.

This thin-film breakthrough makes possible the future development of 256-word memories, complete with selection circuits, drivers, and sense amplifiers, in a volume of about one-half cubic inch. This development assumes the use of evaporated circuit components and conductors with miniaturized diodes and transistors. The full use of evaporated circuitry would permit even smaller volumes.

Development work was done at the Univac Engineering Center, Whitpain by Dr. T. Matcovich, W. Flannery, W. Luciw, A. Adomines, R. Moore, and R. Storck of the Molecular Systems Unit. Dr. Matcovich is the Project Engineer.

J. W. HANSON (center) of the University of North Carolina, retiring General Chairman of USE, was general chairman for the Washington conference. He is shown here with A. T. Fischer (left) Univac Marketing Manager for large-scale computers, and R. E. Steele of Marketing who is Executive Secretary of USE and principal Univac-USE liaison.

UNIVERSITY of North Carolina representatives, between conference sessions, informally exchange views with Carl Brose of Univac Marketing, New York.

SOFTWARE SESSION ON 1107—Norman Viss of the University of Notre Dame is shown delivering one of the presentations during this session.

Executives IN THE NEWS

International Business Machines Corporation announced recently the appointment of Richard M. Wight as director of communications for the company. He succeeds John R. Opel who has become assistant to T. V. Learson, IBM Vice President and Group Executive.

Mr. Wight's responsibilities in his new corporate staff position will include public information, employee communications, and corporate advertising and promotion. He formerly was assistant to the director of communications and has been associated with IBM since 1955.

Mr. Opel joined IBM in 1949. He held several marketing and management positions prior to taking his most recent position in early 1961.

* * * * *

Richard M. Wight **George W. Price**

George W. Price, manager of the Burroughs Corporation tax department since 1960, has been appointed director of tax affairs, Harry G. Bowles, Burroughs Vice President and Controller, announced recently.

With Burroughs since 1951, Price joined the business machines firm when it acquired the former Control Instrument Company of New York, of which he was Vice President and Treasurer.

Price has a broad background in tax matters confronting a company with extensive international operations. He is active in federal, state and local tax committees of the Detroit Board of Commerce and is widely recognized as an expert in national and international tax areas.

He is a graduate of Albion College, Albion, Michigan, and is commissioned a certified public accountant in both New York and Illinois.

* * * * *

Appointment of veteran financial executive James B. McCormick to the newly created position of Vice President and Treasurer was announced by H. Russell Smith, President of Avery Adhesive Products, Inc., San Marino, Calif.

Smith said the appointment reflects expanding operations of the pressure-sensitive adhesive products firm which has manufacturing facilities at Monrovia, Calif.; New Brunswick, N. J.; Painesville and Cleveland, O.; Rexdale, Ontario, Canada; and Leiden, Holland.

Prior to joining Avery, McCormick was associated with the Dole Corporation, Honolulu, Hawaii, for 15 years, most recently as Vice President and Treasurer. He also served in financial capacities with Standard Oil Company of California.

Agraduate of Stanford University, McCormick received his MBA from the Stanford Graduate School of Business.

* * * * *

The appointment of Kenneth E. Myers as Controller and Assistant Treasurer of Burroughs Finance Corporation, finance subsidiary of Burroughs Corporation, has been announced by Harry G. Bowles, Vice President and Controller of the parent company.

In addition, Myers will have added duties as Controller and Assistant Treasurer of Burroughs Control Corporation, another subsidiary of the business equipment firm.

Myers joined the Burroughs international division economic and financial analysis department in 1957. Since October, 1960, he has been assigned to the corporate financial analysis department.

A graduate of the University of Michigan, Myers also has a master's degree in business administration from U of M.

* * * * *

Robert W. Bemer, one of the computer industry's leaders in the realm of software development, has been named Director of Systems Programming for

Kenneth E. Myers **Robert W. Bemer**

the Univac Division of Sperry Rand Corporation, according to an announcement recently by W. R. Lonergan, Director of Product Planning and Systems Programming.

Mr. Bemer will be responsible for the development of major programming packages for all Univac systems. Managers of Univac Programming Departments in Whitpain Township, Pennsylvania; New York, N. Y.; and St. Paul, Minn., will report directly to Mr. Bemer.

* * * * *

Samuel J. Wiegand has been appointed to the new position of manager of service engineering for the Federal Systems Marketing Department of Minneapolis-Honeywell's Electronic Data Processing Division.

He had been a member of the Division's executive staff and Associate Director of product development.

* * * * *

Samuel J. Wiegand **Robert R. Johnson**

Robert R. Johnson has been named Manager of Employee and Community Information for The Standard Register Company, in an announcement by Loren F. Minnick, Assistant Corporate Director, Employee Relations.

Johnson will be responsible for corporate communications programs including the editing of all corporate employee publications and the origination of communications material for company-wide plant campaigns and employee activities.

* * * * *

— Continued on Page 64

The six new model radios added to the existing ITT line are all-transistorized portable units. They range from a pocket-size 6-transistor radio to a portable 10-transistor AM-FM receiver, one of the smallest such receivers on the market.

The high-quality wire products, to be available through the ITT division's industrial distributors from ITT's Surprenant Manufacturing Company, include such popular hookup wire as Mil W 16878, Mil W 76, Mil W 5086, and miniature Teflon coaxial cables per Mil C 17. The home entertainment receiving tubes comprise a range of the most popular varieties.

NEW ALUMINUM SECRETARIAL CHAIR NOW BEING MARKETED BY GLOBE-WERNICKE

A new aluminum secretarial posture chair, called the "Norwood," has been introduced by The Globe-Wernicke Co., Cincinnati, Ohio, manufacturer of office equipment and systems.

According to Morris H. Wansky, Vice President, Chair Sales, the "Norwood' is a high quality chair — yet is competitive in price with quality steel seating of the same. type.

It offers all the beauty and utility of brushed finish aluminum, along with the comfort of two-inch virgin foam rubber on the seat. Five posture adjustments enable the secretary to accommodate the chair to her personal requirements.

The "Norwood" also features flexible rubber back suspension, a label holder identification plate, and ball bearing casters. It is available with seat and backrest in a variety of materials.

Further information on the Globe-Wernicke "Norwood" (SP-111) posture chair, can be obtained from The Globe-Wernicke Co., Norwood, Cincinnati 12, Ohio.

NEW MONEY SAFES BY MOSLER

A new line of burglary-resistive money safes has been introduced by The Mosler Safe Company to provide maximum cash protection for supermarkets, chain

stores and other commercial establishments.

Designed to block the newest methods of attack used by today's burglars, the Mosler units have built-in checks against the latest tools and equipment. The safes are built to withstand attack by torches, explosives, hole saws, cut-off wheels, carbide drills, and other types of modern penetrating tools.

In addition, the Group 1R combination lock is radiological-proof, manipulation-resistant, and UL approved.

NEW HARDENED AND KNURLED CUTTERS NOW STANDARD ON SHREDMASTER SECRO-MAT 12 PAPER SHREDDER

The Shredmaster Corporation, is now making new specially hardened and knurled alloy steel cutters standerd at no extra cost on its Secro-Mat 12 model paper shredder. The new hardened cutters make it unnecessary to remove paper clips and staples from material before shredding while the knurled feature provides absolutely positive feed eliminating

danger of slippage or clogging when plastic Addressograph plates or credit cards or carbon paper is destroyed.

The Secro-Mat 12 Shredmaster is an attractive floor model paper shredder that quickly, safely, quietly and completely destroys documents, IBM cards, ledger cards, checks, certificates, coupons, statements and other confidential or obsolete material. The unit is totally enclosed in its own finely styled cabinet complete with waste bin. It stands 36" high and may be rolled easily where needed on casters which have a special locking feature to hold the unit motionless while it is in use. Shreds fall cleanly without litter or dust into the removable waste bin which has its own rollers for easy removal and disposal of waste Cover of the unit lifts off for easy servicing, and an automatic safety interlock cuts power off when the cover is raised. Electric circuits are completely grounded for safety. A three-pronged plug with adaptor is furnished for grounding at the outlet. Unique and exclusive throat construction affords complete safety to the operator. Throat is 12" wide and slopes downward for effective gravity feed. The Shredmaster Secro-Mat 12 can destroy up to 225 lbs. of material per hour and is guaranteed for one full year.

For additional information, contact The Shredmaster Corporation, 384 Woodcleft Avenue, Freeport, L. I., N. Y.

Research and Information Services for Management

AMERICAN DATA PROCESSING INC.
Formerly Bills Associates Inc.
22nd FLOOR BOOK TOWER • DETROIT 26, MICHIGAN • WOodward 2-8040

May 24, 1962

MAY 28 1962

Mr. Robert W. Bemer
Director of System Programming
Univac Division
Sperry Rand Corporation
315 Park Avenue, South
New York 10, New York

Dear Bob:

Congratulations on your new appointment as Director of Systems Programming for the Univac Division of Sperry Rand Corporation.

Your past accomplishments in this field have been outstanding and as a former associate of Univac I join the many who are congratulating Univac Division for its recent notable acquisition.

Cordially,

Alan D. Meacham

Alan D. Meacham
Editor

ADM/ng

people IN DATAMATION

■ Robert W. Bemer has been named Director of Systems Programming for the UNIVAC Division of Sperry Rand and will be responsible for the development of major programming packages for all UNIVAC systems. Previously, he had been with IBM as Manager of Programming Systems Development; Manager of Corporate Logical Systems Standards; and Director of Programming Standards, his most recent position before joining UNIVAC. Prior to his affiliation with IBM, he was Manager of Mathematical Analysis for the Missile and Space Division of Lockheed. He had also been associated with the RAND Corp. and Marquardt Aircraft Co. Bemer represents the U.S. on the Terminology Committee of the International Federation for Information Processing (IFIP).

■ Jack Strong of C-E-I-R, Los Angeles, and formerly of North American Aviation has resigned to join Computer Sciences Corp. as assistant to the president. Prior to C-E-I-R's recent cancellation of STRETCH Strong was director of this project and instrumental in encouraging the cancellation.

■ Dr. Louis Robinson has been named manager of the IBM Data Processing Division's Application and Systems Programming Department White Plains, N.Y. He will be responsible for coordinating development and marketing of computer languages and applications programs.

■ R. J. Mindlin, director of the Banks and Financial Systems Section of National Cash Register's Product Planning Department, has been named chairman of the International Standard Committee for Character Recognition.

Apologies!

In DATAMATION's April Business & Science column, it was incorrectly reported that Charles M. Edwards had departed as Bendix Computer's general manager. A correct report appeared in the March issue (page 119) in which Edwards was listed as having been promoted to general manager while Charles W. Horrell resigned from Bendix to join UNIVAC.

AMERICAN DATA PROCESSING INC.

1616 FLOOR BOOK TOWER - DETROIT 26, MICHIGAN

May 24, 1962

Mr. Gordon Smith
Univac Division
Sperry Rand Corporation
315 Park Avenue, South
New York 10, New York

Dear Gordon:

Congratulations on acquiring one of the most outstanding men in the computer industry to head Univac Systems Programming operations. Bob Bemer is tops.

Please extend my heartiest congratulations to the people responsible in your organization for this smart move.

It restores my faith somewhat in the future for the Univac Division.

Kindest personal regards.

Cordially,

Alan

Alan D. Meacham
Editor

ADM/ng

REMINGTON RAND
UNIVAC
DIVISION OF SPERRY RAND CORP.
315 PARK AVENUE SOUTH
NEW YORK 10, N.Y. SPRING 7-8000

NEWS RELEASE

In Systems Programming Post

Robert W. Bemer has joined the Univac Division as Director of Systems Programming, according to an announcement by W. R. Lonergan, Director, Systems Programming and Product Planning.

R. W. Bemer

Mr. Bemer brings to the Division more than thirteen years of experience in the programming field.

With IBM for the past six and a half years, he has held a number of management positions, including Manager of Programming Systems and Director of Programming Standards. Prior to joining IBM he spent two years with Lockheed as Manager of Mathematical Analysis for the Missile and Space Division. He has had about five additional years of programming experience in the computing field with the Rand Corporation, Marquardt Aircraft and Lockheed.

Mr. Bemer is a graduate of Albion College and a member of ACM, AIEE, the British Computer Society, AFIPS and IFIP. He is the techniques editor of the Communications of the ACM and will be chairman of the IFIP Congress Symposium on Programming Languages to be held in Munich. He has many publications in the computer field to his credit.

ROBERT W. BEMER, NOTED AUTHORITY ON COMPUTER SOFTWARE,

BECOMES DIRECTOR OF SYSTEMS PROGRAMMING FOR UNIVAC

NEW YORK, N. Y., May 23, 1962. . .Robert W. Bemer, one of the computer industry's leaders in the realm of software development, has been named Director of Systems Programming for the UNIVAC Division of Sperry Rand Corporation, according to an announcement today by W. R. Lonergan, Director of Product Planning and Systems Programming.

Mr. Bemer will be responsible for the development of major programming packages for all UNIVAC systems. Managers of UNIVAC Programming Departments in Whitpain Township, Pennsylvania; New York, N. Y.; and St. Paul, Minn., will report directly to Mr. Bemer.

During the six and a half years prior to assuming his new post with UNIVAC, Mr. Bemer had been progressively: Manager of Programming Systems Development, Manager of Corporate Logical Systems Standards, and Director of Programming Standards for International Business Machines Corporation.

MORE-

REMINGTON RAND
UNIVAC
DIVISION OF SPERRY RAND CORP.
315 PARK AVENUE SOUTH
NEW YORK 10, N.Y. SPRING 7-8000

NEWS RELEASE

FOR RELEASE: NOON, MAY 23, 1962

ROBERT W. BEMER, NOTED AUTHORITY ON COMPUTER SOFTWARE,
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M O R E -

Before joining IBM, he was Manager of Mathematical Analysis for the Missile and Space Division of Lockheed. Earlier programming experience included assignments with the RAND Corporation and Marquardt Aircraft Company.

In September, 1960, Mr. Bemer delivered the principal address before the annual meeting of the British Computer Society, the first time that this honor was conferred on an American. As "National Lecturer" for the Association for Computing Machinery, he participated in a one-week tour of principal United States cities with four distinguished co-speakers. He will be Chairman of the IFIP Congress Symposium on Programming Languages, to be held in Munich, Germany, this September.

Mr. Bemer is Techniques Editor of the Communications of the ACM and is a member of the Association for Computing Machinery, American Institute of Electrical Engineers, the British Computer Society, and represents the United States on the Terminology Committee of IFIP (International Federation of Information Processing). He is a graduate of Albion College.

# # #

For further information: Harry D. Wulforst, UNIVAC Division of Sperry Rand
315 Park Avenue South, New York 10, New York
SPring 7-8000, Ext. 256

RELEASE NO. 562 - 189

Lonergan Director of New Systems Programming, Product Planning Dept.

Establishment of a new department within the Division — the Systems Programming and Product Planning Department — was announced last month by J. W. Schnackel, Vice President and General Manager of the Division. William R. Lonergan was promoted to the post of Director of the new Department.

Dr. W. W. Leutert, formerly Director-Systems Programming, resigned from the company last month.

All personnel of the former systems Programming Department, as well as all Marketing Department personnel formerly in Product Planning and Applied Programming, have been transferred to the new Department headed by Mr. Lonergan.

Mr. Lonergan joined the company a year ago from the Burroughs Corporation where he had held management positions in engineering, marketing and product planning. During the past year he has been Manager, Product Planning and Applied Programming in the Marketing Department. He holds Bachelors and Masters Degrees from the University of Pennsylvania where his major areas of study were engineering and accounting.

W. R. Lonergan

13 February 1962

MEMORANDUM TO: Dr. G. L. Tucker

SUBJECT: Multiple Purpose Programming Processors

I support fully the principles (proposed to you by Mr. F. A. Williams and others) for the fabrication of processors that will accept and translate a multiplicity of source languages. The transformation of source language statements in ALGOL, FORTRAN, COBOL, etc. to various tables of flow precedence, operands, arithmetic processes, operator hierarchy, etc. is well within the present state of the art. So also is the transformation of these tables to machine language instructions through direct generation and use of pre-packaged subroutines. These statements may be supported by:

1. ALGOL, FORTRAN, COBOL, are all Chomsky phrase-structure grammars of type 2. As such, there are existing transformations to state diagrams, Backus normal form, flow charts, etc.

2. There are phrase-structure compilers in existence today which can first accept the definition of the syntax and semantics and then adjust the processor to accept programs in this language (see Brooker & Morris, JACM 9 #1, January 1962 - also, Irons, CACM 3 #1. Many additional references are available as may be required)

3. See page 133 of the attachment

4. Recent work by Ross & Ingerman has indicated the extreme simplicity of initial scans - For example, an algorithm of Ross', which depends upon a linear operator hierarchy, utilizes less than ninety 709 commands. It seems feasible to obtain more efficiency in object programs when they are directly generated by use of ranking tables of combinations of operators, rather than single operators.

5. It would also be feasible to accept assembly language as a nearly degenerate case of the above.

Apart from the efficiency of the object program, there are efficiencies pertaining to both creation of the processor and the translation of source programs to object programs. The latter, in my opinion, would be higher for direct generation of the phrase-structure type (and therefore more desirable) than a processor which goes through the intermediate assembly language phase. As for the former, I cannot conceive that the additional work required for a single processor to accept multiple languages, rather than single languages, would exceed 25%. In fact, the additional work might even be negative compared to other IBM efforts; this might acrue from a cleaner design. Adapting the processor for other languages should than not exceed an additional 25% for each additional language. It might be recalled that I advocated this technique two years ago for COBOL and Commercial Translator processors.

It would also be useful to get the opinion of Julien Green in light of his experience with XTRAN. In general, as far as I have been able to ascertain, the fastest translators in existence today are those which use this phrase-structure technique. Without exception, they have been created with much less effort. For example, Brooker created a basic FORTRAN for Atlas in three man-months.

RWB:l

R. W. Bemer

BUSINESS WEEK

January 20, 1962

Fifty cents

A McGraw-Hill Publication

Executive suite with a bullpen look

[Management]

Below: Hanna Mining Co. emerges under Pres. W. A. Marting as the largest independent producer and seller of iron ore [page 64]

Saw cures its shakes

Balanced-piston engine eases vibration; chain can sharpen itself while in use

The man in the picture is demonstrating not one but two new products: a chain saw that can sharpen itself while in use, and a 9-lb., balanced-piston engine. Combined in the BP-1 model just announced by Los Angeles' McCulloch Corp., they make a power saw that weighs only 15 lb. and is free from the heavy vibration of most engine-powered chain saws.

The self-sharpening feature is provided by a built-in emery wheel that the saw operator can activate by a pushbutton without stopping work. In older models, the chain is removed for sharpening—and frequently goes away to an expert—with considerable waste of energy and loss of time.

The engine effects its saving in weight and vibration by its lightweight materials and its balanced-piston arrangement, with one powered piston in the single cylinder balanced by another that is not powered. In the conventional 2-cycle engine, with either a single piston or with two or more pistons working in opposition to each other, there is heavy vibration that is hard on the saw and makes it difficult to handle.

Early work. The balanced-piston principle was first tried in Europe in the 1930s for motorcycle engines. But it was shelved, probably because of lack of suitable materials. With the postwar advent of lightweight materials and the techniques for working them, McCulloch returned to experimenting with balanced pistons. The result is the engine for the BP-1, which delivers 4.2 hp. at 10,000 rpm. that compares with last year's conventional McCulloch chain saw engine, which delivered 5.5 hp. at 7,000 rpm., but which weighed 21 lb. including the saw. BP-1, according to McCulloch, has the highest power-to-weight ratio ever achieved in a gasoline-powered saw. The cost, incidentally, is around $300, roughly the same as the older model. Production of BP-1 won't reach full volume until next year. The saw is available in limited runs until then.

McCulloch Corp. claims its new chain saw has highest power-to-weight ratio.

Lightness and absence of vibration aren't the only advantages claimed for the new model. McCulloch says the balanced piston serves as a valve to regulate fuel intake and as a compressor for charging the combustion chamber with fuel, thus gaining power. The fuel-and-air mix is injected into the engine in much the same way as in some of the latest automobiles.

McCulloch predicts that the new engine design will eventually be adopted for racing karts [BW Sep. 12'59,p74], small generating plants, lightweight power sources for various tools, and pumps, and a number of other outdoor applications.

Aircraft engine. At the same time, McCulloch announced it is working on a small 2-cycle, 4-cylinder engine for light aircraft. When this graduates from the development stage, it is expected to weigh 115 lb. and deliver 80 hp. at 4,100 rpm.

The McCulloch company was started in 1948, producing chain saws. Eight years later it acquired its Scott Div., which makes outboard motors and boats. Other products—the company now has $65-million annual sales—include engines for drone aircraft and karts. **End**

Young team wins a COBOL race

COBOL-61—Common Business Oriented Language—is a simpler way to communicate with computers so all the computer makers are rushing to use it

Young IBM team that wrote the first full checked out COBOL-61 compiler includes (left to right) Samuel V. Codella; Thomas J. Worosz, Jr.; Leo R. O'Leary; and Paul Pecukonis. The fifth member, Frank M. Quigley, is not shown.

Operational version of COBOL, a common business-oriented computer language, is demonstrated to Charles A. Phillips (left) of the office of the Secretary of Defense, by IBM's Earl Wheeler, who managed and wrote the program.

The computer industry isn't old enough to be particularly set in its ways. Yet a fresh eye and a set of new tools occasionally can startle the digits out of the business.

Last week, a team of five neophyte computer programmers (pictures) from International Business Machines Corp.'s General Products Div. at Endicott, N. Y., did just that. They sent a reel of magnetic tape to IBM's New York Data Processing Center that won for IBM an industrywide race, and surprised not only outsiders but IBM itself.

Their feat was the first fully checked out COBOL-61 compiler to be submitted to the Defense Dept. by a computer manufacturer—IBM in this case. COBOL, which stands for Common Business Oriented Language, is a sort of basic business English used to communicate with computers and put them to work [BW Sep.23'61,p70].

Simplification. Given COBOL instructions, a properly prepared computer automatically will set itself to tackle computations. Without such automatic programming, the computer has to be set up—using long strings of numbers and symbols incomprehensible to anyone but a computer programmer familiar with the foibles of the specific computer.

With the English-like notation of COBOL, fewer instructions are necessary, and they are easier for nonexperts to follow. And, eventually, COBOL instructions will operate almost every computer made.

Standard method. Devising a system so that each computer can understand COBOL is anything but simple. Programmers have to write a huge master program for each kind of computer, to enable it to understand COBOL. Virtually every computer manufacturer has teams of programmers working on COBOL projects. They almost have to.

The Defense Dept., worried by the Tower of Babel that was building up in the specialized world of computer programming, has put the industry on notice that it will not purchase equipment incapable of using

COBOL automatic programming. That's powerful pressure for standardization, since the Defense Dept. is the largest single customer for data processing equipment.

Revised versions. To assure a fair shake for computer makers and users alike, the Defense Dept. set up a group called CODASYL—Conference on Data Systems Languages—under the chairmanship of Charles A. Phillips of the Office of the Assistant Secretary of Defense. CODASYL is open to interested manufacturers and large users of data systems.

The first version of COBOL, known as COBOL-60, was published two years ago. A revised version, published last June, is called COBOL-61. While five types of computers—notably RCA's 501 and Remington Rand's UNIVAC—have COBOL compilers operating, a tremendous race has developed to get the revised, and more final, version into the hands of the government and commercial customers.

Young team. The first computer to cross the line came as a complete surprise to industry, the Defense Dept., and to some degree to IBM itself. It was the IBM 1410—a relatively obscure member of the big IBM family.

The young programming team that turned the compiler trick is even more obscure. The old man on the job is James H. Frame, 33, manager of IBM's processing systems group in Endicott. Earl F. Wheeler, 28, managed the team of five men whose ages range from 23 to 32. Wheeler's group wrote the program itself.

None of the five had much computer programming experience prior to June, 1960. In fact, according to Robert W. Bemer, who, as director of programming standards, coordinates IBM's programming efforts with outside agencies, the youthful group was chosen specifically to see whether people without preconceptions about computer programming could be trained to use a new method IBM developed to write automatic computer programs.

The five are an odd mixture. One has a degree in speech, one in sociology, two in engineering, the fifth in pure science.

Computer language. The method the men used to write the complex computer program in record time is significant to the whole computer industry and to its customers as well.

Bemer says "For a long time it has been standard practice to use computers to design new computers, so it seemed quite logical to use a shortcut automatic programming technique to develop a new automatic computer program."

Schedule for development of COBOL-61 compilers

Company	Model of equipment	Target date for compiler
Bendix Computer Div.	G-20	This year
Burroughs Corp.	B-5000	Fourth quarter
Control Data Corp.	CDC-1604	February
	CDC-924	February
Ferranti, Ltd.	Atlas	Not yet established
General Electric Co.	GE-225*	September
	GE-304B	February [with NCR]
International Business Machines Corp.	705-II	January
	705-III/7080	January
	709/7090/7094	Fourth quarter
	7070/7074	February
	7040/7044	Third quarter 1963
	1410	Now available
	1401 [12,-16,000 memory]	May
	1401 [4,-8,000 memory]	August
International Computers & Tabulators, Ltd.	ICT-1301	This year
Minneapolis-Honeywell Regulator Co.	MH-400	Fourth quarter
	MH-800	1963
National Cash Register Co.	NCR-315-Tapes	February
	NCR-315-CRAM	May
[joint implementation with General Electric]	NCR-304A	February
	NCR-304B	February
Philco Corp.	2000 series	October
Radio Corp. of America	RCA-301	July
	RCA-601	December
	RCA-501*	
Remington Rand UNIVAC	UNIVAC II*	First quarter
	Solid State*	First quarter
		Second quarter
	UNIVAC III	Third quarter
	UNIVAC 1107	Third quarter
	UNIVAC 490	
Sylvania Electronic Systems Data Systems Operations	9400	First quarter
	MOBIDIC	May

*COBOL-60 compilers now available.

Data: Dept. of Defense, Business Week

Instead of teaching the group to program a computer in the numbers and symbols of computer machine language, IBM taught them right off a still different kind of automatic programming language called XTRAN. XTRAN is a computer language that is capable of talking about languages and logic instead of about business or scientific problems.

With their knowledge of XTRAN, the group put together the complex COBOL-61 master program for the 1410 computer. IBM's Bemer is happy about the outcome, admits that it was an experiment stimulated half by conviction that a new approach to program writing would work, half by the problem of just not having enough experienced programmers to develop, simultaneously, automatic programming in COBOL for all of the IBM computers.

Results. The experiment worked better than anyone had expected. The young team not only whipped the competition, but beat some of the veterans inside their own company—

experienced programmers who are working on COBOL compilers for the bigger IBM computers.

The result is that more attention will be focused on the mysterious XTRAN that automatically programs automatic programming systems. If a young, inexperienced group can whip out a COBOL compiler in six months, the same men could make up a special automatic programming system for a business in record time, too.

It could mean, says Bemer, that it ultimately will be possible to create special automatic computer programming techniques built around individual company requirements and word usage. That would make it even easier for management to understand what computers are doing with the figures.

Catch-up work. Meanwhile, a startled computer industry is working overtime to get other COBOL computers out as quickly as possible. The latest status report of COBOL-61 is in the chart on page 61. With COBOL so well under way, and with the prospect that soon all government computers will be able to use the same programs, Phillips—who has headed the COBOL program since its beginning—is changing jobs. He'll switch from the Defense Dept. to Business Equipment Manufacturers' Assn., where he'll continue working toward standardization of computer programming techniques.

Ford using computer to analyze designs

Ford Motor Co. designers are using a Remington Rand Univac computer to evaluate new chassis and suspension designs.

Previously, to analyze a typical design, Ford engineers drew up the proposed system, which took one to three weeks, and then performed a tedious, step-by-step mathematical analysis. Even at this, they restricted their study to "stable conditions"—where the car simply turned a circle. A minor change in design demanded a whole new drawing.

Now, with the computer, Ford has done away with the drawings and manual figuring and is evaluating designs under various assumptions as to road conditions—and in less than a day. More than 100 design factors, plus such factors as wind and road condition, are cranked into the computer for each design being considered. The computer then comes up with an evaluation. **End**

Dr. B. Gilchrist Promoted In Syst. Engineering Area

Dr. Bruce Gilchrist has been promoted to director of systems engineering technology, reporting to W. J. Lawless, IBM director of systems and application engineering.

Dr. Gilchrist joined IBM in 1959 at the Thomas J. Watson Research Center as manager of programming and computer usage, his former position. He will continue to be located at the Research Center.

He received a B.S. in mathematics and a Ph.D. in meteorology from the University of London. A member of a number of technical and scientific associations, Dr. Gilchrist has served as secretary of the Association for Computing Machinery, is vice president this year of the IBM Westchester branch of RESA, an honorary research society, and currently is director of the American Federation of Information Processing Societies.

Daughter of CHQ IBMer In White House Performance

Miss Margaret Phillips, daughter of Mrs. Sally Phillips, CHQ Cafeteria cashier, was one of seven actors representing the American Shakespeare Festival at Stratford, Conn., who gave performances at The White House recently.

The program—consisting of selections from Henry V, Macbeth, As You Like It, Troilus and Cressida, and the Tempest — was witnessed by an audience headed by President and Mrs. John F. Kennedy and their honor guest, President Ibrahim Abboud of the Sudan.

Miss Phillips, who at The White House played Lady Macbeth in the regicide scene from that play, also was with The Shakespeare Festival all of last season. She previously played important roles in several Broadway productions.

Personnel Assignments

James F. Benton to contract representative, CHQ, reporting to licensing manager—commercial, Contract Relations Department, Commercial Development Staff, from sales-supervisor, Chicago Downtown. Joined IBM 1956.

▪

Price M. Corney to senior accountant, Components Division HQ, Poughkeepsie, from accountant, Corporate Accounting Department, CHQ. Joined IBM 1959.

▪

Stuart L. Coyne to management communications associate, Management Communications, corporate, from senior writer on staff of *Business Machines.* Joined IBM 1955.

▪

Julius Jancin Jr. to patent operations manager, Washington, reporting to manager, domestic patent operations, corporate, from patent staff attorney, Office of Director of Patents, CHQ. Joined IBM 1947.

▪

John M. Kinn Jr. to manager, scientific information, corporate, to be located in Yorktown, from associate editor, *IBM Journal of Research and Development,* CHQ. Joined IBM 1959.

▪

Samuel B. Korin to manager, manufacturing equipment development, reporting to director of Manufacturing Research, corporate, from administrative assistant, same area. Joined IBM 1953.

▪

Edward G. Meade to clerical supervisor, Stockholder Records, corporate, from senior clerk, Stockholder Relations. Joined IBM 1956.

▪

Martin T. Mobach to manager, work measurement, CHQ, reporting to director of industrial engineering, Manufacturing Services Staff, from administrative assistant, same area. Joined IBM 1959.

▪

Harvey S. Turner to associate editor, *Business Machines,* from assistant for planning, CHQ Internal Publications Department. Joined IBM 1959.

R. W. Bemer Is Director, Programming Standards

Robert W. Bemer, formerly manager of corporate logical systems standards, has been promoted to the new post of director of programming standards. He will report to W. E. Andrus Jr., group director of standards.

Mr. Bemer will be located in White Plains and will be responsible for IBM's participation in standardization activities with industry and national associations in the area of programming.

In 1955 he joined IBM at CHQ as assistant manager, programming research, and was promoted to manager, applied programming systems, Data Systems Division, in 1957. He advanced to his former post in May 1960.

Mr. Bemer received his B.A. degree in mathematics from Albion College. He is the author of published technical papers on character set codes and standards and is an editor of *Communications of the ACM,* Association for Computing Machinery.

Pres. A. L. Williams . . .

(Continued From Page 1)

treasurer in 1947, and vice president and treasurer in 1948.

In 1951 Mr. Williams was named to the IBM Board of Directors, elected IBM executive vice president in 1954, became a member of the IBM board's Executive and Finance Committee in 1956, and elected IBM president in May 1961.

Mr. Williams attended Beckley College and is a Certified Public Accountant.

An Interview With

M. J. Kami, IBM Director of Long Range Planning

(This is the second of a series of "interview" features covering the functions of IBM's various corporate departments, how they help solve problems, and their contributions to the progress of the company.)

Mr. Kami, how far into the future does long range planning extend?

Basically, our planning period covers five years ahead. Each spring the ten IBM divisions and subsidiaries present to the Corporate Management Committee formal plans that show their prospects for five years ahead. Emphasis is placed on what the division expects to accomplish within the five-year period to reach its goals. This often means looking six, seven, or more years into the future to be sure that product development, facilities, and manpower will be the right kind during the five-year period to meet the needs of the even longer-run future.

How did we organize our long range planning process and why?

In 1959 a long range planner was appointed in each division and subsidiary and a corporate department of Long Range Planning was established. The purpose was to stimulate and strengthen long range planning activities throughout the corporation. This was done by creating specific responsibility for long range planning coordination with a clearly defined organizational structure. We wanted and are gradually achieving a better integrated effort and a more precise spelling out of our needs and plans for the future.

How are the various facets of the business coordinated by long range planning?

Each divisional long range planner has the responsibility of coordinating the preparation of long range plans by each function of his division: marketing, customer engineering, product development, manufacturing, personnel, financial, etc. These plans are then integrated into a comprehensive divisional five-year plan. During this process the staff departments at the corporate level assist the planning activities of the divisions in their area of specialty. The long range planning department serves as over-all coordinator to integrate divisional plans into a total corporate picture.

How does long range planning contribute to the growth of the business?

Each division has established challenging growth and profit objectives within the framework of over-all corporate goals. As IBMers always set their sights high, often their initial plans do not meet the desired objectives. The divisions then re-examine all facets of their operation to set forth new and creative proposals which will bring the plans and objectives together. They re-evaluate their long range prospects in various markets, they review the capabilities of their personnel, and they re-align their technical and product development efforts. All of this is aimed at enhancing their ability to move faster in bringing their total resources to bear in the directions that are most promising for the future.

Michael J. Kami

How does long range planning improve decision making?

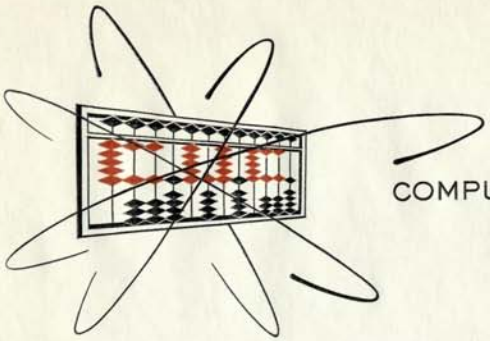
By giving the decision makers a framework and a perspective. Although the future can never be exactly predicted, long range plans provide the base against which the potential impact of short range decisions on future operations can be examined. In this way, decisions bearing on immediate needs are balanced with the long term requirements of the business. This process tends to channel decision making from expediency toward lasting long-run improvement of operations.

What is the most difficult problem of long range planning and what is being done to overcome it?

Precise measurement of our future market opportunities has always been among our most difficult problems. For this purpose we need accurate estimates of market potentials and accurate long range sales forecasts. Projecting the future will never be an exact science but we are making considerable progress. Corporate and divisional market research people are continually introducing new techniques of analysis and improving the accuracy of their forecasting methods. They are specifying and obtaining, in more detail than ever before, the necessary data for precise forecasting. Increasing use of data processing equipment in this area is also very encouraging.

How can IBMers individually contribute to long range planning?

Many individuals, who are not directly connected with the long range planning function, think that they cannot effectively contribute to this management process. This may not be so. Progressive planning requires many inputs of ideas, innovations and new ways of looking at the future. There are no organizational bounds on creativeness. Original ideas may come from any level and any department in the company. If an IBMer has suggestions of a long range nature he should spell them out and talk to his manager or use the IBM Suggestion Plan to bring them to the attention of the proper divisional or corporate long range planners.



COMPUTER USAGE COMPANY, INC.
18 EAST 41st STREET • NEW YORK 17, NEW YORK
MUrray Hill 9-7672

October 5, 1961

Mr. Robert A. Bemer
Director of Programming Standards
International Business Machines Corporation
White Plains, New York

Dear Bob,

Jill Kelly joins me in wishing you all the best in your new post. We are delighted to see a man of your caliber assigned to this sort of task.

Very truly yours,

Dorothy Walsh

(Miss) Dorothy Walsh
Assistant Director of Programming Systems

DW:nd

1825 CONNECTICUT AVENUE, N.W.
WASHINGTON 9, D.C.
NOrth 7-7225

6266 MANCHESTER AVENUE (AT SEPULVEDA)
LOS ANGELES 45, CALIFORNIA
ORchard 0-7246

IBM News Bulletin

August 23, 1961

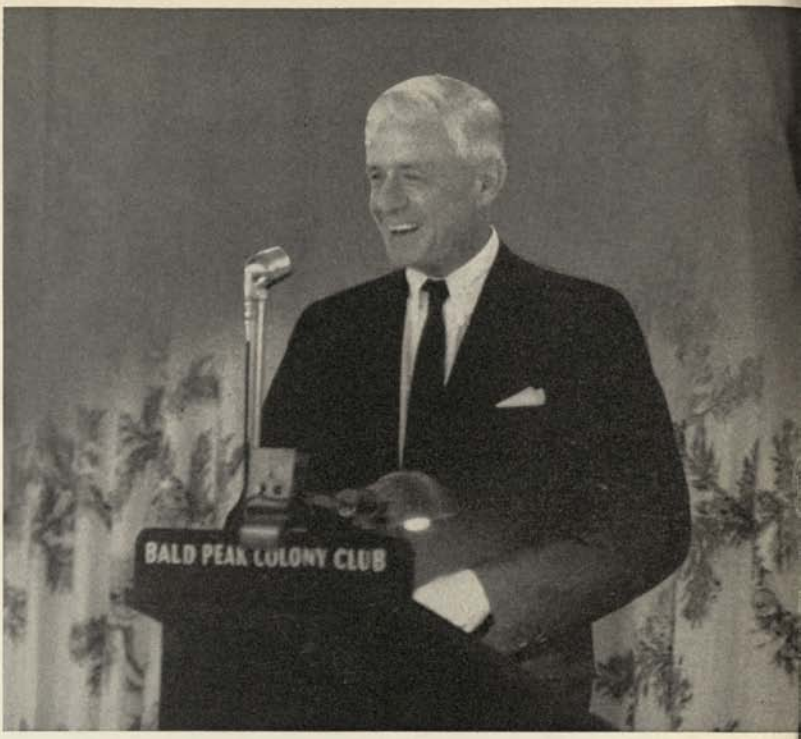
PROMOTED TO NEW POST

Robert W. Bemer, formerly manager of Corporate Logical Systems Standards, has been promoted to the new post of director of Programming Standards. Mr. Bemer will report to William E. Andrus Jr., who recently became group director of standards.

Located in White Plains, Mr. Bemer will be responsible for IBM participation in standardization activities with industry and national associations in the area of programming.

8/25

THE NATIONAL SCENE



"Two conferences are considered milestones in IBM's history. One was a sales conference held in the Twenties which established the whole sales orientation of IBM. You all know how successful that's been. The second was an engineering conference in the Forties which profoundly influenced our entire manufacturing effort. I have every confidence that this meeting will be as much a milestone as the other two." Thomas J. Watson Jr., chairman of the board, addressing the company's first major programming conference.

MILESTONE

Programmers' Conference

The hills of New England are familiar ground for historic occasions. Last month, at the Bald Peak Colony Club above the waters of New Hampshire's Lake Winnipesaukee, IBM held an historic meeting of its own—the first major programming conference ever held in the company.

W. J. Lawless Jr., IBM director of systems and application engineering, and Dr. D. Sayre, director of programming, systems and application engineering staff, laid down the objectives for the five-day conference. They were: to reconsider the total role of software* in the company's operations; to put software on a par with hardware in IBM's future plans, and to strengthen the entire programming effort in IBM.

T. V. Learson, IBM vice president and group executive, set the mood of the meeting in his keynote talk by stressing the need for feedback on all phases of programming in the company.

They took him at his word. The 115 attendees—including programming managers, programmers, design and systems engineers—split into seven workshops. They met in

(continued on next page)

Conference workshop discusses software. Workshop reports, presented to division executives, led to action plans with specific deadlines.

* *Software — Non-hardware elements of a data processing system, particularly programs such as compilers, assemblers, input/output control systems, utility programs and applications programs.*

Conference—(continued)

day and evening sessions and discussed:

- Programming as a profession at IBM.
- Programming research and advanced development.
- Systems planning of hardware-software systems.
- Software production techniques, including testing.
- Marketing, installation, maintenance of applied programming systems.
- Product line strategy with hardware-software systems.
- The structure and significance of applications programming in IBM.

After two days of workshop discussions, a number of executives from various areas of IBM concerned with programming activities joined in a general meeting. There, each workshop presented its final report.

In the final two days the workshop reports were reviewed by division managers and workshop chairmen.

The result: action plans with specific deadlines. These were some of the determined needs:

- Improved research and development in the programming field.
- Integration of software and hardware in the design of IBM products.
- Establishment of production control and product test procedures to insure the same delivery schedules and high standards of quality for software as for hardware.
- Integration of software and hardware efforts in dealing with customers.
- Complete integration of programming costs and goals in each unit's two-year plans.
- Improvement of the professional status of programming in IBM.
- Identification of the role application programming plays in the company's business plans.

Each division has appointed a coordinator to make sure its action plans are put into effect quickly and effectively. In addition, Dr. Sayre has been temporarily assigned to Mr. Learson's staff to serve as over-all coordinator for the line organizations in the implementation of the program.

In about 90 days, a further report on the status of the action plans will be made.

W. J. Lawless, Jr., IBM director of systems and application engineering, describes the conference's objectives. The 115 attendees split into workshops to carry these out.

Conference group listens to preliminary workshop reports. Members include J. C. McPherson, IBM vice president and director of Systems Research Institute (lower left.)

At the conference: T. V. Learson, IBM vice president and group executive, confers with F. T. Cary, IBM assistant director, corporate staff. Mr. Learson keynoted this meeting.

In The Nation And In The World:

Standards Are Set For Data Processing Industry

are established by the American Standards Association— a national clearing house for a whole spectrum of standards* which may be developed through ASA committees or voluntarily recommended by different organizations in the United States. But it is the ASA which systematically obtains approval for the standards and publishes them, seeking at all times to prevent conflicts and duplication of work.

Standardization is equally desirable in the data processing industry. For example, most computer manufacturers have developed different programming languages, but efforts are now being made to consolidate these. FORTRAN, a program which translates standard mathematical terminology into machine language, is a major step in this direction.

> ASA, which is composed of 123 trade associations and professional societies, has established standards in such areas as industrial safety, interchangeability of parts, terminology and definitions, performance standards, and standardization as it affects design and manufacture.

In January, 1960, the ASA formed a committee of major data processing manufacturers, users, and other interested groups to look into several areas of data processing, notably programming languages and communication between machines.

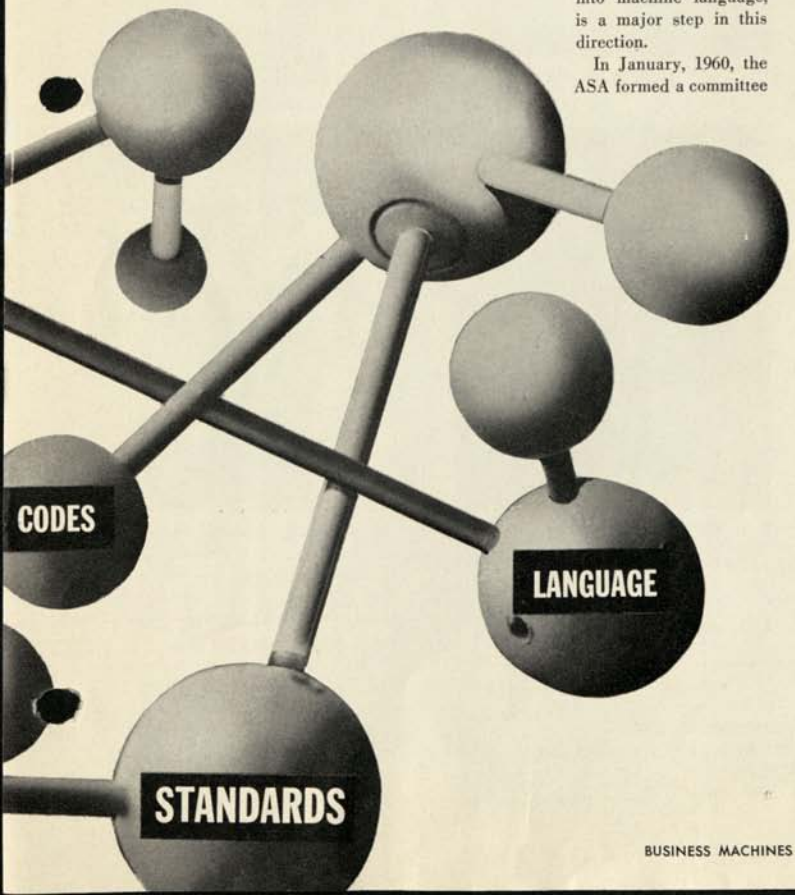
Getting computers to "talk" to each other will require a standard code of alphabetic letters, numbers and special symbols which can travel back and forth freely between all computer systems over existing transmission lines.

So important is the problem of data processing standards that the International Standards Organization — the world-wide body concerned with standards—has also started activity in this field. Nine countries are actively participating and 15 are observers. The United States, because of its leading position in this area, was asked to sponsor the ISO committee.

Several task groups of IBMers are lending their support to help get the work of the committee under way. Three men were sent to the committee's first organizational meeting in Geneva recently. Irv C. Liggett, director of systems standards at CHQ, and Robert W. Bemer, manager of corporate logical systems standards, reported on the progress of systems standards in programming, character codes, and input-output media. Dr. A. Barry Credle, ASDD manager of advanced technical development, (Westchester), represented U. S. interest in components and electrical characteristics.

In addition, the IBM World Trade Corporation is one of 18 founders of the newly-formed European Computer Manufacturers Association located in Geneva. Aim of the ECMA is to cooperate with the ISO and other standards organizations to enable European manufacturers to offer better products at less cost through standardization.

IBM, with its long experience in data processing systems and applications, is giving its full support to the solution of such industry problems through agreed-upon standardization.



* These standards are to be distinguished from the basic standards of dimension, mass and time which are developed by the National Bureau of Standards, a U. S. Government agency.

What Competition Is Doing . . .

MOTOROLA INC. AND GENERAL PRECISION INC. have formed a team to present a new approach to air traffic control. The system combines automatic communications and a new data processing air traffic control system.

GENERAL ELECTRIC CO., LTD., OF ENGLAND and THOMPSON RAMO WOOLDRIDGE, INC. have formed a new British company, International Systems Control, LTD. The new firm will manufacture and market industrial process control equipment.

WESTINGHOUSE ELECTRIC CORPORATION has announced a new industry systems department which will design, develop and sell complex process control systems.

The company also states it intends to market, by late 1962, a molecular block computer which will be 10% of the size and weight of a similar transistorized computer. Westinghouse expects it to be particularly useful in space and military applications.

BURROUGHS CORPORATION reports the opening of a permanent consultation center in Chicago for the financial industry's new electronic language—magnetic ink character recognition. The firm expects bankers from all parts of the country to visit the MICR center to investigate such financial applications as checking, savings, mortgage and installment loan accounting.

COMPAGNIE DES MACHINES BULL of France reports that negotiations are underway with an American firm for the marketing of Bull machines in the United States.

JONKER BUSINESS MACHINES, recently established in Gaithersburg, Maryland, expects to specialize in the development and manufacture of inexpensive information retrieval systems. The firm reports the current organization of a nation-wide network of offices to sell and service retrieval and data processing equipment.

RADIO CORPORATION OF AMERICA has reported the doubling of capacity at its Needham, Mass. EDP components manufacturing plant. The company states that increasing demands for complete memory systems and associated components are behind the move.

UNIVAC, DIVISION OF SPERRY RAND CORPORATION, recently announced plans to send a COBOL (Common Business Oriented Language) lecture team on a 12-city tour this summer. Purpose of the tour is to further acquaint customers and their field organization with use of the new computer technique.

PERSONNEL

Promoted to Director

R. W. Brown

NEW YORK, N. Y.—What is the job of the personnel staff within IBM? Richard W. Brown, recently promoted to the post of IBM director of personnel, defines it this way:

"The main responsibility of the personnel staff is to assist management in developing policies which are responsive to the balanced best interests of all employees.

"As the company grows, it is most important that each individual has maximum opportunity to develop and utilize his best talents. Our efforts will be pointed in this direction."

Mr. Brown and the personnel staff recommend personnel policies and give advice and counsel to the divisions. The divisions have overall responsibility for implementing these policies according to their specific needs.

After joining the IBM sales force in 1953, Mr. Brown was promoted to assistant branch manager of the Denver office, administrative assistant in the office of the president, and subsequently director of stockholder relations. He is a graduate of Stanford University and the Stanford Graduate School of Business.

T. J. Watson Jr., 2nd from left, was one of Syracuse Univ. honorary degree recipients.

DOCTORATE

T. J. Watson Jr. Honored

SYRACUSE, N. Y.—Thomas J. Watson Jr., IBM chairman of the board, has received an honorary Doctor of Laws Degree from Syracuse University.

In making the presentation, Chancellor William P. Tolley said, "In concern for medical and scientific research, higher education, international service, and personal family life, you have exemplified the highest ideals. We are delighted today to confer upon you our highest honor."

Among others to receive degrees were (see photo): Bishop W. R. Ward, Syracuse Methodist Church; Dr. T. H. Carroll, George Washington U.; Dr. G. N. Ray, Sec'y.-Gen., John Simon Guggenheim Memorial Foundation; S. L. Udall, Sec'y., Interior; H. C. Hirsch, Hirsch and Company, N. Y.

The people who talk with machines

By ROBERT O'BRIEN

AT THIS MOMENT, 30,000 young Americans are engaged in a fascinating occupation virtually unheard of ten years ago. They are implementing new ways of running business offices. They are tracking satellites and translating books. They are helping to solve hitherto unsolvable problems in engineering, physics, and chemistry. They are helping to regulate vast government inventories, forecast the weather, and chart flight paths of unidentified aircraft for our defense warning systems.

Some have only high school or technical school training. Some are college graduates. Their incomes swing widely from starting wages of about $5000 a year to a high of around $23,000. But all of them, regardless of background or income, have one thing in common: a job that is a call to high adventure.

These young men and women are electronic computer programmers—the people who talk with machines.

Less than ten years ago, digital computers were something akin to the flying machine in the days of the Wright brothers. No one could be quite sure whether these spaghetti-like tangles of wires and banks of brooding vacuum tubes really had a future. Today, they are sleek, transistorized monsters clicking busily away in air-conditioned chambers. Their tiny signal lights pulse mysteriously from compact control consoles. Their magnetic tape stations are ranged upright in vibrantly-colored metal cabinets.

Computers are incredibly complex, seemingly superhuman calculating machines. They add, multiply, subtract, divide, make rudimentary comparisons at speeds of less than a millionth of a second and print out results at the rate of six hundred lines a minute and more. In the time it takes to light a cigaret, they make calculations that would occupy the waking hours of a man with a desk calculator for two and a half months. They perform millions upon millions of such calculations easily, obediently, and perfectly. But without programmers, these electronic genii are useless arrangements of hardware, spaghetti-like tangles of wire and transistors—in the words of one expert, "immensely skillful but completely helpless boobies." To act, they must have instructions fed into them on punched cards, or paper, or magnetic tape. A set of these instructions controlling one problem, or machine "run," is called a program. The programmers are people who write the programs that tell computers what to do, and how to do it.

THE JOB demands two clear-cut qualifications: an analytical mind, and a regard for detail that borders on the obsessive. Just for example, let's endow a computer with human capabilities, and suppose that we wanted it to pass the bread. The simple instruction, "Pass the bread, please," would have no effect whatever. To make it do as we wanted, we'd have to spell out painstakingly each detailed step: "Extend right hand over table...Poise right hand above bread plate...Lower right hand to bread plate...Open right thumb and forefinger...Close them on plate...Lift plate...If person to right has no bread, swing plate to right...If person to right has bread, swing plate to left..." and so on.

But there are still other complications. Computers know nothing. Information must be stored inside them before they can follow a set of instructions. In our example, this would be a vocabulary of the words we were going to use, plus the combinations in which we would arrange them, plus the movements these combinations should activate.

Here's how a programmer might handle the problem. First, with pencil and paper, he would diagram the operation from start to finish, breaking it down into its logical sequence of steps. This would give him a detailed blueprint—programmers call it a "flow chart"—of every movement involved in the bread-passing procedure. This tells (a) the information the computer must have in storage before it can operate, and (b) the instructions it needs to produce the desired result. Programmers call stored information and instructions "input;" the result—answers, or whatever else a computer produces—is "output."

Once the flow chart was drawn, our programmer would compile a vocabulary for the computer, then translate it into the code language of letters, symbols, and numbers understood by our particular computer system. Perhaps verbs would be expressed by initial letters: "Extend" by "E," "Poise" by "P," "Lower" by "L," "Open" by "O," and so on. Nouns might be coded as numbers: "Right hand" as "1," "right thumb" as "2," "right forefinger" as "3." Let's say that "8" would mean "table," "9" would mean "bread plate," the symbol ":" would mean "to," and "-" would mean "and."

Having translated the words into code, the programmer would then give the vocabulary to a card-punch operator, whose machine, in turn, would reproduce these words as a deck of punched cards. Each perforation represents a bit of electronic machine information. When the cards are put through a converter, their bits are registered on magnetic tape. From this medium, information is fed directly into the computer's magnetic core memory.

In complicated programs, these steps can and do number into the tens of thousands. Our program might total only a dozen steps. When

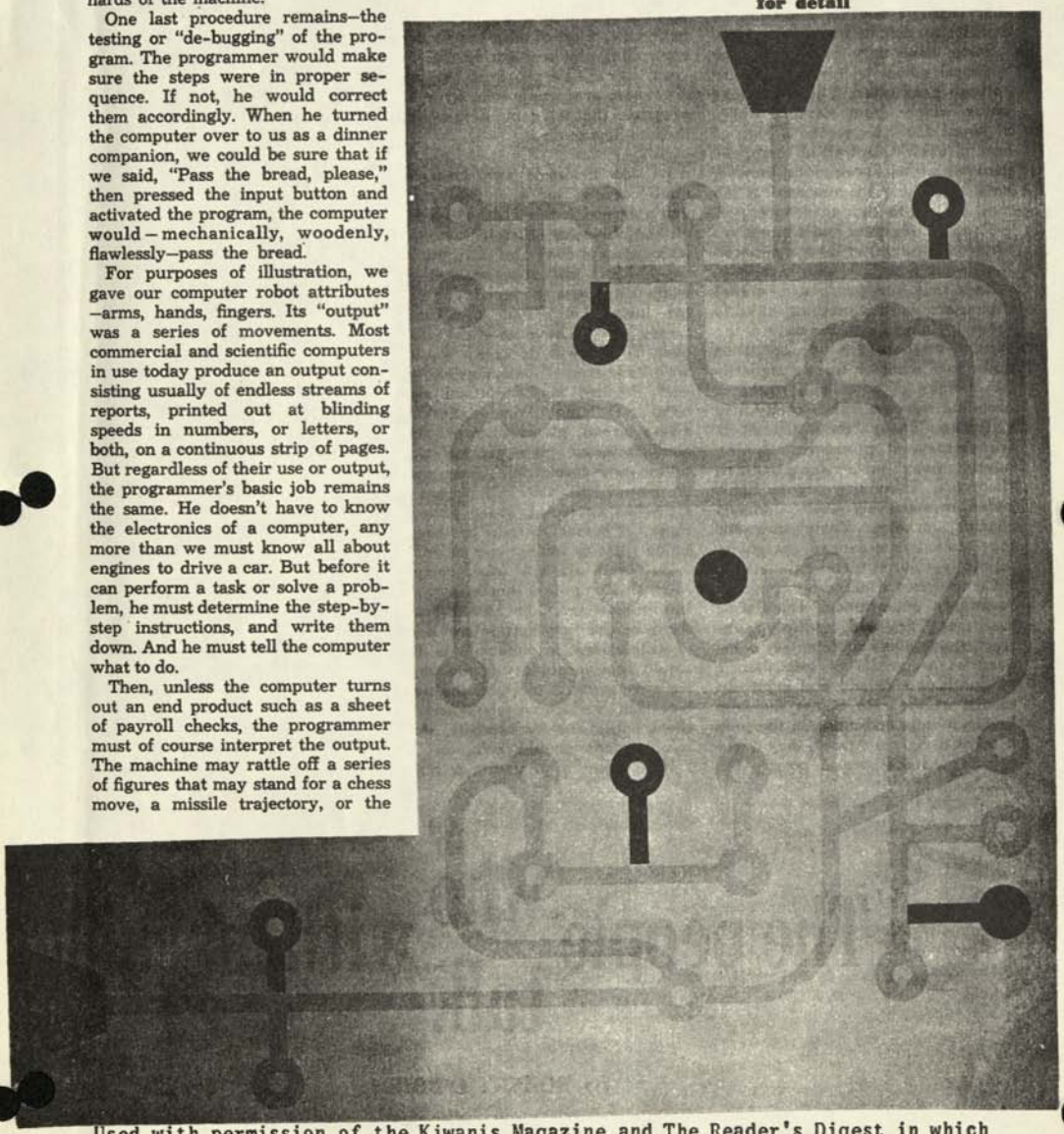
finished, the programmer would give the instructions to a card-punch operator, who would produce them in card form, just as he had the vocabulary. The cards might be used as direct input; or, like the stored information, their bits could be transferred to magnetic tape, then relayed off the tape into the processing innards of the machine.

One last procedure remains--the testing or "de-bugging" of the program. The programmer would make sure the steps were in proper sequence. If not, he would correct them accordingly. When he turned the computer over to us as a dinner companion, we could be sure that if we said, "Pass the bread, please," then pressed the input button and activated the program, the computer would – mechanically, woodenly, flawlessly--pass the bread.

For purposes of illustration, we gave our computer robot attributes --arms, hands, fingers. Its "output" was a series of movements. Most commercial and scientific computers in use today produce an output consisting usually of endless streams of reports, printed out at blinding speeds in numbers, or letters, or both, on a continuous strip of pages. But regardless of their use or output, the programmer's basic job remains the same. He doesn't have to know the electronics of a computer, any more than we must know all about engines to drive a car. But before it can perform a task or solve a problem, he must determine the step-by-step instructions, and write them down. And he must tell the computer what to do.

Then, unless the computer turns out an end product such as a sheet of payroll checks, the programmer must of course interpret the output. The machine may rattle off a series of figures that may stand for a chess move, a missile trajectory, or the

One of the new jobs not available a few years ago calls for people who can tell computers what to do. These computer programmers come from varied walks of life, but each possesses an analytical mind and a love for detail



Used with permission of the Kiwanis Magazine and The Reader's Digest in which a condensation appeared in June, 1961.

names of all the shoe factories in Pennsylvania; it's all the same to the computer.

Now the programmer must translate these numbers and letters into understandable terms, which may enable a shoe manufacturer to decide how many pairs of a certain type of shoe he can expect to sell under current market conditions, or help a weather forecaster to predict a hurricane's course during the next twenty-four hours.

No programmer today is bored with his job. On the contrary, like poets and pioneers, nearly all of them are brimming with enthusiasm, completely carried away by their work. Talking with these amazing machines is to them a thrilling experience. It unlocks doors never before opened. It promises new horizons, far beyond those in sight today.

A program, they say, is an exciting new form of self-expression, with elegance and form as lovely as a sonnet's. They study programming masterpieces as avidly as students of chess play over the classic games of Lasker and Alekhine. They even read programs aloud to each other. One young IBM programmer told me, "We wake up in the middle of the night and scribble down numbers. We should be in a special risk class for insurance, because even while crossing the street or driving a car, we can't keep our minds off our work. We eat and sleep programming."

WHAT'S THEIR background? Do they all hold graduate degrees in math, or physics? Not at all. Education is important, of course, as in all technical fields today—the more the better. But it's by no means imperative. The logical mind, the analytic aptitude, the patience and persistence, can turn up anywhere.

Not long ago, an East Coast steamship line computerized its bookkeeping. It gave standard IBM programming aptitude tests to all interested employees, many of whom were college graduates. The highest mark was scored by a brawny longshoreman with a high school education. He became one of the company's top programmers at a comfortable salary of $7000 a year.

As a rule, the more specialized a programmer wants to be, the higher training he needs. A recent survey by University of Southern California psychologists revealed that of a typical group of programmers working on scientific problems, all had high school diplomas; 58 per cent were college graduates, and 29 per cent had graduate training. Degrees most commonly held by programmers are in mathematics and engineering, but there's no set pattern. "In our New York computer center, we've got programmers with degrees in everything from Elizabethan literature to biology," an IBM executive told me. "Fine programmers can come from any good liberal arts background. If they've had some college math or logic, so much the better." Many college students are learning how to program before they graduate. Nearly one hundred colleges and universities operate campus computer centers and offer courses in their use.

IBM's Robert Bemer at 41 is one of the older generation of programmers. He majored in math at college, then, paradoxically, became a Hollywood movie set designer. To make ends meet during a studio strike, he took a programming-trainee job offered by the RAND Corporation. "It was love at first sight," Bemer says. That was twelve years ago. Today Bemer heads a group of programmers devising languages by means of which machines "can talk with machines"—languages that will facilitate the exchange of information by radio, microwave, or telephone wire, between computers at widely separated centers. "It's important, inspiring work," Bemer says. "I never want to do anything else."

At Remington Rand's New York computer service bureau, I met a pretty, 22-year-old blonde programmer who was graduated from college last year with a B.A. degree in English, and is married to a newspaperman. She's busy writing a program that will set the center's big Solid State 90 computer to rapping out projections of the 1965–66 sales of a national tire manufacturer. Are programming opportunities as bright for women as for men? "Absolutely," she says. "The knack for detail, the ability to work piecemeal on a problem while keeping the overall goal in mind—most girls who want careers are very good at this. If she has ability, a girl can get ahead in programming as fast as a man."

Furthermore, young married women who quit programming to have children can usually find well-paying jobs, on either a full- or part-time basis, when they're ready to return to work. Sometimes they can even write programs at home. One Remington Rand programmer left to have a baby before her last program was tested. Errors developed during the test runs. The project supervisor called her at the hospital. She wrote out new machine instructions from her bed in the maternity ward.

MOST programmers have a passion for puzzles and mathematical games. Many play chess, or its Japanese equivalent, Go. A surprising percentage is deeply dependent on music for release and relaxation. One programmer I talked with, a University of Pittsburgh graduate in English, made a living as a jazz pianist before going into programming. Bemer of IBM has mastered fifteen different musical instruments.

An attractive young lady programmer with a philosophy degree from Tufts is an accomplished artist on the clarinet. She's also an authority on medieval and Renaissance musical instruments, and is constructing a clavichord in her spare time. She works in a highly specialized branch of computer science called "character recognition logic"—the development of a machine system that will enable a computer to accept hand-printed instructions. Does she like programming? "I couldn't be happier. It's creative. It's filled with excitement. And it's work for the future. What we're doing will some day enable these machines to free Americans from monotonous, soul-deadening drudgery. What more could you ask of a job?"

Though the career wasn't in the dictionary a few years ago, it's growing as fast as the computer industry itself. The University of Southern California study reported that the need for programmers between now and 1970 may range "into the hundreds of thousands." An IBM executive predicts that by 1975 there will be more programmers than doctors. "For the next ten or fifteen years," he told me, "it will be impossible for an able programmer to be out of work."

Fascinating developments in computer science are on the way. Computers are growing bigger, faster, more versatile. IBM's new STRETCH-class computer, for example, performs more than a million calculations *a second*, and soon may be eclipsed by later models. But however big and swift these electronic wizards become, they will still need programmers to tell them what to do, and to devise new ways for them to serve science and industry. THE END

704 Plays Integral Role In FAA Flight Inspection

An IBM 704 Data Processing System, installed at the Federal Aviation Agency Aeronautical Center, Oklahoma City, Okla., is being used to check the accuracy of skyway navigation aids.

The computer is an integral part of the new intermediate altitude flight inspection system designed and produced by the AIL (Airborne Instruments Laboratories) Division of Cutler-Hammer Inc.

Called Project SAFI (Semi-Automatic Flight Inspection), the airborne system is one of the largest ever designed for civil use.

The SAFI approach embodies two sub-systems—a ground-based evaluation system and an airborne inspection system. Flight inspections and evaluations start with a tape produced by the 704 at the center. This tape carries navigational instructions for a pre-planned flight along a chosen section of the grid pattern. Installed in the first of five FAA Convair 440 flight-check aircraft, the inspection system performs fast, accurate flight checks as the planes are flown in a grid pattern that covers the whole United States.

MAIN ADVANTAGE of IBM 704 in altitude flight inspection system is its ability to handle volumes of data within a short period of time. Examining a typical FAA airways map are Jay Moody, standing, chief of the aeronautical data processing center at Oklahoma City, Okla., and Stanley Adams, IBM 704 computer operator.

Each day about 2,000,000 "words" of data will be recorded on magnetic tape in the planes, reduced to about 700,000 in preliminary editing runs on the 704 at the center, and finally printed out as 15,000 facts.

FAA will be able to analyze the tape of five aircraft within an eight-hour period.

The British Computer Society To Publish R. W. Bemer Survey

The March issue of the *Computer Bulletin,* published by the British Computer Society, is slated to carry in its entirety the paper of Robert W. Bemer, manager, logical systems standards, corporate, entitled "Survey of Modern Programming Techniques."

Mr. Bemer has the honor of being the first American chosen to address the annual general meeting of the British Computer Society. It was at the 1960 event that his paper formed the basis for his lecture to that group.

The paper has received favorable publicity in this country through distribution to CODASYL (committee on data systems language).

H. J. Moore Jr. Named to Council of New AMA Purchasing Division

Harry J. Moore Jr., director of purchasing, corporate, has been appointed a council member of the newly created purchasing division of the American Management Association.

The new AMA division will be concerned with the management of more than $150,000,000,000 of purchases made annually by business and industry.

More than 50 seminars for purchasing executives will be presented by the division during the year. Some 20 problem areas of purchasing management will be covered.

Creation of the new division recognizes the major part which purchasing plays in American business by establishing it on equal divisional status with the other major functions such as engineering, marketing and manufacturing.

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BALLOT

OF THE

ASSOCIATION FOR COMPUTING MACHINERY

Election of officers for the period June 1960 – May 1962, except as otherwise noted:

Ballot envelopes must be signed.

Ballots must be received at the headquarters of the Association, 2 East 63rd Street, New York 21, New York, by the morning of June 1, 1960.

President (Vote for one) 1-2

H. D. Huskey	U	☐	1955
J. D. Madden		☐	1397

Vice President (Vote for one)

J. Moshman	U	☐	1881
N. R. Scott		☐	931

Secretary (Vote for one)

B. Gilchrist	U	☐	1764
S. Hanges		☐	998

Members-at-Large (Vote for six)

(The three candidates receiving the largest number of votes will be elected for four years. The three candidates next in order of votes received will be elected for two years.)

I. E. Block	3-3	U 6	☐	1130
H. S. Bright		U 5	☐	1220
E. Bromberg			☐	870
H. Bromberg			☐	746
G. E. Forsythe		U 1	☐	1850
C. C. Gotlieb			☐	1003
M. Grems			☐	946
B. F. Handy, Jr.			☐	1062
D. H. Lehmer		U 2	☐	1402
J. C. McPherson			☐	1120
M. Rubinoff		U 4	☐	1259
W. Sangren			☐	856
R. S. Varga			☐	1031
F. V. Wagner		U 3	☐	~~1414~~ 1399

7-3

Regional Representatives (Vote for one only in Region in which your mailing address is located.)

Europe

G. Fichera U ☐ 30

Great Lakes
(Minnesota, Wisconsin, Iowa, Illinois, Indiana, Michigan, Ohio)

20

E. L. Jacks # ☐ 133

N. C. Metropolis U ☐ 170

Mid-Atlantic
(West Virginia, Pennsylvania, New Jersey)

20

F. Engel, Jr. ☐ 79

S. Gorn U ☐ 172

R. Todd ☐ 89

New York
(New York)

14

R. W. Bemer U ☐ 221

R. S. Jones ☐ 95

R. D. Richtmyer ☐ [illegible]

Northeast
(Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island)

10

W. Ramshaw # ☐ 58

W. W. Seifert U ☐ 117

Northwest
(Washington, Oregon, Idaho, Montana, Wyoming, Utah, Colorado, North Dakota, South Dakota, Nebraska, Kansas)

3

A. T. Lonseth U ☐ 49

C. Schure ☐ 45

South Atlantic
(Maryland, Delaware, Virginia, North Carolina, South Carolina, District of Columbia)

10

G. M. Dillon # ☐ 63

S. I. Gass U ☐ 177

South Central
(Texas, Oklahoma, Missouri, Arkansas, Louisiana)

9

D. W. Peaceman ☐ 54

D. M. Young, Jr. U ☐ 74

Southeast
(Florida, Georgia, Alabama, Mississippi, Tennessee, Kentucky)

5

W. F. Atchison U ☐ 61

A. A. Grau ☐ 41

Southwest
(California, Nevada, Arizona, New Mexico)

75

M. H. Halstead U ☐ 412

J. K. Slap ☐ 416

General Information

Registration

Registration will take place at the **Masonic Hall, Corn Exchange Street,** from 2.30 p.m. until 4.30 p.m. on Monday, 22 June. Members arriving later may register at the inquiry desk in the **Arts School.**

Conference Sessions

All sessions will be held in the **Arts School, Bene't Street.** The main sessions will be in **Room A,** but **Room B** will be used for the smaller parallel sessions. For the main sessions, Room B will be connected to Room A by closed-circuit television. Both lecture rooms are on the ground floor of the Arts School.

Refreshments

Morning coffee will be served at **10.45 a.m.,** and afternoon tea at **4 p.m.,** on Tuesday, Wednesday, and Thursday, and afternoon tea will be served from **3.30 p.m.** on Monday. These refreshments will be served in the Lecturers' Common Room (on the first floor of the Arts School) for 100 members, and in the Masonic Hall, Corn Exchange Street for the remainder. Admission to the refreshment rooms will be granted only to members wearing the official badges issued to them on registration.

Payments

Members who have not already paid the balance of their conference fee are requested to do so on registration. Members for whom accommodation has been arranged in either Christ's or Selwyn Colleges, or in the Garden Hostel of King's College, are requested to pay for this accommodation on registration, unless they have already done so by post. To reduce congestion and delay during registration, all members who can conveniently do so are urged to pay for these items in advance, using the forms that have already been sent to them for this purpose.

Cloakrooms

Cloakrooms for ladies and gentlemen are provided in the basement of the Arts School and, for gentlemen, in the Masonic Hall.

Visits to Mathematical Laboratory

By invitation of the Director, arrangements will be made for parties to visit the University Mathematical Laboratory, Corn Exchange Street, after tea on Tuesday, Wednesday, and Thursday. Anyone wishing to join one of these parties is requested to leave his name at the Inquiry desk at the Masonic Hall or the Arts School.

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THE BRITISH COMPUTER SOCIETY
LIMITED

FIRST CONFERENCE

to be held in

CAMBRIDGE

22, 23, 24 and 25 JUNE 1959

PROGRAMME

PROGRAMME

Monday 22 June

	SESSION	
2.30 p.m.		Registration
4.30 p.m.	1	Opening Address and Report on the International Conference on Information Processing to be held in Paris by UNESCO, 15–20 June 1959 by **M. V. Wilkes, President** Chairman: **F. Yates, Chairman of Council**

Tuesday 23 June

9.15 a.m.	2	The State of the Art (a) Commercial Computers in Britain by **J. A. Goldsmith** (Robson Morrow & Co. London) (b) Computers in British Universities by **A. S. Douglas** (Director, Electronic Computing Laboratory, University of Leeds) Chairman: **D. W. Hooper**
11.15 a.m.	3	Symposium on The Selection and Training of Programmers *It is expected that contributions will be made by* (a) **R. W. Bemer** (Manager, Programming Systems, IBM Data Processing Division, White Plains, New York) (b) **John W. Carr III** (Director of Research, Computation Center, University of North Carolina) (c) **H. W. Gearing** (Head of Computer Division, The Metal Box Company Ltd., London) (d) **B. Richards** (Central Instrument Laboratory, Imperial Chemical Industries Ltd., Reading) Chairman: **A. S. Douglas**
2.30 p.m.	4A	Symposium on Some Problems of auditing computing data: internal audit practice and external audit theory *It is expected that contributions will be made by:* (a) **T. R. Thompson** (Director of Leo Computers Ltd., London) (b) **A. J. Bray** (Systems Manager, Turquand, Youngs & Co., London) (c) **F. C. de Paula** (Partner, Robson Morrow & Co., London) Chairman: **L. R. Crawley**
	4B	Symposium on Logical Design *It is expected that contributions will be made by:* (a) **T. Kilburn** (Electrical Engineering Laboratories, University of Manchester) (b) **M. Lehman** (Scientific Department, Israel Ministry of Defence, Haifa, Israel) (c) **N. C. Metropolis** (Director, Institute for Computer Research, University of Chicago) Chairman: **S. Gill**

Wednesday 24 June

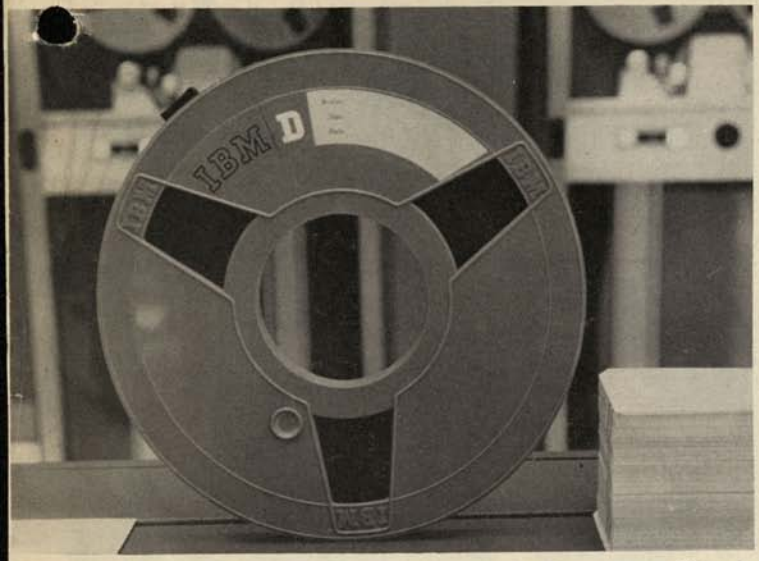
	SESSION	
9.15 a.m.	5	Review of Current Theory and Practice in Automatic Programming by **S. Gill** (Ferranti Ltd., London) Chairman: **A. D. Booth**
11.15 a.m.	6	A scientific application of digital computers: The Three-dimensional Structure of a Protein-Myoglobin by **J. C. Kendrew** (Medical Research Council Unit, Cavendish Laboratory, Cambridge) (*Abstract available*) Chairman: **M. V. Wilkes**
2.30 p.m.	7	Symposium on Experiences with the use of Magnetic Tape *It is expected that contributions will be made by:* (a) **C. A. Wilkes** (Imperial Chemical Industries Ltd., Dyestuffs Division, Blackley, Manchester) (b) **L. Griffiths** (Rolls-Royce Ltd., Derby) (c) **P. B. Livesey** (Newton, Chambers & Company Ltd., Sheffield) (d) **C. B. Griffiths** (Babcock & Wilcox Ltd., London) Chairman: **D. H. Rees**

Thursday 25 June

9.15 a.m.	8A	Production Control (a) Models of Stock Control and Production Scheduling by **J. Harling** (Urwick Orr & Partners Ltd., London) (*Abstract available*) (b) The Introduction and Establishment of a System of Computer Production Control in a Light Engineering Factory by **Francis Bryen** (International Computers and Tabulators Ltd., Letchworth) (*Abstract available*) Chairman: **R. H. Tizard**
	8B	Some remarks on the Inversion of Matrices by **A. S. Householder** (Oak Ridge National Laboratory, Oak Ridge, Tennessee) (*Abstract available*) Chairman: **E. T. Goodwin**
11.15 a.m.	9A	Symposium on Business Applications of Digital Computers *It is expected that contributions will be made by:* (a) **A. G. Wright** (The Imperial Tobacco Company (of Great Britain and Ireland) Ltd., Bristol) (b) **C. W. Mallinson** (Deputy County Treasurer, Cheshire County Council) Chairman: **H. W. Gearing**
	9B	The Solution of Hyperbolic Problems in Three Independent Variables on an Electronic Computer by **D. S. Butler** (A.R.D.E., Fort Halstead, Kent) (*Abstract available*) Chairman: **R. A. Buckingham**
2.30 p.m.	10	The Use of Computers for Economic Planning in the Petroleum Chemical Industry by **G. S. Galer** (Shell Chemical Company Ltd., London) (*Abstract available*) Chairman: **R. L. Michaelson**

PRODUCTION

Educating the Big Computers



REEL OF TAPE holds a basic education for IBM's family of big computers. When the reel is finished in 1961, it can easily be duplicated for installation in new and late models.

This reel of magnetic tape is the first step toward a basic "education" for computers.

The reel is exciting to computer users right now—even though International Business Machines Corp. is two years and several million dollars away from completing its basic education for big commercial computers. For it means that IBM, which dominates the computer field, is adopting a concept already being exploited by other manufacturers and big computer users. It's the final endorsement for educating the computer instead of its operator.

• **Three Big Gains**—To computer people, the reel represents a big step in automatic programing.

To non-experts, it is to the "thinking machine" what an education is to a man.

For the reel gives the machines three things:

• An understanding of English. With it, an engineer or accountant will be able to type out instructions for the machine in simple English—and get the job done with no need for a time-consuming translation into mathematical or machine code instructions.

• A library of knowledge, an accumulation of information that will enable the machine to do perhaps 90% of the work of making instructions for its own operations.

• A system of logic that will allow the machine to decide, for example, the best of several ways that it might go about solving a problem.

• **What It Is**—The Univac Div. of Sperry Rand Corp. pioneered in the development of these commercial "processors." Its Flow-Matic is on the market, is available for Univac users. They can now feed English language instructions into their machines.

IBM's COMTRAN will spread this system of automatic programing with English instructions to its family of large general-purpose computers. It will help a 705 or (7070 or 7090) computer write its own problem instructions in a system much faster and more sophisticated than IBM's Autocode, a method of assembling computer routines. Other manufacturers are at work on their own systems.

These "processors" are not machines or hardware. Rather, they are complex systems of information and logic—systems that can be stored on reels of tape and used directly in computers. They are tapes coded with thousands of instructions directing the machine in the general solutions of problems, in translating English words and phrases into computer language, and arrays of logic that wrestle a problem into the best form for running through the computer.

Ordinarily, computers accept instructions only in the form of a complex numerical code. It may take a small army of high-paid technicians to translate a hundred English sentences describing an operation into the hundreds of thousands of instructions in computer language.

The automatic programing processor substitutes its education for that of the corps of human programers, and it does the job infinitely faster.

I. Filling a Need

Next week, IBM will release its first official information about the new COMTRAN (which stands for Commercial Translater—IBM already has a scientific formula translator called FORTRAN).

The tape reel will hold upward of 100,000 blocks of instructions by the time it is completed and tested by IBM's programing staff in 1961. It will represent an investment of several million dollars and perhaps 100 man-years of work by programers. But it will be applicable, at negligible extra cost, to all late and future models of IBM's big computers.

IBM thinks COMTRAN will double the utility of the big computers. Users of FORTRAN report even greater gains in solving scientific problems.

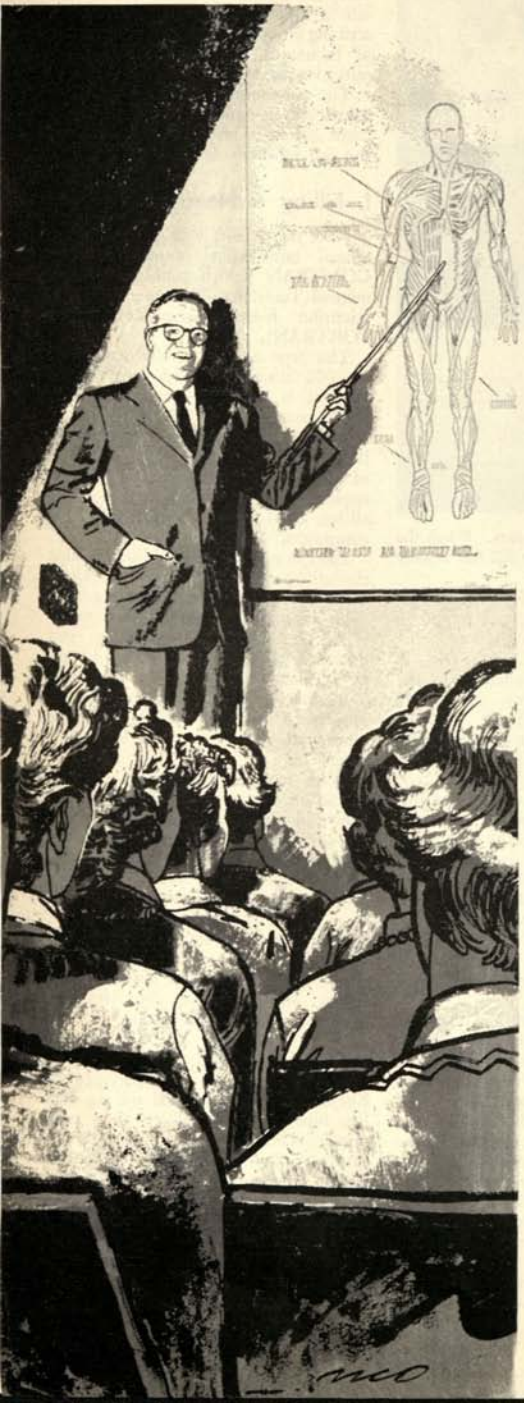
• **A Time-Saving Step**—Suppose you have a relatively simple job for a computer, such as: "For 1-in., 2-in., and 3-in., bar stock, add inventories in process to stock inventories; compare totals with reorder levels; if less, print order."

With manual programing, even so simple an operation balloons into perhaps a hundred punch cards, each bearing a dozen or so instructions to the computer. These cards tell the machine where to find each piece of information in the files, where to store it in index registers for use, which memory areas should be reserved for computing work, and dozens of detailed coded instructions about sorting, combining, and comparing the data and about what to do with results.

With automatic programing, the problem is put together into only some 10 steps, each a simple sentence in English. These are typed on an electric typewriter hooked up to a card punch. The 10 or so resulting punch cards are then fed into the computer, which, under the guidance of the processor, in minutes rattles out the hundred cards bearing detailed instructions to itself.

• **How It Works**—The educated computer accomplishes this by recognizing the nature of the problem, organiz-

New knowledge for nurses. As part of its occupational medicine program, Liberty holds one-week refresher courses for policyholders' in-plant nurses. This training keeps the nurses brushed up on everything from first aid to record keeping. To date, over 900 nurses from some 800 industrial firms have attended thirty-four of these courses. Result for Liberty policyholders: better medical programs, lower absenteeism, reduced workmen's compensation costs.



Power saw gets wired for sound. In the "anechoic chamber" of Liberty Mutual's Research Center, an acoustical engineer gets ready to find out what parts of a power saw make all the noise. This fiber-glass-lined, soundproof room makes it possible to get at sound sources of all kinds of industrial machinery, helps policyholders find ways to muffle excessive noises in their plants, cut down on accidents.

Look for more from

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"CREATIVE ENGINEERING" GUIDES STEEL MILL WASTE HEAT INTO MORE PRODUCTIVE CHANNELS

New "Package" Boiler squeezes more steam out of by-product BTU's

The open hearth furnaces of a steel mill produce large quantities of very hot gas. Frequently, this heat-laden gas is used to generate steam for the mill by passing it through "fire tube" boilers. But the limitations inherent in this type of boiler prompted Combustion—an organization with more than 75 years of experience in harnessing heat—to develop a new boiler concept to better meet this special need.

The result is the C-E Waste Heat Boiler, Type WCC, a completely shop-assembled (package) unit. Its unique feature is the use of "Controlled Circulation," as developed by C-E for large utility boilers and now generally regarded as the most important development of this decade in the field of steam generation. This feature enables the WCC Boiler to produce substantially greater amounts of steam from the same volume of waste gases. The WCC Boiler is expressly designed to handle "sticky" or abrasive gases without erosion, and with minimum maintenance. It therefore promises important advantages for many applications outside the steel industry—notably, in the chemical process industries.

Here then is another example of **C**reative **E**ngineering—the C-E approach to providing the most advanced designs of boilers for all fuels and steam requirements—from those of small industrial and institutional plants to the largest utility power stations.

[redacted]VE ENGINEERING" is the reason for the leadership attained by C-E products. The products which bear this mark of leadership include:

all types of steam generating, fuel burning and related equipment • nuclear power systems • paper mill equipment • pulverizers • flash drying systems • pressure vessels • soil pipe

COMBUSTION ENGINEERING

Combustion Engineering Building, 200 Madison Avenue, New York 16, N. Y.

C-216

ing it into the most effective sequence of computations, expanding general questions into detailed but simple instructions, and finally translating these instructions into the machine's own code—just as a technician draws on his own education and experience.

The example is simple, but it illustrates the same process as in the most complex problem—one that may require thousands of general instructions to produce tens of thousands of machine code instructions. In such a case, automatic programing might be the only practical way to get a problem on the machine at all. Hand-coding in machine language would take years of effort by programing experts; by that time, the problem might have changed.

• **Human Analogy**—A computer without an education is like a deaf and dumb employee with a prodigious memory, a whiz at addition, and lightning-fast at locating items in files. Such a man might speed things up around the shop if he could be restricted to addition and file-searching, but his ignorance of even elementary accounting and any mathematics except addition might make it impractical to use his talents.

It would take so long to write out detailed instruction for such a man to do anything except add and search files that it would be wiser to use a slower worker who had broader training, in such problems as:

"Find out the profit margin for the last quarter on second-shift operations in Plant 4."

At the rate that automatic programming is progressing, there seems to be no reason why you won't eventually be able to feed such a request directly to a computer.

II. Finding a Language

From the moment computers came on the scientific and, later, business scene, it was evident that programing was the checkrein on their speed. In early demonstrations, mathematicians using slide rules or even abacuses sometimes beat computer teams by a wide margin because it took so long to code a problem for a computer.

One way to speed up the programing was to preserve the coding of the various steps for future use. Programers developed libraries of these sub-routines; computer groups in various companies put together cooperative libraries.

• **Computer Babel**—Generally, though, the material in a library was usable only on one type of computer; so systems proliferated as the number of computer makes and models increased. A count last year showed nearly 100 different programing systems.

One system for coding machine tool instructions is called APT (BW—Mar. 14'59,p77). Others—largely for scientific computation—have been cooked up under such acronyms as SOAP, IT, SHARE, USE, SCAT, UGLIAC, FLIP, SNAP, QUICK, and QUEASY. To avoid so much duplication of effort, the Assn. for Computing Machinery, which includes both manufacturers and users, tackled the job of standardizing systems, at least for scientific use.

• **Scientific Esperanto**—The first task was to establish a universal language for computers, regardless of their type. This would enable a scientist familiar with the common language to move from one make of computer to another without changing his progamming style or having to refer to a different instruction manual.

With the approval of European users and manufacturers, English was adopted as the basic language for operating instructions, and modified algebraic form of notation was also developed. This week, at an international computer conference in Paris, the world's leading experts on programing will approve much of the final form of this International Algebraic Language, called IAL.

Virtually all computer manufacturers will then develop compilers or more powerful processors that are compatible with this language.

• **Business Language**—Meanwhile, English had also been adopted as the common language for automatic programing in commercial use of computers. In 1954, Grace Murray Hopper, chief of automatic programming for Sperry Rand's Univac Div., developed the concept of a commercial processor that would automatically code a program based on the customer's plain English.

Out of this came the Flow-Matic system for Univac computers, which the Air Materiel Command has adapted to its entire data-processing under the name AIMACO. This adaptation uses Flow-Matic language but is capable of writing programs for IBM 704 computers as well as Univacs.

Col. Alfred Asch, deputy chief of data systems planning for the Air Force, is thoroughly convinced of the savings from automatic programing. In fact, he says, from now on the Air Materiel Command in choosing computers will give first consideration to their ability to use automatic programing and to fit in with the AIMACO system.

The Defense Dept. has already started to investigate the possibility of a standard computer language that can be used throughout its immense data-processing system.

III. The Coming Thing

Business users and computer manufacturers all seem to have been struck suddenly by a realization of the importance of automatic coding systems for computers. Most of the large computer users queried by BUSINESS WEEK said they wouldn't consider buying a new computer that didn't offer comprehensive automatic coding processors.

So far, Sperry Rand's Flow-Matic has this field to itself. The company is so convinced of the virtues of automatic programing that its latest machine, the Univac Solid State computer, is entirely committed to that use, omitting some of the circuitry that might simplify hand coding.

Other companies are working, too, on educating their computers. IBM spokesmen say COMTRAN in 1961 will be an advance beyond the present Flow-Matic. And, Flow-Matic itself will undoubtedly have been improved by then.

The beauty of the education of computers is that it can continually be broadened and intensified by making additions to the tape.

Minneapolis-Honeywell's Datamatic Div. has two sets of consultants hard at work on both scientific and commercial computer languages. It expects to have its commercial language defined by next fall and a full crew at work designing the processor.

Burroughs Corp. is among other companies with systems in various stages of development. "We consider the processors we have under development as important as any product we have," says a Burroughs spokesman.

• **Value of Education**—Some computer users doubt that automatic programers can ever match the flexibility and ingenuity of human technicians, but even at this early stage Flow-Matic and IBM's scientific processor, FORTRAN, have been able to hold their own. Most researchers say automatic programing, as it is perfected, should ultimately surpass its human masters.

Robert W. Bemer, who heads IBM's automatic programing staff of 200, and Grace Hopper of Sperry Rand's Univac Div., both say that as computers get faster and more complex—and the problems put to them get vastly more complex—it becomes easier to teach a computer to understand English and to program itself than to teach people how to program a computer.

A survey by IBM among FORTRAN users shows an average reduction of 75% in costs of computing. Programing time itself has been cut to one-fifth or even one-tenth of hand coding. Moreover, engineers find it easy to learn to write their own computer programs in the FORTRAN language.

At its Port Arthur (Tex.) refinery, for example, Texaco has 40 men who can use FORTRAN, and many of them are chemical engineers—not programers or mathematicians. **END**

P.O. Box 655
Amagansett, N.Y. 11930
June 26. 1973

Dear Bob:

Market for Autotypography
I do indeed!
We've come a long way toward your goals - and on some points we're a long way to go - but the Honeywell Journal, + the My Public Library catalog of current acquisitions, and the Engineering Index abstracts, and many others are useful outcomes of your vision. Can you do practical spelling correction or verify grammer yet?

I've had a lot of fun with one of your other hot buttons - ship's lines. My son is

in the design office of Sparkman + Stevens working on racing sailboats and we've set up all sorts of little programs to compute their hydrodynamic coefficients - wetted area, displacement, stiffness etc; and evaluate the new ocean racing rating rule.

Good to hear from you + appreciate your publication and your continued participation in computer affairs, here + abroad.

Best regards

John W.

P.S. We were shocked last week by the death of Jerry Haddad's wife, Peggy suddenly at Memorial Hospital.

February 10, 1959

Memorandum to: Messrs. D. W. Pendery
A. W. Kleinebecker
J. J. Kenney, Jr.
R. Bemer
A. L. Harmon
Dr. L. Robinson
Dr. J. E. Flanagan

Subject: General Motors Meeting, Tuesday, February 17, 1959

The following people from the General Motors Company in Detroit, Michigan will arrive in White Plains at 10:15 a.m. on Tuesday, February 17:

Mr. Arthur Sarason	Assistant Corporate Comptroller	1,200,000 points
Dr. Arnie Hestenes	Director Operations Research	1,200,000 points
Mr. Bob Mock	Director Data Processing Fisher Body Division	38,000 points
Mr. J. C. Fisher	Superintendent Data Processing Buick Motor Division	105,000 points
Mr. Boyd Zacharias	Director Data Processing Chevrolet Division	140,000 points
Mr. R. G. MacIver	Manager, Central Office DP Bureau	
Mr. F. H. Belli	Director of Operations, Central Office, DP Bureau	
Mr. C. H. Forger	Assistant Comptroller, Pontiac	
Mr. R. A. Voorhis	Director of Data Processing, Allison Division	
Mr. J. F. Whitehead	Account Manager - General Motors (IBM)	
Mr. R. Schuett	Sales Representative - General Motors (IBM)	

The objective in bringing these people to White Plains is to convince them that IBM is ahead of the field in terms of existing as well as advanced Data Processing systems and techniques. One man in particular, Dr. Hestenes, seems to be rather cold toward IBM. He was with the National Cash Register Company for quite a number of years and two years ago he joined General Motors. He is a factor in all decisions regarding Data Processing equipment for all divisions of the General Motors Corporation.

The meeting will convene in Conference Room A at 10:15. Due to another meeting which is scheduled for the same conference room in the afternoon, the General Motors meeting will adjourn to Conference Room B also on the third floor. The program will be as follows:

10:15 - 11:40	A Product Planning and Marketing Discussion by J. J. Kenney, Jr., D. W. Pendery, and A. W. Kleinebecker.
11:40 - 12:00	Meeting must temporarily adjourn so that the table can be set for lunch.
12:00 - 1:45	Luncheon
1:45 - 2:30	(Conference Room B) Operations Research discussion by L. Robinson and J. E. Flanagan
2:30 - 3:30	Automatic Programming discussion by R. Bemer

The following people will attend the luncheon:

All General Motors people plus Messrs. Whitehead and Schuett
Messrs. G. E. Jones
J. J. Kenney, Jr.
A. W. Kleinebecker
C. Garrison, Jr.
L. Robinson
J. E. Flanagan
D. W. Pendery

It should be emphasized that this program is to be informal. We expect there will be many questions, particularly in the area of the 705 TX and it is important especially for Mr. Kleinebecker and Mr. Pendery and Mr. Kenney to determine how much we can tell the General Motors people concerning the 705 TX area.

J. J. Keil

JJK:ab

February 12, 1959

MEMORANDUM TO: Mr. Arnold Lerner

SUBJECT: IBM Participation on Educational TV Program

Miss Dorothy Geddes, a teacher at Hunter College, appears on and is on charge of "Mathematics 9," on Channel 11, WPIX, Friday mornings from 10:20 to 10:50. This half-hour show was started last week and is part of the Regents Educational TV Project.

Miss Geddes' program on February 20th will discuss the binary number system and its use in data processing systems. She requested that we supply her movie footage explaining the binary system, a model of a data processing system installation and an IBM mathematician who could discuss the binary system with her.

We showed her the Systems Development film, "Computer Programming", which has a good, five-minute section explaning the binary system. She liked it and is arranging with UPA for its inclusion on her telecast.

I contacted DP Displays and Mr. O'Sullivan told me that a model of the IBM 7070 would be available for the telecast.

Don Trownsell has asked Bob Bemer of Applied Programming to appear as her guest and he has consented. I have also talked with him and he knows that there will be a model of the 7070 to use in his discussion with Miss Geddes.

E. C. Brewster
Information

ECB/nb
cc: Mr. George Capsis, WHQ
Mr. D. R. Wright, WHQ
Mr. D. L. Trownsell, White Plains
Mr. R. W. Bemer, White Plains
Mr. G. G. Ahlborn, WHQ
Mr. J. O'Sullivan, WHQ

Lesson 8:(February 18) Number SystemsI: Binary System

A. Consider number systems to base 2 - binary system and its relation to electronic computer. (Make comparisons and analogies to decimal system wherever possible.)

1. Number of symbols: 0, 1
2. Addition table: $0 + 0 = 0$
   $0 + 1 = 1$
   $1 + 1 = 10$
3. Multiplication table: $0 \times 0 = 0$
   $0 \times 1 = 0$
   $1 \times 1 = 1$
4. Consider conversion of numbers in binary system to numbers in decimal system (Note place value)
   101 (base 2) ------- $1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$
   ------- $4 + 0 + 1 = 5$
   101 (base 2) ------- 5 (base 10)
   Similarly for: 10011 (19)
   111 (7)
   11000 (48)
5. Conversion of numbers in decimal system to numbers in binary system:
   23 (base 10) -------- $1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$
   $16 + 0 + 4 + 2 + 1$
   23 (base 10) ---- 10111 (base 2)
   Similarly for: 8
   15
   36
6. Simple addition in binary system:

101 (5)	101 (5)	10011 (19)
10 (2)	11 (3)	111 (7)
111 (7)	1000 (8)	11010 (26)

7. Simple multiplication:

101 (5)	101 (5)
11 (3)	10 (2)
101	000
101	101
1111 (15)	1010 (10)

B. Assignment:

1. Write the following numbers in the binary system:
   75
   200
2. Add and multiply the following numbers in binary system and check by translating to the decimal system:
   10011
   1001
3. Announce availability of "Yes, No - One, Two".

ZERO

HUNTER COLLEGE HIGH SCHOOL
930 LEXINGTON AVENUE
NEW YORK 21, N. Y.
TR9-2100
X206 APPOINTMENTS

February 11, 1959

Mr. Robert Beamer
International Business Machines
112 East Post Road
White Plains, New York

Dear Mr. Beamer,

Enclosed please find a copy of the outline of the lesson planned for Wednesday, February 18th on the television program, Mathematics 9.

Sincerely,

Dorothy Geddes

Dorothy Geddes

January 9, 1959

Mr. Dicky Powell
600 Forest Height Drive
Knoxville, Tennessee

Dear Dicky:

Fortunately your problem is not one that must be put on an electronic computer to solve. I remember doing this myself when I was in junior high school, or at least trying to do it, for it is impossible and I can show you why.

You have probably seen floor plans for houses, so picture your diagram as being a rectangular house with 5 rooms in it, with one door in each wall. You will see that 2 of the rooms have 4 doors and the other 3 rooms have 5 doors.

In the diagram I have shown the number of doors in each room. Now let us look at one of the rooms with 4 doors, as shown in this drawing.

Notice that if we start on the outside of the room and go through all 4 doors that we have to end up on the outside again. Similarly, if we start on the inside of the room and go through all 4 doors, we end up on the inside again. This is true whether we have 4, 6, 8, ... or any EVEN number of doors. Now look at a room with 5 doors in it.

Notice that if we start on the OUTSIDE we have to end up on the INSIDE; or if we start on the INSIDE we must end up on the OUTSIDE. This is true for 5, 7, 9, ... or any ODD number of doors. Remember that going in and out through the doors is the same as crossing the lines in your problem.

Obviously, for any room that has 5 doors, we would have to start from the inside in order to end up on the outside and continue our path through the other rooms. (Don't forget, if we had started on the outside we would end up on the inside after going through all the doors, and could not get out without going through a door already used, which is against the rules.) This means that in every room which has 5 doors there is going to have to be a starting place inside the room. Since there are three rooms with 5 doors, there are three "ends." Now anybody knows that a continuous line has only 2 ends, and we've got to have 3 ends. Therefore, the problem is impossible.

These are known as "unicursal" problems and I will give you some references that your teacher may look up:

MATHEMATICAL RECREATIONS AND ESSAYS, W. W. R. Ball, revised edition, The Macmillan Company, 1947--Chapter Nine

MATHEMATICAL RECREATIONS, Maurice Kraitchik, second revised edition, W. W. Norton and Company, 1942 and Dover Publications, Inc., 1953--Chapter Eight, Section 4, Figure 98.

Sincerely,

rwb/ep

R. W. Bemer, Manager
Programming Systems

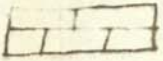
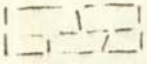
bcc/ Mr. R. A. Nelson

Dicky Powell
600 Forest Heights Dr.
Knoxville, Tenn.

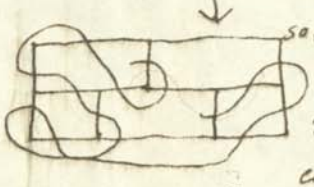
Dear Sirs:

I have a puzzle which I would like you to work in your D. B. M. Brain if possible. All the people at Bearden Jr. High were I go to school have been working on it for a long time. We would appreciate it very much.

DIRECTIONS

Draw this   Push together

There are 16 lines each must be crossed only once without retracing or back tracking without lifting pin or pencil.

EXAMPLE 

When you start you can start anywhere.

Sincerely Yours
Dicky Powell

P.S. Please Work Soon

December 3, 1958

Memorandum for Mr. V. F. Johnson

Subject: Sales Currents - Vol. 1, No. 11

In the November 26 issue of Sales Currents, on Page 9, we credit R. P. Hullsberg, DP field representative, Camden, New Jersey, with the advice that "all IBM customers using their equipment for payroll applications should be reminded of the increase in the F. I. C. A. which goes into effect January 1, 1959.

On Page 11, there is an article relating to EN/DECODER "slate" which simplifies IBM 705 instruction translation. The latter is an ingenious item developed by a member of the Applied Programming Department, R. W. Bemer, and would appear much more worthy of identification than the fact the F. I. C. A. increase will affect our customers since that is a fairly well known, non-creative observation.

I don't think there is much question that stimulation of creative thinking is greatly enhanced by recognition, and hope that we can be a little more consistent and logical in this regard in the future.

If you have any question in this matter, I would like very much to discuss it with you.

D. T. Spaulding

DTS/mb

cc: Mr. J. T. Ahlin

December 1, 1958

Memorandum to: Mr. D. T. Spaulding

Subject: Sales Currents - November 28

I would like to call your attention to the November 28 issue of SALES CURRENTS. The EN/DECODER on Page 11 is a device which Bob Bemer developed on the train one evening. I wonder if individuals should not be given credit for such contributions.

J. T. Ahlin

JTA:cw

June 30, 1958

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75 cents

A McGraw-Hill Publication

Swiss Design Mobile Missile

—

Computer Aim Is Fast Coding

Avro CF-105 Arrow

Computers Learn Engineer's Language

By James A. Fusca

Large, high speed digital computers are learning the language of the engineer as part of the effort of computer designers to improve the performance of the most undependable component in present-day computing systems—the human being.

Human beings, according to one study, average one error in every 650 mathematical operations, while a properly functioning computer is virtually error-free. Therefore, designers are attempting to limit the engineer to doing the creative thinking that only he can do, while assigning to the computer translation of engineering problems into computer language for working out the solutions.

Technique for doing this consists of writing special programs for large computers to convert words and mathematical symbols familiar to the engineer into the unfamiliar and involved series of letters and numbers that comprise the machine's own language.

At present, the best known systems for automatically translating the engineer's version of the computer program into machine code are International Business Machines Corp.'s "Fortran" (formula translation—an advanced version will be available this fall called "Xtran") and Sperry Rand Corp.'s "Math-Matic." Similar systems are available for automatic coding of computers used for business purposes.

Engineer Programmers

Conventionally, an engineer with a problem to be solved on a large digital computer must program it himself which requires that he learn a highly complicated programming technique or he must submit it to a programmer who must know enough of the complexities of his problem to progam it intelligently for the computer.

Sperry Gyroscope Co. is attempting a solution to this problem with the addition of the Math-Matic automatic coding system to its Univac computer. Sperry has found that its engineers can learn to program their own problems within a few days' time from study of the Math-Matic manual, so that most problems require only that a programmer check the program for careless errors.

Sperry says that several advantages have accrued from this approach. Time and cost of programming has been reduced, but even more important the

UNIVAC installation combines control panel (foreground), computer and tape handling equipment.

SPECIAL typewriter prints program electrically on magnetic tape, types paper copy (above). High speed printer can print computer output at 600 lines per minute (below).

Things to Come ?

A series of experiments performed last year at the laboratories of the International Business Machines Corp. has attracted wide attention. A medical student, Richard Friedberg, working at the laboratories during the summer explored the use of "learning theory" as applied to a digital computer.

Using an IBM 704 computer, Friedberg first simulated a very simple and naive computer which had only four kinds of orders, a maximum length of program of 64 instructions, and a memory consisting of 64 one-bit words. This very simple computer, which he called "Herman," exhibited the ability to "learn."

The method involved the simulation on the IBM 704 at the same time of an instructor which told Herman if it had made a mistake or not, and a bookkeeping section which tallied its successes and failures. Herman was not told whether a useful set of instructions had been chosen but simply if a correct answer had or had not been produced.

If Herman made a mistake it was, in effect, punished; if it got the right result it was, in effect, rewarded. This was done by attaching a success number to each of the instructions that decreased in the event of failure, increased by one for success, or by two for success at double speed. In the event of 64 failures, the one-quarter of the instructions with the lowest success numbers would be replaced with new, random instructions with arbitrarily assigned success values.

When failing, therefore, Herman received constant changes in program, while tendencies toward operating programs were rewarded with larger success numbers. By this method Herman actually learned to do a number of things, and to do them without being told. The computer learned which words in its memory were the input from the outside world and which words were the output. It learned to move a number from the input to the output. It learned simple logical addition and to place the result in the output. Most important of all, the computer demonstrated its ability to learn the same things on repeated occasions . . . simply as a result of reward and punishment.

engineer learns the capabilities of the computer and consequently is alerted to possibilities of using the computer in new areas and for problems that have not previously been handled analytically.

Except for problems planned well in advance, and which require long enough computing times to make conventional coding advantageous, Sperry now uses Math-Matic almost exclusively for engineering problems to be solved on its Univac. (The computer also is used for payroll and bookkeeping purposes.) The company says the result has been a broad increase in the use of the computer.

In particular, automatic coding has been valuable for the kind of rapid and intensive engineering work that precedes a technical proposal, and for analyzing unsuspected problems that arise late in an engineering development program approaching its deadline, according to Sperry engineers.

Typical problems for which Sperry has applied the automatic coding technique include: computation of ballistic trajectories, gyro drift problems in inertial guidance systems, computation of specifications in motor and transformer design, Fourier analysis of electrical networks, computation of electron paths and other characteristics in traveling wave tubes and klystrons, radar antenna design, and design problems of special purpose digital computers.

Credit for the first important work in automatic coding is attributed generally to Dr. Grace M. Hopper of Sperry Rand Corp. Since 1951-52, more than 90 of these automatic coding systems have been developed both for scientific and business use by computer manufacturers and their customers, including universities, large corporations, and civilian and government research laboratories.

Generally, these systems were developed to help solve specific types of problems on a specific type of computer. The advantages, however, of a coding system capable of expressing all but the most difficult problems and of working on computers anywhere in the country are forcing concentration on just a very few systems.

At the same time, these advantages are impressing computer manufacturers with the desirability of standard computer configurations, and are the reason that several translation systems are under development that will convert a problem from one automatic coding language to another: for example, Xtran into Math-Matic.

An advanced example of this trend is the program at the University of Michigan to develop an "anycode-to-anycode" translator, although cost and complexity would limit the application of such a program to a very few installations. Probably the ultimate program underway today is at the Massachusetts Institute of Technology where an automatic operator is being developed to eliminate errors made by computor operators—instead, the automatic operator will be given 12 hours' work and left to its own devices.

Attempts to help solve the mushrooming problems of new computer uses and more complex computer problems through development of a common automatic coding system and the exchange of information have resulted in the formation of cooperative groups over the past 10 years. These groups have been of major importance in the evolution of automatic coding.

• **Pact Group.** Composed of Douglas Santa Monica, El Segundo and Long Beach, Lockheed, Naval Ordnance Test Station Inyokern, North American and Rand Corp., the Pact Group developed an automatic coding system known as Pact IA, which is of special interest because it was the first major cooperative coding effort.

• **Share Group.** The Share (Society to Help Avoid Redundant Effort) Group was founded as an association of IBM 704 users. The cooperative code used by this group, called Sap (Share Assembly Program), was the work of Roy Nutt of United Aircraft and, also, served as the basis for the Fortran system developed by IBM.

IBM has estimated that use of the Fortran system reduces programming costs and elapsed time of programming by a factor of 10 – 1 over that required for machine language coding, and by a factor of 5 – 1 over that required for coding in Sap symbolic language. Similar reducations would be expected from a system such as Math-Matic.

Computer Problems

The engineer faced for the first time with the problem of programming a computer usually encounters three immediate difficulties: a program is unsuccessful if he ends up knowing how to solve the problem but the machine does not; knowing how to solve the problem is not the same as knowing the logic of the problem, and the output of a computer can be fantastic—ream upon ream of data—so to obtain useful data he must learn to be extremely selective about what he asks for as a solution.

In describing automatic coding systems, terms that should be defined are:

• **Program.** A program is a set of instructions given to a computer.

• **Programming.** Programming is the translation of a mathematical problem into language acceptable by the computer.

• **Routine.** Routine is synonymous with program.

• **Subroutine.** A subroutine is a portion of a program used more than once in that program.

• **Assembly program.** An assembly program combines separate pieces of cod-

June 2, 1958
R. W. Bemer
Programming Systems
425 Park Avenue - 10

P. W. Burgard
Office of Director of Research
590 Madison Avenue - 19

Russian Visit

To recapitulate our telephone conversation and provide you with information in a form for distribution to others, if you find it necessary, my latest advice on the Russian trip is as follows:

A Dr. Green of MIT talked personally to Mukhin in Moscow last week. There is a possibility that they will not be able to come here before the Ann Arbor meeting on the 16th June. If we do not hear from Dr. Carr by Wednesday noon, the earlier visit may be considered cancelled and arrangements will be made for the period following 27th June, in coordination with the State Department, which has apparently moved the visa back to the 16th.

Dr. Carr states that he will write a letter of request for a visit to IBM and will request the State Department to write another letter to IBM giving details and covering all pertinent regulations. His contact at the State Department has been F. C. Merrill, tel. EXecutive 3-3111. Miss Ellen Gavrisheff of this office is acquainted with the arrangements. Apparently the reciprocal invitation has so far not been issued for more than Dr. Carr personally and the State Department has expressed a feeling that the number should be equivalent, that is, four U.S. to match the four Russians coming here. I have been informed verbally by Dr. Carr in my conversation with him today that he would consider it quite proper to have an IBM representative to be included among these four if and when the invitation becomes official, providing IBM hosts a visit to WHQ and POK. We may assume that Dr. Carr, through his contacts, will have discretionary influence in naming the members of the U.S. party.

Dr. Carr has invited John Backus and myself to attend the University of Michigan Summer Session for a period of time and, if long enough, expects that we should pay our way with talks. This might provide a reasonable opportunity to become conversant with the Russian 'state of the art'.

R. W. Bemer

RWB:ck

Programming Systems, WHQ
May 29, 1958

MEMO TO: C. D. Aser, DP-HQ
W. Campbell, POK Guest Services
Grosch for C. R. DeCarlo, DP-HQ for LaMotte
B. D. Hauser, WTC
J. C. McPherson, WHQ
B. Oldfield, SBC
E. R. Piore, WHQ
G. L. Ridgeway, WHQ
D. T. Spaulding, DP-HQ
V. A. Tauber, Washington Federal
F. N. Walker, WHQ Guest Services

SUBJECT: Tentative Visit of Russian Computer People

Dr. John W. Carr III, President of the Association for Computing Machinery and Associate Professor of Mathematics at the University of Michigan, has been in communication with Academician S. A. Lebedev of the USSR Academy of Sciences. They have arranged for five Russians to visit the University of Michigan Engineering Summer Conference, 16-27 June. Dr. Carr has been in consultation with the State Department; the University of Michigan will take care of all visas, travelling arrangements and responsibility in this country. The group consists of:

Academician A. Dorodnitsin (mathematician and numerical analyst specializing in non-linear equations),

V. Burtsev (electrical engineer),

I. Mukhin (specialty unknown), ENG → RUSS.

L. Korolev (information theory),

one Russian interpreter.

These people also plan to attend the National Conference of the ACM on 11-13 June at the University of Illinois, Urbana, Illinois. If all goes as planned, the group will leave Moscow on June 7th, possibly arriving in New York sometime on the 8th.

Dr. Carr has asked several officials of the ACM if they would make arrangements for visits while the group is in this country. He has asked me to see whether or not plans could be made to tour World Headquarters and Poughkeepsie between the 8th

and 11th of June. Dr. Grace Hopper was asked to make similar arrangements for Remington-Rand Univac in Philadelphia. Other tentative stops include the Wayne University Computing Laboratory, General Motors Technical Center, MIT Computation Laboratory, Carnegie Tech. Computing Center and the University of Pennsylvania Computing Center.

Among the factors that influence and pertain to this visit are:

1. There is a good possibility that a reciprocal invitation will be extended for some United States computer people to visit Moscow, no details known.

2. As the acknowledged leader in world trade, IBM should certainly endeavor to give proper reception and courtesy to these visitors, who are presumably among the most important people in the computing profession in Russia.

3. Any plans made will have to be of the utmost flexibility due to the uncertainty of their travel schedules or the possibility that the trip might be cancelled.

Dr. Carr reports that a Margaret Fraser from the Minneapolis office of IBM may be in attendance at the University of Michigan summer session. She has been invited by Dr. Carr in order to talk to these people because she holds a Master's degree in Slavic languages.

Dr. Ridgeway, Mr. Hauser and Mr. Campbell have been contacted by phone to get preliminary information. It appears that a possible arrangement would be to have the party proceed to Poughkeepsie Sunday night or early Monday morning, where they could be toured through the Research Labs, production line and other normal points of interest on the standard itinerary. Returning to New York sometime in the early afternoon, they could tour the 705 center, the Service Bureau Corporation and central activities such as Applied Programming. They could then proceed that night or the following morning (Tuesday) to Philadelphia if Remington-Rand so desires. Suggestions are solicited for a possible schedule which could include a visit to the Washington Vanguard installation in combination with the Philadelphia trip. They must leave late in the afternoon of June 10th to go to Urbana via Chicago or Indianapolis.

A few tentative thoughts on the character of such a visit, if feasible, are:

1. Mr. Hauser suggested that Mr. Aser accompany the party generally, due to his knowledge of Russian. The duration of the visit will be too short to include technical talks or discussions thru an interpreter. Interested parties could travel with them in shifts as dictated by the locale of the tour.

2. The 704 at the Service Bureau will in all probability be the demonstration highlight. Possibly a matrix inversion or some other interesting demonstration could

be run for their benefit although this would involve utmost flexibility in SBC scheduling for the day.

3. Presumably the proper departments will wish to have a photographer along.

4. It would also seem to me that a much appreciated gift could be sets of some of our spectacular publications and manuals as cleared by the Company for release.

5. Could short films be considered as a possibility?

6. If Vanguard could be included, the SBC visit would be unnecessary except as a filler and to show the switching network.

Since this could be a complicated and delicate operation, would you please advise me of any restrictions or thoughts generated in your respective responsibilities? No confirmation will be made to Dr. Carr on behalf of IBM until fully approved by the requisite management.

R. W. Bemer

RWB:ck

LOOK

COWLES MAGAZINES INC. *Look Building, 488 Madison Ave., New York 22, N.Y., MURRAY HILL 8-0300*

April 28, 1958

Mr. Beemer
International Business Machine
590 Madison Ave.
New York, N.Y.

Dear Mr. Beemer:

Miss Kaytor has asked me to forward to you a tear sheet of our "New 5-Day Crash Diet" feature which will appear in the May 13th issue of LOOK, on the newsstands April 29th.

Many thanks again for all your help and cooperation.

Sincerely,

Pamela Jacobs

Pamela Jacobs
Assistant to the Food Editor

Electric Typewriter Division

April 14, 1958

MEMORANDUM TO: Mr. Robert Bemer

SUBJECT: Gary Moore Show

On behalf of the ET Division, I want to express our appreciation for arranging to have the IBM 632 Electronic Typing Calculator on the Gary Moore Show.

As you know, this was the 632's first appearance on TV and you brought it through with flying colors.

Thanks again and please accept my personal regards.

B. M. Stevens
ET Sales Manager

BMS:evg

IBM

CBS TELEVISION

A Division of Columbia Broadcasting System, Inc.

485 MADISON AVENUE, NEW YORK 22, NEW YORK · PLAZA 1-2345

April 11, 1958

Mr. Robert Bemer
I.B.M. Corporation
590 Madison Avenue
New York, New York

Dear Mr. Bemer:

I want to thank you for the time and care you devoted to the preparation of the I.B.M. feature and tell you what a pleasure it was working with you.

The staff, Garry, and our producer, Herb Sanford join me in this appreciation of your contribution to the show. We felt your demonstration was most interesting - incidentally, an added thanks for helping sort cards backstage before the show!

Best wishes,

Marcia

MD/ms

Marcia Durant

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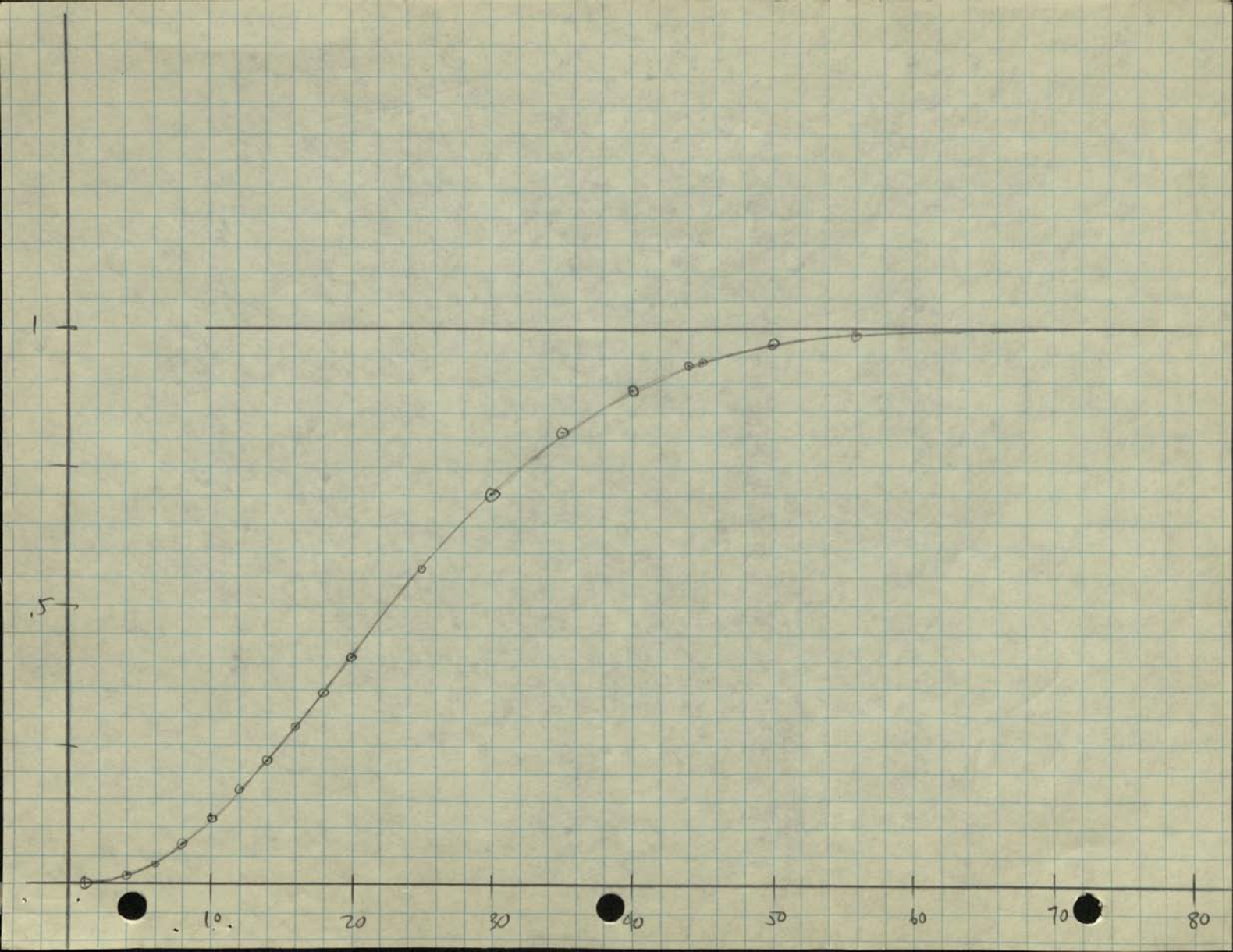
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2	.99726 02740	363	43	.07607 71444	322
3	.99179 58341	362	4	.06711 46315	321
4	.98364 40875	361	5	.05902 41006	320
5	.97286 44263	360	6	.05174 71567	319
6	.95953 75164	359	7	.04522 55972	318
7	.94376 42970	358	8	.03940 20272	317
8	.92566 47077	357	9	.03422 03907	316
9	.90537 61662	356	50	.02962 64204	315
10	.88305 18224	355	1	.02556 80066	314
1	.85885 86218	354	2	.02199 54906	313
2	.83297 52113	353	3	.01886 18865	312
3	.80558 97249	352	4	.01612 30372	311
4	.77689 74881	351	5	.01373 77111	310
5	.74709 86803	350	6	.0116	309
6	.71639 59948	349	7		308
7	.68499 23348	348	8		307
8	.65308 85822	347	9		306
9	.62088 14740	346	60		305
20	.58856 16164	345			
1	.55631 16448	344			
2	.52430 46923	343			
3	.49270 27656	342			
4	.46165 57420	341			
5	.43130 02960	340			
6	.40175 91798	339			
7	.37314 07177	338			
8	.34553 85276	337			
9	.31903 14625	336			
30	.29368 37573	335			
1	.26954 53663	334			
2	.24665 24722	333			
3	.22502 81459	332			
4	.20468 31354	331			
5	.18561 67611	330			
6	.16781 78936	329			
7	.15126 59918	328			
8	.13593 21789	327			
9	.12178 03356	326			
40	.10876 81902	325			
1	.09684 83885	324			
2	.08596 95284	323			

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ARMOR SC

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EXAMP

OUT 475

IN 250

TRY 6

LIKE 4 OR KIND 1

20 PAIRS

HOW MANY PAIRS (475)?

" (250)?

n	② $\frac{n(n-1)}{730}$	③ $(\quad)^{\frac{n-2}{1095}}$	④ $(\quad)^{\frac{n-3}{1460}}$	⑤ $(\quad)^{\frac{n-4}{1825}}$	⑥ $(\quad)^{\frac{n-5}{2190}}$
22	.6328 7671	.0115 5939	.0001 5043		
	.6051	.0111	.0001		
200	54.5205479 35.0	9.8585 108 6.3	1.3302 236 .86	.143 .092	.0127 .008
250	85.2739 7260 48.9	19.3131 9197 11.1	3.2673 6878 1.88	.4404 2341 .254	.0492 7111 .029
300	122.8767 123 63.0	33.4404 203 17.2	6.8026 060 3.50	1.1033 2678 .569	.1486 2164 .077
350					
400	218.6301 370 89.6	79.4655 657 32.6	21.6081025 8.89	4.6886 622 1.933	.8456 7195 .350
450					
500	341.7808219 111.9	155.4400 450 51.0	52.9134947 17.40	14.3808 731 4.739	3.2504 713 1.074
550					
600	492.3287671 128.8	268.8699 568 70.5	109.9420302 28.89	35.9043561 9.456	9.7548 365 2.575
100	13.5616 4383 10.9	1.2137 3616 1.0	.0806 3863 .065		
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201-3	79.000	.280	84.250	.109	95.550	.026	98.800	.005	99.850	.001	
300-4	83.200	.266	70.900	.154	87.200	.054	96.350	.014	99.150	.003	UNDER SIZE
400-5	100.400	.223	59.000	.184	74.800	.085	90.700	.028	97.550	.007	
500-6	127.400	.169	53.500	.195	59.800	.115	81.150	.047	93.600	.015	
	99.800	.042	100.000	.004							
6-100	93.300	.176	99.400	.016	100.000	.001	100.000	.000	100.000	.000	

TOP SIZE

$$XXX.X00 + (.XXX)(XXX.) - 100.000 = XXX.XXX$$

$$XXX.XX$$

EXPECTED # GROUPS OF k IN A POPULATION n

$$= \binom{n}{k} \frac{364^{n-k}}{365^{n-1}} = \binom{n}{k} \left(\frac{364}{365}\right)^{n-k} \frac{1}{365^{k-1}}$$

VARY k FROM 2 TO 6

k	365^{k-1}
2	365
3	133225
4	48627125
5	17748900625
6	6478394828125

$$\binom{n}{k} = n \underset{365}{\left(\frac{n-1}{2}\right)} \underset{365}{\left(\frac{n-2}{3}\right)} \underset{365}{\left(\frac{n-3}{4}\right)} \text{ UP TO DEN} = k$$

R. Bemer, Mgr.
Programming Systems
DP Sales Service

FORM 70-7333-0

IBM GRAM

March 31, 1958

On Tuesday, April 1, and Wednesday, April 2, IBM equipment will appear in data processing roles on the following television shows:

Tuesday, April 1

$64,000 QUESTION (CBS-TV network, Channel 2, 10:00 - 10:30 P.M., E.S.T.) The 083 Sorter, featured on the show, will be given an additional job to perform. In a program innovation, it will help in the selection of money winners from among home viewers by means of a special sort.

Wednesday, April 2

I'VE GOT A SECRET (CBS-TV network, Channel 2, 9:30 - 10:00 P.M., E.S.T.) The 608 Transistor Calculator and the 407 Accounting Machine will play a feature role. IBM'er D. A. Hemmes of Applied Programming will appear on the show.

ARMSTRONG CIRCLE THEATRE ("The Trusted Thief") CBS-TV network, 10:00 - 11:00 P.M., E.S.T.) The last act of this drama shows how an embezzler is trapped with the aid of IBM equipment.

NOTE: Television shows are, of course, always subject to last minute programming changes.

Department of Information

Distribution: WHQ Executives and Department Managers
WHQ, White Plains, Plant, Laboratory
and Field Location Bulletin Boards

Removal Date: April 3, 1958

FORM **1040**

U. S. Treasury Department
Internal Revenue Service

U. S. INDIVIDUAL INCOME TAX RETURN—1957

or Other Taxable Year Beginning ____ 1957, Ending ____, 195__

(PLEASE TYPE OR PRINT)

Name DAVID AND GENEVA HEMMES
(If this is a joint return of husband and wife, use first names of both)

Home address [redacted]

(City, town, or post office) [redacted] (Postal zone number) [redacted]

Occupation PROGRAMMER NONE

If Income Was All From Salaries and Wages, Use Pages 1 and 2 Only. See Page 3 of the Instructions.

Exemptions

1. Check blocks which apply. Check for wife if she had no income or her income is included in this return.
   (a) Regular $600 exemption ..... X Yourself X Wife
   (b) Additional $600 exemption if 65 or over at end of taxable year. ☐ Yourself ☐ Wife
   (c) Additional $600 exemption if blind at end of taxable year. ☐ Yourself ☐ Wife
   Enter number of exemptions checked → 2
2. List first names of your children who qualify as dependents; give address if different from yours. RAHLS JENNIFER COLE
   Enter number of children listed → 3
3. Enter number of exemptions claimed for other persons listed at top of page 2 3
4. Enter the total number of exemptions claimed on lines 1, 2, and 3 5

Income

5. Enter all wages, salaries, bonuses, commissions, tips, and other compensation received in 1957, before payroll deductions.

Employer's Name	Where Employed (City and State)	(a) Wages, etc.	(b) Income Tax Withheld
I.B.M.	NEW YORK NEW YORK	$ 10250 00	$ 1240 20
	Enter totals here →	$ 10250 00	$ 01240 20

6. Less: (a) Travel, reimbursed expenses, etc. (See instructions, page 6. Attach required statements.) $ 200 00 — 200 00
   (b) Excludable "Sick Pay" in line 5
7. Balance (line 5 less line 6) ..... $ 10050 00
8. Profit (or loss) from business from separate Schedule C .....
9. Profit (or loss) from farming from separate Schedule F .....
10. Other income (or loss) from page 3 (dividends, interest, rents, pensions, etc.) ..
11. ADJUSTED GROSS INCOME (sum of lines 7, 8, 9, and 10) ..... $ 10050 00

If social security tax (FICA) withheld from your wages exceeded $94.50, see instructions, page 5.

Unmarried or legally separated persons qualifying as "Head of Household," see instructions, page 7, and check here ☐ Widows and widowers who are entitled to the special tax computation, see instructions, page 7, and check here ☐

Tax due or refund

12. Tax on income on line 11. (If line 11 is under $5,000, and you do not itemize deductions, use Tax Table on page 16 of instructions to find your tax and check here ☐. If line 11 is $5,000 or more, or if you itemize deductions, compute your tax on page 2 and enter here the amount from line 9, page 2.) $ 945 10

If income was all from wages, omit lines 13 through 16

13. (a) Dividends received credit from line 5 of Schedule J ..... $
    (b) Retirement income credit from line 12 of Schedule K ....
14. Balance (line 12 less line 13) ..... $
15. Enter your self-employment tax from separate Schedule C or F .....
16. Sum of lines 14 and 15 ..... $
17. (a) Tax withheld (line 5 above). Attach Forms W-2 (Copy B) ..... $ 1240 20 — 01240 20
    (b) Payments and credits on 1957 Declaration of Estimated Tax (See page 8, instructions.) $
    District Director's office where paid ____
18. If your tax (line 12 or 16) is larger than your payments (line 17), enter the balance due here → $
    Pay in full with this return to "Internal Revenue Service." If less than $1.00, file return without payment.
19. If your payments (line 17) are larger than your tax (line 12 or 16), enter the overpayment here → $ 295 10
    If less than $1.00, the overpayment will be refunded only upon application. See instructions, page 8.
20. Amount of line 19 to be: (a) Credited on 1958 estimated tax $____; (b) Refunded $ 295 10

County in which you live: WESTCHESTER

Is your wife (husband) making a separate return for 1957? ☐ Yes ☐ No If "Yes," enter her (his) name. X

Do you owe any Federal tax for years before 1957? ☐ Yes ☐ No

TAXPAYER—I declare under the penalties of perjury that this return (including any accompanying schedules and statements) has been examined by me and to the best of my knowledge and belief is a true, correct, and complete return.

Sign here ____ (Your signature) ____ (Date) ____ (If this is a joint return, wife's signature) ____ (Date)

To assure split-income benefits, husband and wife must include all their income and, even though only one has income, BOTH MUST SIGN.

PREPARER (other than taxpayer)—I declare under the penalties of perjury that I prepared this return for the person(s) named herein; and that this return (including any accompanying schedules and statements) is, to the best of my knowledge and belief, a true, correct, and complete return based on all the information relating to the matters required to be reported in this return of which I have any knowledge.

Sign here ____ (Individual or Firm Signature) ____ (Address) ____ (Date)

cnr—16—73583-1

● ATTACH COPY B OF FORM W-2 HERE ●

EXEMPTIONS FOR PERSONS OTHER THAN YOUR WIFE AND CHILDREN

Name	Relationship	Number of months dependent lived in your home. If born or died during year also write "B" or "D"	Did dependent have gross income of $600 or more?	Amount YOU spent for dependent's support. If 100% write "All"	Amount spent by OTHERS including dependent from own funds
				$	$

Enter on line 3, page 1, the number of exemptions claimed above.

→ If an exemption is based on a multiple-support agreement of a group of persons, attach information described on page 5 of instructions.

ITEMIZED DEDUCTIONS—IF YOU DO NOT USE TAX TABLE OR STANDARD DEDUCTION

If Husband and Wife (Not Legally Separated) File Separate Returns and One Itemizes Deductions, the Other Must Also Itemize

State to whom paid. If necessary write more than one item on a line or attach additional sheets. Please put your name and address on any attachments.

Contributions

CHURCH 75.00
RED CROSS & COMM CHEST 20.00
MISC ORGANIZED CHARITIES 25.00

Total paid but not to exceed 20% of line 11, page 1, except as described on page 8 of instructions.... $ 120 00

Interest

TWO AUTO LOANS 318.67
HOME MORTGAGE 1050.38

Total interest 1369 05

Taxes

REAL ESTATE 587.11
AUTO LICENSES 38.50
CALIF STATE INCOME TAX 43.30
RETAIL SALES TAX & STATE GAS TAX 222.50
DRIVERS LICENSES 10.00

Total taxes 901 41

Medical and dental expense (If 65 or over, see instructions, page 9)

Submit itemized list Do not enter any expense compensated by insurance or otherwise.

1. Cost of medicines and drugs, in excess of 1 percent of line 11, page 1 ..... $
2. Other medical and dental expenses .....
3. Total ..... $
4. Enter 3 percent of line 11, page 1 .....
5. Allowable amount (excess of line 3 over line 4). (See instructions, page 10, for limitations) .....

Other Deductions (Including child care and casualty losses)

Enter child care expenses paid but not to exceed $600 Enter casualty losses which are not compensated by insurance or otherwise.

See page 10 of instructions and attach information required .....

Total

TOTAL DEDUCTIONS (Enter here and on line 2 of Tax Computation, below)..... $ 2390 46

TAX COMPUTATION—IF YOU DO NOT USE THE TAX TABLE

1. Enter Adjusted Gross Income from line 11, page 1	$ 10050 00
2. If deductions are itemized above, enter total of such deductions. If deductions are not itemized ***and line 1, above, is $5,000 or more:*** (a) a married person filing separately enter $500; (b) all others enter 10 percent of line 1, or $1,000, whichever is smaller	2390 46
3. Balance (line 1 less line 2)	7659 54
4. Multiply $600 by total number of exemptions claimed on line 4, page 1	3000 00
5. TAXABLE INCOME (line 3 less line 4)	4659 54
6. Tax on amount on line 5. Use appropriate Tax Rate Schedule on page 11 of instructions	945 10
7. If you had capital gains and the alternative tax applies, enter the tax from separate Schedule D	
8. Tax credits. If you itemized deductions, enter: (a) Credit for income tax payments to a foreign country or U. S. possession (Attach Form 1116) $; (b) Tax paid at source on tax-free covenant bond interest and credit for partially tax-exempt interest. Enter total →	
9. Enter here and on line 12, page 1, the amount shown on line 6 or 7 less amount claimed on line 8	$ 945 10

cmr—16—73583-1 GPO

Mademoiselle®

The magazine for smart young women

March 1958

50 cents

What price fashion?

Spring buys
from
$12 to $30

Career issue:
How much should you
give to a job?

Shoes and stockings:
new focus

Children's
Easter primer

Paris
extra

For a new look at leisure go to

Britain

By Phillip Andrews

The British, architects of the steam engine, the industrial revolution and various other innovations that have led to a more complex existence, have wisely provided antidotes in the form of weekends and "hols" (short for holidays, of course —"bank" and otherwise).

Furthermore, in their own country and abroad, they have demonstrated a sixth sense for intrinsic travel values. They were the first foreigners in any number to appreciate the charms of Italy, the winter sports prospects of Switzerland and, in more recent years, the rugged beauty of Spain's Costa Brava.

They have also applied their "make-do-and-mend" philosophy to travel and leisure with singular success.

Confined to their tight little isle for long periods at a time by wars, currency controls and other considerations, they have found a Venice of their own in British canals and rivers, ski facilities of a sort on the slopes of Scotland, a Riviera on the Cornish coast, and they have even developed their own version of Western trail-riding.

Accordingly, if you want to get the most out of your trip to Britain it may help to follow the example of Britannia on a holiday.

You will begin, of course, in London, which is not really a city but the largest, most populous collection of towns and villages on earth. If you want to look, act and feel like an American tourist, try to do it all in a few days.

But if you would do London as the British do, you will divide in order to conquer. The best place we have found to appraise the size and scope of your amiable adversary (and a Briton showed us the way) is the top, but the *very* top, of St. Paul's. (You will have no difficulty in finding the Cathedral, for the blitz and buzzbombs have leveled nearly everything for blocks around and such buildings as you see are conspicuously new.)

Look long and well at Sir Christopher Wren's masterpiece and before you go inside breathe deeply several times. Your climb begins at the crypt, continuing upward from the tombs of Nelson and Wellington, Turner, Reynolds and Millais to the Whispering Gallery and on to the Stone Gallery.

If you are an ordinary tourist you will stop here; but an able-bodied Briton with a modicum of curiosity will climb higher still, to the Golden Gallery—more than 600 steps in all and some 365 feet above the city streets.

On a clear day (the London fog, if not a figment of Conan Doyle's imagination, is at least slightly exaggerated) you can see all of London and much of the country beyond. With a good map to plan your course (London is extremely well charted) you'll find that it is not far from where you are to Dr. Johnson's house (where he and six assistants compiled a classic dictionary), Trafalgar Square, the National Gallery, St. James's Palace and Park, Buckingham Palace, Westminster Abbey and the Houses of Parliament.

After a midmorning cup of coffee (it's no worse than *our* version of *their* tea) you may feel fit to do your sight-seeing, at least in part, in the British manner, which is to walk with measured gait seemingly impervious to the world around you—but not missing a thing.

When you tire of strolling along Victoria Embankment, Birdcage Walk, Whitehall and the Mall, you'll do as Britannia does—take to a taxi, a bus or the underground.

London taxis and drivers are as fine a combination as you will find anywhere and the fares are quite cheap. Unlike many of our own cabs, they were designed for the purpose intended. There is convenient space alongside the driver for your luggage, plenty of headroom and a generous view of the passing scene.

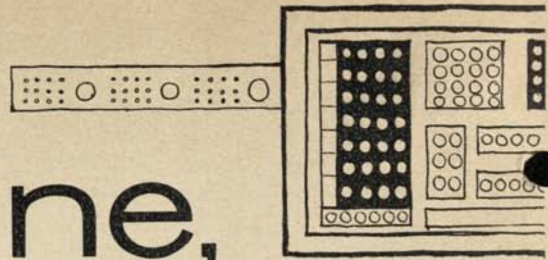
London buses are big, red, double-decked and provide a lofty vantage point where you may smoke if you wish. The price you pay is according to the distance traveled, but it's a long ride that comes to more than a shilling, which amounts to fourteen cents U.S.

When Londoners are in a hurry to get from one part of their sprawling city to another they do as New Yorkers, Parisians or Moscovites do—they go underground. Here again the farther you travel, the more you pay. But in any case it won't [Continued on page 52]

The Elizabethan Room at the Gore Hotel offers a unique dining experience for London visitors

Shopping in Britain for antiques, woolens or anything else is best done at a leisurely pace

By Katherine Kirkbride and Kent Garland



Machine, what do you think?

Jobs in automation

Picture a long, thin, coffin-like room, thirty feet long, twelve feet wide and twelve feet high. There is a furry brown spider in the center of one of the end walls. An ordinary housefly sits in the center of the opposite wall, one foot from the ceiling. How do you find the shortest possible route along which the spider should crawl to reach his dinner?

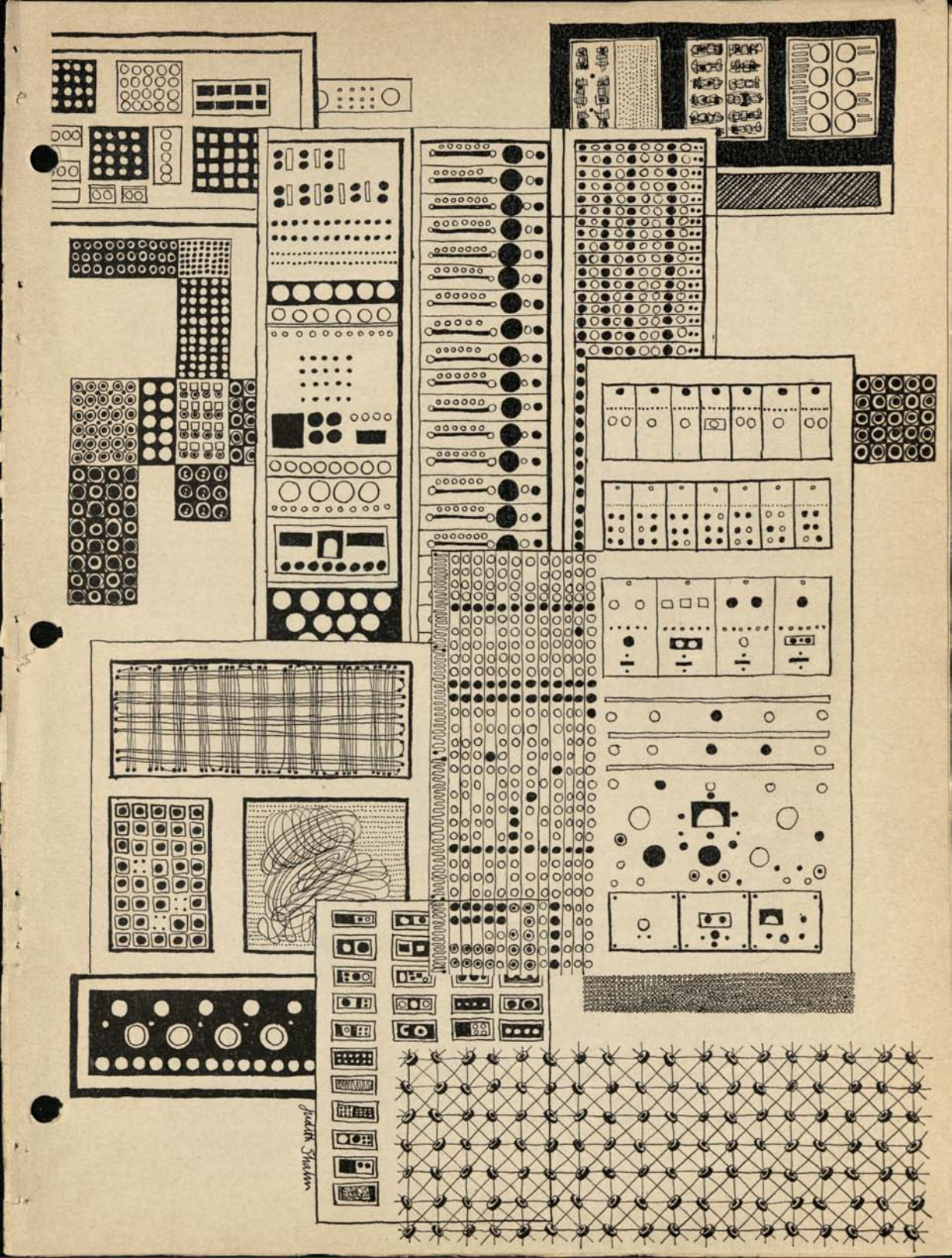
The mind that solves puzzles of this sort easily (for how-to see page 157) is worth plenty of dollars today, and not just in the circulation-booster contests of the country's daily newspapers. A talent for solving puzzles is a good aptitude barometer for work in automation—a field that is eagerly recruiting orderly minded, logical young women who, say their bosses, perform every bit as well as orderly minded, logical young men.

The wonders of automation first caught the public eye when, in the early evening hours of November 4, 1952, a machine predicted, with many of the voting polls of the country still open and only a portion of the nation's votes recorded, that Dwight D. Eisenhower would be elected President of the United States by a nation-wide landslide. The men feeding the machine said no, the machine was too optimistic, and rigged it to reach a conclusion that coincided with their own dimmer viewpoints. Later, when the machine's first answer proved correct, a broadcaster quipped, "The trouble with machines is men."

Since that historic night the electronic computer has become a marriage counselor with hardly a divorce to its record (which is more than human counselors can claim). It has recorded data on freshmen entering college, foretelling with 95 per cent accuracy who would flunk out. It has shown promise of predicting stock growths, forecasting weather and calculating population increase. One authority suggests that world wars might be fought with computers. At least the side with the better computers and a sharper knowledge of how to use them would hold the advantage. The computer brain has composed songs, diagnosed human ills, made up pay rolls, foreseen the course of floods and checked airline reservations. For a jet-engine plant outside of Cincinnati it simulates mathematically the design of planes still on the drawing boards, ending the necessity for making expensive and time-consuming models to test. A computer is telling an oil company the most profitable way to run its big refineries. And with the new Monte Carlo technique the computer may make it possible to solve business problems that couldn't even be stated formerly, let alone solved. To amuse itself the computer plays chess—a game at which the people who hold automation jobs also very often excel.

The supercompetence of the electronic robot has led some economists to warn that it will put humans out of work, decrease the number of jobs awaiting those in school and wither man's creative spirit by forcing the human mind to conform to the mechanistic one. Others point [Continued on page 155]

Illustrated by Judith Shahn


Judith Shahn

By Florence Stevenson

Part-time jobs

While the four-day week is yet a "perhaps" and a promise, the four-hour day is here—at least for the moment—as the part-time job. Even in our present fluctuating economy (as we go to press employment is on the decline but expected to pick up), there are still so many openings for typists and stenographers that firms are willing to hire qualified part-timers for routine office work—dull for a whole day, just bearable for half. The interesting job filling a morning, afternoon or evening, leaving hours free to finish painting or housework or to care for tots home from nursery school, is very hard to find, though not impossible. Following, some examples:

The pollers. Market research firms such as Crossley, S-D Surveys, Inc., employ people who go from door to door asking questions about popular products or trends. Hours are short but a girl must be on call at almost any time—day, night or weekends. Pay ranges from $1.40 to $1.70 an hour.

Teachers without credentials. (1) The Y.W.C.A. has part-time openings for college grads who can teach languages, art, games, swimming—any subject fitting into their vast adult education programs. Pay depends on location of Y. but can go as high as $5 an hour. (2) Girls who've really mastered their major can find tutoring jobs; e.g., young women living in college towns often make $3 to $5 an hour guiding athletes through the mazes of higher math. To find tutoring jobs, try college placement offices. (3) Church-operated nursery schools welcome young women who can manage groups of children. They prefer to hire college graduates but will take girls with some college training if they can't find B.A.'s.

Teachers with credentials. (1) Substitute-teacher jobs are available in local high schools. Pay is high but part-time work is uncertain as it depends on the health of the permanent teacher. (2) Elementary schools have niches for teachers with specialties such as typing, music, art or drama.

Good medicine. Doctors hire part-time receptionists, prefer college grads since the job is more than merely receiving patients. Girls often learn to take blood counts and give hypodermics. Jobs pay anywhere from $20 to $50 a week depending on hours—and doctor.

Science major. Laboratories have openings for graduates with science degrees. The jobs are working as technicians or filing microfilms and case histories. The work requires accuracy—even a small mistake may mean a disaster. [Continued on page 70]

Machine, what do you think?

[Continued from page 92]

Lois Haibt, IBM

Rita Stern,
Remington Rand

Anne Gardner
Remington Rand

out that the machine has introduced into American office life possibilities that to be realized require a new work force. People who today take up careers in automation, they predict, will hasten the arrival, for the rest of us, of the thirty-hour week and the three-day weekend.

To meet the young women undertaking automation jobs and to learn the nature of their work, we went to the New York City headquarters of automation, into IBM and Remington Rand.

Anne Gardner, a programer at Remington Rand, gave us our first look at the imposing, humming Univac. She pointed to the machine's five components: the magnetic-tape input mechanism, the mercury memory unit, the arithmetic device, the control or co-ordinating section and the output printer.

Anne is a serene, blond girl with soft gray eyes. You are surprised that she is a mathematician until she starts to explain her work. Then she is so wrapped up in what she is talking about that she seems to forget that anyone else is present. Anne says that the electronic brain awed her at first, but "it's like learning a language. You learn a new alphabet. It doesn't take long. Then you can manipulate the symbols the machine uses."

Programing, Anne explained, means instructing the machine in what it's to do. Her instructions for the machine are in code and may read something like this: "When you receive these four bits of information, do this to them. With the result you obtain, do that. When you are finished, store the result away where you can locate it when I ask for it."

But before you can feed the machine a problem you have to take the problem and break it down into certain steps suitable for machine-processing. "You have to enjoy working with the minute details of a problem," Anne says. (She believes many women have this ability.) "And you have to be very logical. If you put a problem to the computer with one part that isn't logical the machine will detect it immediately."

To be sure her programing for a complicated program is mistake-proof, Anne figures out by hand simple examples of the equations she wants to solve, then tests to see if the computer gets the answer she did. "I get terribly excited," she says, explaining her feelings when a problem is ready for the machine, "to see if this time the machine will come out with the right answer. I don't know night from day. I'll even get up for the 2:00 A.M. shift and hurry to work all anticipation."

She has, Anne says, even spent a straight twenty-four hours checking the gradual behavior of equations while the machine computes them. Her husband questions the hours she keeps with Univac, but being an electrical engineer himself, now working for his Ph.D. at Brooklyn Polytechnic, he can understand her infatuation.

Anne was a Phi Beta Kappa at Brooklyn College, where she majored in psychology, minored in math. The summer she left college she hunted two months for a job that pleased her. When an employment agency finally suggested programing she thought that it had something to do with TV and that it just couldn't be for her. But Remington Rand's brand of programing, she feels, she is suited for. She now says: "I would have a hard time finding a job I could be happy with if I had to give up programing." And this is not because Anne is a one-interest girl. There have been times (she blushes when she speaks of it) when she has thought of trying to become an actress. She currently gets a great deal of enjoyment from exotic cookery. And after a hard day's work with the computer she regularly goes off to evening classes where she studies oil painting. Sometimes she is tired at night when she sets off for her four-hour painting class, but she soon throws off fatigue, for she is always absorbed in what she is doing.

Anne started at Remington Rand the same day as Eugene F. Klausman. Eugene was a securities salesman on Wall Street before he "converted" to the computer. Today he is the executive in charge of training people for Remington Rand programing positions, pay for which ranges from four thousand to ten thousand dollars a year. The majority of programers should have college backgrounds, Klausman believes, but the field in which the college degree is earned is not important. "We are looking for people who demonstrate an ability to analyze problems logically." (Mathematics, science, philosophy, economics and accounting are all considered "problem-solving areas of study.")

There is a story at IBM about a girl who called up one day and said: "I'm wondering if I have the kind of mind you need. You know that logic puzzle about the monkeys and the balls? Well, I can solve that." She took the IBM aptitude test, passed it, and a few days later left her job in the art department of an advertising agency. After fourteen months her income had doubled. Now, instead of planning page layouts, she plans trajectories (curved paths) for guided missiles.

Sometimes the automation mind runs in families. Lois Haibt's father was an optical engineer. Her mother was "always good at math." Her brother excelled in his naval academy at the highly involved study of fluctual ocean currents. Lois wrote a high school term paper on the "importance of puzzles" and was a math major at Vassar. When we first met Lois she was an assistant mathematician working with a group of IBM people in an East Side hotel while IBM finished new quarters at 425 Park Avenue. Lois does not work on solving a specific problem but on the solving ability of the machine itself.

She and her colleagues are developing "Fortran" (formula translation), which is a system of converting mathematical equations into machine language automatically. They are, in Lois' words, teaching the computer to state the problem in terms of its own so it can then solve the problem. Fortran is expected to cut down the time, money and man power now spent in the process of translating language to a system of numbers (coding).

Lois won't give the computer credit for being one bit smarter than she. If she has made a mistake writing the instructions the computer won't correct her. She moans: "It does just what you tell it to do, which is not always what you *want* it to do."

This twenty-two-year-old girl started at IBM with a salary of five thousand dollars a year, and increased her income to six thousand in eight months. Evenings she gathers with friends who shoptalk science. Her husband is studying for a Ph.D. in math and working part time for IBM. Together they are reading the four-volume *World of Mathematics*. They can also get very excited about a hi-fi record, they say, but admit the technical production of the music means more to them than the music itself. To win a bet about whose set produces the highest and lowest overtones, it is said, the Haibts and any one of their friends would rent an oscilloscope at the drop of a hat.

Lois spends a good part of her day at a large bare desk writing up instructions for the computer to follow. The IBM 704 that she works has eighty-six operations and she must select and sequence (work out step by step) those which, when run through the computer, will give her the answer to the problem at hand.

Lois waits her turn at the machine in a glass-enclosed, red-walled balcony above it. One or two white-shirted young men are usually sitting on the floor riffling through punched cards in long file boxes. The girl who keeps the computer's social calendar tells Lois to stand by, ready, so that when the person before her is finished Lois can step up for her "date" immediately. The machine runs twenty-four hours a day, challenging the people who work with it to keep pace. Lois mustn't waste an instant. The machine's time is worth $685 an hour.

But if the machine's time is valuable, so is the time of the people who work in automation. We caught Rita Stern of Remington Rand between trips. Rita is a dark-haired, vital girl who was graduated from Hunter College with a B.A. in economics and minors in math and English. A native-born New Yorker, Rita attended New York's High School of Music and Art (for talented children) and still plays the violin occasionally. Many of her friends are musicians, and she likes the theatre when she is in town.

Rita is something of a perfectionist and has the kind of mind that follows mathematical reasoning; yet her vitality adjusts to the job of systems analyst. She travels much of the time, either alone or leading a team of two or three people, to visit companies that may rent or buy a computer.

"It means a lot," Rita told us, "just to get around to different places and see what goes on behind the scenes of big companies."

There are two stages of the work in Rita's department: one, analyzing areas of work that lend themselves to the computer, such as inventory, pay rolls, sales statistics and billing operations. She may visit a company before it has purchased a computer, act as a consultant judging the needs of the prospective client. In the second phase Rita may review a company's operation and help adjust Univac's abilities to the company's needs after the machine has been installed.

Rita believes each new company is an educational exchange. "They teach me their business, their terms. I teach them ours. Each time I am faced with a new set of circumstances and I have to design an appropriate way to handle them on the computer." Univac can find the answer, Rita says, if she can state the problem.

When Rita visits companies considering the purchase of a computer, she tries to deport herself as a technical adviser, never as a saleswoman. Yet she is aware that her conduct, her presentation are bound to influence the sale.

On her trips away from New York home is a hotel, sometimes for weeks; but Remington Rand pays all expenses. In fact, Remington Rand pays systems analysts very well: a trainee earns four thousand dollars a year while going to school. Seven years' experience in the field pays ten thousand to twelve thousand dollars a year.

Rita stepped into an automation career through a night course at N.Y.U. "We had given a free evening course," one personnel man explained, "open to all metropolitan college students. Rita took it and when the course was over applied for employment."

Free evening courses aren't always available to people seeking careers in automation, but regular training courses are. Courses for programers last six weeks. An introductory course of two weeks is open to business executives, systems and methods analysts; and a logical-operations course is recommended for operational and maintenance personnel. Students who take these courses watch the computer in operation and see problems processed.

While personnel men prefer college background for jobs such as Rita's, Lois' and Anne's, automation also has many jobs for high school graduates. Some are in clerical and secretarial work. Others are coding jobs, keyboard-operating and Unityping (typing on a machine connected to the magnetic tape fed the computer). Executive secretaries use typewriters that type a letter and at the same time punch the message on a five-channel paper tape for filing.

All of these jobs require more skill than former so-called "mechanical" office jobs did; in fact, all automation companies are upgrading their people.

Unemployment caused by automation just isn't discussed by the computer companies. They have their ways, they say, of avoiding that. Normal employment turnover takes up

Let's go

[Continued from page 56]

You too can travel solo. If the lack of a traveling companion is keeping you at home when you would like to be winging your way to faraway places, we have news for you. Wherever we go in the world these days we meet young ladies traveling alone and loving it.

There is something to be said, we are told, for being able to come and go as you like, to stay up or sleep as late as you please, and to have no worries about whether the young man you meet has a friend for *your* friend.

One of the disadvantages *used* to be that a lone woman traveler had difficulty in coping with some of the technicalities with which men are, or at least pretend to be, more familiar. But not any more.

Sabena Belgian World Airlines, for example, "in recognition of the important role women are playing in world travel, and particularly by airplane and helicopter," founded four years ago the world's first "petticoat" sorority. It's called the Lady Sabena Club and its membership is now numbered in the thousands.

There are no dues, no fees, yet the benefits are considerable. You become eligible for membership the moment you book passage on Sabena's transatlantic service—and it doesn't matter whether you're traveling de luxe, first class or tourist. After you have filled in your application blank you receive an attractive certificate ("suitable for framing") and a membership card. Either of these constitutes, at least in part, your passport to carefree travel and you begin to feel like a Very Important Passenger even before you board your plane in New York. The sorority has its own Fifth Avenue clubrooms, a pleasant place to relax between last-minute shopping excursions and to meet your friends—male or female.

Here "Mademoiselle Sabena" (happy choice of a name) will give you advice on matters concerning baggage, customs formalities, immigration and public health requirements. (Sabena takes care not to impinge on services generally rendered by your travel agent, but there is always a chance that you may have forgotten something.)

At the Sabena section of New York's International Airport (breath-takingly new and modern, by the way) you will find that your membership card makes the airline ground personnel seem even *more* polite and ingratiating than their usually charming selves.

Aboard the plane you'll appreciate the special attention, particularly if you happen to be traveling with small children. (The club, if we haven't made it quite clear, is for marrieds and mothers as well; and even your husband may suggest that *you* "take care of that little matter" through your influential affiliation.)

Upon arrival in Brussels you'll find another Mademoiselle Sabena at Melsbroek airport to assist you in making flight connections or finding a place to stay if you've neglected to make reservations or are told that they haven't been confirmed. She

slack, and every automating company retrains people who want to stay. Tedious jobs, they say, are being ruled out, and work is automated offices becomes more stimulating to the mentally alert and more lucrative as people are upgraded.

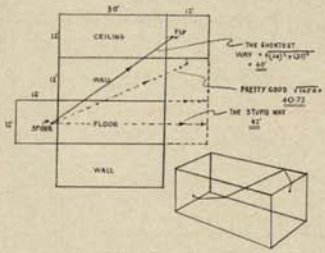
And automation has more jobs to offer, even, than those begging to be billed at the big computer companies. (The big computer companies include Burroughs, Minneapolis-Honeywell, Raytheon and RCA as well as IBM and Remington Rand.) Computer companies have customers and their customers need computer employees.

Some of these customers are General Electric, Westinghouse, Sylvania Electric, U.S. Steel, Metropolitan Life Insurance, Franklin Life Insurance in Springfield, Illinois, Pacific Mutual Life, John Hancock Mutual Life Insurance Company in Boston, the Carborundum Company in Niagara Falls and the U.S. Government. The Bureau of the Census was Univac's first customer.

Automation people insist there are more jobs today rather than fewer, in spite of the speed of the computer, because in business and science there is more basic information to be processed, and while the computer "thinks" fast it takes people to process material fed to the machine, others to process the information after it's come from the computer's "output."

Even more difficult to answer than the economists' worries about unemployment and a possible depression is the moral critics' fear of sick humans with spirits deadened by the machine. One moral critic warns against conformity and uniformity in society and of future machine neurosis. "The machine never conforms to you," he says, "you must conform to it."

It is basically aptitude that impels people to enter the field of automation, the kind of mind they have. And it is aptitude that holds them there. Too, many in the field believe in the social significance of automation, hoping, and even feeling certain sometimes, that they are part of a new machine world that can one day free man's mind from tedious labor and grant the needed leisure for higher pursuits.



Answer to the spider-fly puzzle: cut a sheet of paper, folding it to make a model of the room, then join the two key points by a straight line. Above, diagram shows the *best* route to the fly and alternates.

speaks English, of course, probably several other languages besides her own, and will find an interpreter should you have urgent need to converse with a maharaja or a Tibetan monk. She will also locate temporarily misplaced husbands ("I distinctly said the *Palace* hotel, which doesn't sound a bit like 'Metropole' "—or does it?). Mademoiselle Sabena will explain how easy it is to convert (mentally) francs into dollars and vice versa. ("Just think of fifty francs as a dollar bill.") If you require medical attention she'll find you a good doctor, or a cleric to attend to your spiritual needs. (Case history: A Spanish woman wanted a Spanish-speaking priest—not an easy assignment in French-Flemish Brussels—but Mademoiselle Sabena found one within the hour and is proud of the thank-you letter she received, laboriously written in *English*.)

Spanish women remind us of mantillas and mantillas remind us of lace. Belgian lace is as delicately fine as a cobweb and as a member of this international air sorority you will be able to buy it at a special discount.

In Paris, Mademoiselle Sabena will arrange for you to attend a fashion showing, and in Manchester she might even set up an interview with your favorite *Guardian* editor. Wherever you go on Sabena's vast international network, which even extends into the Congo, you'll never lack for a friend, adviser or confidante. So you see there's no reason why you shouldn't set off alone on a two-week tour of the Continent —or an African safari.

And speaking of safaris, the coupon on page 56 will bring you detailed information on a surprisingly inexpensive one as well as literature on other Sabena tours.

A trip to Europe may be as near as the jewelry store on the corner, and it won't cost you a penny for transportation. Keepsake, the diamond-ring people, have two first-class tickets to London, Paris, Amsterdam and Rome via KLM-Royal Dutch Airlines that they would like to dispose of in their current "giant sweepstakes." As we understand it there is no catch, nothing to buy. All you do is drop in at any Keepsake jeweler and ask for an entry blank, or write (a post card will do) to A. H. Pond Co., Inc., Syracuse 2, New York. If you miss out on the grand prize there's still a chance that you won't be left empty-fingered for your expression of interest. There are fourteen Keepsake diamond rings to bring you consolation.

The passport photo, traditional deflater of egos ("Do I look like *that*?") is undergoing some much needed improvement. Frances Knight, director of the Passport Office, has been encouraging photographers for some time to "humanize" their subjects. Now, Miss Knight announces, *color* photographs will be acceptable if they meet requirements as to size (2½ to 3 inches square) and permanence. "Color," she says, "provides more accurate identification . . . can be more appealing."—PHILIP ANDREWS

The free-lance life

[Continued from page 96]

with the rakish air of a stray cat as she appeared briefly at the office in her shabby suit to collect her second-rate assignment.

Maybe it's time to take another look. Nowadays your free-lancing friend may turn up to escort *you* to lunch on her credit card (the better to declare it as a tax deduction, my dear). And somehow your own salary, in terms of what's for keeps after Uncle Sam has had his bite, isn't as big as the original pie had led you to hope it would be.

What happened when to whom?

Our present Federal income tax structure is the clue. Evolved at the onset of World War II, it has resulted in a drastically revised system of compensations and promotions.

Specifically, income tax created the contemporary Expense Account Society, that hard core of senior business executives rewarded not primarily by larger salaries (which inevitably boil down to proportionately smaller incomes on the up-sliding tax scale) but by fringe benefits—luxuries to be had for the signing and (despite the new 1958 policy of closer Government scrutiny) not easily verified on the expense account, affectionately immortalized as the swindle sheet, on which probably more imaginary characters have been wined and dined than have ever been invented for the entire body of English fiction.

Second and subtler, this same tax setup has made free-lancing in many specialized occupations—such as illustrating, writing, editing, styling, scripting—a sound business proposition. *If, reasonably capable and experienced, you offer a service and know the market,* you have a realistic choice between deciding to stay on salary or striking out on your own.

Let's assume you've been out of school and working four years in a full-time job. You've learned the ropes, made friends in the field, acquired particular skills. For a forty-hour week you earn $5,000 a year—with *no* cushy expense account because you're a *junior* executive. If you're unmarried, without dependents and take the standard 10 per cent deduction of $500 on $5,000 plus the personal exemption of $600, your taxable income would be $3,900, on which you'd pay an average Federal income tax of slightly over $800. Social security comes to $95 more. Exclusive of State income taxes, which vary widely, this leaves roughly $4,100 for the year's work or about 20 per cent less to spend than you thought you had.

Earning $5,000 free-lancing gives you many more deductions. Although every return will vary, let's consider one at random. Working at home, you may possibly deduct about one-third (it may be more, it may be less) of your apartment rent (perhaps $600), a proportionate percentage of maid or cleaning-woman bills ($200), telephone bills in excess of the minimum monthly charges ($100), business stationery and supplies ($100), miscellaneous such as reference books, magazines, professional club dues, business travel ($200), workaday taxis ($150), plus a reasonable percentage of restaurant, theatre and at-home entertaining ($250)—provided you are able to substantiate it in that deadly annual duel between you and the revenue agent. These deductions add up to about $1,600, leaving an adjusted gross income of $3,400. (If a car is essential to your work, you may claim part of its depreciation, garaging and upkeep as well.) From this adjusted gross income of $3,400 is subtracted the 10 per cent standard deduction of $340 and the personal exemption

18. You and Your Job

By Walter Lowen

Spot for Mathematician

I am a young lady, aged eighteen, in my first year of college. While I am a good student, my main interest is mathematics, in which I get very high marks. I do not know whether I'll be able to continue college after the first year and upon leaving wonder where I can best use my mathematical ability. I do not refer to accounting work but rather some sort of mathematical research. Do you think there would be an opening in some engineering company for me or do you know if there is some school where I can continue my studies in mathematics with a view of later getting a job where I can make use of the subject in which I am most interested? Miss H. C.

With the rise of the electronics field and the giant electronic computers, you will find no trouble obtaining employment. These computers can make up large payrolls in a matter of minutes. Persons good at mathematics, preferably with a college degree but not necessarily, are employed by IBM (International Business Machines Corp.) as programmers. They are trained for several months to take mathematical problems and state them so that the giant computer can understand and electronically supply the answer. A well qualified programmer may qualify for a $5,000-a-year-job—with rapid advancement directly dependent on demonstrated ability. The next step up is to the position of analyst. There is a constant demand for mathematical ability in the engineering department. Address a letter to R. W. Berner, I. B. M. Corp., 590 Madison Ave., N. Y. 22, N. Y. for further information. You might be near an IBM office and wish to stop in to see what a computer can do. For example, they help design jet aircraft.

• • •

Would you please tell me where I could get information about a teaching position abroad with an oil company. I mean teaching in a school operated by the oil company for children of their employees. Miss M. C.

A high school principal suggests that you write to The Institute of International Education, 1 E. 67th St., New York 21, N. Y., for lists of overseas teaching jobs. Also write to the Personnel Directors of The Shell Oil Co., 50 W. 50th St., New York 20, N. Y., and The Esso Standard Oil Co., 15 W. 50th St., New York 20, N. Y. She also recommends The Dorothy Marder Teachers Agency, 342 Madison Ave., New York 17, N. Y.

• • •

Your column seems to me to fill a long-felt need for people who want to do things and do not know how to go about it, especially those of us who live off the beaten path. As a resident of Vermont, can you help me with these questions: Do television broadcasting stations buy free-lance material? If so, should it be in story form, synopsis or script? Could you recommend any publication which covers this field? Mrs. W. B.

A successful free-lance friend recommends you write to Publisher's Weekly, 62 W. 45th St., New York 36, N. Y. for a list of reputable TV script representatives. Should you submit a story idea or script to a station direct, it will probably be quickly returned to you, perhaps unopened, with a request that you release all rights to the idea before they even look at it. Experience has taught them the necessity of this to avoid suits for theft or plagiarism. Upon receipt of your list of representatives, who charge ten per cent in case of sale, contact one or two by letter—enclosing samples of your work—and tell them you would like to write for television. If you show talent they will help you.

(Mr. Lowen will answer inquiries from readers in his column. He regrets that it is impossible for him to reply to requests for information by mail.)

How About YOU and Your Job?

The following leading employment agencies each Wednesday in this space offer a

MID-WEEK CAREER-JOB CHECK LIST

May we suggest that you read these ads carefully. Your future may depend upon it.

601—Agencies—Women

Webinger Service

702—Agencies—Men

ENGINEERING

702—Agencies—Men

ALL-AMERICAN SERVICE
22 EAST 40th ST., 9th FLOOR

NEW SCHOOL BULLETIN

VOL. 15
No. 19

JANUARY 6, 1958

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(For Associate Information, see page 157.)

Some of the subjects covered are: an examination of the roles played by an individual in his development as an effective adult; interpersonal relationships on the job with associates, supervisors and the public; added strain and stress of everyday business — criticism, fault-finding; the human relations aspects of promotion, employment and dismissal; the dilemma of the multiplication of meetings, committees and conferences; and individual plans for evaluating, estimating, and maintaining interpersonal relations of depth, creativity and variety.

408 COMPUTERS AND AUTOMATION. Wednesdays, 6:20-8:00 P.M. $27 (Reg. fee: p. 6). RUDOLPH E. HIRSCH. Assisted by Richard K. Ridgway and William M. Selden.

Automatic factory processes, payrolls, accounting, inventory control systems, and similar problems are examined in this course, which provides understanding of the uses and potentialities of automation. Students attend lectures and do practical work in the classroom and on computing equipment. A study of computer programming is made in sufficient detail to enable the student to design and apply basic computation and automation procedures in his field. Included in the material presented are the details of the methods of handling the data processing which underlies automation. Students are not expected to possess a detailed scientific background.

Guest lecturers: *Robert W. Bemer,* Manager, Programming Systems Department, IBM Corporation; *Robert D. Acker,* Programming Systems Coordinator, IBM Corporation.

Feb. 19	The history of automation to date. Mr. Hirsch.
Feb. 26	Automation: its potentialities and limitations. *Mr. Bemer.*
Mar. 5	The hardware and techniques of automation. Mr. Hirsch.
Mar. 12	Control, the key to automation. Feedback. Mr. Selden.
Mar. 19	Visit to a modern data processing center. To be arranged as convenient.
Mar. 26	Computers as control devices. Mr. Selden.
Apr. 2	Input/output. Mr. Ridgway.
Apr. 9	Basic computer programming. Mr. Selden.
Apr. 16	Stored programs and the arithmetic unit. Mr. Selden.
Apr. 23	Establishing feedback loops. Mr. Ridgway.
Apr. 30	Detailed descriptions of applications. Mr. Selden.
May 7	Class problem decided upon and considered. Mr. Ridgway.
May 14	Class problem solved and explained. Mr. Ridgway.
May 21	Description of various practical business applications. *Mr. Acker.*
May 28	Review and evaluation. Mr. Hirsch.

PUBLIC RELATIONS

416 PUBLIC RELATIONS AND JOURNALISM: PRINCIPLES AND PRACTICE. Tuesdays, 6:20-8:00 P.M., beginning February 11. $27 (Reg. fee: p. 6). RALPH OBER.

A comprehensive course for beginners and advanced students ranging over the entire area of publicity, public relations and journalism. This course bridges the gap between the closely allied fields of publicity and journalism.

Media, including newspapers, columns, wire services, radio and television, magazines, trade papers, house organs, technical journals, etc. are studied intensively Practical experience in news and feature writing for all media. Preparation of radio and television material given special attention. Analysis includes preparation and planting of pictures, news and feature layouts. Class discussion and criticism of students' presentations.

(Continued)

Object of the course is to help master techniques of writing acceptable copy, to plan and conduct successful publicity campaigns, to develop and maintain strongest possible relations with all sections of press and other media.

422 PUBLICITY WRITING. Fridays, 8:30-10:10 P.M., beginning February 14. $27 (Reg. fee: p. 6). SELWYN JAMES.

The course covers the elements of writing form and technique in the field of public relations. Its aim is to develop in the student an ability to write news releases, feature stories, personality profiles, circular letters, squibs for radio and newspaper gossip columns. Emphasis is on a simple, concise prose style devoid of clichés and over-used publicity devices gradually falling into disuse; on the importance of legitimate news in publicity releases, and the unresponsiveness of editors to obvious publicity spaceseeking; on the methods of reaching the broadest readership with news normally interesting to a limited audience; on the treatment of specific material — whether, for example, to employ the spot news technique or the suspended interest form; on the imaginative presentation and interpretation of statistics; on the editor-publicity writer relationship, the mechanics and organization of newspapers and magazines.

Essentially a workshop; assignments to be done at home are made at the end of each class so that the student may derive as much experience as possible through practical work. The course demands ability to write grammatical English, but is open to beginners as well as to those who are now or wish to become associated with public relations and publicity work.

426 NEWSPAPER ADVERTISING. Tuesdays, 6:20-8:00 P.M. $27 (Reg. fee: p. 6). STANLEY K. BABICH.

This course is designed for those interested in entering or advancing themselves in the newspaper field as newspaper advertising representatives.

The techniques and practices discussed are largely those which have been tried and proven by the more progressive newspaper advertising departments. Each student undertakes an assigned advertising project, involving step by step development from market analysis to salesmanship, to an advertising campaign. The advertising manager of a metropolitan and a suburban newspaper is invited, each in a separate session, to share his experiences with the class.

Feb. 11 Evolution and status of newspaper advertising.
Feb. 18 Knowledge of the market.
Feb. 25 The advertising representative and salesmanship.
Mar. 4 Writing effective copy, its aim, variety and organization.
Mar. 11 Typography and mechanics.
Mar. 18 Preparing effective layouts.
Mar. 25 Developing new ideas.
Apr. 1 Advertising that gets results.
Apr. 8 Advertising in metropolitan newspapers.
Apr. 15 Advertising in suburban newspapers.
Apr. 22 Comparative advertising rates, local and national.
Apr. 29 Building linage. Legal and ethical problems.
May 6 Operation of the advertising department.
May 13 Class discussion of individual term projects.
May 20 Review and summary.

R. Bemer, Mgr.
Programming Systems
DP Sales Service

FORM 70-7333-0

IBM OGRAM

December 13, 1957

SUBJECT: IBM'ER TO APPEAR ON TV SHOW

On Monday, December 16, Robert Bemer, Manager of Programming Systems, will appear on the FAIRLEIGH-DICKINSON TV Show (WATV-Channel 13, 3-3:30 PM, EST)

He will discuss with Martin Lipschutz, Instructor in Mathematics at the New Jersey university, the history of electronic computers from the abacus to the present.

Note: Television shows are, of course, always subject to last minute programming changes.

R. M. Wight
Manager of DP Information

Distribution: WHQ and White Plains Executives and Department Managers
Eastern Regional Manager, District 4 Manager
Branch Office Managers, Metropolitan Area
Bulletin Boards All Above Locations

Removal Date: December 17, 1957

R. Bemer, Mgr.
Programming Systems
DP Sales Service

FORM 70-7333-0

IBMOGRAM

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R. M. Wight
Manager of DP Information

Distribution: WHQ and White Plains Executives and Department Managers
Eastern Regional Manager, District 4 Manager
Branch Office Managers, Metropolitan Area
Bulletin Boards All Above Locations

Removal Date: December 17, 1957

Fairleigh Dickinson University
Rutherford and Teaneck
New Jersey

EDWIN COOPERSTEIN
DIRECTOR OF TELEVISION
AND RADIO

GENEVA 8-1600

November 29, 1957

Mr. Robert Bemer
International Business Machines Corp.
590 Madison Ave.
New York, N.Y.

Dear Mr. Bemer:

This note will confirm our telephone conversation of a week ago in reference to your appearance on a Fairleigh Dickinson University television program.

The date of the program is Monday, December 16, 1957. The program is seen on Station WATV, Channel 13, from 3:00 to 3:30 pm. It will be the second in a series titled "Science: Yesterday and Today", which highlights the history and background of various aspects of science, as well as their practical applications in modern life.

We would be very grateful if you would bring with you some of the material you used on our show this past summer; it worked out very well that time.

We shall be arriving at the television studio at 1020 Broad Street in Newark at 1:30 pm, and feel that this is enough time to rehearse by talking over what we hope to do on the program, much the same way we handled it last time.

Enclosed is a full outline of the series for your information. I shall call you a few days before the program as a reminder, and look forward to meeting you again. Many thanks for your assistance.

Sincerely,
Edwin Cooperstein
Edwin Cooperstein

FAIRLEIGH DICKINSON UNIVERSITY
Rutherford and Teaneck, N.J.

Office of Television and Radio
presents a new cycle in the TV series

THIS IS FAIRLEIGH DICKINSON

* * *

"SCIENCE: YESTERDAY AND TODAY"

Alternate Mondays

Station WATV-Ch. 13

3-3:30 pm

Eight half-hour programs present outstanding figures in science and engineering fields in the New York-New Jersey-Connecticut area discussing history, theory and practical applications of various aspects of science in today's society...

Moderator: DR. CLAIR BLACK, Dean of the School of Engineering and Science.

* * *

"SCIENCE: YESTERDAY AND TODAY"

Program	Program Title and Participants
# 1 - DEC. 2, 1957	SIGNIFICANCE OF SCIENCE IN TODAY'S WORLD Dr. Peter Sammartino, President, FDU; Dr. Sidney Kronish, Chairman, Social Sciences Dept.; Mr. Michael Dunham, School of Engineering and Science. Prof. Willy Ley, Rocket Expert.
#2 - DEC. 16, 1957	MATHEMATICS: FROM ABACUS TO ELECTRONIC COMPUTORS Faculty: Mr. Martin Lipschutz, Mathematics Instructor. Industry: Mr. Robert Bemer, International Business Machines.
# 3 - DEC. 30, 1957	CHEMISTRY: FROM ALCHEMY TO FISSION Faculty: Prof. Kathleen Hillers, Mr. Patrick Conway, Chemistry Instructors. Industry: Dr. James Black, Esso Research; Mr. John Lowry, General Foods.

Fairleigh Dickinson University
Rutherford and Teaneck
New Jersey

EDWIN COOPERSTEIN
DIRECTOR OF TELEVISION
AND RADIO

GENEVA 8-1600

September 25, 1957

Dear Mr. Bemer:

Now that the "Aspects of Education" cycle of the "This is Fairleigh Dickinson" television programs has ended its summer presentations, I should like to take this opportunity to thank you formally for your work and participation in one or more of the programs.

The twelve programs were seen over Station WATV, Channel 13, throughout the summer of 1957, featuring the work of five departments and schools of the University. The programs and all the participants included:

June 24	- Social Sciences:	UNITED STATES POLICY IN THE FAR EAST; Dr. Kronish, Dr. Weems, Dr. Chen.
July 1	- Social Sciences:	CIVIL LIBERTIES IN THE UNITED STATES TODAY: Dr.Kronish, Dr. MacKenzie, Dr. Mark.
July 8	- Social Sciences:	UNITED STATES POLICY IN THE MIDDLE EAST; Dr. Kronish, Dr. Fatemi, Dr. Evans.
July 15	- Psychology Dept.:	CHILD DEVELOPMENT; Prof. Kirscher, Dr.Irwin, Mrs.Taylor.
July 26	- Psychology Dept.:	INDIVIDUAL AND HIS CULTURE; Prof. Kirscher, Mrs. Jahoda, Miss Shafer.
Aug. 2	- School of Engin.:	ELECTRONIC COMPUTORS; Dr. Black, Mr. McCaffrey and Mr. Bemer of IBM.
Aug. 9	- School of Engin.:	NUCLEAR POWER IN INDUSTRY; Dr. Black, Mr. Strauch of AEC, Dr. Black of Esso.
Aug. 16	- School of Bus.Adm.:	SCIENCE OF SELLING; Prof. Feldman.
Aug. 23	- School of Bus.Adm.:	LOOKING AT AMERICAN BUSINESS; Prof. Feldman, Mr. Ratliffe and Mr. Rucker of AIM.

Aug. 30 - School of Bus.Adm.: EXECUTIVE SECRETARY IN BUSINESS; Prof. Feldman, Miss McConnell of Time Inc., Mrs. Sumner, Speedwriting Inst.

Sept. 6 - English Dept.: GREEK POETRY AND CLASSICAL STUDIES; Dr. Decker, Mr. Michalopoulos.

Sept. 13 - English Dept.: FDU LITERARY REVIEW SELECTIONS; Dr. Decker, Dr. Haberly, Mr.Angoff.

A special word of thanks must be said about the five moderators of the programs:

Dr. Sidney Kronish, Chairman, Social Sciences Dept.;
Prof. William Kirscher, Chairman, Psychology Dept.;
Dr. Clair Black, Dean, School of Engineering & Science;
Prof. Harold Feldman, Dean, School of Business Administration;
Dr. Clarence Decker, Academic Vice-President.

Without the aid, co-ordination of guests, and on-the-air moderating abilities of these five gentlemen, the series could not have been as successful as it was.

On the subject of its success, you may be interested to learn that "Aspects of Education" was the highest-rated educational show on Station WATV throughout the summer. The "Pulse" service ratings for July and August gave the Fairleigh Dickinson programs a .5 rating, whereas the Rutgers University and New York University programs garnered .3 ratings for those same periods...These ratings, when broken down into the number of television sets in homes and viewers per set in the metropolitan New York area indicates that the Fairleigh Dickinson programs were viewed in an average of 25,000 homes, or over 50,000 viewers per program!

During the series, mail was received concerning the programs ranging in questions from "What is the name of the theme music on the Fairleigh Dickinson program?" (Schumann's "Evening Song"), to requests for full transcripts of various programs. One program in the cycle, "Electronic Computors", was kinescoped at the request of the International Business Machines Corp. for use by their Department of Public Information.

Once again, on behalf of the University, and personally, my sincere appreciation for your assistance on these programs, and in the hope that we shall have the opportunity of working together again on behalf of Fairleigh Dickinson University and the community that it serves, I remain,

Sincerely,
Edwin Cooperstein
Edwin Cooperstein

Copy to: Dr. Sammartino.

FORM 70-4899-2

IBM OGRAM

WHQ, July 29, 1957

Subject: TV Discussion of Computers and Programming

R. Bemer, Programming Systems, WHQ, and W. C. McCaffery, of the IBM Newark office, will discuss the history, development, and future of electronic computers, with Dr. Clair Black, Dean of Fairleigh Dickinson College, on WATV, Channel 13, Friday, August 2, at 1 P. M. Special emphasis will be given to the growing need for programming personnel in industry today.

R. M. Wight, Manager
Data Processing Information

Distribution: Executives and Dept. Mgrs., WHQ, WTC, SBC
Eastern Regional Manager
District 4 Manager
Branch Managers, Metropolitan NY Area

Bulletin Board Removal Date: August 5

July 26, 1957

MEMORANDUM TO: Mr. R. W. Bemer

Thanks a million for helping us out so generously.

The television show will be at 1:00 o'clock August 2 at the Mosque Temple on Broad Street, Newark, N.J. The format will be a panel discussion with questions being asked by Dean Black of Fairleigh Dickenson College. The plan is to have two IBM representatives -- one with programming and research background -- the second with business background.

The questions will uncover the history, development and application of computers. We will have available four historical props: the Abacus, Napier's Bones, Pascal computer, and the Thomas machine. (If you can think of any other props, please let me know -- the more, the merrier!)

We have to be there an hour before the show for rehearsal so we could leave here 11:00 o'clock. I will pick up an AVIS Rent-A-Car and we can drive out with the models.

Thanks again.

G Capsis mm

G. Capsis

GC/mm

cc: Mr. D.C. Lake, NEWARK
Mr. R.M. Wight

Bill
W.C. McCaffrey

CHAN 13
WABD

AUTOMATIC CONTROL
THE APPLICATIONS MAGAZINE OF SYSTEMS ENGINEERING

430 PARK AVENUE
NEW YORK 22, N. Y.
MURRAY HILL 8-8600

May 27, 1957

Mr. R. Bemer
Programming Research
International Business Machines Corp.
590 Madison Avenue
New York 22, New York

Dear Bob:

Your conscientious authorship of an AUTOMATIC CONTROL feature article is sincerely appreciated. Working with you was an editor's **delight.** So I have had your byline permanently engraved on the enclosed remembrance. And I hereby extend a standing invitation to carry your byline on equally excellent articles in future issues of AUTOMATIC CONTROL.

Cordially,

Evan

Evan Herbert
Associate Editor

Enc.:
EH:tm

Remington Rand Univac
DIVISION OF SPERRY RAND CORPORATION

BAldwin 3-0600
19th STREET & WEST ALLEGHENY AVENUE
PHILADELPHIA 29, PA.

1 April 1957

Mr. Robert W. Bemer
Programming Research Department
International Business Machines Corp.
590 Madison Avenue
New York 22, New York

Dear Bob,

I am utterly delighted by your article in "Automatic Control". I'm trying to buy reprints (lots) so I can spread it all over. Of course, I liked the first paragraph, but best of all is your definition of "machine language". This does my heart good. So many many thanks from all of us for such a grand job.

I still don't have any B-Zero (now called Flow-matic by the Sales Department) manuals. But I'm sending

1. Flow chart and pseudo-code for an inventory run.
2. A complete report on a three-way merge run including file designs, flow charts, and final program.
3. The "hand-out" material used in the first course last week.

It will at least give you an overall view. We are busily engaged in adding eleven more generators and improving the overall operating time. In the meantime, we are using it steadily. Public release, with manuals, is now scheduled for June and/or July. This will be a first version--- we are improving B-1.

Again many thanks for the terrific article.

Sincerely,

Grace

Dr. Grace Murray Hopper

P.S. Could you send me Roy Goldfinger's address?

Science World

The magazine for high school science students • Feb. 19, 1957

YOU CAN JOIN THEM IN THE NEW AIR AGE

Today's Airmen of the U. S. Air Force are pioneering in the conquest of outer space. If you have a talent for math, or an aptitude for technical-scientific training, your opportunities are unlimited in the U. S. Air Force.

Airmen skilled in missile guidance, rocket propulsion, radio-radar and other allied career fields are making history today. They serve on "The New Frontier"—the frontier of outer space. Ask your local Air Force recruiter about the exciting technical programs the Air Force offers, or mail the coupon for full information.

U.S. AIR FORCE

PASTE COUPON ON POSTCARD AND MAIL TO: S-89-SW

Airman Recruiting Information Branch, Box 2202
Wright-Patterson AFB, Ohio

Please send more information on my opportunities in the U. S. Air Force. I am between the ages of 17-34 and reside in U.S.A. or possessions.

NAME_____

ADDRESS_____ AGE_____

CITY_____ ZONE____ STATE_____

Careers

The brains behind the 'brains'

A brand-new career field has opened up—feeding problems to giant electronic brains

One of science's new and fast-growing fields is digital-computer programming—doing the advance thinking for giant electronic "brains." For, despite the mathematical wonders they perform, electronic brains, or digital computers, are helpless without human brains behind them.

The human brains are supplied by digital-computer programmers—men who translate problems into the computer's language. The demand for such programmers is increasing so rapidly that a promising new career field has opened up to science students.

There are about fifteen thousand trained programmers in the U.S. today, according to R. W. Bemer, assistant manager of the IBM programming-research department. "In ten to fifteen years," says Mr. Bemer, "we'll need thirty thousand more. Many will come from the allied fields, of course—engineering, physics, chemistry—but we are particularly concerned about the students now in high school and college. As men and women, they will control the giant new 'brains' of the future—provided they head in the right direction."

The "right direction" consists of taking plenty of mathematics in high school and working toward a B.S. degree in college, with courses in mathematics, symbolic logic, set theory, and problem solving. An interest in idioms and the theory of language is helpful.

There are some fifteen hundred digital computers spotted around the country. The larger ones may need as many as fifty programmers. These computers are used by science, business, and the government. With them, the scientist can get answers to complicated problems he couldn't work out alone in a lifetime. Airplane manufacturers use them to figure out how a plane should be designed to meet a given set of specifications such as fuel load, speed, and range. The government has a well-known computer called SAGE, which will be used to spot and head off possible enemy attacks.

But, without the programmer, an electronic brain is as useless as a piano without a pianist. In fact, there is a parallel of sorts between a programmer operating a giant computer and a composer playing his own music on a piano.

The "composition," in the case of the computer programmer, is a "flow chart"—literally a plan of action—which shows how the several mathematical and logical functions of the machine may fit together to solve a problem. When the plan of action is mapped out on the flow chart, the problem must be phrased in synthetic language. Several languages are used, depending on the type and make of computer.

A synthetic language is not meant to be spoken. It consists of numbers, letters, and symbols. It is used instead of English, because it is more concise.

In one synthetic language used by an IBM computer, for instance, a programmer might write: DO 6 I = 2, 9. In English, the same instructions would read: "Do what all of the following statements say, down to statement No. 6, for the successive values of I, namely 2, 3, 4, etc. up to 9."

A list of these "dehydrated" instructions is fed into the computer on punched cards or magnetic tape. The machine then proceeds to translate them into its own language or "code" and eventually produces its answers.

Electronic brains fall into two classes—analog computers, which measure, and digital computers, which count. The prototype of the analog machine is the slide rule. Digital computers work on the basic principle of the abacus or the mechanical calculator, except that they count electrical impulses instead of beads or bits of metal.

To be master of these machines, a programmer must know enough about mathematics to feel at home in the world of numbers. He must have a groundwork in number theory and information theory, so he can understand what a computer does and what it is capable of doing. He must be familiar with electronics and mechanics—enough to understand the physical make-up of his machine. And he must enjoy—and be good at—solving problems.

If you'd like to get an idea of your own aptitude for a programming job, try the problems on page 31. They're used by IBM to test programming applicants. If you enjoy working on them and can solve some, you're probably electric-brain material.

IBM photo

Giant digital computer is put through paces by IBM programmer. From his control spot, programmer can tell exact step being performed by machine.

Science in the news

Bones of extinct bird prove scientists wrong

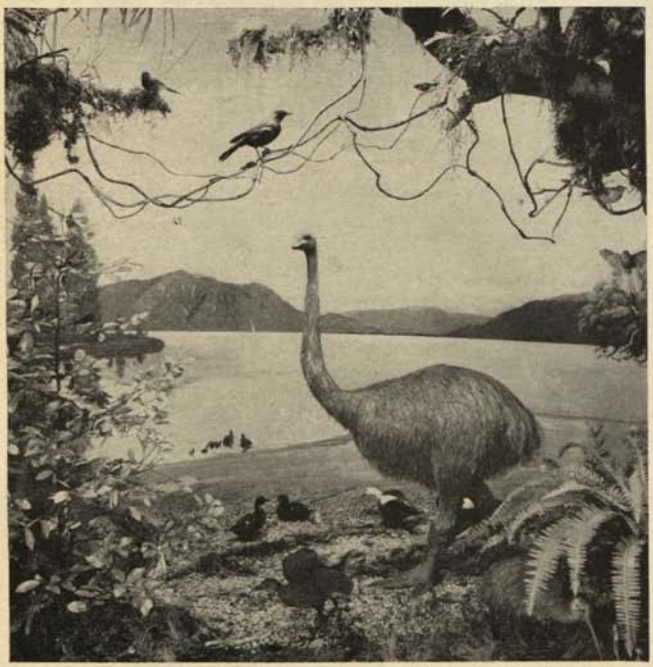
When the Dutch discovered new Zealand in 1642, they found Maori tribesmen there. E-er since, everyone has assumed that the Maoris were the first inhabitants of New Zealand. Now, the charred bones of the extinct moa bird contradict this assumption.

The moa was a wingless bird, somewhat like an ostrich, standing ten or more feet tall. On long, powerful legs and huge feet, it once roamed the New Zealand plains in great herds.

Some years ago, archaeologists unearthed the burnt moa bones while digging in long-buried campsites of moa hunters, presumably Maoris. Close inspection of the campsites proved that they had been in existence over a period of hundreds of years. Archaeologists knew that the main migration of Maoris from Polynesia to New Zealand occurred about 650 years ago. Thus, by adding the estimated life-span of the campsites to the date of the Maori migration, they concluded that the moa (and the moa-hunting camps) had died out about 150 years ago.

But recently, the new and highly accurate method of dating by radioactive carbon was applied to the charred moa bones. What scientists found, to their surprise, was that the "youngest" of the bones was not 150 years old, but more than 600 years old! This meant that the Maoris and the moas had coexisted for no more than fifty years. Therefore, the campsites—which had existed for centuries—could not possibly be those of the Maoris.

Now, archaeologists are sifting the campsites for clues as to what the pre-Maori people were like and where they came from. The best find so far has been a rare type of harpoon point, which may indicate that the people came from the area of northeast Asia.



American Museum of Natural History

Remains of the moa have shed light on when man first arrived in New Zealand.

Flying scientists hunt howler of airwaves

This month, a Douglas DC-7C "flying laboratory" will take off from Sweden and fly over the North Pole to Japan. Its mission: to track down the mysterious howler of the airwaves.

"H-wler" is the name that imaginative radio fans have given to the collection of screeches and whines that affront the ears of radio listeners in northern latitudes.

A recent theory suggests that this radio interference is caused by variations in the electrically charged layers of space surrounding the earth. These variations seem to occur when the density of the cosmic-ray particles within the layers increases or diminishes. In turn, the density seems to be affected by variations in the earth's magnetic field. It has been suggested that as many as four magnetic North Poles may be responsible for the changes in the earth's magnetic field.

Inside the "flying laboratory" a three-man team of Swedish and Norwegian scientists will use specially built counters to measure the density of cosmic-ray particles and their relation to the earth's magnetic field. Flying at 350 m.p.h., the scientists will be able to take continuous readings over great distances in a very short time.

These observations may lead to an explanation of what makes the howler howl. They will also provide valuable information for ground teams exploring the origin of cosmic rays and the earth's magnetic field during IGY.

Thimble-size batteries run on atomic power

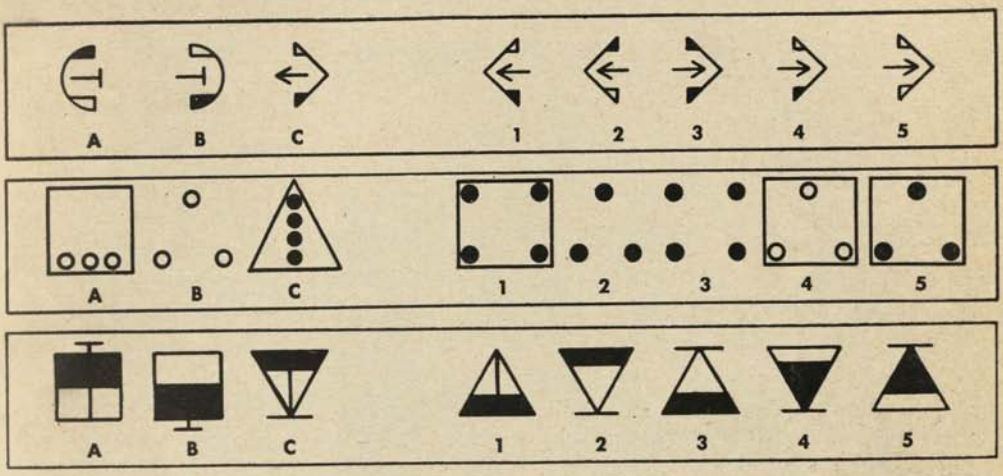
A tiny atomic battery, the size of a thimble, was recently unveiled. The battery's cell uses prometheum 147, a radioactive product of nuclear reactors. A minute amount of prometheum 147 would provide enough power to run a wrist watch for five years. The danger of radiation poisoning? Less than from an ordinary radium dial.

Scientists predict that within a year the tiny batteries will be used in guided missiles, small radios, hearing aids, and—possibly—wrist watches.

Can you solve these problems?

If you can solve some, you'd probably make a good programmer for an electronic "brain"

(See page 17)



1. In each of the diagrams above, figure A is related to figure B in some way. You are to find the rule by which A is changed to make B. Then use the same rule to find how C should be changed. One of the numbered figures at the right is the answer.

2. The numbers in each series at left below follow a certain rule. For each series of numbers, you are to find the correct rule and complete the series. One of the numbers at right is the answer.

3	6	9	12	15	18	a	b	c	d	e
						19	20	21	22	23
4	6	9	13	18	24	a	b	c	d	e
						27	28	29	30	31
10	11	13	14	16	17	a	b	c	d	e
						18	19	20	21	22

3. Solve each problem and indicate the answer.

To calculate the number of hours required to perform a card-punching job, it is necessary to multiply the number of cards by the number of columns to be punched in each card and divide by the key strokes per hour. If there are 50 columns to be punched in each card, 10,000 key strokes per hour, and 1,500 cards, how long will it take?

(a) 3 hrs. (b) 7 hrs. 15 min. (c) 7 hrs. 30 min. (d) 7 hrs. 50 min. (e) 33 hrs. 30 min.

What is the total cost of five file trays at $.35 each and a dozen skip bars at $1.00 per dozen?

(a) $1.35 (b) $2.75 (c) $4.25 (d) $8.00 (e) $13.75

A rectangular accounting machine 42 inches longer than it is wide has a perimeter of 204 inches. What is the width of the machine?

(a) 9 in. (b) 30 in. (c) 40 in. (d) 45 in. (e) 72 in.

Answers:

Problem No. 1 2, 3, 3
Problem No. 2 c, e, b
Problem No. 3 c, b, b

Problems by courtesy of The Psychological Corporation.

Shutterbug's Page . . .

EDITED BY KEN JOHNSON

It's a great year for snapshots with

New Ansco All-Weather Pan Film!

Good News! New Ansco All-Weather Pan costs no more than ordinary snapshot film. And you save when you buy the 3-roll Economy Pak. Each roll climate-proof packed to maintain freshness.

The first "controlled contrast" black-and-white film for snapshot cameras

Now, there's a snapshot film that "sees" your pets just as you see them in your own back yard! It's called Ansco All-Weather Pan Film . . . and it's the first "controlled contrast" film.

Ansco All-Weather Pan . . . an entirely *new kind* of snapshot film . . . reproduces *all* the colors of nature in proper balance with one another. Traditional snapshot film is actually "color blind" to red. It shows red almost as black as black itself. This spoils the color contrast of your pictures . . . puts them on the dark, unnatural side.

But New Ansco All-Weather Pan reproduces *all* colors in proper contrast. Red lips, pink cheeks, red glints in the hair, red tones in nature all photograph soft, warm, and lifelike!

With New Ansco All-Weather Pan in your camera your pictures have a delightfully "natural" look. *You'll* like them better . . . and so will your friends!

Note to color fans: for crisper, more natural color results . . . even in dim light . . . use New, High-Speed *Ansco*chrome. This amazing new color film is actually *3 times faster* than traditional films. It's a great *outdoor* film. Works wonders *indoors* with blue flashbulbs. Ask for it . . . at your nearby Ansco dealer's.

Ansco

The House of Photographic Firsts
Binghamton, N. Y.
A Division of General Aniline & Film Corp.

700-series information:

Automatic coding system for 705

From the time the 705 data processing machine was announced, the need for an automatic coding system was strongly felt. This would have to be a system that would be easy to learn and to operate, and one that could reduce the programmer's coding and diagnostic time.

Now, two such techniques are available for the use of 705 installations. The previously announced Autocoder is a system designed to meet the business application needs of the installations. The PRINT 1 (PRe-edited INTerpretive) system is an interpretive type of automatic coding system for the 705, designed to contain the following desirable features:

1. Rapidity and ease of learning for personnel, with or without programming experience.

2. An advanced instruction set to reduce the number of instructions written and hence the number of errors, together with built-in mathematical subroutines for sine and cosine, square root, logarithm, exponential, and arc tangent.

3. Reduction of elapsed time between problem statement and desired answers.

4. A repeat instruction for doing repetitive operations on grouped data, also allowing a secondary form of indexing.

5. Simulated index registers with limit registers for address modification and counting for control purposes, each of which is addressable for setting and incrementing.

6. Floating-point arithmetic throughout, so that the programmer need never concern himself with decimal points. Conversion instructions easily translate from fixed point to floating point, and vice versa.

7. Variable address and instruction format, making it possible to write and keypunch only necessary information.

8. Symbolic coding throughout, allowing addresses to be descriptive of their contents.

9. Coding in 705 mnemonic language with the same addressing features as when in the PRINT 1 interpretive mode.

10. Input-output images in memory at fixed locations, so that card columns and typewheels may be directly addressed.

PRINT 1 is operated by an executive routine that is always in memory. It is easy to go back and forth between 705 mode and the PRINT mode. Previous interpretive systems have been excessively slow, but the repeat instruction causes interpretation for only the first execution; repetitions are generally faster than those coded by expert programmers or compilers, because advantageous use of fixed memory locations permits address modifications of less than 4 characters of 705 instruction addresses to speed up execution time.

PRINT instructions are straightforward with few limitations, and include a number of combinatorial instructions such as vector-multiply-adds and polynomial-multiply-adds. Convergence testing, indirect addressing, counting switches, counting printing instructions, and table-search operations are performed with single PRINT instructions. Experience has shown that, for mathematical work, one PRINT instruction is equivalent to about forty 705 instructions. PRINT coding time in some instances has been reduced to as little as 1% of 705 coding time for identical problems.

PRINT systems decks for 8- and 10-digit mantissas can be obtained from the IBM Program Library, Applied Science Department, WHQ, New York. A 12-digit mantissa system is currently being fabricated. PRINT manuals (Form 32-7334), PRINT symbolic coding forms (Form 19-6905), and PRINT instruction cards (electro 887834) are also available.

Exchange of 702-705 programs

Experience has shown that many 700-series installations are producing generalized programs that could be of great help to other installations. We believe that many of our customers could profit greatly by having access to 702-705 programs of general interest produced at other installations. And, conversely, they could contribute from their own experience in programming.

Recognizing this need for an exchange of programs, IBM will now publish and distribute any programs of general interest that are submitted.

702/705 Bulletin 34 (Form 32-7203) outlines the procedure to follow in submitting program material.

In brief:

537 Card Read Punch

Recently announced, the 537 Card Read Punch is a high-speed punched-card input-output unit for use in IBM 650 data processing systems.

The IBM 537 offers reading and punching speeds of up to 155 cards per minute. Results may be punched into the same card from which input factors are read. More variable 650 systems are possible in combinations of 537's, 533's and 407's.

Operational features that have been announced for the 533 Card Read Punch are also available for this new machine.

IBM

Personnel codes

The usefulness of personnel codes depends to a large degree on how efficient and informative the personnel codes used are. The illustrative coding system shown in the list below is not all-comprehensive, but it does indicate the scope of information that can be coded in a few card columns—and still provide a wide variety of information for personnel management.

With modifications, extensions, and adaptions to your particular needs, the table reproduced here can be used as the basis of a personnel records coding system.

Absence Reason
0 no reason
1 illness
2 illness in family
3 death in family
4 jury duty
5 transportation
6 personal business
7 other

Citizen Status
1 native USA
2 naturalized
3 non-citizen USA

Education
1 grammar school credits
2 grammar school graduate
3 high school credits
4 high school graduate
5 college or univ. credits
6 college or univ. graduate bachelor
7 college or univ. graduate master
8 college or univ. graduate doctor

Employment Reason
1 replacement
2 addition
3 temporary

Handicaps
0 no disability
1 partially blind
2 totally blind
3 partially deaf
4 totally deaf
5 single hand or arm
6 both hands or arms
7 single foot or leg
8 both feet or legs
9 general illness

Military Status
0 non-veteran
j army
k navy
l marines
m air force
n coast guard

Occupation
104 automatic screw machine
108 bench lathe
112 drill press
115 engine lathe
119 gear cutting
123 grinding
126 hand screw machine
129 heat treat
133 jig boring
141 metal finishing
145 metal plating and polishing
149 milling machine
155 pattern making
160 punch press
167 riveting
172 sand-blast
176 shaper
179 sheet metal
184 tool and model maker
187 tool grinding
190 tool room machine operator
192 tumbling
196 welding
203 bench work
215 cable winding
225 cable finishing
245 disassembly
265 final assembly
285 unit assembly
295 wood working
303 development testing
306 dispatcher
310 final inspection
320 machine functions analyzer
328 material and parts handling
334 packing and shipping
345 parts and assembly inspection
355 process parts handling
365 product testing
375 quality analyzer
385 stockroom attendant
395 tool inspection
405 binding operation
415 commercial artist
425 mechanical engraver
435 paper cutting and slitting
445 photo-engraving
455 photographer
465 printing press operator
475 type matrix maker
485 type composition
495 type making
505 assistant engineer
515 draftsman
525 development engineer
535 estimator
545 laboratory technician
555 machine designer
565 production analyzer
575 project designer
585 technical engineer
593 tool designer
597 tool analyst
604 air conditioning engineer
608 architect
614 carpenter
618 cleaning machine
623 electrician
627 elevator operator
635 factory service
645 general labor
655 machine repair
660 machine service
665 maintenance helper
670 mason
675 millwright
683 painter
685 plant layout engineer
688 plant protection
691 power vehicle operator
694 plumber : pipe fitter
697 power engineer
705 accident prevention
715 chef
725 doctor
735 dietician
745 nurse
755 recreation attendant
765 service attendant
785 waitress
805 accounting machine operator
815 accounting machine wiring
825 key punch
835 copy machine
855 stenographer
865 stenotypist
875 switchboard
885 typist
905 accountant
910 administrator
915 administrative assistant
925 buyer
935 clerk
945 instructor
955 interviewer
965 receptionist
975 secretary
985 technical assistant
995 writer

Occupation Grade
0 no grade
1 trainee
2 operator
3 senior operator
4 setup man
5 manager
6 project manager
7 other

Occupation Status Reason
1 new employee
2 re-employed
3 returned from military service
4 temporary
5 transferred : promotion
6 transferred : demotion
7 transferred : personal reason
8 transferred : disability
9 other

Sex and Marital
0 male : single
1 male : married
2 male : widowed
3 male : separated or divorced
4 male : head of family
5 female : single
6 female : married
7 female : widowed
8 female : separated or divorced
9 female : head of family

Special Qualifications
0 no special qualifications
1 large stature
2 medium stature
3 small stature
4 hands : large
5 hands : small
6 action : quick
7 acute hearing
8 acute sight
9 unusual dexterity

Special Training
0 none
1 business
2 electric shop
3 machine shop
4 wood shop
5 print shop
6 nursing
7 M.E. degree
8 E.E. degree
9 B.Adm. degree

Termination Reason
1 wages
2 opportunity elsewhere
3 working conditions
4 personal
5 health
6 unsatisfactory work
7 company rules
8 military service
9 other

Wage Base
1 hourly
2 weekly
3 semi-monthly
4 monthly

Wage Change Reason
1 probation rate
2 qualifying rate
3 seniority
4 merit
5 promotion
6 demotion
7 cost of living
8 general

Wider Scientific Use of 705 Print 1 Is Emphasized

- **What percentage of machine time is devoted to scientific applications on the 705?**
- **Are the scientific people satisfied with 705 Print 1 for their work?**
- **What are some of the 705 scientific problems actually programmed with Print 1?**

The foregoing questions were put to five 705 customers, selected at random in five different areas. The sampling came up with the following replies:

From Wisconsin —

"Scientific use, eight hours per week. Very satisfied with Print 1. Used throughout on heat exchange ratings . . . flange design, auto frame design, data reduction, motor design, refrigeration problems, curve fitting, curve plotting, plastic research."

From Alabama —

"Very enthusiastic about Print 1 use to date; even more enthusiastic about future. Estimate use of 705 about three hours per week on scientific and engineering problems, most involving five to ten minutes running time. Problems completed are of two general origins — mathematical and research. Mathematical problems include simultaneous linear equations of up to ninety-eight unknowns and multiple correlations of similar magnitude. (One simultaneous linear equation alone reported savings in excess of $30,000). Typical research problems involve metallurgical samplings and design problems. Barely scratched surface, is customer's opinion. Full scale program being developed to extend Print I applications. Promoted by top management."

From Connecticut —

"Percentage of 705 time for scientific applications, 12.5. Satisfied. Problems actually programmed: supercharger design, propeller stress analysis, propeller vibration analysis."

From Pennsylvania —

"Print 1 system successfully used on two machine design problems. Results so encouraging that engineers revised expected use of system after installation (February 1958) from four to twenty hours per month."

From Ohio —

"Twenty-five percent of machine time devoted to scientific applications. Print 1 used on warehouse inventory, a commercial application, and a few scientific applications."

IBM representatives should consider placing greater emphasis on the use of Print 1 by 705 customers because of its "pay off" possibilities. Two IBM publications which cover this area are "Primer and Course for Print 1," Form 32-7855, and "Programmer's Reference Manual for Print 1," Form 32-7334-1, both stocked at Stationery Stores, Endicott, N.Y.

305 RAMAC® Systems Shipped

United Airlines' operational headquarters at Denver has received shipment of the first two models of the IBM 305 RAMAC from San Jose. United will use the new IBM equipment to speed processing of thousands of ticket reservations made daily by the airlines' many offices across the country and to keep a continuous check on advance reservations so that the "space available" status of any flight can be determined at any given moment.

Packing Cases for Customers

Customers who wish to obtain packing cases for equipment they have purchased can receive prices through the medium RPQ (Request Price Quotation). The machine type for which the case is required, and the method of shipment (rail, truck, padded van, air freight, or export) which is to be employed, must be noted in the request for price quotation.

New 654 Auxiliary Unit Extends 650 Horizons

(Continued from page one)

When the Synchronizer Switch is "off" — i.e., not wired — the standard input-output areas prevail.

5. Saves compute time on applications which require processing more than ten fields, since the additional input-output words available with the 654 can eliminate the necessity of "packing" words.

6. When reading, punching or printing fifteen or seventeen words with the use of the 654, the interlock time is no greater than that used in conjunction with ten-word input-output machines. Also, the transfer of all words (fifteen or seventeen, as the case may be) between the input-output synchronizer and Immediate Access Storage will be possible with one read or write instruction. This makes possible a greater use of card-to-tape and tape-to-card applications. The input-output validity checking circuit will be effective for all additional words.

Programs already committed or being considered with the use of the 654 cover a wide variety of applications and industries. Typical examples include a leading surgical-medical supplies manufacturer who will use the 654 with his 650 on applications to include billing, sales statistics and inventory in one run. An electric equipment manufacturer is considering the 654 primarily for payroll. A life insurance company is interested in using the 654 for policy issue, while another life insurance company will use its 650 with the 654 for file maintenance and billing. A merchandizing corporation will use the 654 in its inventory management application. Still another insurance company is considering the 654 in a solicitation application. A large TV-radio manufacturer will use the 654 for billing and for inventory-control order editing. The latter is an application where substitute parts are automatically supplied when original items are out of stock. Other typical applications include manufacturing control and state government use of the 654 in connection with issuing drivers licenses.

The 654 comes in four models. It is approximately the size of the 655 Power Unit and is equipped with a control panel.

Here is a new device that should have a powerful influence on the extension of applications with the 650. The 654 not only enhances the end-product potential of the 650 but also provides a tremendous means for the sales representative to add substantially to his quota points.

L. H. LaMotte Heads OEMI

L. H. LaMotte, executive vice-president of IBM and general manager of the DP Division, has been chosen president of the Office Equipment Manufacturers Institute. He was elected by the board of directors of the OEMI at the institute's seventy-first annual meeting held in New York recently.

MES Procedures Clarified

Under normal conditions, 85 to 95 percent of MES (Miscellaneous Equipment Specifications) shipments are made within thirty days after the order is received at the plant. Therefore, the need for a separate "scheduled shipping date advice" to the branch offices has been deemed unnecessary.

With regard to the remaining 5 to 15 percent of MES orders, schedules are furnished when the shipping date exceeds forty-five days.

774 Panel Templates Available

Availability of the new 774 Tape Data Selector control panel templates has been announced by the Supplies Division. These punched paper templates make it possible to use the 407 Accounting Machine control panels with the 774.

Package Part Numbers of the templates, which may be ordered from Stationery Stores, Endicott, N.Y., are: Lower right panel, 517350; upper right panel, 517352; lower left panel, 517354; upper left panel, 517356.

Address communications to IBM Data Processing FIELD LETTER, WHQ. Distribution:

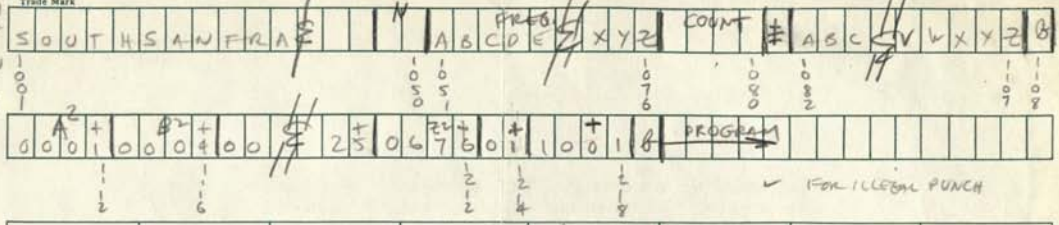
WHQ EXECUTIVES & DEPT. MANAGERS
REGIONAL MANAGERS & ADMINISTRATION
DISTRICT MANAGERS & ADMINISTRATION
BRANCH MANAGERS & ADMINISTRATION
APPLIED SCIENCE REPRESENTATIVES
DP MANAGERS & SALES REPRESENTATIVES
CE DISTRICT, FIELD MANAGERS & TERRITORY SUPERVISORS
DISTRICT SALES ASSISTANCE MANAGERS
EDUCATION CENTER MANAGERS AND INSTRUCTORS
ET AND TE MANAGERS
FIELD INSTRUCTORS
FIELD INSTRUCTOR SPECIALISTS
PLANT AND LABORATORY EXECUTIVES
SALES ASSISTANCE MANAGERS & PERSONNEL
SPECIAL REPRESENTATIVES
SYSTEMS ANALYSTS
SYSTEMS SERVICE REPRESENTATIVES

IBM Trade Mark — ELECTRONIC DATA-PROCESSING MACHINE — TYPE 705

WORK SHEET

PROBLEM WORD ANALYZER

CLEAR 1001 → -1080 BY READ-IN



✓ FOR ILLEGAL PUNCH

0001	0004	A/Z	01	( )²	1		
01	02	03	04	05	06	07	08
			J1				
09	10	11	12	13	14	15	

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
1224	RAD	1112	08	H1(1)2		0001	+	
29	RAD	1116	02	H1J6		0004	+	
34	SET	0001	03	B0001				
39	RAD	1214	04	H1S14		01	+	
44	RAD	1082	06	H1≠Q2		1	+	
1249	SEL	0100		20100				READ NEW WORD
54	RD	1001		Y1001				(FROM CARD READER)
59	~~TRET~~	~~1266~~	~~1404~~	U1266				RESTORE MODIFIED COMMAND
64	TMT	1215	08	9 1205		K1		FOR GETTING LETTERS (TO 1ST)
69	LOD	[1001]	03	8 1001		A/Z	+	
74	RCV	1309		U1309				RESTORE LOCAL
79	TMT	1374	00	9 1374				MODIFIED COMMANDS
84	CMP	1108	03	4 1158				TO A BLANK
89	TRE	1359		L1359				TO PCH & READ NEW CARD
94	AOM	1309	08	6 1≠09		L0		
99	AOM	1324	08	6 1354		L2		
1304	AOM	1329	02	613K9				
09	CMP	[1081]	03	410H1				ITS A LETTER
14	TRE	1324		L1324				FOUND IT
19	TR	1294		1 1294				TRY THE NEXT LETTER TO MATCH
24	AOM	[1050]	06	61≠N0				ADD TO FREQ. IN PROPER PLACE
29	RAD	[1108]	05	H1/≠8		XXXX	+	ADD TO
34	NOP	000≠		A 000≠				
39	AOM	1080	05	61≠Y0				COUNT
44	AOM	1050	04	61≠50				ADD TO # OF LETTERS
49	AOM	1269	08	612W9		K6		ALTER TO TAKE NEXT LETTER
54	TR	1269		1 1269				
59	SEL	0300		20300				
64	WR	1001		R1001				
69	TR	1249		1 1249				
74								
79								
84								
89								
94								
99	NOP	000≠						
1404	SET	0032	15					
1409	ONL	1080	15					
1414	RCV	1266						
1419	TR	1264						

BLANK ON LOADING

TYPE 705 INPUT-OUTPUT STATISTICS

TAPE

200 characters per inch density; 3/4" gap between records. This gap signifies end of record when reading from tape. In writing on tape this gap is made in place of group mark in memory.
75 i. p. s. tape speed (forward or backspacing).
500 i. p. s. average rewind speed.
2400 ft. of tape per maximum reel.
50 ft. approx. per minimum reel.
10 tape units maximum for one control unit.
0200-0299 possible range of tape unit addresses.
10. 0 milliseconds access time.
. 067 milliseconds to read or write one character.

CARD READER

250 c. p. m. speed in continuous operation.
Information read determined by control panel.
2. 78 milliseconds to read record from record storage to memory.
240 milliseconds to read one card into record storage.

CARD PUNCH

100 c. p. m. speed in continuous operation.
600 ms. to punch one card record from record storage.
2. 78 ms. to write maximum of 80 characters into record storage.
Records of 80 characters or less.
Group mark in memory is not punched but stops the writing into the record storage.

PRINTER

150 lines per minute in continuous printing.
400 ms. for one print cycle.
4. 088 ms. to write full line into record storage.
120 characters maximum printed per line.
Under program control, first character controls carriage and is not printed.

DRUM

60, 000 character capacity in full drum.
300 addressable sections.
200 characters per section.
1000-1299 available addresses for first drum.
Writes up to memory group mark.
Reads up to drum mark.
8. 0 ms. access time.
. 040 ms. to read or write one character.

A HILLMAN PUBLICATION

PAGEANT

MARCH 35¢

PAGE 6

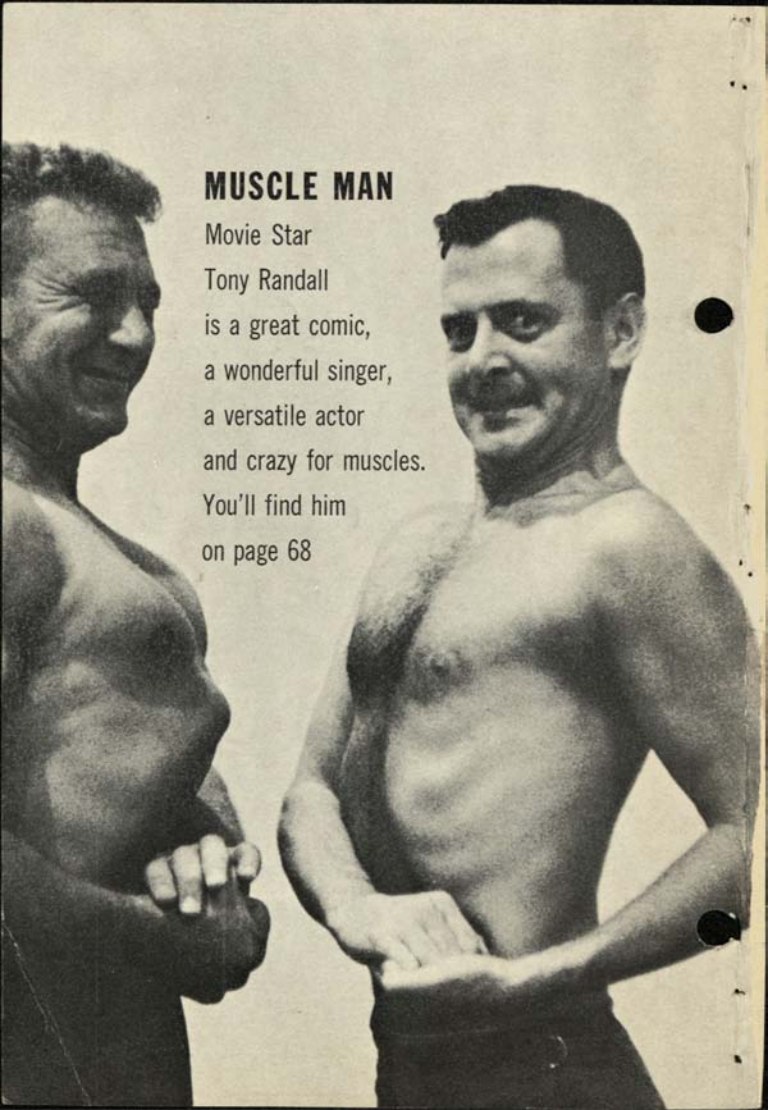
What's Polio's Dr. Salk Up To?

A SURE CURE FOR ALL VIRUS DISEASE

SNORING • SEX AND YOUR HEART

— page 58

— page 40



MUSCLE MAN

Movie Star
Tony Randall
is a great comic,
a wonderful singer,
a versatile actor
and crazy for muscles.
You'll find him
on page 68

"I don't know what others will think of all this," the prominent physician says today. "I only know that it remains the most vivid experience of my life."

For a time after death invaded my own life, my feeling about immortality was indefinite. Then came a personal crisis I was not equipped to handle. It was a problem involving my husband and his work.

ONE DAY in a prayer tinged with desperation, my petition took a strange turn, surprising even to me. . . . "O God, You've asked me to accept by faith the fact that Peter is still alive. I've tried, but it isn't real to me. But if he is, then he will be as concerned as I about this problem.

"I don't know how this works—but if it's possible, then I ask that Peter join me in this prayer asking for Your specific help."

Within two months the crisis passed. One door closed; another opened. The good appeared. It was significant beyond imagining. The crisis led directly to the writing of *A Man Called Peter.*

On earth, human fellowship always involves the inner person, the spirit. Then what about after death? Either there is simply oblivion, or else the spirit that is the real person lives on in conscious awareness. If the latter, then the only possible communion across the barrier is through spirit. And for the Christian, the most potent vehicle—as well as the safest—is prayer.

One correspondent has asked:

> I cannot believe in personal immortality. . . . You seem to believe it. . . . Can you offer the rest of us any proof?

And my answer had been . . . no, not final proof as the scientist means proof, not yet in our day. When I sought that proof, I found that the best reasoning of the finest minds, plus all the piling up of evidential testimony, can take us only part of the way.

But until science can finally prove life after death beyond evidential experiences, we are backed up against faith. For anything relating to the spirit, the irreversible order is faith first, then knowledge.

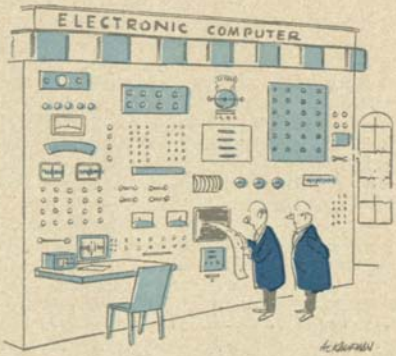
I am not a mystic nor do I have any psychic gifts. I have no experiences to report that could not have happened to anyone. During the first summer after Peter's death, I had been told that if I would believe in Peter's presence when I needed him, the feeling and the proof would come later. Exactly that has happened.

There has come the restoration of perspective on life; the knowledge that our world is connected with joy and hope to another. We who refuse to explore life's spiritual and physical boundaries with zest and a sense of adventure, who will not lift our eyes to far horizons, cheat only ourselves. ■■

SEMI-PRECIOUS GEM

■ IT'S AMAZING how many people know a good thing the moment someone else sees it first.

—Oswald B. Barker



"It wants a vacation."

ELECTRONIC BRAINS MEAN JOBS FOR YOU

BY HAROLD MEHLING

The U.S. is going computer happy, and 100,000 people are needed

■ YOU'RE WORKING in an insurance company office that sends out thousands of premium notices every day. Your job is to calculate the bills and type them.

One day a lot of big crates arrive and are opened to reveal an enormous amount of gleaming, complicated machinery. Technicians come in and hook it all up. It turns out to be an integrated data processor, a computer—an electronic brain.

The next week the brain is turning out in one hour the number of premiums you spent two weeks on.

"Where does that leave me?" you ask.

You're not alone in asking. In offices and factories from one end of this electronic-happy country to the other, people are wondering: "Who's going to run these brains? who's going to build them, and fix them, and improve them, and sell them? Can *I* get a job working with them? Will I be in or out?"

While the future of the electronic computer field is complex, leaders in the business agree that the need for trained people will be enormous.

"Competition is keen right now for specialists who can make the computers work faster," says Edmund Berkeley, publisher of the periodical *Computers and Automation*. The most conservative estimate holds that 100,000 men and women will be ministering to computers within ten years. Other estimates run as high as 180,000.

Today's outpouring of electronic computers represents the fastest technical revolution in history.

YOUR BOSS MAY once have grinned at the idea of electronic brains in *his* office, but he isn't laughing any more. He knows that businessmen are paying $1,500,000 for some big ones, and renting smaller ones for $15,000 to $50,000 a month. He knows that corporations are planning their future policies around answers the machines give to marketing questions.

One thing you should keep in mind—no electronic brain can *think* as well as the dullest employee. When a specialized computer was fed a French dictionary and told to translate "out of sight, out of mind," it produced, "invisible, insane." That's because, as the Remington Rand Corporation says: "No computer ever built has a true brain of its own. It depends on the human intelligence which directs it."

If a computer doesn't have horsesense, then, what is its secret weapon? The answer is speed—fantastic, incredible speed in which a second is an old-fashioned measurement of time. How long, for instance, would you need to multiply 9,617,763 by 6,481,992? Four minutes, without errors, would be pretty good. An electronic brain does it in a thousandth of a second. And it does not make mistakes.

The Univac-Larc, which the U.S. Census Bureau will use in 1960, will do over 100,000 multiplications a second. Univac can print 600 lines of answers on paper every minute, complete with carbon copies.

When such feats are compared with the abilities of humans, it's enough to give man an inferiority complex. An IBM machine in the government's vast Social Security headquarters in Baltimore is managed by a dozen clerks; it does in two and a half hours what 100 of them used to do in three eight-hour shifts. The Univac-Larc will duplicate in two minutes the lifetime output of a man using a good desk calculator.

That is the drama of the computer revolution. It's the reason atomic scientists at Oak Ridge can perform rapid calculations previously not possible at all. The machines are even computing the amount cows should be fed to produce a maximum quantity of milk. And right now Eastern Airlines is installing a Univac that will store information on a million seats for three months ahead. It will arrange for 60,000 reservations a day.

All of which brings us to the problem of finding the right people to run these brains. Will you be one of them? Perhaps the best way to find out is to look at the people who already hold these jobs.

For one thing, the computer world will be dominated by youth. A random sampling of 50 people in the field shows that all are under 50 years of age; their average age is 33. The chief statistician of Remington Rand Univac is 31, and the

director of the scientific computer department of Royal Precision is 29. One hiring man said:

"I'm afraid we're a little prejudiced against the older man. It's not so much that you can't teach an old dog new tricks as that older people's minds are already full of too many old tricks."

The same obstacle does not, apparently, confront women, who are found all over the field. One personnel director feels they are inherently better at detail. Another maintains they aren't distracted by as many outside interests.

As FOR THE job duties themselves, they run from complex positions paying five-figure salaries to relatively simple work paying about $100 a week.

At the top are methods and systems analysts. If you are a methods analyst you will work for a company using computers, deciding whether and how to use them. A systems analyst on the other hand will work for a computer manufacturer, showing customers how computers can increase output and efficiency. Pay begins at $7,000 a year and can rise above $10,000.

Next come program researchers or designers. These are deep thinkers who simplify the process of feeding information to a computer so almost anybody can do it. Pay will reach that of the analyst.

The position of programmer is the bonanza job of the future. As a programmer you will take a problem and determine how it can be fed into a computer so the machine can understand it. This is where the greatest need for people will be; one estimate calls for 50,000 new programmers, who will earn about $6-7,000 to start.

The coder takes the final step before information goes into the computer. He converts the programmer's instructions into figures and letters that correspond to a computer's keyboard. Pay is about $6,000.

A computer supervisor schedules work and manages employees. If you handle people well now, you have a good start. Your pay will be about $6,000.

Console operators punch the computer's buttons, following step-by-step instructions. If this is your job, your work will become simpler as time goes by, because the machines are being simplified. Your pay will be about $5,000.

A technician builds and installs computer equipment, and repairs it. If you know electronics, or have had experience in that field with the armed forces, you're on the right track. Pay is $5,000.

Finally there is the salesman, no ordinary drummer with a thick sample case and a thin line of patter. To be this kind of salesman, you must be able to explain computers to a businessman and show him how they can streamline his business. Earnings will depend on your success in selling, and can be quite high.

Now, how should you go about being hired? At Remington Rand, Eugene F. Klausman, director of programming training, gives candidates a home-made problem in logic. He doesn't expect everyone to be able to solve it, but if you can't follow the logic of it after an explanation, he won't consider you a promising contender.

Klausman puts much store by what he calls the ability to express

ideas clearly and specifically. "The logical mind," he says, "that's what we're looking for."

While Remington Rand doesn't regard aptitude tests highly, IBM feels otherwise. Here is an oversimplified sample of the kind of problem the IBM test contains:

: : is A, and ∴ is B. Something was done to A to make it B. Now, this is C: ⁝ ∴. If you do to C what was done to A to make it B, which of the following will be the correct D: ⁝ ⁝ ⁝ ∴ ∴. (Answer at bottom of page.)

If all this sounds very grim and academic, start forgetting some of it right now. Consider, for example, the opinion of John Baer, a Royal Precision systems analyst:

"I've heard it said that a man who plays chess well would make a good programmer. But some people may hate chess and still be good problem-solvers. It's never that simple. They're liable to end up making darned good computer programmers."

OR YOU MIGHT want to think about Robert Bremer, of IBM. Bremer came to IBM just two years ago out of as unlikely a background as possible. He had been a cabinet maker, television set designer and player of 15 musical instruments. But he took to electronic brains like glue to wood, and today he is IBM's director of programming research.

All in all, adjustment to the amazing machines should not be too difficult since modern business offices already have some form of automatic calculating machines. There will always be some people, however, who will be awed by the fast-computing brains.

One program researcher, for example, denied he ever regards a computer as anything but an inanimate series of circuits and buttons. But when he taught a machine to play chess and succeeded in beating it, this very scholarly fellow jumped up and shrieked, "Ah, you messed it up, didn't you, you phony!"

At Remington Rand, an instructor reports that occasionally he will be teaching a businessman to program a computer and will find the man staring dumbly at Univac. "I tell him," the instructor says, "to give the machine a good kick. And he's never afraid of it again."

Fortunately, once people get into electronic brain work, they seem to love it. A young woman at IBM put the situation most invitingly when she said:

"I wouldn't trade my job for anybody's. Where else can you sit around teaching machines to play parlor games with you—and get paid for it, too?"

Perhaps you'd better not waste time figuring out the answer to that one. Your new job may be waiting just around the corner. ■■

The third symbol is correct.

ODD BALL

■ "I'M A VERY SLOW BOWLER," the girl informed her escort as they entered the alleys. "It has its advantages, though," she added. "If I don't like a ball I've bowled, I just walk after it and bring it back." —Bob Duffy

January 16, 1957

Air Mail

R. W. Bemer
I. B. M. Corp.
590 Madison Ave.
New York 22, N.Y.

Response No. 8

Dear Mr. Bemer:

Enjoy solving puzzles -
Have adding machine -
Will travel -
Yours Truly,
E. Stewart

Dear Bob,

Had planned to wire you the above upon reading the "New Yorker" last week but was in the middle of a Gemeray T.B. and couldn't find ten extra minutes. Tho still wrestling with Mr. G. I certainly can spare the time to let you know that I would be delighted to work on Trib. TB. Just send it along a phone and I'll drop everything.

Incidentally, Oseveral people called me about "New Yorker" item, including Jean Rogers and Bub was proud to inform Lockheed Engineering Dept. about the whole bit, re the sandy-haired, fast talking old man with a long beard, name of Bemer at I.B.M.! Back to work-love.

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so far. Chess is still beyond it, but won't be for long. There's no telling how many ticklish problems computers will someday be able to solve. I foresee the time when every major city in the country will have its community computer. Grocers, doctors, lawyers—they will all throw problems to the computer and will all have their problems solved. Some people fear that these machines will put them out of work. On the contrary, they permit the human mind to devote itself to what it can do best. We will always be able to outthink machines." Triumphantly, Bemer turned a sign on his desk in our direction. It read, "REFLEXIONE."

al computers scattered throughout the country (ninety per cent of them built by I.B.M.), and each of the larger models requires from thirty to fifty programmers—programmers being the clever fellows who figure out the proper form for stating whatever problem a machine is expected to solve. "All told, there are probably fifteen thousand trained programmers in the United States," Mr. Bemer said. "They're very well paid and always in short supply, so we

1955, is twice as big as Mark I and approximately fifty times as subtle. Since giant computers cost a couple of million dollars apiece to build and are quickly outmoded, I.B.M.'s usual practice is not to sell them but to rent their electronic services by the month. (Rental fees run from thirty thousand to fifty thousand dollars a month.) Computers are used by scientists, for working out abstruse calculations that it would take a man a lifetime, or many lifetimes, to work out by himself, and also by commercial enterprises. At the moment, the best computer customers are airplane manufacturers, who, in effect, can feed

THE NEW YORKER Features IBM

An IBM ad in a New York paper which recruited for "research programmers for digital computers" drew an unusual response. Miss Andy Logan, a reporter from the magazine, THE NEW YORKER, came to World Headquarters to interview R. W. Bemer, Assistant Manager of the Programming Research Department. Based on the interview, the write-up, which is reprinted below, appeared in THE NEW YORKER of January 5th.

Chess to Come

THE International Business Machines people ran an ad in the *Times* a few weeks ago asking any "research programmers for digital computers" who might be interested in taking part in an "expanding research effort in the development and automatic translation of a multi-computer language" to apply to Mr. R. W. Bemer, assistant manager of the I.B.M. programming-research department. The ad suggested that programmers in related fields—language theory, logic, topology, and the like—might also be interested, and noted teasingly, "Those who enjoy playing chess or solving puzzles will find this work absorbing." Though we know practically nothing about digital computers except what we've seen of their fancy work on TV on Election Nights, and though we had never even heard of topology, we made bold to apply to Mr. Bemer. Not that we wanted a programming job, we told him; we just wondered if anyone else did. A fast-talking, sandy-haired man of about thirty-five, Mr. Bemer said that the ad, which was also run in the Los Angeles *Times* and the *Scientific American*, had brought a total of seven responses, and that although this might sound disappointing to us, I.B.M. considered it excellent. There are some fifteen hundred digital computers scattered throughout the country (ninety per cent of them built by I.B.M.), and each of the larger models requires from thirty to fifty programmers—programmers being the clever fellows who figure out the proper form for stating whatever problem a machine is expected to solve. "All told, there are probably fifteen thousand trained programmers in the United States," Mr. Bemer said. "They're very well paid and always in short supply, so we didn't expect many of them to be mooning over 'Help Wanted' ads. Of the seven who answered us, we hope to take on five in this department. The sixth man really *was* interested only in playing chess, and we let him go back to his board. The seventh man knew almost nothing about computing, but he had the kind of mind we like, and will no doubt be hired by some other department of the company. He has an I.Q. of a hundred and seventy-two, and taught himself to play the piano when he was ten, working on the assumption that the note F was E. Claims he played that way for years. God knows what the neighbors went through, but you can see that it shows a nice independent talent for the systematic translation of values."

We expressed modest astonishment that a profession we'd never heard of should have as many as fifteen thousand members. "Whole thing happened overnight," Mr. Bemer said, in a consoling voice. "I've been programming for eight years now and I'm considered an old man with a long beard." Small digital computers were used during the war, and the first giant, Mark I, was built by I.B.M. for Harvard in 1944. The latest I.B.M. giant, completed in 1955, is twice as big as Mark I and approximately fifty times as subtle. Since giant computers cost a couple of million dollars apiece to build and are quickly outmoded, I.B.M.'s usual practice is not to sell them but to rent their electronic services by the month. (Rental fees run from thirty thousand to fifty thousand dollars a month.) Computers are used by scientists, for working out abstruse calculations that it would take a man a lifetime, or many lifetimes, to work out by himself, and also by commercial enterprises. At the moment, the best computer customers are airplane manufacturers, who, in effect, can feed the carrying capacity, fuel load, speed, and maximum range of a projected plane into a computer and in a few minutes' time will be given back what amounts to a complete design; moreover, each item of the design, down to the smallest rivet, can then be tested by the computer for all imaginable stresses and strains. Shipbuilders and bridge designers use computers in the same fashion.

We asked Mr. Bemer about the multi-computer language referred to in the *Times*. He said that I.B.M. has already developed two synthetic languages for its computers: Fortran, which is strictly for scientific use, and Print I, which can handle both scientific and commercial information. By I.B.M.'s strict standards, both languages leave much to be desired (what strikes us as miraculous is mere irritating clumsiness to I.B.M.); for example, though the point has been reached where computers can translate scientific data from Russian into English at the rate of four or five sentences a minute, the data requires pre-editing and post-editing. "We're out to develop a language that will let computers think pretty much as we do—make ready use of their stored memories and be capable of free association," Bemer said. "A computer has been designed that plays checkers and has beaten all comers so far. Chess is still beyond it, but won't be for long. There's no telling how many ticklish problems computers will someday be able to solve. I foresee the time when every major city in the country will have its community computer. Grocers, doctors, lawyers—they will all throw problems to the computer and will all have their problems solved. Some people fear that these machines will put them out of work. On the contrary, they permit the human mind to devote itself to what it can do best. We will always be able to outthink machines." Triumphantly, Bemer turned a sign on his desk in our direction. It read, "REFLEXIONE."

ROBERT S. ALBRITTON
Chartered Life Underwriter
941 WESTWOOD BLVD. - WESTWOOD VILLAGE
LOS ANGELES 24, CALIFORNIA

GRANITE 9-3773
BRADSHAW 2-3733

January 15, 1957

Mr. Robert W. Bemer, Assistant Manager
Programming Research Department'
International Business Machines Corporation
590 Madison Avenue
New York 22, New York

Dear Bob:

It was a real pleasure to read "The Talk of the Town" interview with you in the January 5th New Yorker Magazine. Helen and I were delighted to know where you are and what you are doing. I know that this is the sort of job you thrive on, and that you will continue to experience great success in it.

Sincerely,

Robert S. Albritton

RSA:AR

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION · SUNNYVALE, CALIFORNIA

28 January 1957

Mr. Robert W. Bemer
International Business Machines Corporation
590 Madison Avenue
New York 22, New York

Dear Bob:

Enclosed find your chart with annotations. I hope that I have interpreted the meaning of your columnar headings correctly. If not, perhaps you can figure out what I meant from what I put down.

I see by the national magazines that you are surviving, I should say thriving, in that mild climate back there. Everyone was quite impressed with the two and one-half columns you received in the New Yorker Magazine.

Best regards to Virginia and the family. And say hello to Dave and Geneva for me.

Very truly yours,

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

Dick

R. B. Talmadge
Mathematics and Computer
Services Department

RBT . jem

Enc.

IBM

(FOR INTRACOMPANY CORRESPONDENCE)

[redacted] – OFFICE Programming Research WHQ ATTENTION Mr. R. W. Bemer FROM Birmingham

SUBJECT AND OR REFERENCE TCI Experience With PRINT I DATE 6-4-57

TCI has moved along quite well in their use of PRINT. The Metallurgical, Industrial Engineering and Accounting Departments have been the primary users. Some very real savings have resulted from the jobs completed to date. The biggest problem area with regard to utilization of PRINT is the unwillingness of certain departments to provide their own people with PRINT training the turn them loose on problems. In an effort to eliminate this problem, the TCI Comptroller has recently hired a mathematician to serve on his staff as a consultant on PRINT and scientific problems He will be made available to requesting departments as a liason. The future use of PRINT at TCI looks very bright. Following is a recap of some jobs already completed.

Problem	Processing Time	Savings
CO-2 Tables	8 min.	Undeter.
Matrix Inversion	10 min.	Undeter.
Competitive Pricing	5 min.	$150.00
Multiple Correlation (Mould Life)	15 min.	Undeter.
Coal Washer Design Eval.	1.2 hrs.	540 man hrs.
Restatement of Property Accounts	12 hrs.	908 man hrs.
Matrix Inversion	3 min.	16 man hrs.
Simultaneous Equations - 5 Unknowns	1 min.	$64.00
Ferrostan Sampling	2.2 hrs.	$1.050.00
Simultaneous Equations - 24 Unknowns	4 min.	$160.00
Simultaneous Equations - 65 Unknowns	1.1 hrs.	$32,960.00

The foregoing is for your information and should not be published or quoted in association with the TCI name.

E. E. Cowan

EEC:mka

business. In addition to symposia, the conference will feature exhibits by leading manufacturers of such equipment. In photo, **Bruno Chiappinelli,** computer systems specialist of **ElectroData Corp.** of Pasadena, explains operation of the company's "DataTape" magnetic tape unit to EBSC's "Miss Welcome," **Lona Devon.** The unit will be part of ElectroData's exhibit at the show. **Jerry Bednarek,** executive board member of EBSC is the interested spectator. Infor-

ANALOG COMPUTERS were among the Lockheed equipment viewed by naval officers who last week visited MSD as part of their advanced studies at the U.S. Naval Postgraduate school. Art L. Hubbard, instrumentation and data analysis, here explains the intricate work performed by the computing machines.

MSD Hosts Student Naval Officers on Industry Tour

THE MAGAZINE OF

Fantasy AND Science Fiction

Open to Me, My Sister

PHILIP JOSÉ FARMER

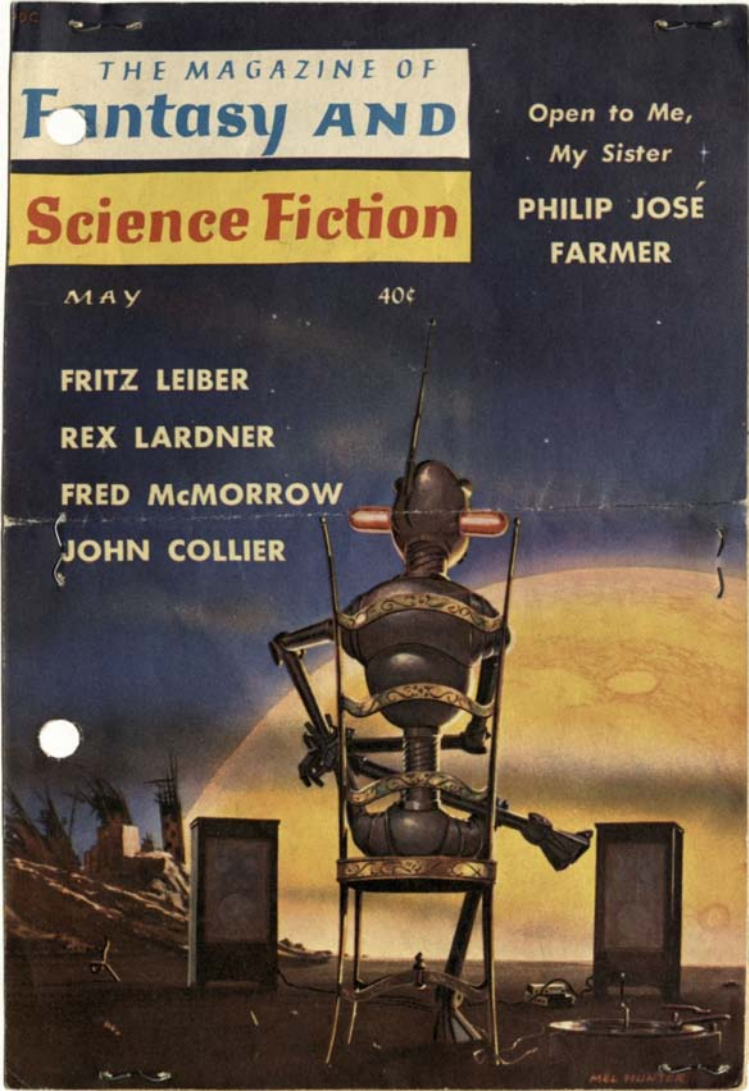
MAY 40¢

FRITZ LEIBER

REX LARDNER

FRED McMORROW

JOHN COLLIER



WOCKYJABBER

'Twas finite and the polar cusp
Orthogonal to the secant lay.
The semi-tacnode operates on
The Gudermanian of A.

"Beware the Integral, my son,
With shape of non-symmetric bell.
Beware old Van der Pol, and shun
The curious vector del."

He took his program in his hand.
Long hours the real root he sought.
Then rested by the memory drums
And sat awhile in thought.

And as in tedious thought he sat,
The Integral, without a name,
Rose from a skewed, conformal map,
Diverging as it came!

Pi-e, Pi-e, and x, y, z,
His digital went clicky-clack.
He found the norm in series form
And brought the work sheets back.

"Oh hast thou solved the Integral?
Here's thy degree, my brainish boy!"
He threw his punch cards in the air
And clapped his hands with joy.

'Twas finite and the polar cusp
Orthogonal to the secant lay.
The semi-tacnode operates on
The Gudermanian of A.

—HILBERT SCHENCK, JR

Fairchild Aircraft
DIVISION OF FAIRCHILD ENGINE AND AIRPLANE CORPORATION
HAGERSTOWN • Cable Address "Faircraft" • MARYLAND

In reply please refer to EF-206

31 October 1955

Mr. Robert Bemer
Mathematical Analysis Section
Missile Systems Division
Lockheed Aircraft Corp.
7701 Woodley Avenue
Van Nuys, California

Dear Mr. Bemer:

Your Flair System was used to check out two of our basic engineering problems with the results being very satisfactory. May I commend you at this time on the Flair Routine plus your excellent tracing routine.

In order to make our CPC work compatiable with the 650, it is necessary for us to change the floating decimal number used by Flair to a form PPX.XXXXXX, where PP is 50 plus the associated power of ten. As far as I can tell, reducing the numbers by one in memory locations 1714, 1642, 1744, 1437, 1346, and 1593, should do the trick. Am I correct in my deduction? If not, your guidance will be appreciated.

Thank you very much for your assistance.

Sincerely yours,

FAIRCHILD AIRCRAFT
Division of
Fairchild Engine & Airplane Corporation

Stephen J. Bilo

Stephen J. Bilo
Flutter & Vibration Section

SJB:gb

GENERAL ELECTRIC COMPANY

AIRCRAFT NUCLEAR PROPULSION PROJECT

POST OFFICE BOX 535 • IDAHO FALLS, IDAHO • IDAHO FALLS OFFICE

April 22, 1955

Mr. Robert Beemer
Missile Division
Lockheed Aircraft Corp.
Van Nuys, California

Dear Bob:

I am making a survey to determine which computer will be used for our data-reduction purposes here. If you would fill out the enclosed form and add any pertinent facts, it would be very helpful to me. Our choice is apparently between the EDC and the I.B.M. 650. You are probably better acquainted with this latter machine than any other one person not employed by I.B.M. For this reason, I would value your opinions highly.

I am working for General Electric on their Atomic Energy project now. We are just getting started but things are developing at a rapid rate. What do you hear from my brother Mal lately? He never writes, I guess he must have a gal friend.

Thanks very much for your help.

Sincerely,

Bob Perry

Olney R. Perry, ENGINEERING
Idaho Test Station - ANP Dept.

ORP:mj

May 10, 1955

Mr. A. L. Hubbard
Lockheed Missile Systems Division
Van Nuys, California

Dear Mr. Hubbard:

We would like to express our appreciation to your department, and specifically to Mr. Robert Bemer for the courtesy and cooperation exhibited last week in demonstrating to representatives of the C. F. Braun Company, the capabilities of the Type 650 Magnetic Drum Data Processing Machine.

Mr. Bemer is an acknowledged leader in the field of digital analysis; his contributions toward effective utilization of our several computers has been of great value to IBM as well as to Lockheed Aircraft Corporation.

Very truly yours,

Fred L. Brown

Fred L. Brown
IBM Manager

DLD:vrl
cc: Mr. R. W. Bemer
Lockheed Missiles System Division

SAMUEL B. MORRIS
GENERAL MANAGER
AND CHIEF ENGINEER
WILLIAM S. PETERSON
ASSISTANT GENERAL MANAGER
AND CHIEF ENGINEER
FRANK TWOHY
CONTROLLER

DEPARTMENT
OF
WATER AND POWER
THE CITY OF LOS ANGELES

BURTON S. GRANT
CHIEF ENGINEER OF WATER WORKS
AND ASSISTANT MANAGER
IVAN L. BATEMAN
CHIEF ELECTRICAL ENGINEER
AND ASSISTANT MANAGER
GEORGE C. SOPP
JOINT SYSTEM HEAD
AND ASSISTANT MANAGER

207 SO. BROADWAY
BOX 3669 TERMINAL ANNEX
LOS ANGELES 54
MICHIGAN 4211

April 29, 1955

Mr. Robert Bemer
Mathematical Analysis Supervisor
Missile Systems Division
Lockheed Aircraft Corporation
Woodley Avenue and Saticoy
Van Nuys, California

Dear Mr. Bemer:

I wish to express my sincere appreciation for the demonstration of the 650 which some of my staff and I were privileged to see this morning.

It was a masterful presentation of the intricacies of this new electronic device and of great assistance to us in our study of it.

Please do not fail to call upon me at any time if there is any way in which we may return the favor.

Sincerely,

Frank Twohy

FRANK TWOHY
Controller

FT:oc

INTERNATIONAL BUSINESS MACHINES CORPORATION
3287 WILSHIRE BOULEVARD LOS ANGELES 5, CALIFORNIA APPLIED SCIENCE DIVISION TELEPHONE DUNKIRK 8-0391

February 14, 1955

Mr. R. W. Bemer
Lockheed Aircraft Corporation
Missiles System Division
7701 Woodley Avenue
Van Nuys, California

Dear Bob:

This letter brings the sincere appreciation of all participants in the Type 650 discussion which you were so kind to conduct last Friday, February 11. Although I was unable to attend myself, by talking to several that did attend I was able to understand something of the effort that you and your associates put into this meeting. The effects were excellent; everyone was impressed by the high quality of work which you discussed and demonstrated. Your ability to manually load and manipulate the Type 650 awed the people that I talked to. The duplicated programs and card forms which you distributed will be most helpful to our other customers.

Many thanks for your willingness to play host at this meeting, and for the outstanding discussion which you organized.

Sincerely yours,

Don

DWP:hld

D. W. Pendery
Field Manager

COLLINS

COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA, U.S.A.

March 14, 1955

Mr. Bob Bemer
Lockheed Missiles Systems Division
Van Nuys, California

Dear Mr. Bemer:

I want to express our appreciation to you and your associates for the very fine demonstration you gave us on your 650.

We are convinced that you are pioneering the field on the use of the 650 and know its capabilities and limitations much better than probably even I.B.M.

If the offer still stands, our Dr. Bolie will undoubtedly want to spend some time with you on the use of the 650 for research and engineering problems.

If we can ever be of any assistance to you, do not hesitate to call on us.

Sincerely yours,

S. A. Lawrence
Director Systems Control Department

SAL/fh

cc. Dr. Bolie
File

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SOCIÉTÉ ANONYME AU CAPITAL DE 1.400.000.000 DE FRANCS

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N° D'ENTR. 297.75101.0016

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C. CH. POST. PARIS 1279-42

Mr. Robert BEMER
Mathematical Analysis Section
Missile Systems Division
Lockheed Aircraft Corp.
7701 Woodley Avenue
VAN NUYS - California

November 3rd, 1955

Dear Mr. Bemer,

We have been working lately on your 650 routines and are much interested in them, especially in machine language and FLAIR routines, for possible use in our Paris Computing Center.

To allow more complete experience, we should like to get some extra information about them, including a complete design of the 533 utility control panel. We already have the load cards.

Thanking you in advance to send this documentation, we remain

Yours very truly,

René Rind

René RIND

PS/cl

Lockheed Announces New Executive Positions

ROBERT E. GROSS

COURTLANDT S. GROSS

CHARLES A. BARKER JR.

CYRIL CHAPPELLET

HALL L. HIBBARD

AN OFFICIAL PUBLICATION OF THE LOCKHEED AIRCRAFT CORPORATION

THE LOCKHEED MSD Star

FOR EMPLOYEES OF THE MISSILE SYSTEMS DIVISION, VAN NUYS

Vol. 2 September 5, 1956 No. 1

To The Men and Women of Lockheed

I have unqualified faith in the field of aviation and in the future of the Lockheed company. It was this firm belief that attracted me to the industry as a young man some 30 years ago. And it was the same conviction that caused me to get together a small group of men, almost 25 years ago, and buy the then defunct Lockheed company out of bankruptcy.

You know the story. Many of you have been with the company since the early years. We've had our ups and downs, our feasts and famines, and we've had to weather many a storm together. It hasn't been easy, but the important thing is that we've always solved our problems, and the trend has always been upward.

I've never had greater faith in the future of aviation and of our company than now. But never has our business called for such significant management decisions as those that must now be made. We must make plans and commitments in the days immediately ahead that will determine our course for many years in the future. The risks and hazards of the future will be great and the competition will be more and more intense.

But just as the hazards are great, so are the opportunities. And I believe you will agree with me that the organizational changes we are putting into effect will place us in the best possible position to capitalize on the almost limitless opportunities that lie ahead in this dynamic, ever-changing business of aviation.

With the kind of leadership that exists today in our younger management group, I have no doubt that the achievements of our second quarter century will far exceed those of our first 25 years.

Robert E. Gross

Robert E. Gross
President
Chairman of the Board

Younger Men Move Into Key Positions

The board of directors yesterday approved a series of organizational changes and executive promotions that will bring younger men into positions of top responsibility in the company.

The administrative committee recommended the changes to the board of directors. The recommendations were approved at yesterday's regular meeting of the board to become effective Oct. 1.

The action included creation of a new position, chief executive officer.

Robert E. Gross, who has occupied both the positions of chairman of the board of directors and president of the corporation, will continue as chairman and chief executive of the company.

The other principal changes in titles and responsibilities are:

1. Courtlandt S. Gross, who is currently executive vice president, will become president.

Establish Policy Committee

2. Charles A. Barker Jr., vice president finance and treasurer; Cyril Chappellet, vice president administration; and Hall L. Hibbard, vice president engineering, will become senior vice presidents. Together with the chairman and the president, they will constitute the corporate policy committee. Hibbard will continue to act as general manager of the Missile Systems division.

3. Dan J. Haughton, presently a vice president and the general manager of the Georgia division, will become executive vice president.

4. Carl B. Squier will serve as vice president and assistant to the chairman of the board of directors.

5. Clarence L. Johnson, who is now vice president research and development, will become vice president engineering and research.

6. Dudley E. Browne, presently controller, will become vice

(Continued on Page 3)

MSD Occupies New Palo Alto Buildings

Yesterday—right on schedule—MSD employees moved into the first two buildings to be completed in the division's Bay area building program.

About 100 research people moved into the two 51,000 square foot research laboratory buildings in Stanford university's industrial park. At the same time, engineering, administrative, and service employees moved in the San Jose office where they will work for several months until other facilities of the multi-million dollar building program are completed.

More Arrive Daily

More employees will arrive each day at both locations, and in another 10 days about 400 will have transferred. By mid-October nearly 600 will be working in the Bay area.

The first shipment of desks, chairs, files, and laboratory equipment from the Van Nuys plant arrived last Saturday in 12 35-foot vans. Additional ones are arriving every day, and it will take about 50 truckloads in all to handle this phase of the move.

At the present time a 14,000 square foot experimental building is under construction in the $4 million research building program and two 96,000 square foot manufacturing and engineering facilities are going up at Lockheed's $8 million Sunnyvale plant.

Quickest, Smartest Electronic Brain Has Longest Memory

A new lightning-fast "electronic brain" computer, which will solve some of the problems involved in the development of the nation's vital intercontinental ballistic missile, will soon be put into operation by MSD.

The electronic genius, known as the Univac Scientific 1103A and the first of its kind ever built, is the only machine in the world versatile enough to interrupt one complex problem to solve a new, high priority problem while retaining all work on the first in its "mind" for subsequent solution.

"High speed calculations by the computer will give us very rapid solutions to some of the problems involved in the research and development of newer, faster, and more complex weapon systems," said Dr. Werner W. Leutert, head of the mathematical and computer services department.

Solves Complicated Problems

Dr. Leutert said that Lockheed's missile scientists and engineers will use the new equipment for such computations as flight paths for orbiting vehicles,

DR. WERNER W. LEUTERT

nuclear reactor problems, missile trajectories, flutter analysis, heat transfer problems, and many others.

The computer, built by the Remington Rand Univac division in St. Paul, Minn., will also analyze secret missile data obtained during flights.

Installed at Palo Alto

The Univac Scientific, according to Dr. Leutert, will be the heart of the computer center just completed in MSD's new research laboratories at Palo Alto. The center also includes analog computers and other digital computers.

Dr. Leutert explained that the new computer is the digital type which computes units rather than comparing measurements as done by analog computers.

To handle large scale missile computations at a rapid rate, the computer features two high speed memories—a magnetic core unit and a magnetic drum unit. Each of the memories has different storage and speed capabilities providing a versatile operation. Dr. Leutert said.

The magnetic core, from which information can be plucked in eight millionths of a second, has rapid-access storage for 4096 "words." The magnetic drum has a memory capacity of 16,384 "words" and produces information in 17 thousandths of a second. A word consists of 36 binary digits and is equal to a 10-digit decimal number—for example, a number such as 6,845,927,861.

Adds in a Flash

It can add nearly 30,000 of these numbers in one second and perform 1000 operations in the wink of an eye.

Magnetic tapes are often used as individual memories with each tape holding 383,000 words, or more than 13 million digits which can be used at any time for either input or output functions.

The complete computer, one of the outstanding installations in the nation, consists of some 15 related units and will occupy some 2000 square feet of floor space in the Palo Alto facilities.

Performs 41 Operations

The Univac Scientific, Dr. Leutert said, performs 41 different arithmetical and logical operations. It can be fed instructions and initial data four different ways—on magnetic tape, punched cards, punched paper tape, or manually.

Both the instructions and the problem are recorded in the high speed memories. As the computer solves the problem, the final results are produced on a magnetic tape, on punched cards, or by electric typewriter.

And indicitive of its nearly error-free operation, the Univac Scientific detects and signals most operational errors that occur from equipment failures.

Garver Speaks to NACA Members

Oliver B. Garver Jr., 81-10, spoke last week at a monthly luncheon meeting of the National Association of Cost Accountants.

Garver spoke to the Van Nuys and North Hollywood section of the association on preparation of overhead budgets and their use as a performance measure.

Vote Registration Ends Next Week

Registration for general elections will close on Sept. 13, S. H. "Si" Parr, employee services coordinator, reminded employees today.

Services of a registrar at the plant next Tuesday and Wednesday will make registration practically effortless for MSD employees, Parr said.

The registrar will be in the cafeteria from 10 a.m. to 1 p.m. and at gate 17 from 1 to 4:45 p.m. both days.

Venetian Conference To See MSD Report

A report by two Missile Systems division men will be presented in colored slides this month at the Agard conference in Venice on missile guidance and control data automation. Missile experts from many countries will attend the meeting chairmanned by Dr. Theodore von Karman.

The report, written by E. K. Fisher and David A. Hemmes, mathmetics and computer services department, and illustrated by the MSD art department, will be presented to the conference by Dr. W. B. Klemperer of Douglas Aircraft Corp.

Dr. Klemperer heard the report in July at the Naval Ordnance Laboratory in Corona, Calif., at Swift's Symposium, a bi-annual conference on missile problems and suggested it be given at the Venice conference as an example of the automatic data reduction approach.

The report will give the conference a visual, step-by-step survey of data reduction equipment and techniques designed and produced by MSD.

Work Begins on New $3 Million Test Center At California Division

The California division last week announced plans for construction of a new multimillion dollar flight test center adjoining Lockheed Air Terminal.

The complete project including structures and purchase of added land will cost more than $3 million.

The new facility will provide a center for all of Lockheed's engineering flight test activities, both military and commercial, with the exception of jet flight test operations. This will include instrumentation activities, data processing, photo work, and all other flight test technical groups.

Doubles Test Space

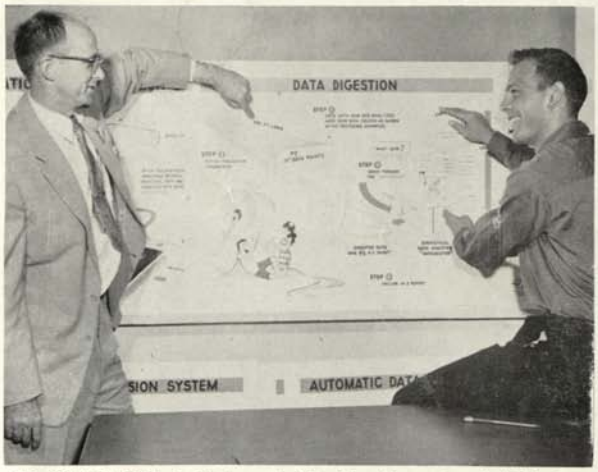
The new center will approximately double the present flight test space, now heavily loaded with work on the F-104, T2V-1, and early warning models.

The new structure will be divided by a concrete firewall into a two-story office and laboratory building 110 by 600 feet on one side and a flight test hanger and static test hanger 200 by 600 feet on the other side. Offices and laboratories will be cooled by a 550-ton absorption-type refrigerator unit.

Ground clearing for the new center has started, and occupancy of the first unit is scheduled late in 1957.

New Arrivals

LEDEGANG, daughter, Sandra Maria, 5 lbs. 11 oz., born Aug. 24 to Mr. and Mrs. John W. Ledegang, 82-20.



NO TRANSLATOR should be needed for the picture story of MSD's data reduction equipment and techniques that will be presented at a Conference in Venice this month. Co-authors E. K. Fisher, right, and David L. Hemmes first gave the report at a technical meeting in July. Enthusiastic viewers arranged for the repeat performance abroad during last week in September.

LOCKHEED AIRCRAFT CORPORATION
Missile Systems Division

INTERDEPARTMENTAL COMMUNICATION

To Robt Bemer Date 5-4-55

From O. R. VanDerhoof Dept. 50-10 Plant B-9 Ext. 95

Subject COMPUTER MACHINE FAMILIARIZATION PROGRAM

The Training Office, in cooperation with Robert Bemer of Dept. 74-23, has planned this Computing Machine Program. The purpose is to show participants how machine computations can be of assistance in the work of their groups. There will be examples of management problems and their solution by computers. Emphasis will be given to adaptation of these methods for use by your group.

Each class will start at 8:15 A.M. and run until 9:45 A.M. They will be held in the Computer Machine Room, northeast corner of building 901.

Below you will find the five groups with your name and assignment underscored in red. In the event that it is absolutely impossible for you to attend, call extention 95 and we shall try to change your appointment.

GROUP I Friday, May 6	GROUP II Monday, May 9	GROUP III Tuesday, May 10	GROUP IV Wednesday, May 11	GROUP V Thursday, May 12
Anderson, K.	Brown, H. J.	Coles, E. W.	Harberg, R. A.	McMullen, K. E.
Andrews, E. F.	Williams, M.C.	Garver, O. B.	Haire, L. W.	Ray, T. B.
Cadd, B. F.	Boyce, A. G.	McHam, J. D.	Parsell, R.	Teal, J. M.
Betz, T. E.	~~Catts, H. L.~~	Paris, V. W.	Shimp, H. E.	Snow, B.
Bradley, J.O.	Hohneck, W. G.	Kerry, A.	Lane, M. E.	Kenna, T. W.
Bart, C. W.	Irish, E. E.	Haydon, J. H.	Moberly, F. W.	Kirkpatrick, J.W.
VanDerhoof, O.R.	Bird, A. W.	~~Truesdale, J.~~	Redmon, E. J.	~~Lyons, T. E.~~
Perkins, J. H.	Bison, W. L.	Mathieu, W. J.	Brenneman, R.W.	Waller, J. A.
Webster, R. E.	TRUESDALE, J	Packard, D. H.	Long, D. W.	Osgood, L. R.
McChesney, J.B.	~~Weaver, R. B.~~	Tigue, G. W.	McMillan, D. L.	CATTS, H.L.
	LYONS, T.E.	WEAVER, ROSE	McHam	
		BOYCE		

O. R. VanDerhoof

ORV:au

UNIVERSITY OF MICHIGAN
ENGINEERING RESEARCH INSTITUTE

TELEPHONE:
YPSILANTI 5110

WILLOW RUN RESEARCH CENTER
WILLOW RUN AIRPORT
YPSILANTI, MICHIGAN

September 19, 1955

Mr. R. W. Bemer
Mathematical Analysis Section
Lockheed Aircraft Corporation
Missile Systems Divisions
Van Nuys, California

Dear Mr. Bemer:

Thanks again as an old Michigan Alumnus for going back and helping the school in some of its activities. I certainly appreciated your participation, and will you tell your supervisors that you gave an excellent description of the extent to which Lockheed is making use of Digital Computers?

If there is anyway in which Professors Scott and I can help you in problems of recruiting or anything else, call on us. Thank you again.

Sincerely yours,

John W. Carr III

JWC:nf

FORM 3812-14

LOCKHEED AIRCRAFT CORPORATION
~~CALIFORNIA DIVISION~~

CHANGE OF STATUS NOTICE

Missile Systems Division

EFFECTIVE DATE: 10-10-55

CHECK APPROPRIATE BOX: ☐ HOURLY ☒ SALARY

EMPLOYEE NAME	SENIORITY DATE	LIMITED SERVICE	EMPLOYEE NUMBER
BEMER, Robert William	3-1-54	None	104760

	FROM	TO
WORK WEEK AND SHIFT	1-D	1-D
DEPT. NO. AND PLANT	74-23, B-9	74-23, B-9
OCCUPATION AND CODE	Group Engineer - Research 125-00	Mathematical Analysis Section Engineer,/ 090-00
GRADE	SG 12	17
PAY RATE	$223.15	$235.00
CHANGE CODE		2
DIFFERENCE		$11.85
IF SALARY		5.3%
OTHER (SPECIFY)		INDIRECT

NOTICE PREPARED BY: D. Morris, 355

DATE: 8-19-55

KARDEX POSTED: ☐

FOR RETROACTIVE PURPOSES ONLY

APPROVALS

IMMEDIATE SUPERVISION

PERSONNEL REPRESENTATIVE

DEPARTMENT HEAD

SALARY ADMINISTRATION

TOOL CRIB CLEARANCE

SAFETY APPLIANCES CLEARANCE

EMPLOYEE CLEARANCE COPY

FORM 3812-14

LOCKHEED AIRCRAFT CORPORATION
~~CALIFORNIA DIVISION~~

CHANGE OF STATUS NOTICE

Missile Systems Division

EFFECTIVE DATE: 6-20-55

CHECK APPROPRIATE BOX: ☐ HOURLY ☒ SALARY

EMPLOYEE NAME	SENIORITY DATE	LIMITED SERVICE	EMPLOYEE NUMBER
BEMER, Robert W.	3-1-54	None	104760

FROM	TO
WORK WEEK AND SHIFT: 1-D	DEPT. NO. AND PLANT: 74-23 B-9
WORK WEEK AND SHIFT: Same	DEPT. NO. AND PLANT: Same
OCCUPATION AND CODE: Group Engineer-Research 125-00	
OCCUPATION AND CODE: Same	
PAY RATE: $211.15 GRADE: 12	PAY RATE: 223.15 CHANGE CODE: 1 GRADE: Same DIFFERENCE: $12.00 IF SALARY: 5.7 %
OTHER (SPECIFY)	OTHER (SPECIFY)

NOTICE PREPARED BY: D. Bashta 61 | DATE: 5-21-55 | KARDEX POSTED: ☒

FOR RETROACTIVE PURPOSES ONLY

APPROVALS

IMMEDIATE SUPERVISION	PERSONNEL REPRESENTATIVE
DEPARTMENT HEAD	SALARY ADMINISTRATION

TOOL CRIB CLEARANCE

SAFETY APPLIANCES CLEARANCE

EMPLOYEE CLEARANCE COPY

FORM 2412-14

LOCKHEED AIRCRAFT CORPORATION
~~CONFIDENTIAL~~

CHANGE OF STATUS NOTICE

EFFECTIVE DATE: 12-20-54

CHECK APPROPRIATE BOX: ☐ HOURLY ☒ SALARY

EMPLOYEE NAME	SENIORITY DATE	LIMITED SERVICE	EMPLOYEE NUMBER
BEMER, Robert William	3-1-54	None	104760

	FROM	TO
WORK WEEK AND SHIFT	1-D	Same
DEPT. NO. AND PLANT	74-23 B-9	Same
OCCUPATION AND CODE	Group Engineer - Research 125-00	Same
PAY RATE	$195.00	$205.00
GRADE	12	Same
CHANGE CODE		1
DIFFERENCE		$10.00
IF SALARY		5.1 %
OTHER (SPECIFY)		

NOTICE PREPARED BY: D. Bashta 61 | DATE: 11-30-54 | KARDEX POSTED: ☒

FOR RETROACTIVE PURPOSES ONLY

APPROVALS

IMMEDIATE SUPERVISION

PERSONNEL REPRESENTATIVE

DEPARTMENT HEAD

SALARY ADMINISTRATION

TOOL CRIB CLEARANCE

SAFETY APPLIANCES CLEARANCE

EMPLOYEE CLEARANCE COPY

LOCKHEED AIRCRAFT CORPORATION
California Division

NOTICE OF PAYROLL ADDITION

MISSILE SYSTEMS DIVISION

EMPLOYEE NAME BEMER, Robert William	SOCIAL SECURITY NUMBER [redacted]	EMPLOYEE NUMBER 104760
STREET ADDRESS 17615 Miranda	CITY AND ZONE Encino	HOME PHONE DI 2-5313
CLEAR IN DATE 2-17-54	REVIEW GROUP	SEX M
EFFECTIVE DATE 3-1-54	PRESENT RATE 195.00 weekly	CLOCK STATION
OCCUPATIONAL TITLE Group Engr. Research	OCCUPATIONAL CODE 125-00	REQUISITION NUMBER 39305X1
DEPARTMENT NAME	DEPARTMENT NUMBER 74-31	PLANT NO. & FACTORY B-1 Bldg. 103
NUMBER OF EXEMPTIONS 8	WORK WEEK 1	SHIFT & STARTING CODE 7:30
PHYSICAL LIMITATIONS None	GROUP INSURANCE Yes	MARITAL STATUS Married
DATE OF BIRTH 2-8-20	NEW, REHIRE OR VETERAN CODE Rehire	ACCOUNTING DISTRIBUTION
MINOR OR PART-TIME CODE	SENIORITY DATE 3-1-54	VETERAN REHIRE DATE
EFFECTIVE DATE OF PRES. RATE	VAC. ELIG. DATE / PRIOR VAC. ELIG. DATE	INTERVIEWER'S NAME LRO:RB:mhg

REMARKS

PTD:12-5-52

QUADRUPLICATE COPY

ALLSET—MFD. BY THE KOBY REGISTER COMPANY, PATENTED

FORM 3216-4

Jan 29 '56

Dear Bob,

As you see, I have a stationery problem too and this happens to be at hand. I was very glad to hear you're so nicely settled and pleased with your job. It sounds ideal all the way round.

The knife has been quite a success so far, it has gone on several fly trips for practical reasons and has lightened several meetings at NCSO as a conversation piece. (I threatened to cut my way out of one conference with it.) My burning ambition is to try the saw blade on Dave Harris! Anyway, thank you very much for it - and for your letter too.

I think you've heard of our latest move - from Engineering to Research

The entire Department moved organizationally to Research under Ridenour. As far as I'm concerned, the move was entirely voluntary and I think our position is considerably improved. The move to Sunnyvale is about to be formally announced and I think the plans which are developing are very good. The 1103 vs. 704 is not yet decided as far as I know, but whatever it is will go to Palo Alto. How many of the present MSD people will go with sis is anyone's guess. Casual informal polls have been taken, but I'm sure they are highly unreliable. No one will say now he won't go if he feels there is the least possibility.

We have an Ampex 600 tape recorder as part of our Hi fi system and Paland I have enjoyed it even more than

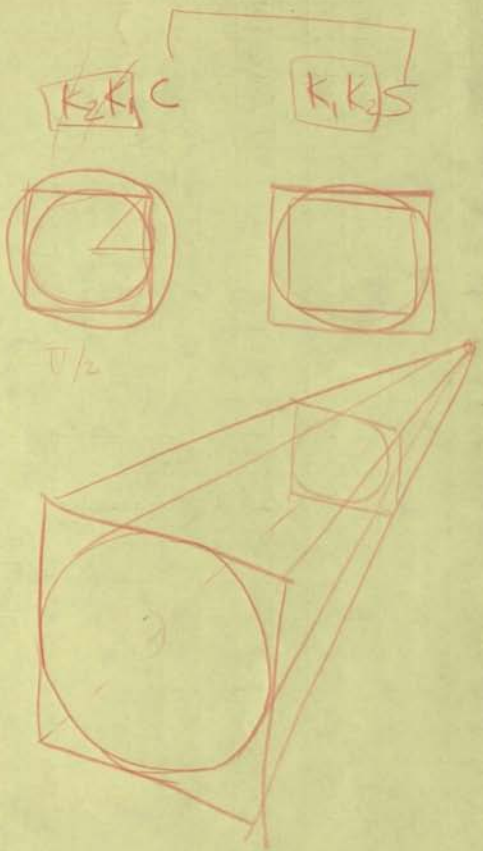
we thought we would. It is the smallest model Ampex makes and has an entirely satisfactory response for hi fidelity music. We record from KCBH f.m. and have already built up a considerable library of recordings at a fraction of the disc recording cost.

You lost me in explaining your new 705 system but it sounds good anyway. Do you find yourself free of politics until the technical side all important or are politics more or less universally present? I am slowly becoming more and more impatient with the politics we seem to have as a permanent feature at HSD. If there is no abatement in the next five years, Tammany Hall can have the whole damn thing!

If you have a chance at WICC
I hope you'll get down to S.A. and come
see us.

Thanks again for the knife, old man.

Art



$S = K_1 C$

$C = K_2 S$

ELECTRONIC ASSISTANT—Leigh E. Dunn, chief engineer, test division, left, and Robert Sforzini, test operations supervisor, inspect control panel of new IBM 650 computer recently installed at Marquardt Aircraft Company, Van Nuys.

IBM Computer Aids Jet Tests For Marquardt

The business of determining in a hurry how a supersonic ramjet behaves in high speed ground tests is being expedited by the installation of a new "electronic assistant" in the Air Force Marquardt Jet Laboratory, Leigh E. Dunn, Chief Engineer, Test Division, said today.

The "electronic assistant" is an IBM 650 Magnetic Drum Computer which will be used for the physical conversion of pressure, temperature and fuel measurements as sampled at high speed in ramjet development tests.

In addition, Dunn said, the computer will be employed to expedite the design and development of ramjet components and accessories.

Marquardt Aircraft Company is the leading producer of ramjet engines and its Jet Laboratory is one of the largest and most powerful facilities of its kind in the country.

The computer can completely process the IBM cards into calculated form for engineering analysis within two and a half hours after completion of a test run, five times faster than previous methods used.

Test data are taken during the ramjet tests and automatically recorded on punched cards. These readings are processed on the IBM 650 Calculator at the rate of 900 per minute. No other auxiliary equipment is required to process the test data. The final punched cards are interpreted or typed on a tabulator at the rate of 750 readings per minute.

Other applications of the 650 include engine performance predication studies, heat transfer analyses, trajectory studies, combustion phenomena studies, engine structural investigations and flight test analyses.

The Magnetic Drum is the heart of the 650. This drum can remember 20,000 digits (2000 words, each word consisting of 10 decimal digits and a sign). The drum is used to store not only the data to be used in processing a problem, but also to store instructions to the machine.

Sales Problems Solved With Aid Of Punch Cards

By SAM DAWSON

NEW YORK (AP)—A carpet maker is turning to a mechnical brain to help him lick the problem of the public's fickle taste. To survive in this competitive age a manufacturer must roll quickly with the punches of the consumers.

Sales data, computed quickly on punched cards, reveals color and style trends in floor covering. Then another card can be punched and used to control the machinery running carpet looms.

A maker of auto seat covers each week feeds into a mechanical brain nationally gathered data on what shades are favored at the moment by suddenly color-conscious motorists.

The bank speeds up handling eight fold by using an electronic device to scan the millions of Travelers Checks which touring Americans are scattering around Europe and the rest of the world this year.

WALL STREET GLEANINGS

N.Y. Herald Tribune News Service

American Airlines carried 140,454 passengers out of New York City in May, believed to be a monthly record for any line.

American Iron and Steel Institute reports average hourly earnings in the industry up 85 per cent since World War II, while increases in supplements to wages were up 172 per cent.

Steel scientists have found that increased use of nitrogen as an alloying element makes steel more resistant to high and low extremes of temperature.

May traffic on Seaboard and Western Airlines, all-cargo transatlantic operator, was up 62 per cent from a year ago.

Israel-American Oil Corp. reports an important gas strike on the Mediterranean side of the country.

A Sylvania Electric Products official states both use of electricity and production of electric products will double in the next 10 years.

Congress Group Authorizes 51 Calif. Projects

WASHINGTON (AP) — The House Armed Services Committee has authorized 51 military public works projects in California.

The measure, with a total nationwide authorization of $2,368,998,000 now goes to the House. It is not an appropriation bill. A separate bill will be necessary to provide funds.

The California list, as approved by the Armed Services Committee of the House:

Army: Sierra Ordnance depot, $1,075,000; Sharpe General depot, $337,000; Sacramento Signal depot, $715,000; Two Rock Ranch station, $1,298,000; Oakland Army [illegible] $1,923,000; West Coast Army [illegible] terminal, $12,860,000; [illegible] Monterey, $1,878,000; [illegible] $1,407,000; Presidio of San Francisco, $144,000; [illegible] barracks [illegible]

MSD Men Attend Technical Courses

As part of the Missile Systems division's technical training program, Dr. Richard B. Tallmadge and Bernard D. Rudin, both in instrumentation and data analysis, are enrolled for summer sessions covering their field of work at the Wayne university computation laboratory.

Under the university's summer program, the MSD men each will attend one of the four specialized week-long courses on computing and data processing systems and equipment.

Rudin is now attending the third session which covers linear programming, model building, industrial applications, case studies in mathematical programming, data processing based on mathematical programming, special seminars and workshops, and equipment presentations.

Dr. Tallmadge will attend the fourth course beginning next Monday which will include integration of differential equations by numerical methods, direct methods for solution of problems of matrix algebra, numerical techniques in partial differential equations, theory of approximation, special mathematical topics, and advanced programming techniques.

MSD To Get New IBM 650

The Missile Systems division will be the first facility west of the Mississippi to have a battery of IBM 650 "electronic brains" when the third such computor is received next week, Art L. Hubbard, instrumentation and data analysis department head, said yesterday.

Two 650s already are in operation at MSD, the first having been installed last February and the second in May.

The division also has on order a new type 704 computor, Hubbard said, which is IBM's latest production model. The 704 is approximately 50 times faster than the 650, he said. It has a magnetic core storage unit—the latest type of electronic memory—and is able to add 10,000 sets of 10-digit figures in one second, automatically placing the decimal point.

The 650s can handle problems at the rate of 200 a second and have a magnetic drum memory which can store up to 20,000 digits at 200 separate locations. The computors can add 10-digit numbers at the 200-a-second rate.

The new computors put MSD among the most up-to-date facilities in the country in data processing equipment, Hubbard said.

Bemer To Talk On Computor

The efficient use the Missile Systems division is making of its type 650 electronic computors will be told to a large group of computor technicians during a scientific computation seminar to be held Aug. 1-4 at Endicott, N.Y.

Robert W. Bemer, instrumentation and data analysis department, will describe the MSD system to approximately 70 representatives of firms from various parts of the country. The seminar is being sponsored by International Business Machines, manufacturer of the 650 computors.

Further national attention will be drawn to MSD's use of the 650s through a book compiled by the instrumentation and data analysis department. The book, covering the division's entire system for use of the machines, will be distributed to almost 700 companies who have the IBM computors on order.

Engineers Deliver Technical Papers

Two Missile Systems division engineers presented technical papers at recent scientific conferences in their fields.

Alfred E. Sibley, an electronic research engineer in the data reduction service, addressed the symposium on magnetic tape recording instrumentation at CBS Television City on February 25. He spoke on "An Automatic Data Reduction System for FM Telemetered Data."

Bernard D. Rudin, a group engineer of the mathematical analysis section, department 74-23, spoke before the West Coast Computor conference at the Statler Hotel in Los Angeles on Thursday, March 3. His paper, entitled "A Theorem on SPDT Switching Circuits," presented a theorem developed by Rudin which has far-reaching applications to logical circuit design.

Fast Machine Gets To Work Fastest

There's no grass growing under foot at the Missile Systems division when it comes to getting something into production in a hurry.

Latest example occurred with installation of the third IBM 650 electronic computor. The computor arrived at 2:17 p.m. At 3:03 it was tested, and at 3:54 it was solving its first problem. Elapsed time was only one hour and 37 minutes.

IBM technicians who installed the computor said it was a record time. Added to MSD's other two 650s, each of which took three and a half hours to set up, the new computor gives the division the largest battery of 650s west of New York.

Bemer to Address Engineering Group

Robert W. Bemer, instrumentation and data analysis department, will explain MSD's computing and data reduction system at a special summer conference sponsored by the Engineering Research Institute, University of Michigan, on Aug. 5.

Bemer's talk will be a "report from a user" of digital computors and data processors, a series being presented by the university.

Bemer to Give Technical Paper at Computor Meet

Robert W. Bemer, instrumentation and data analysis department, will give a paper at the annual general meeting of the Association for Computing Machinery on polynomial relaxation coefficients.

The meeting will take place Sept. 14, 15, and 16 at the Moore School of Electrical Engineering, University of Pensylvania, Philadelphia.

MSD Employees Teach for USC

Two of the Missile Systems division's mathematical analysists, Dr. Richard Talmadge and Bernard Rudin, recently started teaching assignments for the University of Southern California.

Dr. Talmadge is teaching "introduction to complex variables" at USC, and Rudin is teaching "numerical analysis" for USC at Edwards Air Force base.

The Missile Systems division encourages its mathematicians, scientists, and engineers to maintain academic contact with colleges and universities in the area by taking on such assignments as teaching.

New Data Machine Performs Math Miracles for Missileers

Even if you're a real hotshot in math, you'll probably think that adding and subtracting 10-digit figures at the rate of 200 a second is not only fantastic but impossible.

It's fantastic but not impossible, at least not for the new electronic data processing machine that arrived at MSD a week ago.

The new machine is called a Type 650 magnetic drum data processing machine, and is one of the first to be shipped by IBM. It is the first in the missile and aircraft industry and also first this side of the Mississippi river.

For the most part, the new machine will be working for missile engineers, computing flight paths for fully-guided missiles, calculating heating effects at extremely high speeds, helping with upper-atmosphere research, and working on design studies and computation of orbits for space vehicles.

Almost as startling as the complex kinds of mathematical problems it can solve is the machine's ability to check its own operations. It automatically checks each of its calculations and even the work of the operator. If the operator sets up any false information to feed into the machine, it stops running and signals with a red light where to find the error.

The machine can do other things, however, and won't devote its efforts exclusively to the missile engineers. It also can handle problems of payroll, income tax, overtime, and social security data.

Once a week it will take an hour off to turn out the MSD payroll. During this hour the machine will figure out, for each of the division's 1500 employees, the accumulated earnings, deductions, and weekly pay. After that, it will turn back to another missile problem.