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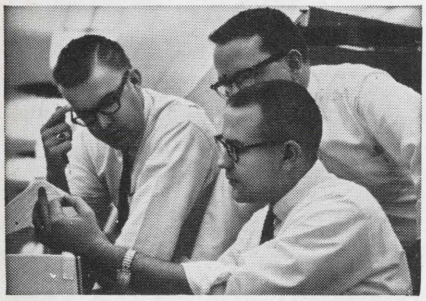

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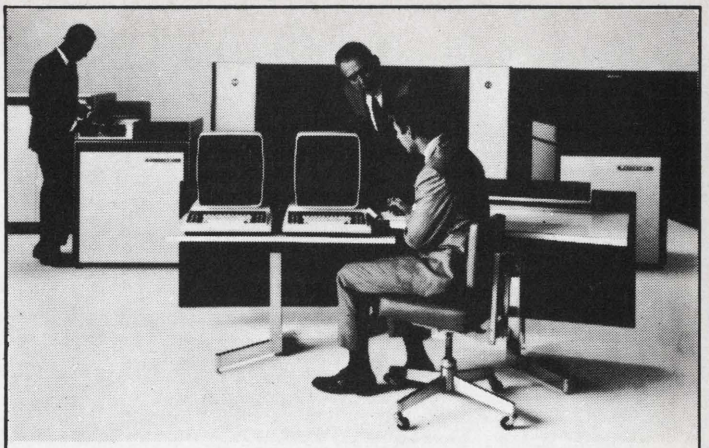

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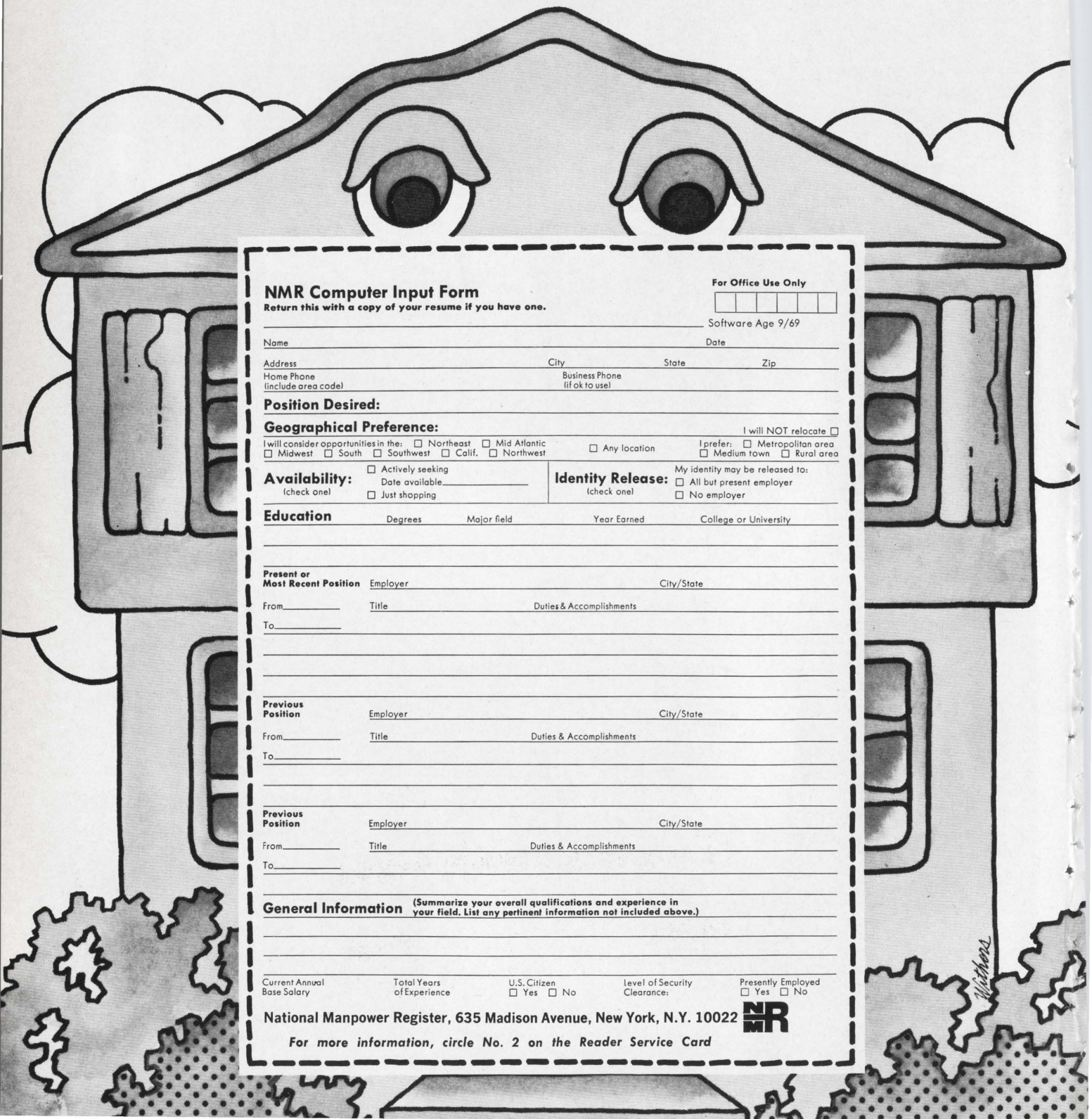

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new applications

IBM Computer Streamlining Home Delivery

Diamond Milk Products has installed a computer to streamline home delivery of 85 different dairy products to 14,000 customers in the Columbus, Ohio area. The IBM 1130 computer has apparently increased the effectiveness of route efficiency, resulting in a lower price to the consumer and a higher wage for the routeman.

When the routeman reports in the morning, he signs out with his inventory for the day and receives a deck of punched cards. The deck contains one card for each of his customers and is designed for him to simply check the numbers and quantities of items as they are delivered.

At the end of the day, he returns the cards which are run through a mark-sense punching device to record the information in the computer.

By running the cards through the computer, volume discounts automatically are calculated and are posted according to customers. The system also automatically produces an itemized bill, credits partial payments and indicates balances due. With the availability of all this information, analyses of each route can be made for planning the product mix.

Computer to Help Name Harness Horses

Harness racing has turned to the computer to help name the hundreds of thousands of colts foaled each year. A master file of the names of all modern era harness horses—both trotters and pacers—will be available later this year on an IBM/360 Model 20. When this information is available centrally, breeders and owners will be able to determine quickly whether the name they have selected is acceptable. There are several criteria for naming a harness horse:

A harness horse may have no more than three words in its name nor can it be longer than 18 units, including 2 spaces. There must be no similar sounding names whose differences are only in the spelling, such as "Night Flight" and "Nite Flite."

If a name has been used previously, it may not be used again for at least five years after the death of the original horse or about 20 years after registration.

Names of horses who are world record holders can never be used a second time. In addition, the names of horses whose records or performance distinguished them, can be removed from the available category on a permanent basis by owner request.

Names of famous dams and sires cannot be incorporated into a name unless the horse was a blood-line offspring.

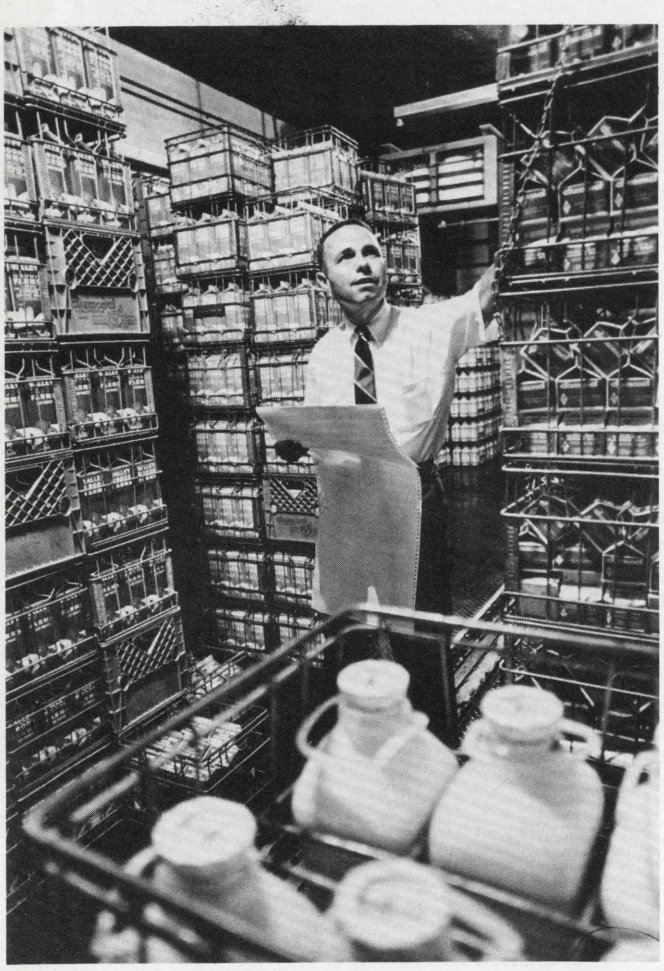
The computer is being programmed to review all of these considerations on the three choices submitted by the owner. If none of the three selections are eligible the computer may try rearrangements of the three choices or it may introduce names of the sire or dam of the young horse to find an available combination.

The many regulations on name selection, the hundreds of thousands of previously assigned names, and the names of some 175,000 active standardbred horses have made the use of a system like this imperative," said Dennis Nolan, the data processing manager of the United States Trotting Association.

Blood Bank Installs Computer to Control Inventory and Track Donors

Irwin Memorial Blood Bank of the San Francisco Medical Society has put a computer to work serving the expanding blood needs of 59 hospitals in eight Northern California counties. The computer, an IBM System/360 Model 20, was installed to help maintain inventories of lifesaving blood, recruit voluntary blood donors and aid in research and technical services.

To meet the constant demand for blood, the blood bank must keep at least 2800 units of all eight basic blood groups and types in inventory, mostly stocked at the



hospitals, at all times. Storage of whole blood must be used within 21 days. The problem becomes one of shifting aging blood from hospitals with surpluses to those with shortages of particular groups and RH types.

The IBM system will help eliminate this problem by providing up to the minute information on the status of all blood consigned to the hospitals, including data on how many units have been processed for use by specific patients and how many are still retrievable for use elsewhere.

When the hospital uses a unit of blood from its supply, a punched card accompanying that unit will be inserted into the terminal. The terminal then will report the unit number, the blood group and Rh type and the expiration date to the computer which will reduce its inventory balance accordingly.

The ultimate goal of the computer installation is to provide total information on each available unit of blood—from the time it is given by the donor until it is received by the patient. "This will help us provide blood of the right types, in the right amounts and at the right times for the best possible service to patients," said Mrs. Hemphill, managing director of the blood bank.

USC Uses Computer to Help Fight Juvenile Delinquency

Researchers at the University of Southern California have developed a computer-based system for providing probation officials with background information to help evaluate juvenile offenders. The first step is to compile information from the case histories of 2,290 juvenile offenders on the youths' sex, age, family situation, background and specific juvenile act. Once the statistical compilation is complete, probation officials will be able to make quick reference to previous cases similar to those of youngsters under their current jurisdiction.

As explained by A. W. McEachern, the program director: "Suppose a probation official is considering the case of a boy who is 14 years old, fatherless, from a specific economic background and charged with theft. The computer can provide this official with a statistical breakdown on similar cases involving boys of similar circumstances—including their progress following certain kinds of decisions made in their cases."

The statistical analyses from the computer are not intended to be a substitute for the probation's officer's judgement; it should give him a better idea of the kinds of judgments that will be successful for each case as it comes before him and then considering *all* relevant factors the decision can be rendered.

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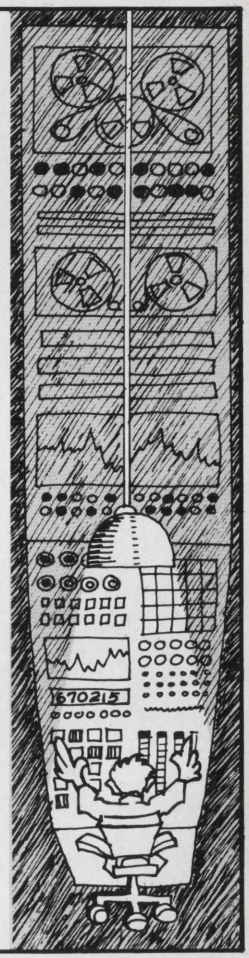

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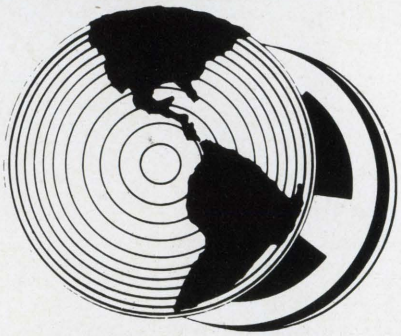

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SIMPLIST/70

An Elementary List Processing Language

John David Canter
Park Point College
Pittsburgh, Pennsylvania

SIMPLIST/70 is an elementary list processing language designed to facilitate the manipulating of information in both simple list and complex list structure formats. It reduces the time normally required to master a list processing language while maintaining the flexibilities inherent in list techniques, including dynamic allocation of storage, hierarchical data structures, recursion and garbage collection. SIMPLIST/70 is general purpose in that it includes the capabilities of both symbolic and arithmetic processing. The language consists of twenty-five macros for the creating, processing, analyzing and destroying of form-free lists, and for logical decision making and program control. The basic element of SIMPLIST/70 is a quadri-cell which contains a data element and FROM, TO and HIERARCHY address pointers. A SIMPLIST/70 compiler has been written in Assembler Language for the IBM System/360, and requires a minimum of 32K bytes for operation.

The design of the language is explored, and the function and application of each of the twenty-five macros is examined in detail.

The field of educational computer science has been both a leading participant in, and major observer of, a trend in recent years away from assembler-level programming languages and towards high-level compilers requiring a minimum of time in learning, while providing a maximum of time in productive application. In almost all instances, high-level language developments have

been algorithmic in nature, and include such familiar mnemonics as BASIC, FORTRAN, COBOL, PL/1 and the ilk. Algorithmic languages are those which operate through defined processes within a finite number of steps. They may be characterized as providing static or one-time allocation of memory, iterative or loop processing, and the creating of strings, vectors or arrays of data in which elements of the set are arranged contiguously in memory. Processing through algorithmic data structures is accomplished by indexing, in which the length of the data unit is added to the current address to provide a reference to the next element in the array. Array sizes are declared before processing begins, and these sizes may not be dynamically altered. Thus, in algorithmic programming, the semantics or contents of the data base may change during the executing of a program, but the syntax or structure of the data base remains intact.

There is, however, a continuously growing body of educational institutions, industrial, governmental and not-for-profit research organizations in the Western Hemisphere, and to a lesser degree in the Soviet Union, which are investing considerable sums of money and expenditures of manpower in the investigating of such topics as heuristics, cybernetics, game theory and information storage and retrieval. These problem areas are not particularly adaptable to algorithmic conceptualizations. In place of static allocation of memory, they require a dynamic and continuously changing partitioning of store. In place of contiguous juxtaposition of the members of an array, they utilize a scattering of list elements throughout available memory. In place of iteration, they adapt to recursive techniques in which complex data structures consisting of lists and associated sub-lists are subjected to the same processing, and in which operations on the prime list are alternately suspended and restarted as the operations on the intervening sub-lists are begun and completed. As opposed to algorithmic facilities, list processing systems may be conceptualized as permitting changes not only to the contents of the data base, but to the structure of that data base as well.

With the exception of such list processing languages as COMIT and SNOBOL3, relatively little has been done to bring the field of symbolic manipulation and heuristic programming to the ease of mastery which algorithmic languages have already attained. It appears, however, with the trend towards high-level compilers and programming languages for nonprogrammers a reality, and with the increased activity in nonnumeric manipulations becoming a significant force in computer science, that there is justification for the developing of a list processing language which is simultaneously easy to

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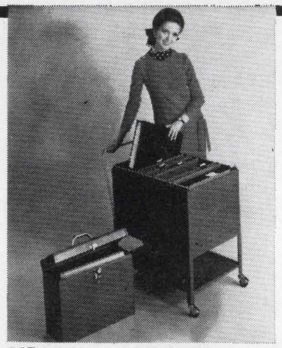

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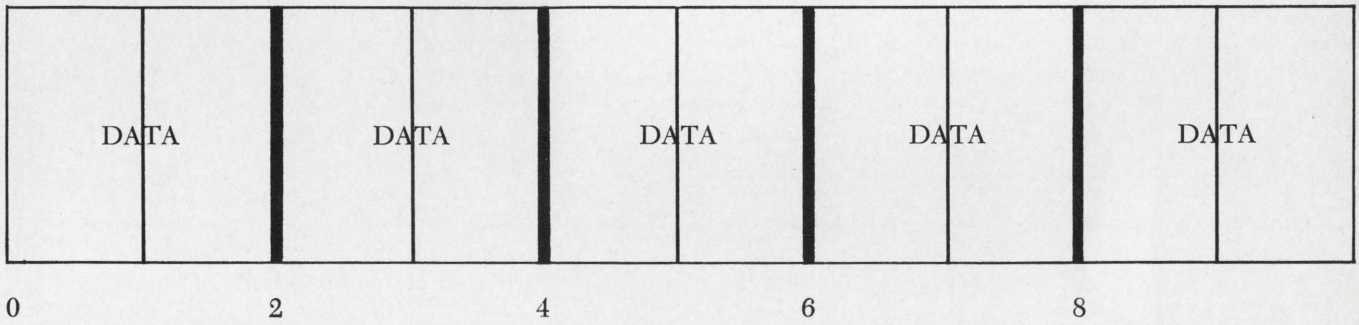
use yet powerful in capability. It is with this in mind that SIMPLIST/70 has been developed.

As indicated earlier, algorithmic programming languages represent data structures in contiguous areas of memory. Thus, regardless of whether an algorithmic array is mono-dimensional or multi-dimensional in composition, it resides in the computer as a linear string. Because of this phenomenon of linearity, the representation of complex data structures, i.e., those comprised of sets and interrelated sub-sets, is extremely difficult. On the other hand, however, the contiguous and linear attitude of the arrays lend themselves quite naturally to iterative programming techniques, in which all members of the array are processed in turn under loop control.

A linear array may be symbolically depicted by the following diagram.

The example shows an array consisting of five data elements, each element comprising two computer words in length. Thus, in order to move from one element of the array to the next, one need only add a numeric value of two (for this example) to the existing address in order to force the computer to the next member of the array. Additionally, since the size of arrays, as already discussed, must be declared before processing commences, and since the array must be large enough to handle the greatest possible number of data elements that may occur at any one time, when manipulating variable length records much valuable computer store may be wasted. This pre-defining of array sizes into unalterable blocks is known as static allocation of memory.



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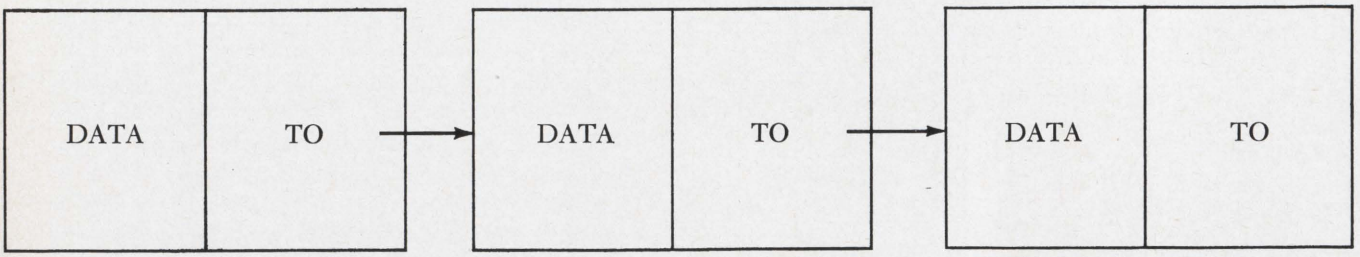
DATA-TECH

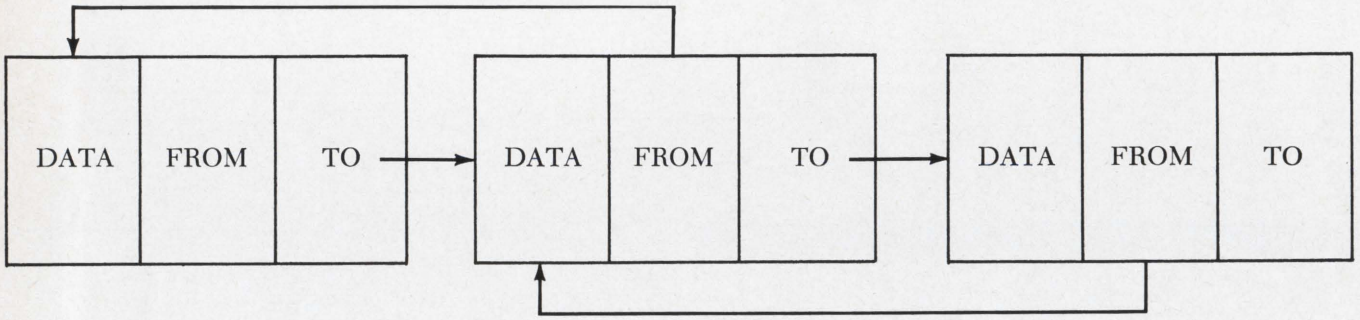
In list processing languages, data elements belonging to the same list do not necessarily reside in contiguous areas of memory and, in fact, may be scattered at random throughout a computer's store. The mechanism which permits the successful functioning of this scattered-yet-related phenomenon is the address pointer, a portion of the area encompassed by every list element and containing the location of the next member of the list.

A simple list may be symbolically represented as follows:



In order to signify to a list processing program that the physical end of a list or TAIL has been reached, the TO address of the final element of the list must contain a special codification to denote this condition.

Lists may be designed to contain not only a TO pointer, indicating the location of the next member of the list, but a FROM address as well. The FROM address refers to the item in the list immediately preceding the currently active list element. A list designed with both FROM and TO address pointers would be represented by:



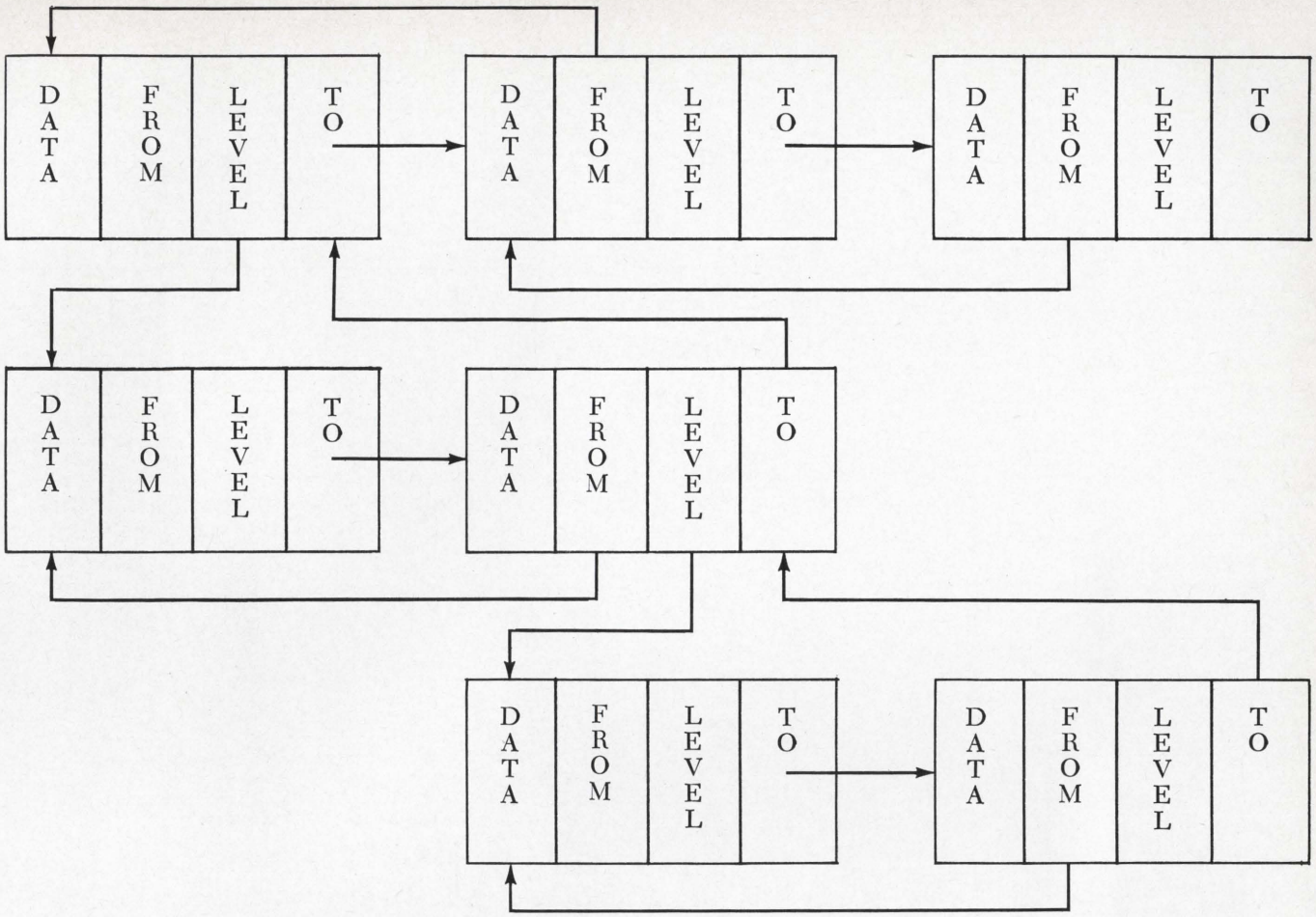
In this case, the FROM address of the first item of the list must also contain some special notation. Its purpose is to inform the list processing program that the physical beginning or HEAD of the list has been reached.

The above two symbolic representations are of relatively simple linear lists, and as such differ only in addressing techniques from like data structures processible by algorithmic languages. Lists may, however, be organized into complex data structures, replete with sub-lists, sub-sub-lists, and hierarchical constructions and interrelationships. When lists are thus constructed, they are known as list structures, and may be depicted by the diagram on page 13.

List structures permit the application of recursive processing, in which operations being performed on the prime list may be interrupted by the presence of a sub-list, and operations on a sub-list may be interrupted by the presence of a sub-sub-list, control returning in sequence as each subordinate list's activities are completed.

SIMPLIST/70 is a recursive list processing language which utilizes both simple list and complex list structure data arrangements. The language is comprised of twenty-five macros which permit the creating and destroying of lists, the searching and scanning of lists, the reading and writing of lists, and the transferring of items to and from lists. Additional facilities include mathematical operations, decision making, and program control. Data may be both numeric and nonnumeric in content, and may be processed both arithmetically and symbolically.

The basic unit in SIMPLIST/70 is a four word or sixteen byte quadri-cell. The first word (or bytes #0 through #3) of the quadri-cell contains either a legitimate list number, or an '@' which indicates the availability of that particular cell. The SIMPLIST/70 language uses the '@' in the data portion of the quadri-cell to denote that that cell is currently unused. The second word (or bytes #4 through #7) of the quadri-cell contains the FROM address. The FROM address points to the cell immediately preceding the one under current examination. In accordance with convention already established by other symbol manipulation or heuristic programming languages, the HEAD cell, or first cell of a list, contains a FROM address of zero. The third portion of the quadri-cell (or bytes #8 through #11) contains the TO address. This address points to the next member of the list immediately following the cell or list mem-



ber currently being examined. Again, in accordance with already established convention, the last cell (TAIL) of a SIMPLIST/70 chain contains a TO address of zero. This zero address is used to indicate the physical end of the list. The fourth portion of the quadri-cell (or bytes #12 through #15) contains the LEVEL or HIERARCHY pointer, and is used for the creating of complex list structures. If there were no sub-list attached to the prime or hierarchically higher list at this position, the HIERARCHY pointer would contain an '@'. If, however, a sub-list were attached to the prime list at this point, then the HIERARCHY portion of the quadri-cell would contain the address of the first member of the attached sub-list.

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DATA ELEMENT	FROM ADDRESS POINTER	TO ADDRESS POINTER	HIERARCHY POINTER
Bytes 0–3	4–7	8–11	12–15

SIMPLIST/70 QUADRI-CELL

Data in the SIMPLIST/70 language may consist of any character or characters permissible to the computer system in question, with the single constraint that the '@' not be used as a data element. This is because of the special function of the '@' as a SIMPLIST/70 control character. Data lists may be of any length within the capacities of the given computer system, and the number of lists also is without limit, except as such limits are constrained by available memory.

One of the features which permits dynamic allocation of memory in a list processing program is the utilization of the concept known as "garbage collection." Garbage collection is the act of returning to the computer's available store those list cells no longer required by the program. Existing list processing systems use either programmer-controlled garbage collection routines, or automatic routines which are executed by the operating system. SIMPLIST/70 uses both approaches. As a by-product of certain of the SIMPLIST/70 macros, cells no longer needed are automatically made available without the intervention of the programmer. Additional macros provide programmers who wish to utilize them the facility of user-controlled list erases, including the recursive erasing of all sub-lists if the prime list is a list structure.

(to be concluded next month)

John Canter graduated in 1960 from University of Pittsburgh, Phi Beta Kappa. He is currently Chairman of the Department of Information Science and Director of the Computer Center at Point Park College, which will offer the first B.S. degree in Information Science this year. He previously worked with the IBM Corporation as an instructor in unit record and computer systems, served as director of the computer center of a multi-state retail drug chain, and served as Assistant Director of the University of Pittsburgh's Knowledge Availability Systems Center.

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PROBLEM OF THE MONTH

Problem 17: The One Instruction Computer

Consider a hypothetical computer which has only one instruction:

SJ A,B,C where SJ is the operation code and A, B, and C are memory locations. Subtract B from A and store the result in A. Jump C if the result (A) is zero.

Using this instruction, write a program to compute the absolute value of the contents of a location X and store the result in a location Y.

Rules:

1. Assume two's complement integer arithmetic.
2. Assume 2 $|X| < R$ where R is the maximum integer on the computer.
3. Assume any temporary locations needed, but the initial contents are undefined.
4. Use symbolic names for locations.
5. You are given a location I whose initial value is 1.
6. The program terminates with a jump to location END.
7. Assume one instruction per location.

P.S. This problem was submitted by Jim Cook, TRW Systems.

Answer to Problem 15: Prime Numbers

What a way to spend a vacation . . . reading thirty pounds of mail from over 300 TROUBLE-TRAN readers . . . and not being able to choose a winner!

I had promised my family a trip to San Diego during the first week of August, and had planned to take the mail with me and spend a couple of evenings reading it and writing this column. I had expected a good response, but I never thought I would be buried under an avalanche of mail just one day before my vacation. Instead of taking all that mail with me, I decided to leave it home and cut my vacation short.

Well, here I am . . . spending the last two days of my vacation opening large brown envelopes. As you recall, the "Prime Numbers" problem had been published with rules and restrictions that were designed to make my job easier in selecting a winner. I thought all I had to do was to open the envelopes and look for the smallest estimate of executed instructions for N = 10000. However, I never expected a count of zero, or a count of 40,000,000. Also, I never expected that some readers would send programs that merely read and write prime numbers. Other readers stored these numbers in tables and then executed table look-up programs. One reader stored the differences of prime numbers instead of the actual numbers (in a packed table) and then computed the numbers with a table look-up routine. By now, it is very clear to me that the rules and restrictions placed on this problem were not sufficient, and sophisticated programmers took advantage of this.

This is a good illustration of the communication problem that exists in this and other technical fields. Often, we use a word that has a certain meaning to us and we assume it has the same meaning to others. Only when someone says "what do you mean by this?" we realize that the meaning of a word depends very much on the context in which it is used, and even then ambiguities arise.

I was not surprised when a reader asked me to explain what I meant by ". . . compute all prime numbers . . .". I checked several dictionaries for the precise meaning of the word *compute*, but neither Webster nor Random House could tell me whether a table look-up scheme is the same as computing. One may argue that everything a computer does is computing and, as long as a program gives the right answers, it makes no difference what method is used. This reminds me of a computer salesman who was given a problem by a prospective customer and asked to write a program in two days, which would have taken an experienced programmer three weeks. Since he was also given the expected answers, he decided to gamble by writing a program which read the answers in and printed them neatly on one page. The customer was very impressed and signed the contract without even asking for a listing of the program. Of course, the salesman was also gambling on the fact that the customer would not be able to read the listing anyway.

In this problem, the judges have decided to disqualify all entries which used the results as inputs to the program either by reading them at execution time or by storing them in a table through the use of DATA statements. The winner of this contest will be announced next month.

XTRAN

A Software Program For Simulating Complex Biochemical Systems

David Garfinkel
Johnson Research Foundation
University of Pennsylvania

For about 10 years the author and his associates have been engaged in the simulation of complex chemical and biochemical systems. The computer requirements for this application are unusual, in that close interaction must be maintained between the user and computer during massive computation. This work originated as analog computation, but it has outgrown the capabilities of existing analog computers. The digital computer is used here almost as if it were an analog, with comparable convenience features required by the complexities of the problem being solved added to a problem-oriented-language. The software system to meet these needs is described below.

The systems being simulated are definable in terms of chemical reactions of the type A + B = C + D. The behavior of these chemicals with respect to time is represented by differential equations. Thus, for the reaction $A + B \underset{k_2}{\overset{k_1}{\rightleftharpoons}} C + D$ the fluxes of material are

$$\text{flux } 1 = k_1 (A) (B) \text{ and}$$
$$\text{flux } 2 = k_2 (C) (D),$$

where (A) is the concentration of A, etc., and the Ki are rate constants; and the derivatives are

$$\frac{dA}{dt} = \text{flux } 2 - \text{flux } 1, \text{ etc.}$$

Modifications to this fundamental algorithm are required for situations such as when more than one molecule of a single substance are being formed or consumed in a reaction, or where a substance appears only as a catalyst. Further modification may sometimes be needed to represent discontinuities or approximations that cannot be adequately represented in terms of chemical reactions.

To represent a biochemical system of any complexity requires dozens and sometimes even hundreds of differential equations. The largest system now being simulated has 173 differential equations that represent 438 chemical reactions. Such large numbers of nonlinear differential equations are insolvable analytically and are beyond the capabilities of any but the largest analog computers. The rate constants required to make these differential equations correspond to biochemical reality also tend to make them behave very badly (i.e., they are *stiff*). Tens of thousands of integration steps may be needed to produce a smooth curve that superficially looks as if it might require only a few hundred. As a result this type of work requires massive computation, primarily in floating point arithmetic.

To meet the needs of translating from the user's language to machine language and to perform the subsequent calculations, a series of programs have been prepared and revised from computer to computer. This process has culminated in a computer-independent language, written in FORTRAN IV.[1]

This language actually embodies a two-pass compiler. In the first pass, chemical reactions are converted to differential equations written in FORTRAN. In the second pass the differential equations are compiled by the FORTRAN compiler, along with some subroutines whose dimensioning depends on them. These are then loaded together with a subroutine library and any user-supplied subroutines (to meet special requirements for output or auxiliary calculations). The inputs to the language (on cards) are initially in the form of chemical reactions, and subsequently in the form of initial conditions (rate constants, concentrations, etc.); the outputs are in the forms of graphs of differential equation solutions against time or tables showing the state of the model at specific times. The differential equations are

---

Biographical Note

David Garfinkel received his Ph.D. in biochemistry from Harvard University in 1955, and has since been associated with the Johnson Foundation, where he is Associate Professor of Biophysics. His principal field of activity is in biochemical simulation.

The work reported herein has been supported by a Research Career Development Award and grants FR-15 and GM-AM 16501, all from the National Institutes of Health.

solved by the simplest possible method, the first order Euler method, because it works better than more sophisticated higher order methods with the unreasonable numbers found in realistic biochemical systems. However, there is no *really* satisfactory method of solving the differential equations as yet. In a few instances it is possible to greatly speed the solution by using algebraic methods rather than by solving differential equations to determine some things. Routines have been written to permit the same input to be handled by these methods.

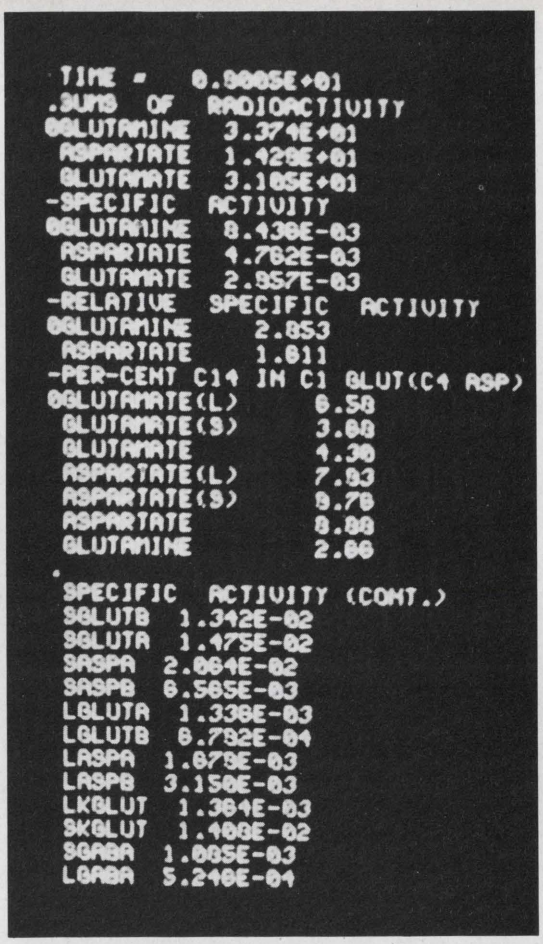


Figure 1.

Display scope shows tabulation from the complex neurochemical simulation with 173 differential equations.

The Need for Interaction

Although it is possible to carry out simulation in the ordinary batch processing manner, this may be quite inefficient, especially when starting a new simulation. In constructing a model of this type one wants to obtain a good fit to a given set of data points. It is commonly done by automatic optimization methods which require hundreds to thousands of repetitions of a calculation and are simply not practical when an hour may be required for each calculation and there may be as many as 25 variables to be optimized. In this case the user must manipulate the variables so as to produce a reasonably good fit, which might perhaps be improved by automatic optimization. He may also have to change the differential equations at times. In the course of carrying out such operations this author has literally stayed with the PDP6 computer all night, intervened in calcaulations in progress hundreds of times, and kept the computer compute-bound during all this time. A person intervening in a calculation in this way can speed the job of approximate optimization by virtue of his ability to recognize patterns (he can decide when things have gone wrong, and what to do about it). To do this requires the kind of intimate access to the computer usually associated with time-sharing, although this usage is distinguished from the customary time-sharing usage by the massive computation. However, the ability to use batch processing should not be blindly sacrificed. There are times when it is advantageous, especially in later stages of simulation, to allow a computation to run all the way through without intervention. Economics also drives one to batch processing, since computer time is often cheaper at night than during the day.

The Resultant Software System

To satisfy the above needs this software system, as run at our PDP6 installation, is set up to permit nearly any form of user-computer interaction which is possible. The computer itself has a very broad range of options and there is no difficulty in combining heavy computation and time-sharing. The user can specify whatever input and output configuration is needed for his specific circumstances (e.g., one may substitute a magnetic tape for a printer if immediate access to printer output is not needed). The permanent record of a simulation, showing the input conditions and the final ouput, is customarily printed, but additional or substitute output may be obtained on teletype, display scope, or even plotter. The form of the output varies with circumstances; two examples from the display scope are shown in Figures 1 and 2.

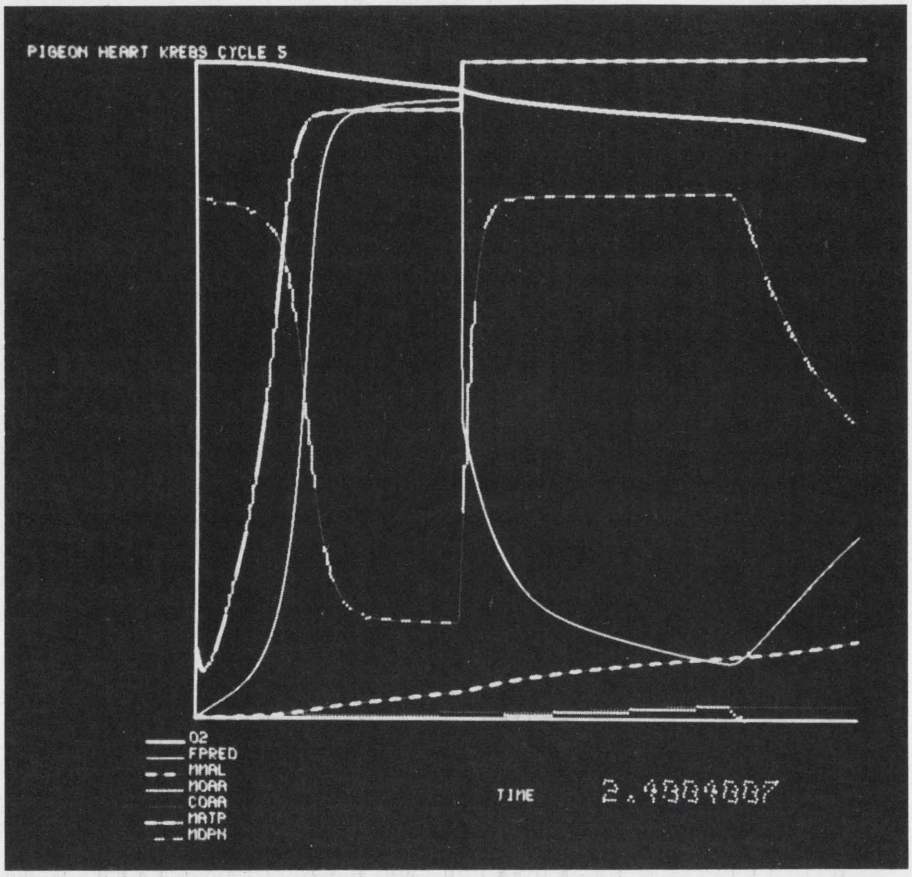
Figure 1 is a tabulation from the complex neurochemical simulation with 173 differential equations, in which considerable inhomogeneity is believed to exist for certain chemicals, especially glutamate and aspartate (these are 5- and 4-carbon amino acids). The experimental data available for these is in terms of specific activities, total radioactivity, and the percentage of the total radioactivity in certain atoms. This tabulation shows nearly all that is needed to check against such experimental data.

Footnote

[1] This program is described in Computers and Biomedical Research 2, 31 (1968 and distributed through the SHARE library; the library numbers are SDA3545 (single precision version for machine word length of 36 bits or more), and 360D 03.2.008 (for 32 bit machines). The difference in word length between these two versions is the only deviation from complete machine independence; unfortunately the interactive features here described cannot be made machine-independent, so that this program is strictly card-input, printer-output.

Figure 2 represents a plot of concentrations against time for a simulation of pigeon heart mitochondria. The qualitative shape of the curves is subject to some controversy between biochemists in different laboratories, and must, therefore, be displayed. This simulation requires at least two interventions in the course of computation, to add chemicals which change the behavior of the system (resulting in two apparent discontinuities). 42,297 integration steps were required to produce this set of curves.

Figure 2. Requiring 42,297 integration steps, this set of curves represents a plot of concentrations against time for a simulation of pigeon heart mitochondria.



In addition to the basic time-sharing software that comes with the computer, a number of additional possibilities for interaction have been added to the version of the simulation language used with PDP6. These permit a user to repeat a calculation at any time (from the initial conditions of that calculation) with changes, which may be made by teletype, on cards, or both, or to exit. He may take a tabulation or a partial tabulation of the current state of the calculation, either as programmed in advance or by intervention (on the teletype, the printer, or the scope (Figure 1); or display graphs or tables on the scope). The user may, during the course of the computation, change the curves that are being displayed on the scope, change the printer or printer substitute to another device, or request the current concentrations of chemicals or fluxes. It is possible to change the value of any input number initially or to have a given value become effective at a specified time during the course of a calculation, or to type in changes of concentrations, rate constants, etc., during the course of a calculation.

At least one additional interaction feature is anticipated. When the software is available, changes may be made by turning potentiometer knobs exactly as for an analog computer. This may be used not only to specify individual numbers, but to improvise a smooth curve as a forcing function. This is now being done with cards prepared in advance, but it is not nearly as convenient. Figure 3, which gives an extreme example of this type of input, shows the behavior with time of a single enzyme within a system which is oscillating spontaneously. An alternative method of inputting such a forcing function might be to draw it with a light pen on the display scope.

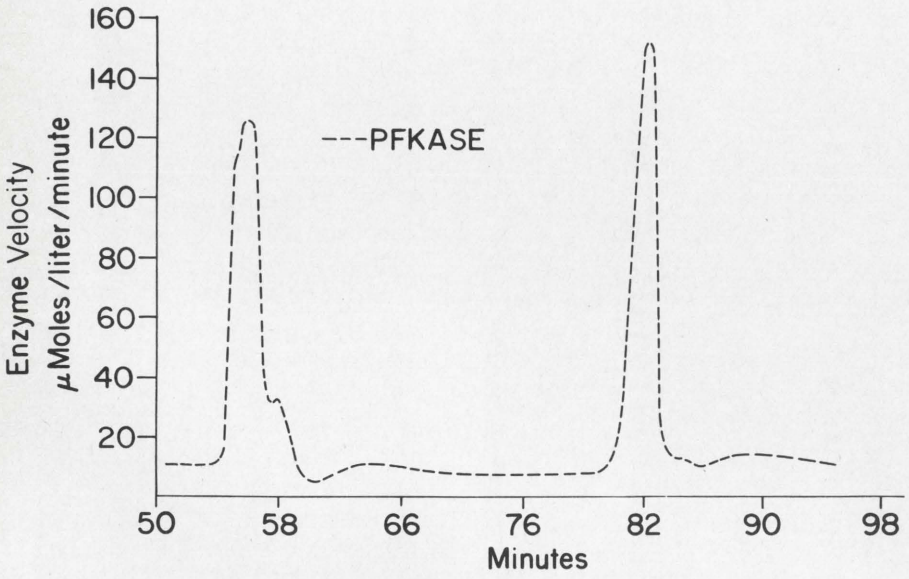


Figure 3. An extreme example of input, this graph shows the behavior with time of a single enzyme within a system which is oscillating spontaneously.

Another anticipated addition would permit the computer to store the state of the system at any desired point and then investigate several variations of how to continue from that point. Presently one can only, rather awkwardly, store the state of the system at certain points designated in advance.

Additional features that might be added, coming under the heading of "interactive graphics," include the ability to display all sorts of curves or functions as they are computed

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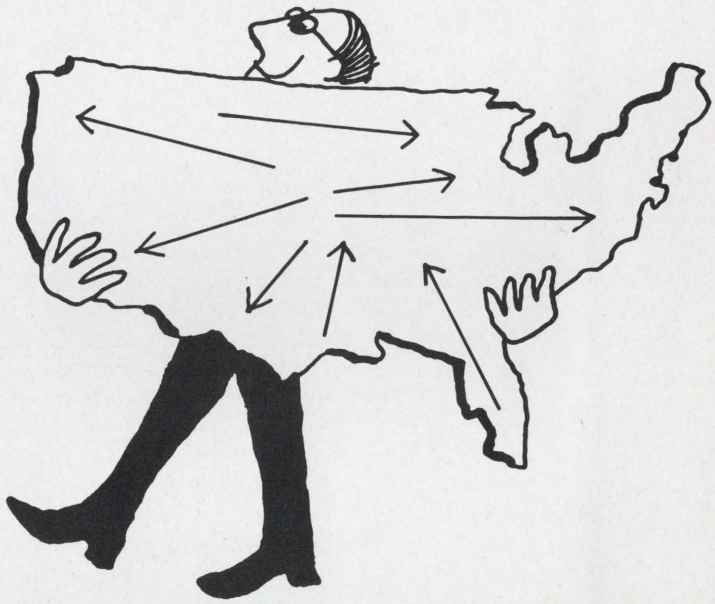

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(not merely concentrations) and to display experimental points together with the corresponding computer curves. It is sometimes desirable to put a partial tabulation on the scope or to display a full tabulation piecewise, rather than all at once, with the ability to specify what is to be displayed. It is possible to go further in this direction by adding an information retrieval system of some sort.

As a result of the existing and planned options for interaction, this language has a considerable degree of flexibility, and is able to carry out this type of simulation in an economical and convenient manner.

It is possible that the program may be extended to a more complex level, so that the individual calculations are part of automatic processes which include optimization techniques and exploration of the properties of a given model. An extreme example, approaching the field of artificial intelligence, would occur in trying to fit a given experimental curve by a given simulated mechanism. The computer could be programmed to find the best fit and decide, by manipulating the set of numbers being used, that the agreement is unsatisfactory because of systematic deviations which cannot be corrected. The computer could then indicate how that mechanism would have to be revised, or perhaps it could make the revision itself. It is unlikely that such programs can be made completely independent of human intervention in the near future. Experience with optimization thus far indicates that a human intervening in the process makes it more efficient (especially where it includes elements of pattern recognition), even in the situation where it is technically feasible for the computer to perform it alone.

This type of human intervention in a large simulation may be valuable in other situations, both where the abilities of the human complement those of the computer, and where the machine is trying to simulate the behavior of a human in a complex situation. In this case it might be easier to ask him what he would do than to write a program to simulate him. Although this is always likely to remain an unusual type of software, it will probably become more common as time passes.

better books

by Dennie Van Tassel

CALCULUS AND THE COMPUTER REVOLUTION by Richard W. Hamming, Houghton Mifflin Company, 72 pages, 1968. $1.75.

Most mathematics courses are obsolete because they fail to take into consideration that the computer is the mathematical tool that students will be using in the not too far distant future. Indeed, many of them are using it now. On-line or small computers are already available in offices and colleges and soon will be available in many homes.

Hamming's chief contribution stems from his awareness of this situation before he began writing. According to the preface in the book, the book began as a set of notes to teachers and students of calculus and was written at the request of the Committee on the Undergraduate Program in Math. Hamming evidently re-wrote and expanded the original at the urging of his supporters.

Calculus and the Computer Revolution describes and illustrates briefly some of the different aspects of computing as they relate to the usual beginning calculus course. Special emphasis is paid to "roundoff" effects and "truncation" effects in calculus when using computing equipment. Also the solution of differential equations and the use of algorithms are treated.

The author has wisely chosen to write boldly and simply for the calculus student that so often must sit immobilized and uninformed on the sidelines during lectures on mathematics. In the past this has led to courses which have not pointed out the relationship between computing and mathematics. Hamming says that one of the major aims of his book is to show how limited is the view that computers are merely number-processing machines—"they are more accurately described as symbol-manipulating machines." It is hoped, he adds, that many of the more common misconceptions about computers will be cleared up for the student.

In my view, Mr. Hamming's development of these aims, together with his analytical presentation of the relationship between math and computer, makes this a valuable contribution to the student's understanding of an important topic.

THE FINAL PROGRAMME by Michael Moorcock, Avon Original. 919 pages. 1968 paperback. 60¢.

The "earthshaking consequences" that result between the union of the the main characters in this science fiction book, and which is promised to the reader on the first page, is that Jerry Cornelius and Miss Brunner are used in an attempt to create a god.

It would be hard to imagine two more similar characters than Jerry Cornelius and Miss Brunner on whom this novel by Michael Moorcock centers. Both are of different sexes when they meet in the rain in a house in Blackheath, South East London, but even this changes.

Jerry is a 27-year old failed priest, electric guitarist, ascetic and hedonist who is the counterpart of Miss Brunner, who is a sharp-faced, attractive young woman who is a computer programmer "of some experience and power" and who looks like and is a predictable predator.

Both Jerry and Miss Brunner's whole existence are shaped by DUEL: whose purpose is to produce "an all-purpose human being equipped with total-knowledge, hermaphrodite in every respect–self-fertilizing and thus—self-regenerating—and thus immortal. . ."

The Final Programme is the story of the days Miss Brunner and Jerry Cornelius spend together and apart before they fulfill the ultimate purpose of DUEL and the effects of their activities on themselves, the people around them and the world.

It is largely a study of dubious characters and the reader is left won-

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ELECTRONIC SYSTEMS PERSONNEL
No. 1 in EDP Personnel Placement

esp

dering why the author didn't do a bit more research on computers.

Is the novel moralistic: In today's technological world, a young, confused man is attracted to a cold, calculating female computer programmer who is, of course, obsessed with technological advancement and immortality.

At the end "the world's first all-purpose human being" blows up the great fake Le Corbusier chateau and contemplates the burning wreckage. Does Michael Moorcock mean that the generation of people who invented the computer have made life evil for its children?

Undoubtedly, but most readers won't find it worth struggling through this awkward though occasionally funny prose to try to find out.

JURIMETRICS JOURNAL. Published Quarterly by the American Bar Center, 1155 East 60th St., Chicago, Ill. 60637. $4/yr. $1.50/single copy.

For some reason the issue dated September 1968 didn't get in the mail until May 1969 but aside from this small discrepancy, **Jurimetrics** is worth the trouble of finding and reading.

It is published quarterly by the ABA Special Committee on Electronic Data Retrieval in cooperation with the Law School and the Mental Health Research Institute, at the University of Michigan.

It consists of articles and reports about the regulatory implications of computer utility, computer application to legal business, and predictably, computer application to legal methodology. Other sections include a section on current literature, news, and proceedings.

Volume 9, Number 1 of **Jurimetrics** has in it articles which would interest people in both the legal profession and the computer profession. "World Co-operation in the Mechanization of Legal Information Retrieval," by Oxford University scholar Colin Tapper, is for example, concerned with the enormous difficulties that lawyers face in storing and using information, difficulties in the applications of computers for legal use—such as the rapid phase of computer development, the problem of indexing, and data preparation. He also brings up the "1984 is just around the corner" theme when he explores whether information technology can make any contribution to world peace; and he prefaces this discussion with the point that an open system should be used so as to provide a system which is open to future demands. A central organization with limited functions is proposed in this paper which was presented at the Geneva World Conference on World Peace through Law in 1967. The central organization is to have limited functions and to be established along with an international legal data bank. Tapper is frankly realistic in recognizing the problems as well as the potential of his proposals.

Also aware is Bernard Strassberg, Chief of the Common Carrier Bureau of the Federal Communication Commission when in his article, "The Marriage of Computers and Communications—Some Regulatory Implications," he urges the reader to study the Inquiries of November 9 and March 2, 1966 to learn about the issues raised by the growing interdependence of computers and communications, and which were outlined in the Inquiry.

They are primarily regulatory and policy problems raised by the growing interdependence of computers and communications. The article itself clarifies and interprets these issues. In this address to the American Management Association, Mr. Strassberg hits upon invasion of privacy—which is this reviewer's favorite topic. This problem was described in the Notice of Inquiry as:

> In the past, the invasion of information privacy was rendered difficult by the scattered and random nature of individual data. Now the fragmentary nature of information is becoming a relic of the past. Data centers and common memory drums housing competitive sales, inventory and credit information and untold amounts of personal information, are becoming common. This personal and proprietary information must remain free from unauthorized invasion or disclosure, whether at the computer, the terminal station, or the inter-connecting communication link.

Strassberg makes it clear that the purpose of the Inquiry is to determine what measures may be required to be taken by the computer industry, by the common carriers, and by the government to protect the privacy and proprietary nature of data stored in computers and transmitted over communications facilities.

Further interest in computers and law is shown in Joseph S. Elmaleh's article, "Project CALM: Computer Application to Legal Methodology" which discusses a pilot project in the use of computers for Legal Information Retrieval at the Law School of the University of Pennsylvania in the summer of 1965. The initial data base used here was the law relating to race relations in the U. S. both from Federal Statutes and from cases decided in the United States Supreme Court from 1865–1965. The browsing capabilities of the system are shown as well as the usability and compatibility of the two combined methodologies used in the project.

Perhaps the real value of this particular journal is to make those who are concerned with the overlapping factors of computers and law more aware of the issues inherent in this combination. Or perhaps it is simply to inform lawyers about the computer situation, or computer people about the legal situation. Nevertheless, it is recommended for the general reader as well as the lawyer, programmer, and system analyst.

THE SYSTEMS APPROACH. By C. West Churchman. Dell Publishing Co., Inc. 243 pages, 1969. $2.25.

As Professor of Business Administration and Associate Director of Space Sciences Laboratory, University of California, Berkeley, Mr. Churchman belongs to a valuable community that poses critical and policy questions which circumscribe large-scale scientific and business enterprises, and demands of the decision-makers both in government and industry, that fresh minds and totally different disciplines be brought into problem situations.

The complex problem of using the systems approach receives an even-handed approach by Churchman in **The Systems Approach.** As is generally known, the use of scientific teams to solve pressing problems grew out of their use in the military in World War II. Their success was outstanding both in Great Britain and in America and after the war there was a rush to apply the same

kind of thinking, which then was called "operations research" to various nonmilitary problems, and in particular industry.

The rush to use the "system" method has four approaches according to the author. These approaches are: 1. The advocates of *efficiency;* 2. The advocates of the use of human feelings, i.e.; the *humanists;* and 3. The *anti-planners* who believe that any attempt to lay out specific and "rational" plans is either foolish or dangerous or down right evil. 4. The advocates of *Science.*

It is obvious that Churchman favors the scientific approach, or as he calls it, "the systems science approach" but he also incorporates the best out of the three approaches. To the efficiency expert he states that total concentration on efficiency, such as reduced idleness (people or inventory) can increase waiting periods at peak times, therefore not be more efficient. To the humanist Churchman states that one must put a value on undesirable characteristics such as accidents and congestion so they can be evaluated scientifically instead of just saying it is impossible to put a value on them. To the anti-planner Churchman seems to say that plans must be constantly re-evaluated to be effective.

This book is really a plea for a total systems approach; that is, when considering systems it is always wise to raise questions about the most obvious and simple assumptions. Real objectives are often hidden. The stated objectives of a college is education but the real measure of performance for the student is measured by his grades and often the measure of performance for the college is the number of students graduated—neither one, of course, being the stated objective. The stated objective of the firm is net profit but growth of personnel or gross profit, in other words, the size of the empire, is often the real goal.

Churchman notes that the obvious measures of performance are not the real ones. For example the objective of the highway system is "thru-put" meaning by this the number of cars that are able to pass over specified segments of the highway within a given period of time. However, the objective, itself may be "legitimate" from a social point of view because of accidents, congestion, ugliness, and environment.

Mr. Churchman has spent enough time and experience in industry, defense, health, and information processing and has published enough books and articles in these fields to understand firsthand the exact methodology necessary for systems. Mr. Churchman also provides a suggested reading list for those interested in further reading.

Reading List

COMPUTER GRAPHICS. An Informatics Inc. publication, Thompson Book Company, 292 pages, $12.00.

GRAPH THEORY. By Frank Harary, Addison–Wesley Publishing Company, Inc., 1969, (no price given).

DESIGN OF REAL-TIME COMPUTER SYSTEMS. By James Martin, Prentice–Hall, Inc., 512 pages, 1967, $12.95.

H. P. LUHN: PIONEER OF INFORMATION SCIENCE/SELECTED WORKS. Edited by Claire Schultz, Spartan Books, 320 pages, 1968, $18.75.

MATHEMATICAL METHODS IN OPERATIONS RESEARCH. By Ronald L. Gue, The Macmillan Company, 450 pages, 1968, $9.95.

DOCUMENTATION STANDARDS. By Max Gray and Keith London, Brandon/Systems Press, Inc. 160 pages, 1968, $7.50.

THE ART OF COMPUTER PROGRAMMING: VOLUME I: FUNDAMENTAL ALGORITHMS. Addison–Wesley Publishing Company, Inc. 634 pages, 1968, $19.50.

MONEY AND STOCK PRICES. By Weryl Wayne. Dow Jones–Irwin, Inc. 214 pages, $6.65.

LAW ENFORCEMENT SCIENCE AND TECHNOLOGY. Edited by S. A. Yefsky. Thompson Book Company, 985 pages, $35.00.

COMPUTER EVALUATION OF MATHEMATICAL FUNCTIONS. By C. T. Fike, Prentice–Hall, 1968, 256 pages, $10.50.

THE MANAGEMENT OF COMPUTER PROGRAMMING PROJECTS. By Charles P. Lecht, American Management Association Inc., 1968, $16.50.

MANAGEMENT AND MACHIAVELLI. By Anthony Jay. Holt, Rinehart and Winston, 1967, 232 pages, $4.95.

COMPUTER DICTIONARY. By Charles J. Sippl, Howard W. Sams & Co., Inc., 336 pages, $7.95.

INSTALLING AND MANAGING A COMPUTER. By Brian Rothery, Brandom/Systems Press, Inc, 1969, 168 pages, $9.00.

CHARACTER READERS AND PATTERN RECOGNITION. Edited by V. A. Kovalevsky, Spartan Books, 1968, 272 pages, $12.00.

APPLIED LINEAR PROGRAMMING. By J. Ronald Frazier, Prentice–Hall, 1968, 192 pages, $8.50.

RUN, COMPUTER, RUN: THE MYTHOLOGY OF EDUCATIONAL INNOVATION. By Anthony G. Oettinger and Sema Marks. 1969, Harvard University Press, 288 pages, $5.95.

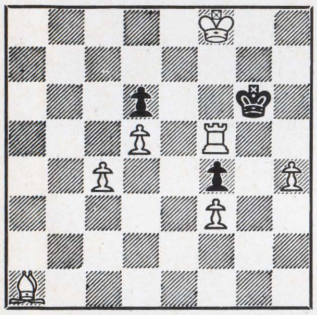
FORTRAN LOGIC AND PROGRAMMING: BUSINESS APPLICATIONS. By Fritz McCameron, Dow Jones–Irwin, Inc., 1969, 246 pages, $5.25.

INTERNATIONAL COMPUTER BIBLIOGRAPHY. Science Associates International, Inc., 23 East 26th St., New York, N. Y. 10010, 700 pages, $50.00.

CHECKMATE

Problem 21

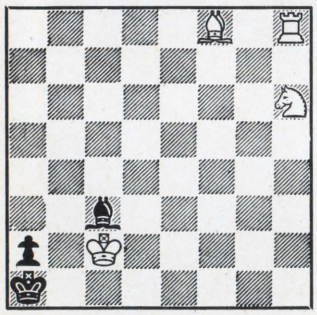
DOBRUSKY



White mates in three

Problem 22

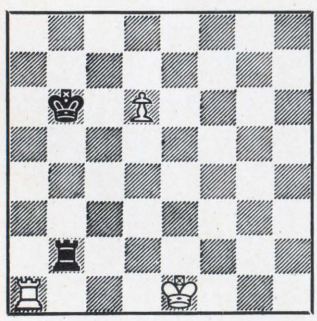
CHERON



White mates in three

Problem 23

SELESNIEV



White to play and win

COMPUTERIZED CHESS

Bobby Fisher take notice! Computers are in the race, and soon you may be asked to defend your title by playing against a machine!

The skeptics of the 1950's and the early 1960's said *computers would never be able to play a good game of chess,* because of the astronomical number of move combinations that had to be analysed at each move. However, this is 1969 and computers have just brought our astronauts back from the Moon!

When I started this column, in January, 1969, I stated that "Computerized Chess" would have high priority. I had no information about chess playing programs at that time, but I kept my fingers crossed hoping that such programs really existed.

Marsland's computer (Software Age, April, 1969) and Berliner's computer (Software Age, July, 1969) are now challenged by the Ceruti & Smith computer. USAF Captain Franklin D. Ceruti (Viet Nam) and USAF Captain Rolf C. Smith, Jr. (Thailand) wrote a chess program while completing a Masters degree at Texas A & M University, last year. Their program, SCHACH, has played four games on three occasions with Mr. Richard Greenblatt's Mac Hack VI chess program at MIT.

SCHACH is presently running on the IBM 360/65 remote terminal system at Texas A & M. Move input is through a CRT which also provides visual move analysis. Hard copy is provided by an IBM 1050 terminal, which rapidly falls behind the CRT during play.

Captain Ceruti, Captain Smith and the Computer Science Department at Texas A & M are interested in playing other chess programs. Dr. A. W. Wortham, head of the Industrial Engineering Department and Mr. David Line are the program monitors at Texas A & M.

Let us now take a look at a game played by Captain Ceruti against his own program. To make it more interesting I would like to ask you to guess who played what color. Are there any clues?

Which one was the computer?

	White	Black		White	Black
1	P–Q4	P–Q4	22	RxP	QR–B1
2	P–K3	P–K3	23	QR–Q1	B–K7
3	B–N5 ch	P–QB3	24	R(Q1)–Q2	B–N4
4	B–R4	Q–R4 ch	25	B–N2	N–N1
5	N–QB3	B–N5	26	P–QB3	K–B1 ?
6	N–K2 ?	QxB	27	R–B2	N–B3
7	O–O	Q–R4	28	R–Q7	R–Q1
8	B–Q2	N–B3	29	BR–Q2	K–K1
9	P–QR3	BxN	30	R–Q6	RxR
10	NxB	Q–Q1	31	PxR	K–Q2
11	Q–K2	N–K5	32	P–QB4	BxP
12	NxN	PxN	33	BxP	R–R2
13	Q–N4	Q–B3	34	B–B8	R–R4
14	QxP (K5)	Q–N3	35	R–N2	R–Q4
15	QxQ	RPxQ	36	P–KR3	R–Q8 ch
16	P–K4	N–R3	37	K–R2	R–Q6
17	P–K5	B–Q2	38	P–N5	N–Q1
18	B–R5 ?	P–N3	39	R–B2	BxP
19	B–B3	P–QB4	40	R–B7ch	K–K1
20	P–QN4	B–N4	41	B–K7	N–B3 ?
21	KR–Q1	PxQP	42	R–B8ch	K–Q2
			43	Perpetual check.	

Neither Captain Ceruti nor his program can be rated as expert chess players. However, this game is better than the average game most of us play at lunch time. If, by analyzing this game, we can not tell which side the computer played, we should not hesitate in letting the computer join our local chess club.

P.S. Please send your guess to: CHECKMATE Editor, Software Age, P.O. Box 2076, Madison, Wis. 53701

Answers to last month's problems on page 59.

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financial currents

On its way to "reshaping" the American way of business and home life, widespread use of time-sharing computer systems is forecast to go from its present $1 billion market to about $5 billion by 1975.

The prognosticator is T. Paul Bothwell, vice president and general manager of Honeywell's Computer Control Division, who added: "Fifty per cent of the computers installed by that time will be used for time-sharing, and these computers, growing into networks of systems, will have dramatic and vital impact on our conduct of business and government at national and international levels."

Several economic changes and technological developments will take place as time-sharing becomes commonplace, he said, among these significant price reductions for computer use, coupled with a greater variety and versatility in types of terminals for "talking" with systems. Areas that will have to be greatly improved: computer memories, programming, special-purpose languages, man–machine communications and long-distance communications.

In helping solve society's problems —economic, political, social, medical, educational and cultural—time-sharing systems can enable social agencies and other non-profit organizations to share the man, money and material resources of giant computer complexes and do their jobs better and more economically, said Bothwell.

Rather than a panacea, the computer is viewed by Bothwell as a tool "to magnify by a considerable degree the likelihood of man's finding solutions in sufficient time to avoid having developments worsen the situations."

* * *

Priced "well within the reach of many businesses that believed they couldn't afford a computer of their own," the newly-introduced IBM System/3 is tailored for retail and wholesale distributors, manufacturers, food processors and banks—among others.

Although the system features a new punched card about one-third the size of a traditional 80-column card with 20% more information, it is also available in a direct access disk storage model to which the user can move as his needs expand.

Customer shipments are scheduled for the first quarter of 1970 for the card version, for the third quarter for the disk version.

personal lines

J. Ward Wright, an authority in the application of EDP methods to the problems of government management, has joined Auerbach Associates as a Principal Consultant and Director of State and Local Government Services. Also at Auerbach: **John J. Esham** has been named Director of Corporate Information Center, and **Bob D. Collins** has joined the Commercial and Industrial Division as a Principal Consultant in the St. Louis office.

At Applied Logic Corporation, four appointments: **Philip C. Cross** as Manager, Computer Operations and Services; **Thomas T. Droege** as Director of System Engineering; **Louis M. Zalvino, Jr.,** as Manager, Computer Operations; and **Mrs. Gloria Goddard** as Instructor, Customer Training.

Robert R. Andrews and **Robert K. Rathbun** have been named Computer Centers Manager and Systems Programming Project Manager, respectively, at Computer Response Corporation.

In the Information Network Division of Computer Sciences Corporation, **Dr. Mathew M. Shapiro** has been appointed Director of Plans and Operations; **Don D. Smith,** Manager of Systems Software; **Robert E. Sharpton,** Manager of Engineering; and **Dr. Melvin A Shader,** Director of Scientific Development. In the Systems Division, **Erwin L. Allen** was named Vice President and Deputy General Manager.

Dale W. Brunner, Vice President of IBM's Field Engineering Division, has been named Vice President of Management Services, a newly created position . . . **Delmar W. Smith** has joined McDonnell Automation Company as a senior technical consultant . . . **Chauncey P. Dewey, Jr.,** has been named manager of the newly formed data displays and switching systems business area for Raytheon Company . . . Computer Time-Sharing Corporation has appointed **Bruce C. Coder** as Director of Operations in its Financial Systems Division.

The Computer Systems Division of Graphic Controls Corporation announces the appointment of **A. S. Rajaraman** as Consultant in the Information Management Services Group . . . **William C. Bushman** has been named Banking Services Manager at United Data Processing's Portland, Oregon, headquarters . . . **Alan M. Stoughton** has been promoted to Chief Engineer at Computer Test Corporation.

At Computer Systems Technology, Inc., **Bruce H. Case** has been appointed Manager of Systems Programming . . . The new position of Director of Advanced Development at Data Memory, Inc., has been awarded to **John T. Phan** . . . Tally Corporation has appointed **Jerry E. Smith** as Director of Management Information Systems . . . **Dr. Robert Keston** has joined the Washington staff of Consolidated Analysis Centers, Inc., as Manager of Market Development.

Neil J. Barta has been appointed Manager, Compiler Development, at Time Share Corporation . . . **Irving Kliger** has joined Atar Computer Systems, Inc., as Director—Product Planning . . . **Marvin W. Bass** is the new Director of Standards for Sperry Rand's Univac Division in Blue Bell, Pennsylvania . . . **John Robert Haley** has joined the staff of Computing and Information Sciences Corporation as Manager of Systems Development.

At Honeywell's EDP Division, **Robert L. Runge** has been named systems Manager for the Central Region in Chicago . . . System Development Corporation announces that **Dr. Paul D. Greenberg** has been named Director of Corporate Planning . . . **William C. Altemus** has joined Computer Image Corporation "to spearhead development of terminal equipment for use with the animation computers" of the corporation . . . **William T. Halpin** has gone to Penta Computer Associates, Inc., as a Principal Analyst at the New York City location.

Robert L. Gilmore has been appointed manager of Professional Employment for Computer Technology, Inc. . . . Data Processing, Inc. has named **Robert Walter Carr** as Senior Systems Analyst . . . New Chief Engineer for Computer Image Corporation is **Francis J. Honey** . . . URS Data Sciences Company has announced the appointment of **Donel T. Blumberg** as Director of the company's Southeast Systems Center in Richmond, Virginia.

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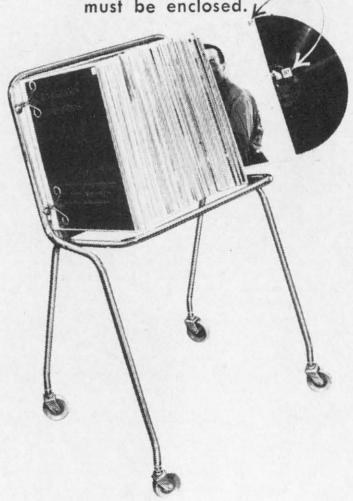

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42370. DISPLAY SYSTEMS ENGINEERING. *Edited by H. R. Luxenberg and R. L. Kuehn.* Thorough exploration of the devices and systems of recording and displaying computer based information. Develops theoretical foundations and discusses their technological applications. Many illustrations and diagrams. $16.50

38160. CIRCUIT DESIGN OF DIGITAL COMPUTERS. *Joseph K. Hawkins.* At last–a simple, straightforward exposition of the principles, applications and limitations of computer circuit design and memory devices and systems. By no means a beginner's book, it's the most explicit, most comprehensive means for learning the intricacies of digital computer circuitry. $17.50

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new products

Express Software Systems, Inc. of New York, has introduced Data Check Express, a new **data editing system to cut programming labor.** The new system is said to be the first general purpose system that checks, corrects and updates any kind of data without original programming. The Data Check Express system can be used on the IBM/360 and up, OS or DOS. It is also convertible to any other equivalent computer.

The core of the system is a new editing language which is simple but powerful, enabling the user to specify a comprehensive data checking and manipulation procedure, including checking complex data interrelationships. The Data Check Express language has a simple syntax, consisting of only 18 commands, and it is very easy to learn. The designers say that use of Data Check Express offers the following benefits:

1) It promotes a standardized and stringent method of data editing techniques, thus insuring against the need for re-runs because of bad editing;
2) It helps speed turnaround on jobs;
3) It insures better quality data; and
4) It allows lower level personnel to perform the data editing function.

Data Check Express is designed to run with 65K bytes of core, including supervisor; two to six sequential (tape, disk or card) devices for file I/O; standard systems reader, printer or work file. It will run with most operating systems on a multi-programming basis and Fortran IV support is required.

For more information, circle No. 7 on the Reader Service Card

* * *

Sigma Data Computing Corp. is offering its INQUIRY AND REPORTING SYSTEM, an **advanced general purpose information management system,** for use on the IBM System/360 and RCA Spectra 70 computers. It was designed to provide the user with a fast, efficient, and easy-to-use technique for extracting information from computer files, performing basic data processing operations, and producing card, printer, tape and disk output.

INQUIRY & REPORTING SYSTEM employs highly simplified notation which can be learned quickly and used effectively by both programmers and nonprogrammers. While easy to use, it is nonetheless powerful and flexible enough to meet a wide range of information processing requirements. The system gives the user the ability to respond quickly to short deadlines and unscheduled or one-time requests for information, as well as recurring report requirements.

For more information, circle No. 8 on the Reader Service Card

* * *

Harold Eden, president of IOMEC, has announced a **new series of data storage systems** for use with small to medium size computers. The IOMEC Series 1000 Data Storage System is available in two models. The IODISC 1012 drive with a removable disk cartridge in combination with a non-removable disk has a capacity of 22 million bits. For additional system storage capacity, the IODISC 1011 drive can be installed using a single 11 million bit removable disk. Both drives will interface to the computer with the IODISC 1800 controller.

One 1012 drive is designed to handle many applications that are normally accomplished with two separate disk drives. Data may be interchanged between the non-removable disk and the cartridge to permit data copying. Programs, tables and other fixed information can be stored on the non-removable disk, while the removable cartridges are used for data input and output.

The Series 1000 control unit permits attachment of up to four IODISC drives to any central processor input/output channel with minimum modification. It provides access controls, read/write formatting, data conversion, and data and status checking. Provision is included for varying work sizes, data formats, command structures and input/output channel sequences for particular system requirements.

IOMEC Series 1000

For more information, circle No. 9 on the Reader Service Card

* * *

David Turetsky Associates, Inc. have developed BYTE–FORTRAN, a multipurpose software package for use with IBM's System/360. Along with **faster execution,** BYTE–FORTRAN provides **additional I/O facilities** to supplement 360 FORTRAN. New facilities include complete card-stacking capability, a full range of printer carriage control and sensing operations, and console input. In addition to the wider range of I/O facilities, a number of other BYTE–FORTRAN facilities are of interest to FORTRAN installations that wish to deal with problems of a more commercial character, such as inventory control, forecasting, and similar areas of interest to management. There are also other facilities. For example, BYTE–FORTRAN provides capability for reutilizing limited core storage to maximum advantage and for interrogating and altering portions of the supervisor. The package also provides routines which explicitly convert data to and from various formats. This is useful where it is desirable to have data in one format for computation, and in another more efficient format for permanent storage. BYTE–FORTRAN also provides complete byte-manipulative capability, which allows for data representation at up to 8 times the efficiency of 360 FORTRAN without any loss of manipulative capability. This efficiency can have a significant impact on storage requirements and data transfer rates. BYTE–FORTRAN is available with a complete program of maintenance and assistance.

For more information, circle No. 10 on the Reader Service Card

* * *

Honeywell has announced another keytape **Communicator/Serial Printer, the model K-737.** The device, and others in the K-730 Series, record data onto 7-channel magnetic tape via a 64-character keyboard or transfer data over voice-grade transmission lines between K-730 Series devices or between a K-730 Keytape and a Series 200 Honeywell central processor.

The K-737 also performs a third basic function, such as card reading, printing, adding, listing, check digit entry, pooling or paper tape reading, and may be used to verify data previously recorded on tape and to search a prerecorded tape for records specified by the operator.

In addition, the K-737 produces a printed copy of the data previously recorded on magentic tape. During the print operation data fields can be omitted, tabulated, left justified, printed on separate lines, or printed in the same format as recorded on magnetic tape.

When not being used to print data from magnetic tape, the printer can be operated manually from its own keyboard as

an electric typewriter. The printer operates at 15.5 characters per second, can print 64 characters—10 numeric, 26 alphabetic, 27 special characters, and a space code.

For more information, circle No. 11 on the Reader Service Card

* * *

General Computer Systems, Inc. of Dallas Texas has announced **a new keyboard-to-magnetic tape data processing input system.** The DATA/TAPE 2100 is said to incorporate many innovations in both hardware and software. The system is designed to replace conventional punch card systems in central data processing installations and to be engineered to reduce data processing input costs by as much as 50 per cent.

The keyboard-printer, which is a GCS design, includes a paper tape roll record of the operator's work. Sight verification is accomplished with a GCS-designed station that offers better operator efficiency. And finally, highly sophisticated software routines provide easy operator editing and correcting as well as better job control for the supervisor and statistical detail on each operator's performance.

Components of the system include the keyboard-printers; sight verification stations; a supervisory control station with a page printer; A Computer Automation 816 Data Accumulator with a core memory of 8K in 16 byte words; A Data Disc, Inc. disk memory unit with 800K capacity; and two nine-track, 800-BPI Ampex TMZ tape drives. Both core and disk memories are expandable. The core capacity may be increased to 32K, and the disk memory can be increased to as much as 3200K with additional modules. The system may also be expanded by the addition of one or more tape drives.

For more information, circle No. 12 on the Reader Service Card

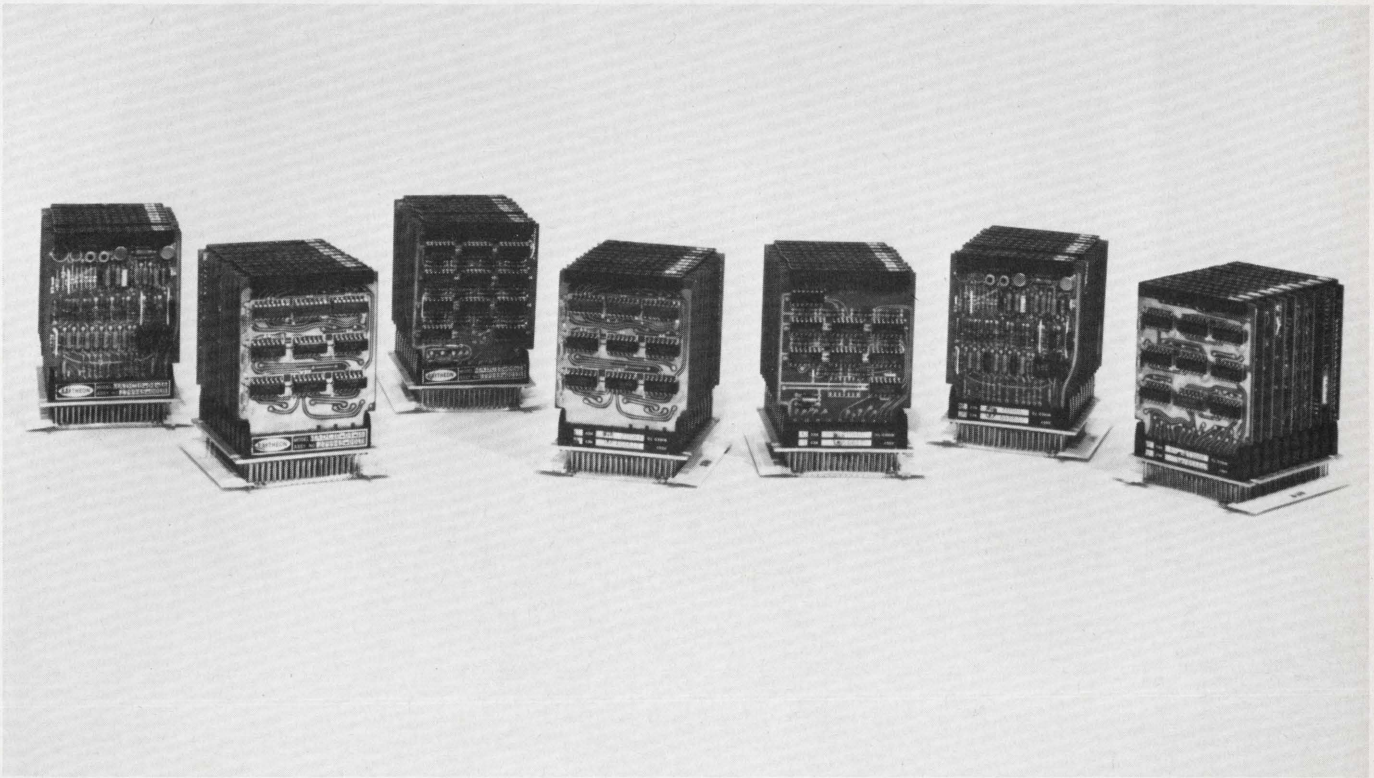
DATA-TAPE 2100

Two new MINI-BLOC instruments, which **convert binary data into BCD and BCD data to binary,** have been introduced by Raytheon Computer of Santa Ana, California. The model MBIN01-04 accepts 16 binary bits and converts the information into five BCD characters. The model MBCD01-04 accepts five BCD characters and converts the information into an equivalent 16-binary word.

The new units are built on the MINI-BLOC concept—a maximum of ten modules mounted on a ten-connector block, wired, tested, and ready to plug in and use. Each converter occupies only 80 cubic inches, and is designed to fit customer or Raytheon chassis assemblies. The MINI-BLOC converter assemblies can be expanded to increase the length of the binary of BCD word by the addition of successive MINI-BLOCS.

For more information, circle No. 13 on the Reader Service Card

MINI-BLOC

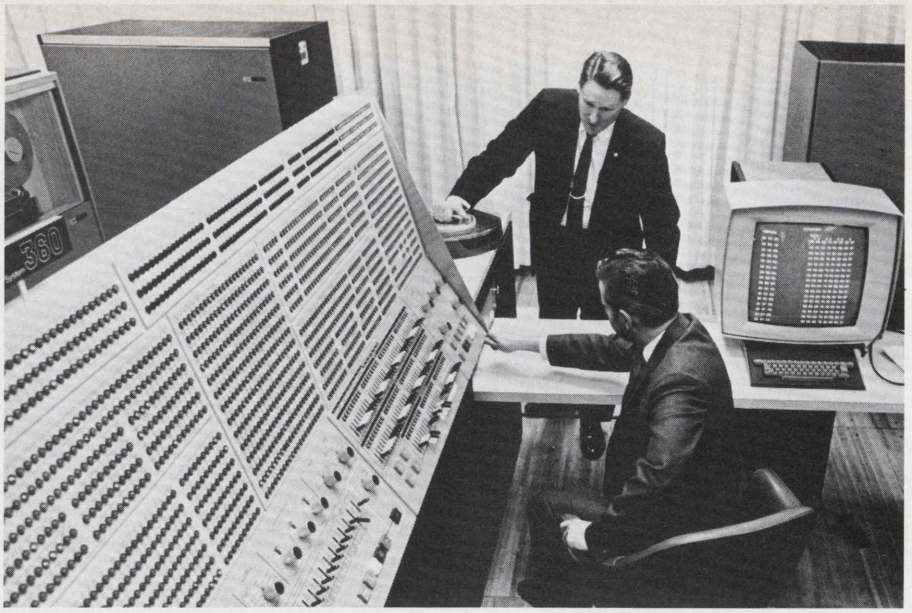


IBM has recently extended the cost and capabilities of its computer systems in two directions. The IBM System/3, the new low cost system, was designed especially for small businesses. Its most dramatic departure from previous computer systems is the punched card format. The System/3 cards are about one-third the size of the traditional 80-column card and they hold 20% more information.

The System/3 is available in two basic models: a punched card system or a system featuring direct access disk storage. The card version starts with an 8,192 character main core memory, a 100 line-per-minute printer and a multi-function card unit (which combines five card-handling operations—sorting, collating, punching, printing and reading). The disk system starts with a 12,288 character main memory, 2.45 million character disk and a 100 line-per-minute printer. The built-in disk file has a storage capacity of up to 9.80 million characters. The main storage for both card and disk versions can be expanded to 32,768 characters, and the printer speeds can be increased to 200 lines per minute. The circuits of the System/3, called Monolithic System Technology, permit the computer to attain an internal operating speed of 1.52 microseconds.

"System/3 packs a lot of computing power into a small package," said F. G. Rodgers, president of IBM's Data Processing Division, "and its price is well within reach of many businesses that believed they couldn't afford a computer of their own."

The System/360 Model 195, on the other hand, is the most powerful computer in IBM's product line. The Model 195 uses monolithic integrated circuits for the arithmetic and logic operations in the central processor and as the storage medium in the 32,768-byte buffer memory. These circuits are a key factor in achieving the basic machine cycle of 54 nanoseconds. The buffer is designed to keep pace with the central processing unit (CPU), which also has a 54-nanosecond cycle. (This is 14 times faster than the main storage.) The buffer holds large blocks of data ready for use by the CPU and streams them into the central processor at the CPU's operating speed.



IBM System/360 Model 195

The Model 195 has five functionally separate units within its CPU: processor storage; storage bus control; instruction processor; fixed-point processor and floating-point processor. This internal organization allows the computer to overlap and process up to seven different operations at the same time. The main memory capacities available with the Model 195 are one-, two-, and four-million bytes. The larger sizes allow users to solve complex problems more effectively and to run several programs at the same time under the control of Operating System/360 MVT (Multiprogramming with a Variable number of Tasks).

"This new top of the System/360 line offers unique performance not only for scientists, but for large scale commercial users as well. The Model 195 will help them tackle some of the most complex problems facing industry and science today."

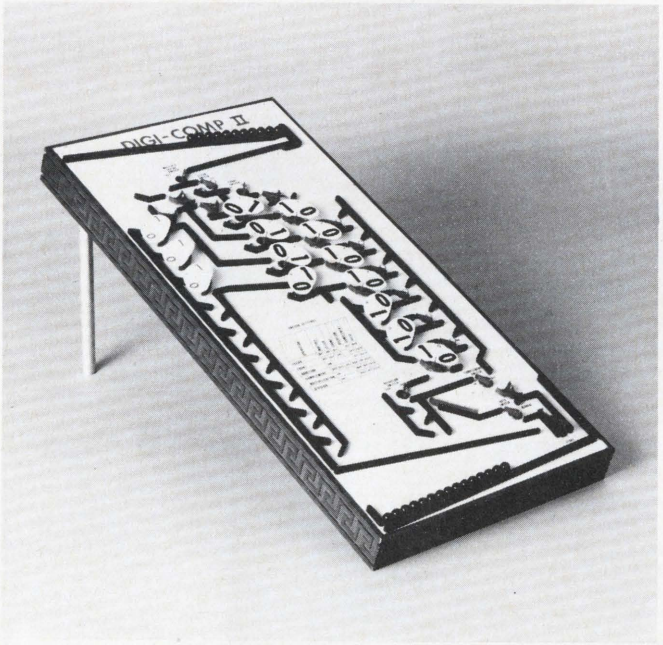
For more information, circle No. 14 on the Reader Service Card

IBM System/3—New System, smaller punched card, disk storage drawer.

Now . . .

DIGICOMP II - the "second generation" of the famous DigiComp,

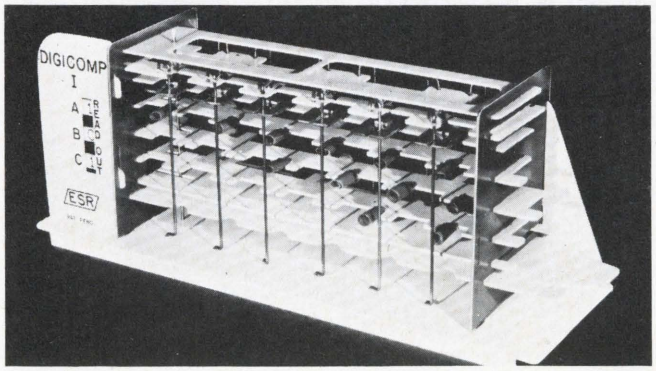
enormously more "sophisticated" as additional "switches" and "core positions" permit many more decisions and "branching" possibilities.



Like its predecessor the DigiComp-I (see below) it is entirely mechanical in operation but affords the functions common to electronic computers in a form far more comprehensible. The best way ever to learn (or to teach) the principles of modern data processing.

$16.95 Postpaid

DIGICOMP-I COMPUTER



Ingenious mechanical equivalent of an electronic digital computer. Can be "programmed" to perform, individually, every operation of a digital computer. Best thing ever for teaching binary math, how a computer operates, how and why problems must be broken down for machine solution. In kit form—1 hr. to assemble. **$5.98 Postpaid**

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Developed in the course of the ALL Project (Accelerated Learning of Logic) Wff'nProof incorporates 21 games of progressive difficulty; has been used to teach propositional calculus to elementary school children but challenges the intellect of professional logicians. Complete with 224-page manual which is an introduction to the world of modern logic; filled with valuable tips to clear thinking.

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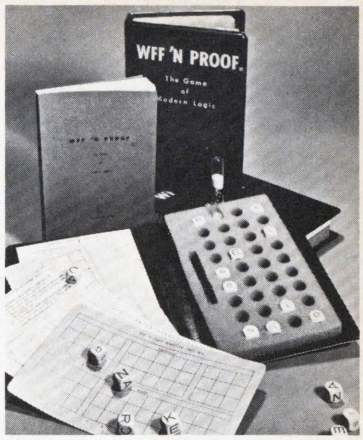

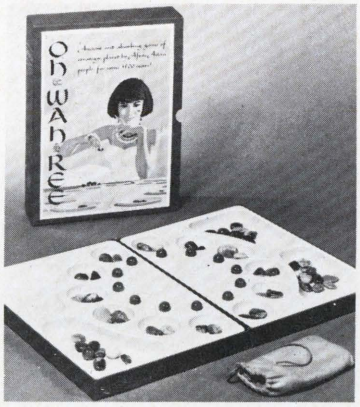

OH WAH REE

The ancient game of mathematical strategy which has intrigued millions for more than 30 centuries. A game at once so simple in its basics that a pre-schooler can enjoy it yet so complex in its possibilities that its fascination multiplies with the mathematical grasp of the player.

$8.50 Postpaid

TWIXT

Another famous "bookshelf" game, package matches that of Oh-Wah-Ree. A stimulating game with a fascinating chess-like strategy of move and countermove. Two or four players.

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Based on concepts from the geometry of incidence, CONFIGERATIONS is a series of intriguing mathematical and geometric puzzles that will challenge and delight those who enjoy careful reasoning. It is authored by Professor Harold L. Dorwart, Chairman of the Mathematics Department, Trinity College, Hartford.

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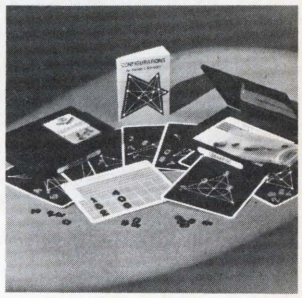

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conference countdown

SEPTEMBER

28–Oct. 1 International Systems Meeting of the Association for Systems Management, New York, N. Y. Contact: Richard Irwin, Association for Systems Management, 24587 Bagley Rd., Cleveland, Ohio 44138.

OCTOBER

1– 5 American Society for Information Science Annual Meeting, San Francisco, Calif. Contact: ASIS, 2011 Eye St., N.W., Washington, D.C. 20006.

2– 3 Second Advanced EDP Audit and Control Conference, New York, N. Y. Contact: Harold Weiss, Automation Training Center, 1930 Isaac Newton Sq. E., Reston, Virginia 22010.

9–11 Developing Professional Manpower through Action, conference of DPMA Division 3, Little Rock, Arkansas. Contact: Robert Redus, 6901 Murray St., Little Rock, Arkansas.

14–16 Symposium of the American Society for Cybernetics, Gaithersburg, Maryland. Contact: Dr. Carl Hammer, UNIVAC Division, Sperry Rand Corp., 2121 Wisconsin Ave., N.E., Washington, D. C. 20007.

17–18 Northeastern Regional Conference of the Association for Computing Machinery, Albany, N. Y. Contact: Dr. E. D. Reilly, Computer Science Dept., State University of New York at Albany, Albany, N. Y. 12203.

19–22 1969 National Conference of the American Records Management Association, St. Louis, Mo. Contact: ARMA National Headquarters, 24 N. Wabash Ave., Chicago, Ill. 60602.

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- A study of information processing development within major industrial classifications including user and non-user industries.
- An examination of the techniques and strategy in career planning.

All of this information has been compiled and edited by the people at Source Edp—the largest nationwide recruiting firm devoted solely to the computer field. To receive your free copy of the 1969 Edition of Source Edp's Computer Salary Survey and Career Planning Guide, circle the reader inquiry card. Or, to speed delivery, write directly to the Source Edp office nearest you.

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Detroit—Robert C. Stevens, 24500 Northwestern Hwy., Southfield, Mich. (313) 352-6520
Houston—George P. Dyer, 2300 W. Loop S. (713) 621-6070
Los Angeles—Wayne G. Emigh, 3470 Wilshire Blvd. (213) 386-5500
Minneapolis—Fred L. Anderson, 801 Nicollet Mall (612) 332-8735
New York—Edward R. Golden, 1414 Ave. of the Americas (212) 752-8260
Palo Alto—Gordon M. Best, 525 University Ave. (415) 328-7155
Philadelphia—George D. Ramming, 1700 Market Street (215) 665-1717
St. Louis—Robert T. Trumbull, 130 S. Bemiston, Clayton (314) 862-3800
San Francisco—Richard O. Clark, 111 Pine Street (415) 434-2410

For more information, circle No. 6 on the Reader Service Card

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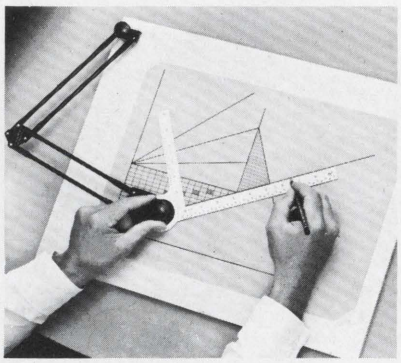
★ FIELD
★ TRAVEL



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24 Fourth Annual ACM Symposium on the Application of Computers to Problems of Urban Society, New York, N. Y. Contact: Jessica Hellwig, Computer Center, Columbia University, New York, N. Y.

26–30 Joint Conference on Mathematical and Computer Aids to Design, Anaheim, Calif. Contact: E. G. Kimme, Collins Radio Company, 19700 Jamboree Road, Newport Beach, Calif. 92663.

27–29 Data Processing Supplies Association's Fall Meeting, New York, N. Y. Contact: Data Processing Supplies Association, 1116 Summer Street, Stamford, Conn. 06905.

27–31 BEMA Annual Exposition & Conference, New York, N.Y. Contact: Paul Notari, BEMA, 235 E. 42nd St., New York, N.Y. 10017.

28–30 24th Annual Instrument Society of America (ISA) Conference & Exhibit. Contact: Ray Cooley & Associates, Inc., 4848 Guiton St., Houston, Texas 77027.

NOVEMBER

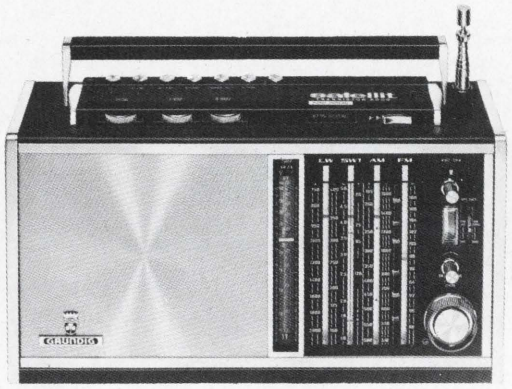
10–11 Digitronics User Association's 4th Annual Conference, New York, N. Y. Contact: Mrs. Lyme Sawyer, Digitroics Users Association, Box 113, Albertson, N. Y. 11507.

17–18 Digital Equipment Computer Users Society Meeting, Las Vegas, Nevada. Contact: Angela Cossette, Digital Equipment Computer Users Society, Maynard, Massachusetts 01754.

17–19 1969 IEEE Symposium on Adaptive Processes (8th), Penn. State University, State College, Penn. Contact: Prof. G. J. McMurtry, Electrical Engineering Dept., Penn State University, University Park, Penn. 16802.

18–20 Fall Joint Computer Conference, Las Vegas, Nevada. Contact: AFIPS, 245 E. 47th St., New York, New York 10017.

19–20 ACUTE (Accountants Computer Users Technical Exchange) Conference, Atlanta, Georgia. Contact: ACUTE, 947 Old York Rd., Abington, Pa., 19001.



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Develop MIS Real-time bkgd.

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Real-time, operating systems

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Manufacturing background

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Chemical Company

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Stamford, Conn: 111 Prospect St. ..... (203) 325-4158

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annual career guide section

Your index to the nation's primary employers of EDP managers and personnel

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How to use the index

The SOFTWARE AGE CAREER GUIDE is a concise and informative index to the nation's primary employers of EDP managers and personnel.

How is the Index Organized?

The index lists primary EDP employers geographically under the state where they are located, and then alphabetically by the company. If you are interested in a particular geographic region, scan the listings beginning on page 36 to find the states you are interested in.

For purposes of cross-reference, we have provided an alphabetical listing of primary employers on page 54, indicating the state and page on which their listing appears. Companies advertising in this issue of S/A are listed in bold-face type in both listings.

Employment and search agencies are listed geographically on page 57.

How to Read the Listings

The typical listing appears as:

(1) **ALPHA SOFTWARE COMPANY**
Div. of American Software Products, Inc.

(2) **Indiana Blvd., Indianapolis, Ind. 48573**
(317) 782–3206

(3) Darrel W. Faucett, Computer Personnel Relations*

(4) Empl: Total this location 600; Total EDP Employees 70; Programmers 50; Analysts 20.

(5) Electronic Central Office Telecommunications Switching Systems Development.

(6) Optimize equipment and information utilization associated with electronic switching systems, and maximize traffic economies through analysis of engineering information.

(7) 360/50, 360/40, 360/30, 360/20.

This is interpreted as:

(1) The company's name and division.

(2) Mailing address and telephone number.

(3) Name and in-house address of company representative to whom application should be address. An asterisk indicates that company literature is available.

(4) Total, technical and software employment figures.

(5) A brief description of the company's operations, services and/or products manufactured.

(6) Principal computer applications at this location.

(7) Major EDP equipment located and used at this location.

(8) Companies advertising in this issue appear in bold face type in both the geographic and alphabetical indexes.

Using the Index

Primary employers, listed geographically ..... page 36

Primary employers, alphabetically indexed ..... page 54

Employment and search agencies . page 57

1000 primary employers

ALASKA

DEPT. OF ADMINISTRATION, ALASKA, STATE OF, DIV. OF PERSONNEL
Pouch C, Juneau, Alaska 99801
(586) 5259*
System 360-40 and peripheral equipment.

ALASKA, STATE OF, DIV. OF DATA PROCESSING
Pouch C, Juneau, Alaska 99801
(907) 586–5334
Keith Angier, Director, Division of Data Processing*
Empl: Total this location 65; Programmers 10; Analysts 8; Operators 5.
Centralized state computer facility, commercial applications development.
IBM 360/40G.

ARIZONA

von LAUTZ CO.
3144 Vista Del Forte Dr., Tucson, Ariz. 85716
(602) 327–7524
Walter Lautz, Pres.
Empl: Total this location 8; Total EDP Employees 4; Programmers 4.
Software consulting.
IBM 360 small retail outlets.

CALIFORNIA

ADPAC COMPUTING LANGUAGES CORP.
P. O. Box 3337, San Francisco, Calif. 94105
(415) 981–2710
William D. Caplan, V. P.*
Empl: Total this location 70; Total EDP Employees 34; Programmers 22; Analysts 11; Operators 1.
Computer languages for business applications.
Languages.
IBM /360, 30 and 40.

AEROJET–GENERAL CORP.
Div. of General Tire and Rubber Co.
P. O. Box 303-S, Azusa, Calif. 91702
(213) 334–6211, X5751
Donald L. Rowe, Empl. Mgr.
Empl: Total this location 2850; EDP Employees 250; Programmers 150; Analysts 50; Operators 50.
Principal activities are electronics infrared, optical, and advanced data systems; microelectronics; power conversion, composite structures and lightweight armor; and marine technology.
Engineering and administrative support; digital data analysis; computer control simulator; computer control data.
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BUNKER RAMO CORP. DEFENSE SYSTEMS DIV.
8433 Fallbrook Ave.,
Canoga Park, Calif. 91304
(213) 346–6000
D. A. Kalal, Mgr.*
Empl: Total this location 1000; Total EDP Employees 100; Programmers 60; Analysts 30; Operators 10.
Command/control and communications—digital computers and displays—ASW—software development.
Business and scientific—basic utility programs to machine language translation—various engr. appl. incl. simulation, ops, research, OCR, online techniques.
BR 130–133; BR 90 display system; GE 415 (business).

BURROUGHS CORP.
460 Sierra Madre Villa,
Pasadena, Calif. 91109
(213) 355–8061
M. R. Olson, Empl. Rep.*
Empl: Total this location 3,300; Total EDP Employees 61; Analysts 16; Operators 31.
Design, development and manufacture of computer systems.
General purpose commercial computer systems.
Computer manufacturer.

CALIFORNIA COMPUTER PRODUCTS, INC.
305 N. Muller, Anaheim, Calif. 92803
(714) 625–6501
M. E. Smith, Personnal Adm.*
Empl: Total this location 800; Total EDP Employees 70; Programmers 20; Analysts 30; Operators 3.
Digital computer graphic systems.
Basic and functional software development for digital plotters and engineering applications.
GE 435 and IBM 1130 computers.

CHAFFEY UNION HIGH SCHOOL DISTRICT
211 W. Fifth St., Ontario, Calif. 91762
(714) 986–2711
G. M. Jaynes, Dir. of Data Processing
Empl: Total this location 1,100; Total EDP Employees 7; Programmers 3; Analyst 1; Operators 3.
Education
Business and student applications.
IBM 1401, Burroughs 2500/3500.

CODE, INC.
8939 S. Sepulveda Blvd.,
Los Angeles, Calif. 90045
(213) 670–2200
C. D. Bruhn, Dir. Tech. Empl.
Empl: Total this location 12; Total EDP Employees 11; Analysts 11.
Systems analysis, systems programming, applications programming, management sciences, and logical design.
IBM, CDC, GE.

COLLINS RADIO COMPANY
19700 Jamboree Rd.,
Newport Beach, Calif. 92663
(714) 833–0600
P. L. Chamberlin, Empl. Mgr.
Empl: Total this location 2,200; Total EDP Employees 127; Programmers 74; Analysts 22; Operators 20.
Communications–computation–control systems.
Software applications–switching–data transmission.
Collins C system.

COMMANDER LABORATORIES, INC.
1177 W. Washington Ave.,
Escondido, Calif. 92025
(714) 746–7400
M. L. Gosack, General Mgr.

COMPUTER USAGE CO. INC.
615 Battery St., San Francisco, Calif. 94111
(415) 391–2180
Bill Mann, Project Director
Empl: Total this location 1,200; Programmers 600; Analysts 600
Software services. All kinds.

CONSOLIDATED ANALYSIS CENTERS INC.
Div. of Santa Monica
225 Santa Monica Blvd.,
Santa Monica, Calif. 90401
(213) 451–5771
Joseph S. Annino, Mgr., Systems Programming*
Total EDP Employees 30; Programmers 3; Analysts 8; Operators 1
Software development, proprietary software.
Compiler development, information retrieval systems (quick qwery), simscript I.5 compilers, digital simulation models, training courses.
Generally use the customers equipment.

COPLEY COMPUTER SERVICES, INC.
1253 Garnet Ave., San Diego, Calif. 92109
John McBride, Pres.
Empl: Total this location 45; Total EDP Employees 25.
Computer service center, communications specialists, software development graphic arts software specialists.
Newspaper data processing applications, type composition support.
RCA Spectra 70/45, IBM 1130.

CYBERCOM
432 Toyama Dr., Sunnyvale, Calif. 94086
(408) 734–3230

Dale L. McPherson, Empl. Section Mgr.
Empl: Total this location 121.
Peripheral computer equipment.

DALMO VICTOR CO.
Div. of Textron Inc.
1515 Industrial Way, Belmont, Calif. 94002
591–1414
Jack M. Harper, Emp. Mgr.*
Empl: Total this location 1,700; Total EDP Employees 31; Programmers 6; Analysts 7; Operators 4.
Electronic systems (defense oriented).
Accounting, manufacturing, engineering.
IBM 36/30–65 K DOS.

DATA DISC, INC.
1275 California Ave., Palo Alto, Calif. 94304
(415) 326–7602
Ed Minium, Personnel Mgr.
Empl: Total this location 160; Total EDP Employees 2; Programmers 2.
Disc memory systems, display terminal systems, information retrieval systems.
Product testing, accounting.
HP 2116B.

DIGITAL DEVELOPMENT CORP.
5575 Kearny Villa Rd.,
San Diego, Calif. 92123
(714) 278–9920
T. L. Azaret, Personnel*
Empl: Total this location 205.
Modular high-capacity fast-access rotating memory sub-systems.

DIVERSIFIED COMPUTER APPLICATIONS
516 University Ave., Palo Alto, Calif. 94301
(415) 324–0618
James M. Lantz, Mgr. Systems Analysis
Empl: Total this location 40; Total EDP Employees 14; Programmers 5; Analysts 3; Operators 6.
Computer service center.
Varied business applications—batch processing and on-line.
IBM 360/30; Burroughs 2500.

ELECTROMAGNETIC SYSTEMS LABORATORIES
495 Java Drive, Sunnyvale, Calif. 94086
(408) 734–2244
Richard Cantu, Sr. Personnal Representative*
Empl: Total this location 300; Total EDP Employees 18; Programmers 10; Analysts 5; Operators 3.
R&D electronics.
Scientific data processing. management systems processing.
1–IBM 360, Model 44, 256 K BYTE, 4–2311 Discs, 2 Tape Drives, and 1–IBM 1130.

ENGINEERING CORP. OF AMERICA
21 Arcade Drive, P. O. Box BA,
Ventura, Calif. 93001
(805) 643–9991
George Kirby, EDP Mgr.*
Empl: Total this location 62; Total EDP Employees 27.
Engineering services and consulting engineers.
IR system for technical capabilities of engineers.
IBM.

HARVEY ALUMINUM INC.
19200 S. Western Ave.,
Torrance, Calif. 90509
(213) 775–2181, ext. 646
Baiz Campbell, Mgr. Professional Staffing
Empl: Total this location 3,500; Total EDP Employees 60; Programmers 13; Analysts 10; Operators 8.
Financial/business—developing and installing "on-line" order entry and inventory control system. Projected 4 year plan includes manufacturing control and mgmt. information systems.
System 360-40 with 2260 and 2740 terminals.

HUGHES AIRCRAFT CO. GROUND SYSTEMS
P. O. Box 3310, Fullerton, Calif. 92634
(714) 871–3232
D. K. Horton, Sup. Engrng. Employment
Advanced information systems.
Real-time operational programming to direct radar operation, generate tactical displays, and transfer information via digital data link.
IBM 360/50, 360/65 plus time shared.

IBEN DATA SYSTEMS
1563 Gordon St., Los Angeles, Calif. 900281
(213) 464–3217
I. Burkoff, Personnel Dept.*
Empl: Total this location 50; Total EDP Employees 32; Programmers 9; Analysts 12; Operators 13.
Data processing services, government, industry, education, aerospace and insurance, general business.
General business, scientific and insurance hospital (hybrid) patient monitoring, R/D, software development and engineering, banking.
CDC 6500, analog hybrid computer, interactive graphics, OCR, telecommunications, and medium scale business system.

INFORMATICS INC.
5430 Van Nuys Blvd.,
Sherman Oaks, Calif. 91401
(213) 783–7500
Jacqueline Zanicchi, Personnel Mgr.
Empl. Total this location 1,300; Total EDP Employees 600.
Custom software services and proprietary products, plus 4 data centers systems design and implementation.

INFOSCI INC.
Box 464, Menlo Park, Calif. 94025
(415) 365–5811
John L. McTap, Office Mgr.
Empl: Total this location 6; Total EDP Employees 6; Programmers 3; Analysts 3.
Consulting services, and documentation.
Consulting services and documentation.

JET PROPULSION LABORATORY
Div. of California Institute of Technology
4800 Oak Grove Dr., Pasadena, Calif. 91103
(213) 354–3830
M. Wallace Peterson, Empl. Supervisor
Research and development, unmanned spacecraft, planetary exploration. Supports the national aeronautics and space administration by planning, developing and administering projects and systems designed for unmanned lunar and planetary exploration.
Space flight operation and DSM.

LAWRENCE RADIATION LABORATORY
Div. of University of California
P. O. Box 808 65–70,
Livermore, Calif. 94550
(415) 447–1100
John Gloekler, Personnal Representative
Empl: Total this location 5,700; Total EDP Employees, scientific EDP; 190; Administrative EDP 26; Programmers 125; Analysts 4; Operators 87.
Nuclear research and development.
Scientific research and administrative data processing
IBM, CDC, PDP, Remington Rand.

LOCKHEED–CALIFORNIA
Div. of Lockheed Aircraft Corp.
P. O. Box 551, Burbank, Calif. 91503
(213) 847–4733
C. R. Alexander, Employment Mgr.
Empl: Total this location 23,500; Total EDP Employees 600; Programmers 335; Analysts 105; Operators 160.
Aircraft, military and commercial.
Business and scientific programming, also management systems analyses.
IBM 360-91, Beckman/SDS, 220/9300 Hybrid, IBM 7080 and 360–65, RCA Spectra 55, WCR 315.

LOCKHEED MISSILES & SPACE CO.
Div. of Lockheed Aircraft Corporation
P. O. Box 504, Sunnyvale, Calif. 94088
(408) 743–2200
H. W. Bissell, Empl. Mgr.
Empl: Total this location 24,000; Total EDP Employees 1,100; Programmers and Analysts 700; Operators 400.
All types—scientific, engineering and administrative applications.
IBM 360 series, CDC 3000 series, CDC 6000 series, UNIVAC 1108.

LOGICON INC.
1075 Camino del Rio South,
San Diego, Calif. 92110
(714) 291–4240
G. W. Kozak, Personnel*
Empl: Total this location 200; Total EDP Employees 140; Programmers 55; Analysts 85.
Planning, engineering and implementation of computer centered systems, systems analysis and evaluation, software development.

LOS ANGELES CITY SCHOOLS
Classified Personnel Commission, Personnel Branch
P. O. Box 1298, Los Angeles, Calif. 90054
(213) 749–6606
Kendall Ellingwood, Recruitment Representative
IBM 360/50—3rd generation equipment.
Random access applications various management disciplines.
Programmers 24; Analysts 24; Operators 25.

MECHANICS RESEARCH, INC.
9841 Airport Blvd., Los Angeles, Calif. 90045
(213) 670–4650
Ruth M. Sharpe, Personnel Adm.*
Empl: Total this location 80; Total EDP Employees 10; Programmers 4; Analysts 4; Operators 2.
Consulting engineers.
Stress analysis, dynamic response analysis, la-

bor distribution, low cost home pricing program, etc.
Key punch, verifier, 9300, tab work, remote.

MEDICAL DIAGNOSTIC OPERATIONS
Div. of Xerox Corp.
3452 Foothill, Pasadena, Calif. 91107
351–1605
George Neff, Employment Mgr.
Empl: Total this location 440; Total EDP Employees 5; Programmers 3; Analyst 1.
Medical diagnostic equipment.
Real time computer control of machine operations. Instrumentation data processing.
Sigma 5/7, CAI PC 808/816, IBM 1130

MELLONICS SYSTEMS DEVELOPMENT DIV.
Litton Industries
1001 W. Maude Ave., Sunnyvale, Calif. 94086
(408) 245–0795
Russ Kiessig, Industrial Relations Mfg.*
Empl: Total this location 650; Total EDP Employees 500; Programmers 200; Analysts 200.
Software and prototype hardware, data conversion equipment, computer terminals LSI test devices and systems, voice input systems.
Computer programming: real time, C&C systems, operating systems, monitors, executives.
Systems analysis: full spectrum services.
360/50.

MOORE ASSOCIATES
Div. The Rucker Co.
815 American St., San Carlos, Calif. 94070
(415) 591–5363
John W. Wattenbarger, Vice Pres., Engineering
Empl: Total this location 100; Total EDP Employees 7; Programmers 4; Analysts 2; Operator 1.
Programming for computer controlled digital systems.
Oil field automation and process control.

NATIONAL CASH REGISTER CO., ELECTRONIC DIV.

2815 D. El Segundo Blvd.,
Hawthorne, Calif. 90250
(213) 777–7346
Steve Williams, Personnel Mgr.*
Empl: Total this location over 4,000; Total EDP Employees 50–60; Programmers 30; Analysts 20; Operators 18; Software Development 50.
Research, design, development, engineering and mfg. of EDP NCR century systems.
All NCR EDP systems.

NAVAL AIR SYSTEMS COMMAND REPRESENTATIVE, PACIFIC
Naval Air Station, North Island,
San Diego, Calif. 92135
(714) 437–7126
Miss M. E. Jacobs, Civilian Personnel Officer
Empl: Total this location 300; Total EDP Employees 5; Analysts 5.
Command provides administrative and technical support to U. S. Navy Air Pacific Fleet. Develop specifications for ADP systems for application primarily in the areas of aircraft material and workload control, financial control and administrative support.
RCA 301, 501 and 3301. Equipment operated by ADP Service Center.

NESS CONSULTANTS
Div. Ness Industries, Inc.
422 Waverley St., Palo Alto, Calif. 94301
(415) 322–4626
Ricardo J. Alfaro, V. P., General Mgr.*
Empl: Total this location 35; Total EDP Employees 10 by year end 1969.
Software consultants, programming, EDP systems design.
Scientific programming
Use client hardware or rented time on IBM 360's/CDC.

NORTHROP CORP.
3901 W. Broadway, Hawthorne, Calif. 90250
(213) 675–4611
P. L. Brady, Supervisor, Tech. Personnel
Empl: Total this location 25,000; Total EDP Employees 500.
Product manufactured—commercial and military communications—electronics-aircraft.
Commercial; corporate finance, manufacturing MIS, and materiel.
OS360/65.

RALPH M. PARSONS CO.
617 W. 7th St., Los Angeles, Calif. 91011
(213) 629–2484
Mrs. Virginia F. Thuresson, Prof. Tech. Recruiter*
Empl: Total this location 2,000; Total EDP Employees 60; Programmers 11; Analysts 9; Operators 7.
Engineers and constructors.
Management information systems, business development, engineering scientific, Burroughs 5500.

RoMAR ENGINEERING COMPANY, INC.
12049 West Jefferson Blvd.,
Culver City, Calif. 90230
(213) 398–5754/870–5859
John R. Vance, Professional Empl.
Empl: Total this location 220; Total EDP Employees 6; Programmers 3; Analysts 3.
Engineering, computer and software services. Various engineering applications, and general business systems, complete systems design, and implementation.

SCIENTIFIC DATA SYSTEMS, INC.

701 South Aviation Boulevard,
El Segundo, Calif. 90245
(213) 772–4511
W. V. Kendall, Empl. Mgr.*
Empl: Total this location 3,900; Total EDP Employees 250.
Applied research, design, development, test, production and sales of digital computer systems.
Development of real time, scientific and business software.
Sigma 7, Sigma 5, Sigma 2, 940, 945.

SHARE RESEARCH CORP.
3704 State St., Santa Barbara, Calif. 93105
(805) 687–5553
Miss Martha E. Blanco, Personnel
Empl: Total this location 20; Total EDP Employees 14; Programmers 6; Analysts 4; Operators 4.
Computer-based information services.
Information retrieum, selective dissemination of information (SDI), library applications.
360/65.

WAYNE E. SIMON RADIATION SURVEYS CO.
Div. Arcsine Zero Mining and Mfg. Co.
163 Lamb Canyon, Beaumont, Calif. 92223
(714) 845–4002
Charles Willard Earley, Dir. of Nuclear Science Group*
Empl: Total this location 42; Total EDP Employees 17; Programmers 3; Analysts 2; Operators 3.
Computer aided design and research, radiological surveys, equipment service and calibration.
Simulated conditions for circuit parameter prediction, inventory and payroll.
IBM 360/30, various peripheral units.

SINGER FRIDEN DIV.

2350 Washington Ave.,
San Leandro, Calif. 94577
(415) 357–6800
Emp. Mgr.
Empl: Total this location 2,500; Total EDP Employees 90; Programmers Yes; Analysts Yes; Operators Yes.
Electronic business machines and EDP systems. Manufacturing systems, Software development, scientific programming, design automation and graphic displays.
IBM 360 DOS/MOS, Honeywell 200.

STROMBERG DATAGRAPHIX, INC.
A General Dynamics Subsidiary
P. O. Box 2449, San Diego, Calif. 92112
(714) 283–6531
J. R. Colvin, Mgr. Prof. Placement*
Empl: Total this location 1,200; Total EDP Employees 60; Programmers 20; Analysts 40.
Microfilm recorders and peripheral equipment.
Microfilm systems analyst.
Honeywell 120.

SYSTEM DEVELOPMENT CORP.
3000 Olympic Blvd.,
Santa Monica, Calif. 90406
(213) 393–9411
Roger R. DeBruno, Empl. Mgr.*
Empl: Total this location 2,222; Total EDP Employees 1,729; Programmers 1,075; Analysts 342; Operators 112.
Computer software as it associates with research, development and application of information technology and the system sciences. Wide range of general purpose and problem-oriented information processing tools and systems related to commercial, public and military applications. These include basic operating systems, data management, statistical processing and analysis.
IBM 360/30–95, CDC 3800; a comprehensive array consisting of 8 major digital systems.

TELEDYNE SYSTEMS CO.
19601 Nordhoff St., Northridge, Calif. 91324
(213) 886–221, X2480
Bill Oldenkamp, Mgr. Employ. & Comp.*
Empl: Total this location 1,100; Total EDP Employees, varies.
Design and manufacture airborne computers, avionics equipment utilizing micro miniature circuitry.

TIPTON'S STAFF DEVELOPMENT AND ENGINEERING
Div. of Tipton's Industries
P. O. Box 5008, Covina, Calif. 91722
(213) 331–0944
A. Vern Tipton, Pres.*
Empl: Total this location 100; Total EDP Employees 5.
Engineering service.

TUSTIN INSTITUTE OF TECHNOLOGY, INC.
Box Q, Santa Barbara, Calif. 93102
(805) 963–1124
Empl: Total this location 10; Total EDP Employees 5.
Consultation and specialized technical education.
Vibration and shock analysis.

UNITED COMPUTING CORP.
802 Torrance Blvd.,
Redondo Beach, Calif. 90277
(213) 376–0436
Jim W. Hayes, V. P.*
Empl: Total this location 40; Total EDP Employees 37; Programmers 25; Analysts 12.
UNIAPT N/C system, UNICON production control, UNIACT accounting system, UNITE simulators.
Real time, business, engineering, diagnostics, N/C, education, simulation and utility software.
PDP-8/1, 12K with 64K disk, card reader and high speed paper tape glar.

UNIVERSAL DATA SYSTEMS, INC.
Div. The Rucker Co.
14482 Beach Blvd.,
Westminster, Calif. 92683
(714) 897–1033
James J. Milanese, V. P.
Empl: Total this location 14; Total EDP Employees 14; Programmers 5; Analysts 6.
Computer system design, analysis and pro-

gramming, computer program testing and validation, application analysis.
Aerospace and defense command and control systems, industrial process control systems, data acquisition systems, operations research, scientific and engineering.
IBM, SDS, Hughes, Hewlett–Packard, CDC.

VARIAN AEROGRAPH
Div. Varian Assoc.
2700 Mitchell Dr.,
Walnut Creek, Calif. 94598
(415) 939–2400
Robert D. Christofk, Personnel Mgr.
Empl: Total this location 430; Total EDP Employee 8; Programmer 1; Analyst 1; Operators 2.
Analytical instruments—gas chromatographs, recorders, data handling systems.
Order entry and sales analysis, quality assurance statistics, document retrieval, manufacturing scheduling, imprint data preparation for central corporate systems.
IBM 360/20.

WATKINS–JOHNSON CO.
3333 Hillview Ave., Palo Alto, Calif. 94304
(415) 326–8830
Jay W. Waste, Sr. Personnel Admin.
Empl: Total this location 750; Total EDP Employees 16; Programmers 4; Analysts 4; Operators 2.
Electronic devices and systems.
Financial.
360–44 DOS.

COLORADO

BLUE CROSS AND BLUE SHIELD OF COLORADO
244 University Blvd., Denver, Colo. 80206
(303) 388–4411
Jerry Litzau, Adm. Asst. Data Processing
Empl: Total this location 900; Total EDP Employees 140; Programmers 16; Analysts 13; Operators 18.
Health insurance and related fields.
General business plus claims and membership processing. Currently developing management information system.
Two (2) H-2200, H-200.

SYSTEMATION, INC.
P. O. Box 730,
Colorado Springs, Colo. 80901
(303) 473–8555
W. Norman Wood, V. P.
Empl: Total this location 35; Analysts 9.
Applied management systems training and education.

CONNECTICUT

AVCO LYCOMING DIV.
Avco Corp.
550 S. Main St., Stratford, Conn. 06497
(203) 378–8211
Myron Dmyterko, Empl. Mgr.
Empl: Total this location 9,000; Total EDP Employees 95; Programmers 30; Analysts 4; Operators 12.
Gas turbine engines/aerospace industry.
Scientific and engineering computations and engineering information systems. Business applications which include labor distribution, wage and salary distribution, payroll computations, and all other management information reports relating to division operations excluding engineering.
Systems 360-130, 360-140, 360-144.

CHANDLER EVANS CONTROL SYSTEMS DIV.
Colt Industries
Charter Oak Blvd.,
West Hartford, Conn. 06101
(203) 236–0651
Richard C. Wellington, Supervisor—Technical Recruitment
Empl: Total this location 2,000; Total EDP Employees 30; Programmers 8; Analysts 5; Operators 4.
Gas turbine controls, pumps, missile control systems, servos, aircraft engine and missile accessories.
Payroll, budgets and forecasts, standard costs parts lists, inventory control, machine loading, etc.
Burroughs B2500.

COMPUTER USAGE CO., INC.
51 Weaver St., Greenwich, Conn. 06830
(203) 661–4100
L. D. Lawrence, Personnel Mgr.
Empl: Total this location 30.
Corporate headquarters—computer software.

GERBER SCIENTIFIC INSTRUMENT C.
83 Gerber Road, Wapping, Conn. 06087
(203) 644–1551
Watson Peterson, Jr., Personnel Mgr.
Empl: Total this location 260; Programmers 15.
Automatic design drafting systems.
Scientific applications.

PERKIN–ELMER CORP.
Norwalk, Conn. 06852
(203) 762–1789
Kevin Rice Jones, Mgr., Scientific Computing
Empl: Total this location 5,000; Total EDP Employees 60; Programmers 30; Operators 10.
Analytical instruments and sophisticated optical equipment.
A broad spectrum of scientific application plus interesting computer system work.
IBM 360/67 time sharing under CP 67/CMS.

SIKORSKY AIRCRAFT
Div. United Aircraft Corp.
N. Main St., Stratford, Conn. 06602
Leo S. Shalvoy, Supervisor Prof. Empl.
Empl: Total this location 10,000; Total EDP Employees 225; Programmers 60; Analysts 40; Operators 20.
Design and manufacture of helicopters, boats and turbo-trains.
Aerospace scientific; manufacturing, purchasing, financial, personnel records.
IBM 360/65, 360/30; UNIVAC 1108.

TRANSCOM INC.
Div. Hi-G
12 Tobey Road, Bloomfield, Conn. 06002
(203) 243–1486
Peter B. Olsen, Sales Mgr.
Empl: Total this location 50; Total EDP Employees 5.
MFG of touch-tone terminal, system design conultants, interested in enlarging sales and systems staff.

DELAWARE

HERCULES INC.
910 Market St., Wilmington, Del. 19899
(302) 656–9811
J. O. Smith, Supervisor, Tech. Recruitment
Empl: Total this location 2,000; Total EDP Employees 75; Programmers 19; Analysts 13; Operators 39.
Home office—corporate headquarters; nature of company business; organic chemicals.
Data processing, systems and programming, operations research.
IBM 360/30/50, teleprocessing.

DIST. OF COLUMBIA

COMPUTER NETWORK CORP. (COMNET)
5185 MacArthur Blvd., N. W.,
Washington, D. C. 20016
(202) 244–9250
John G. Scarry, Jr., V. P., marketing and operations
Empl: Total this location 42; Programmers 3; Analysts 13; Operators 5.
Conversational time-sharing services.
Time-sharing distribution package, BIO–MED; ALPS, etc.
B-5500 time sharing system.

INPUT, INC.
Div. Input, International
815 Connecticut Ave., Northwest, Suite 1200,
Washington, D. C. 20006
(202) 298–7510
James F. Linker, Systems Director*
Empl: Total this location 12; Total EDP Employees 5; Programmers N/; Analysts N/A; Operators N/A.
Management consulting and technical recruiting for the computer industry, national and international.
Market analysis, evaluation studies, and management science applications.
IBM 360/50 time-sharing system.

JOHN I. THOMPSON & CO.
Subsidiary Tracor, Inc.
1118 22nd St. NW, Washington, D. C. 20037
(202) 337–4200
Robert S. Vandiver, Director, information management div.*
Empl: Total this location 200; Total EDP Employees 20; Programmers 6; Analysts 8.
Library science, management information, safety systems engineering, and scientific and technical data services.
Support of contract services.
MTST, digitizer, 360 systems.

U. S. NAVAL INTELLIGENCE PROCESSING SYSTEM SUPPORT ACTIVITY (NIPSSA)
Naval Intelligence Processing System Support Activity (NIPSSA)
Washington, D. C. 20350
(202) Oxford 48267
W. G. Moultrie, Adm. Officer*
Empl: Total this location 150; Total EDP Employees 67; Programmers 33; Analysis 12; Operators 28.
Naval intelligence automated systems.
Automated wall display, CRT graphic interface systems, computer to computer communications, on-line programming, correlation of information and third generation systems planning.
IBM 7090, 1401, 360/30, Honeywell 516, Univac 1004.

FLORIDA

ADVANCED R&D INC.
Div. of Pioneer Systems Inc.
P. O. Box 20125, Orlando, Fla. 32814
(305) 841–1581
John C. Jonas, Personnel Mgr.
Empl: Total this location 300; Total EDP Employees 15; Programmers 5; Analysts 5; Operators 5.
Contract engineering services.
Scientific, real time, assembly language.
IBM, GE 400 and 600 series.

DATACRAFT CORP.
1200 N. W. 70th St., P. O. Box 23550,
Ft. Lauderdale, Fla. 33307
(305) 933–2651
A. J. Olkin, Director, Computer Development*
Empl: Total this location 160; Total EDP Employees 15; Programmers 7; Analysts 2; Operators 6.

Manufacturing of DC 6024/1 and DC 6024/3 digital computers.
Internal programming and customer service applications.
DC 6024/1 24 bit digital computer.

EASTERN AIRLINES INC.
Miami International Airport,
Miami, Fla. 33148
(305) 634–3571
R. O. Hach, Sr. Mgmt. Recruitment Specialist
Empl: Total this location 12,500; Total EDP Employees 506; Programmers 182; Analysts 54; Operators 230.
Air transportation of passengers, cargo and freight.
Commercial and real time reservations system (passenger name record system)
IBM 360/65; IBM/2314 disk files; IBM/2420 tape units; 2401 tape units; IBM/1403 printers.

ELECTRONIC COMMUNICATIONS, INC.
A subsidiary of National Cash Register Co.
1501 72nd St. North, P. O. Box 12248,
St. Petersburg, Fla. 33733
(813) 347–1121
Paul R. Jordan, Supervisor, Empl.
Empl: Total this location 1,700; Total EDP Employees 33; Programmers 9; Analysts 3; Operators 16; Supervisory and Clerical 5.
Command and control communication systems, electronic equipment and accessories for defense and space programs.
350 financial, 70 job cost, 50 manufacturing, 100 scientific and technical.
IBM 360-30 64K, 6 disk, dual job stream; IBM 1130-8K-disk-plotter on line.

PRATT & WHITNEY AIRCRAFT, FLORIDA RESEARCH & DEVELOPMENT CENTER
Div. of United Aircraft Corp.
P. O. Box 2691,
West Palm Beach, Fla. 33402
(305) 844–7311
T. E. Armer, Prof. Placement*
Empl: Total this location 5,400; Total EDP Employees 280; Programmers 78; Analysts 128; Operators 74.
Propulsion research and development.
Scientific simulation.
Two IBM 360-75s.

SYMETRICS ENGINEERING CORP.
Computer Services Div.
1227 S. Patrick Drive,
Satellite Beach, Fla. 32935
(305) 262–3505
Personnel Mgr.
Empl: Total this location 200; Total EDP Employees 9; Programmers 4; Analysts 2; Operators 2.
Antenna, telemetry, communications and industrial process control systems.
Data processing for financial institutions, industrial payroll, inventory control, scientific and management scheduling.
IBM S/360-25.

IDAHO

COMPUTER SCIENCE BRANCH
Div. Idaho Nuclear Corp.
P. O. Box 2067, Idaho Falls, Idaho 83401
(208) 526–0111
Morris Hillyard, Mgr. Personnel
Empl: Total this location 3,000; Total EDP Employees 130; Programmers 50; Analysts 30; Operators 50.
Nuclear reactor safety program, contractor to AEC.
Large scale nuclear reactor research, development and engineering codes. Business oriented systems analysis, design, and development.
IBM 360 Model 75J.

ILLINOIS

ABBOTT LABORATORIES
14th and Sheridan Rd.,
North Chicago, Ill. 60064
(312) 688–5760
George A. Musson, Prof. Empl.
Empl: Total this location 6,000; Total EDP Employees 75; Programmers 25; Analysts 17.
Pharmaceuticals, hospital products, grocery products, pediatrics, and fine chemicals.
Accounting, marketing, manufacturing, and research.
General Electric 425, 435.

AMERICAN OIL CO.
910 S. Michigan, Chicago, Ill. 60680
(312) 431–5294
J. Y. Helmer
Empl: Total this location 2,600; Total EDP Employes 200; Programmers 110; Analysts 60; Operators 45.
General office—petroleum.
Commercial technical and operations research applications in marketing, manufacturing, administration, operations planning, traffic, transportation and research and development areas.
IBM 360/65–75 and various others.

AMMUNITION PROCUREMENT AND SUPPLY AGENCY
Civilian Personnel Office
Joliet, Ill. 60436
(815) 424–4230
Robert W. McDonald, Chief, Recruitment and Placement Division
Empl: Total this location 2,300; Total EDP Employees 250.

ARGONNE NATIONAL LABORATORY
9700 S. Cass Ave., Argonne, Ill. 60439
(312) 739–7711
Professional placement.
Empl: Total this location 5,600; Total EDP Employees approximately 175; Programmers 50; Operators 30.
Atomic energy research and development.
Scientific and engineering applications for atomic energy research and development.
Control data 3600, IBM 360/50/75 systems.

AUGUSTANA HOSPITAL
411 W. Dickens Ave., Chicago, Ill. 60614
(312) 348–1000
William L. Griffith, Dir. of Personnel
Empl: Total this location 850; Total EDP Employees 10; Programmer 1; Analysts 2; Operators 7.
General Hospital.
Payroll, A/R, census, lab scheduling, patient billing.
IBM 5/360 Model 30 32K, 2 disk, 2 tape, 2540 RP, 1403 N2.

BANKERS LIFE & CASUALTY CO.
4444 W. Lawrence, Chicago, Ill. 60630
SP-7-7000
James F. Gawne, Personnal Dir.
Empl: Total this location 3,000; Total EDP Employees 400; Programmers 30; Analysts 18; Operators 40.
Insurance.
Payrolls, billings.
RCA–IBM.

BAXTER LABORATORIES, INC.
6301 W. Lincoln, Morton Grove, Ill. 60053
(312) 965–4700
Paul Biestek, Supervisor of College Relations*
Empl: Total this location 1,000; Total EDP Employees 63; Analysts 16; Operators 13.
*Title programmer is not used by itself.
Pharmaceuticals and medical specialties.
Order entry, billing, sales analysis, responsibility accounting, engineering bill-of-materials.
IBM 360-40.

BELL & HOWELL CO.
7100 N. McCormick Rd.,
Lincolnwood, Ill. 60645
(312) 262–1600
R. A. Rudich, Exec. and Prof. Placement*
Empl: Total this location 5,000; Total EDP Employees 40; Programmers 20; Analysts 12; Operators 8.
Photo products group. Photografic products for industrial, professional, military, space and consumer use.
Mfg., design and acct.
IBM 360-30-40-50.

CAYWOOD–SCHILLER, ASSOCIATES
401 N. Michigan Ave., Chicago, Ill. 60611
(312) 527–4450
Sheldon A. Gibbs, Adm. Mgr.
Empl: Total this location 37; Total EDP Employees 19; Programmers 2; Analysts 16; Operator 1.
Management consultants in operations research.
Problem simulation.
IBM 1620.

COMPUTER PROCESSING UNLIMITED, INC.
232 E. Ohio St., Chicago, Ill. 60611
(312) 943–5636
Richard A. Forsythe, V. P.

DATA DYNE INDUSTRIES, INC.
549 West Washington Blvd.,
Chicago, Ill. 60606
(312) 236–7235
Charles V. Peebles, Pres.
Data processing service bureau.
Accounts receivable, inventory, payroll accounts payable, sales analysis, management.
S/360-25, 1400.

DEERE & CO.
John Deere Rd., Moline, Ill. 61265
(309) 792–4770
J. R. Brotman, Placement Coordinator*
Empl: Total this location 1,500; Total EDP Employees 175; Programmers 37; Analysts 61; Operators 22.
Corporate offices.
Various.
IBM system 360, Model 65.

ELECTRONIC SUPPLY OFFICE
Div. Naval Supply System
Bldg. 3400, Great Lakes, Ill. 60088
(312) 688–4890
Jack B. Young, Civilian Pers. Representative
Empl: Total this location 1,050; Total EDP Employees 185; Programmers 20; Analysts 20; Operators 125.
Inventory control point for electronic parts used by the U. S. Navy.
Inventory control.
Univac 494, Burrough 283, IBM 1004.

FACTSYSTEM INC.
612 N. Michigan Ave., Chicago, Ill. 60611
(312) 944–2530
C. Kenneth DeWitt, Dir. Systems Div.
Empl: Total this location 31; Total EDP Employees 21; Programmers 11; Analysts 7; Operators 3.
Total management information system software package.
All general accounting and control functions, management planning, forecasting, simulation.
IBM system/360, model 30, 65K.

ILLINOIS, STATE OF
Dept. of Personnel
623 E. Adams St., Springfield, Ill. 62706
(217) 525–7121
Robert P. Gosnell, Recruitment Mgr.
Empl: Total this location 37,000; Total EDP Employees 347; Programmers 125; Analysts 63; Operators 159.
Government.
Public assistance, public health, personnel functions, law enforcement and mental health.
IBM 360 system, RCA Spectra 70. Approximately 25 computers in use.

INTERNATIONAL MINERALS & CHEMICAL CORP.
5401 Old Orchard Rd., Skokie, Ill. 60076
(YORKTOWN) 6–3000
John H. Rahm, Mgr. Programming
Empl: Total this location 700; Programmers 10; Analysts 5; Operators 7.
Headquarters—administrative and sales for world-wide mining and manufacturing corporation.
Railfleet car location control, inventory control, plant performance statistic, processing for remote locations (TWX lines), route control system, centralized billing, A/R, statements, etc. General: payroll, acctg, personnel records, sales analysis, property records.
360/30 O.S. 2314 disk tapes.

KEYSTONE COMPUTER ASSOCIATES, INC.
500 N. Michigan Ave., Chicago, Ill. 60611
(312) 644–0404
James J. Frock, Mgr., Midwest Regional Office*
Computer programming and systems design, operations research, systems analysis and systems evaluation.
Operating systems, executive programs, input/output systems, sort/merge packages, utility programs, assemblers, compilers, problem-oriented languages, real-time applications, scientific applications, commercial applications, process control, hardware diagnostics.

McDONALD'S SYSTEM, INC.
221 North La Salle St., Chicago, Ill. 60601
(312) 346–6750
James R. Yuzeitis, Emp. Coordinator
Empl: Total this location 250; Total EDP Employees 25.
Food service. This location is corporate headquarters.
Management information systems, accounting, etc.
IBM 360-30 and some tele-processing.

MIDWEST STOCK EXCHANGE SERVICE CORP.
120 S. LaSalle St., Chicago, Ill. 60603
(312) 346–7374
Raymond Pasini, Recruiting Mgr.*
Empl: Total this location 220; Total EDP Employees 150; Programmers 22; Operators 65.
Complete stock brokerage computer service.
The only nationwide stock brokerage computer service utilizing full teleprocessing capabilities.
IBM 360/50 (5), 360/40 (1), 360/30 (4), 360/20 (5), 1401 (1), digital equipment PDP-8 (12).

MONTGOMERY WARD
Corporate Systems Div.
140 S. State St., Chicago, Ill. 60603
(312) 467–4946
M. K. Fenwick, Empl. Mgr.—Corp. Systems*
Empl: Total this location 2,500–3,000; Total EDP Employees 700; Programmers 125–135; Analysts 130; Operators 123.
Catalog and retail merchandiser Chicago Corp. H.Q.
Catalog order processing, subscription fulfillment and inv. control, credit, traffic and warehousing, retail merchandising, customer service, all financial: payroll, accounting, accounts payable, etc.
9 IBM 360 (4 model/50s, 4 model/30) CRT, TP. scanners.

NATIONAL ACCELERATOR LABORATORY
P. O. Box 500, Batavia, Ill. 60510
(312) 231–6600
William Butler, Personnel Adm.
Empl: Total this location 410; Total EDP Employees 18; Programmers 11; Analysts 4; Operators 3.
Construction of 200 BeV proton synchrotron for research in high energy physics.
Engineering design, magnet design, radiation shielding calculations, high energy physics experiment analysis, control computer applications.
SDS SIGMA 2, Varian 620/i, UNIVAC DCT/200 terminal; access to 360/Model 75 and CDC 6600 elsewhere.

NUCLEAR–CHICAGO
Div. G. D. Searle & Co.
2000 Nuclear Dr., Des Plaines, Ill. 60018
(312) 827–4456
Tom Walenga, Empl. Supervisor
Empl: Total this location 600; Total EDP Employees 22; Programmer/Analyst 5; Analysts 11; Operators Computer and Keypunch 11.
Sophisticated electronics instrumentation mainly specializing in monitoring Alpha or Beta emissions and Gamma and X-ray activity.
Total information integrated system using basic assembler language, modular programing, D.O.S. job control and facilities.
IBM 360.

PERSONAL PRODUCTS CO.
Div. Johnson & Johnson
Kankakee River Drive, Wilmigton, Ill. 60481
(815) 476–2123
J. J. Kennedy, Jr., Personnel Mgr.
Empl: Total this location 230; Total EDP Employees 6; Programmer 1; Operator 1.
MODESS* Sanitary Napkins, MEDS* Tampons.
Customer billing, inventory control, accounts payable, payroll, production and quality reporting.
360-20.

PULLMAN INC.
200 S. Michigan Ave., Chicago, Ill. 60604
(312) 939–4262
R. T. Zenzinger, Mgr. Empl.
Empl: Total this location 650; Total EDP Employees 62; Programmers 10; Analysts 12; Operators 7.
Principal administrative offices of the corporation.
Engineering, manufacturing, financial, sales.
(1) 360/40 2314 disc pack 128K.

ROCK ISLAND ARSENAL
US Army Weapons Command
Rock Island, Ill. 61201
(309) 794–5150
David E. Evans, Personnel Staffing Specialist
Empl: Total this location 7,500; Programmers 45; Analysts 35; Operators 50.
Research, development, design, procurement and supply of conventional weapons to the Armed Forces.
Inventory management and financial management.
RCS 301, 501, 3301; GE 225; UNIVAC 1005.

SANGAMO ELECTRIC CO.
11th and Converse Sts.,
Springfield, Ill. 62705
(217) 544–6411
William J. Mullaney, Empl. Mgr.
Total EDP Employees 16; Programmers 8; Analysts 5; Operators 3.
Manufactures electric meters and allied devices, time switches, small transformers, specialty capacitors, power capacitors, generators, dynameters, gas telemeters, recording speedometers, and highly complex confidential electronic apparatus for the military service.
Manufacturing environment; general accounting; sales analysis.
S/360 Model 40G.

STRUCTO DIV.
King Seeley Thermos
Structo Drive at Route 75,
Freeport, Ill. 61032
(815) 232–2111
Tom Bordner, EDP Manager
Empl: Total this location 500; Total EDP Employees 13; Programmers 2; Analyst 1; Operators 2.

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System 360 Model 25–4 disk system.

INDIANA

ELI LILLY AND CO.
230 E. McCarty St., Indianapolis, Ind. 46205
(317) 636–2211
Donn R. Younger, Personnel Rep.
Empl: Total this location 11,000; Total EDP Employees 225; Programmers and Analysts 75; Operators 125.
Pharmaceutical manufacturing/research and development.
Payroll, personnel statistics, job order acct., inventory control, materials handling, process control direct access, teleprocessing, etc.
IBM 360 Mod. 50, 30, 30 and Honeywell.

IOWA

AMERICAN INSTITUTE OF BUSINESS
424 Tenth St., A.I.B. Bldg.,
Des Moines, Iowa 50309
(515) 244–4221
Keith Fenton, Pres.
Empl: Total this location 35; Total EDP Employees 4.
Education institution.
Training.
Key punch, unit record, IBM 360-30.

COLLINS RADIO CO.
Div. Cedar Rapids
5225 C Ave. N.E.,
Cedar Rapids, Iowa 52406
(319) 395–3715
B. L. Bennett, Mgr. Prof. Empl.*
Empl: Total this location 12,000; Total EDP Employees 125, excluding operations; Programmers 85; Analysts 40.
Communications, computation and control equipment/systems.
Major company information systems—financial, administrative, marketing, manufacturing and engineering; engineering design/analysis systems, and process control system.
Collins 8401, 8561 and 8310/11 computer; IBM 7074 ; SC-4060.

KENTUCKY

ASHLAND OIL & REFINING CO.
1401 Winchester Ave., Ashland, Ky. 41101
(606) 324–1111
M. A. Christian, Jr., Gen. Mgr., Computer Science*
Total EDP Employees 200; Analysts 40.
Petroleum mfg.
Business, engineering, operations research.
S/360 Mod. 65 750K memory; Mod. 40 131K memory.

SPINDLETOP RESEARCH INC.
P. O. Box 481, Lexington, Ky. 40502
(606) 252–5535
James A. Sena, Senior System Scientist*
Empl: Total this location 85; Total EDP Employees 6; Programmers 2; Analysts 4.
Applied research for state and federal gov't's and industry management information systems for water resources planning; for recreations and for urban planning, (also general programming)
Use 360/50 (expect to be hooked-up on terminal) of the Univ. of Kentucky.

MARYLAND

AAI CORP.
P. O. Box 6767, Baltimore, Md. 21204
(301) 666–1400
David B. Bopst, Mgr., Pers. Admin.*
Empl: Total this location 1,450; Total EDP Employees 25; Programmers 10; Analysts 5; Operators 5.
Design, development, and manufacture of training and simulation systems, automatic and computer-controlled test equipment.
In addition to fiscal, accounting and management information systems for normal business activities, real-time and assembly language systems are applied in the software portion of digital equipment.
GE 415.

CENTRAL INFORMATION PROCESSING CORP.
Div. Commercial Credit Company & Control Data Corp.
Quadrangle–Village of Cross Keys,
Baltimore, Md. 21210
(301) 323–7000
M. E. Martindale, Pers. Mgr.
Empl: Total this location 75; Total EDP Employment 50; Programmers 13; Analysts 16; Operators 16.
Computerized financial services for businesses and accountants.
General financial and management decision applications.
Control data corporation hardware with all remote periphial equipment.

DSI SYSTEMS, INC.
11810 Parklawn Drive, Rockville, Md. 20852
(301) 949–2700
G. S. Miffleton, Pers. Mgr.
Empl: Total this location 50; Total EDP Employees 10; Programmers 4; Analysts 4; Operators 2.
On-line microfilm retrieval terminal.
Time sharing.
PDP-10, Varian 520i.

GENERAL ELECTRIC CO.—INFORMATION SYSTEMS DEPT.
Div. General Electric Co.
7735 Old Georgetown Road,
Bethesda, Md. 20014
(301) 654–9360
William J. Regan, Specialist, Professional Recruitment*
Empl: Total this location 500.
Time sharing support and development.
Time sharing.
G.E. 265, 405, 605.

IBM FEDERAL SYSTEMS DIV.
18100 Frederick Pike,
Gaithersburg, Md. 20760
(301) 840–7650
J. W. Dunn, Mgr. Professional Recruitment*
Advanced technology and special systems for information-handling and control.
Military command, management and intelligence, tactical ground-based electronic, space/ground control, air traffic control, civil programs, scientific processor development, communications systems, signal processing.
IBM 360.

LINK DIV. THE SINGER CO.
12156 Tech Road, Silver Spring, Md. 20904
(301) 622–4400
Gary Lindaman, Empl. Mgr.*
Empl: Total this location 600; Total EDP Employees 50; Programmers 30; Analysts 14; Operators 6.
Design and manufacture of electronic flight simulators.
Scientific applications—some commercial applications.
360-30.

MICROMATION SYSTEMS INC.
4321 Hartwick Road, Suite 110,
College Park, Md. 20740
(301) 927–4888
Arthur N. Conner, Jr., Pres.*
Empl: Total this location 15; Total EDP Employees 9; Programmers 2; Analysts 2; Operators 5.
Computer onto microfilm service center.
Stromberg datagraphix 4440, tape drives and SD 3400.

NATIONAL INSTITUTES OF HEALTH, COMPUTER RESEARCH & TECHNOLOGY DIV.
9000 Rockville Pike Bg. 12A Rm. 1005,
Bethesda, Md. 20014
(301) 496–6951
A. L. Wade, Jr., Personnel Officer

NATIONAL SECURITY AGENCY
U. S. Government
Fort George G. Meade, Md. 20755
(301) 796–4480
Fredric D. Forney (M321), Chief, Recruitment Branch*
Design, research, development, and application of advanced communications and high speed computers.
Systems analysis and systems programming related to the design and development of advanced scientific and business oriented applications. Software design and development, and support in hardware design, development, and modification. Processing and analyzing engineering and scientific data to determine the design, functioning and performance of physical systems. The most modern analog and digital data processing equipments.

SYSTEMS SCIENCE DEVELOPMENT CORP.
Systems Science Group
1104 Spring St., Silver Spring, Md. 20910
(301) 587–1601
William C. Cunningham, V. P.
Empl: Total this location 55; Total EDP Employees 30; Programmers 20; Analysts 15.
Systems design, operations research, programming, financial and management consultant.
Management information systems; real-time police and urban information systems; financial and accounting systems.
Honeywell 1250; IBM 360/40; Honeywell H16/48.

TELECOMPUTATIONS, INC.
1104 Spring St., Silver Spring, Md. 20910
(301) 587–1601
John J. Jordan, Mgr. Software development*
Empl: Total this location 92; Total EDP Employees 88; Programmers 20; Analysts 15; Operators 5.
Time sharing services, software development, batch computer services, data reduction.
Varies.
Honeywell 1648; IBM 360/40; Honeywell 1250.

VITRO LABORATORIES
Div. Automation Industries, Inc.
14000 Georgia Ave., Silver Spring, Md. 20910
(301) 871–7200
Harvey Weisberg, Empl. Manager
Empl: Total this location 3,300; Total EDP Employees 210.
Systems coordination engineering.
Systems simulation and analysis.
360-30 and 40, 7090, 360-65.

MASSACHUSETTS

ANALYSIS & COMPUTER SYSTEMS, INC.
2nd Ave., Northwest Pk.,
Burlington, Mass. 01803
(617) 272–5000
William A. Delaney, Pres.
Empl: Total this location 74; Total EDP Employees 13; Programmers 41; Analysts 27; Operators 3.

Systems and mathematical analysis, computer programming and data processing services.
Scientific and commercial data processing.
IBM 360 Model 44.

THE ANALYTIC SCIENCES CORP. (TASC)
6 Jacob Way, Reading, Mass. 01867
(617) 944–6850
Harry Silverman, Dir. of Adm.
Empl: Total this location 40; Total EDP Employees 6; Programmers 3; Analysts 2; Operator 1.
Analysis of navigation, guidance and control systems.
Scientific simulation of complex problems in submarine, missile and aircraft navigation and guidance systems.
IBM 1130 with RJE to A 360/65–75 card and disc; IBM 360-30 card, tape and disc.

BLUE CROSS–BLUE SHIELD OF MASS.
133 Federal St., Boston, Mass. 07106
(617) 357–8000
S. R. Carswell, Emp. Mgr.
Empl: Total this location 2,150; Total EDP Employees 300; Programmers 60; Analysts 12; Operators 38.
Service to all departments of Mass. Blue Cross–Blue Shield.
COBOL and BAL systems programming in an on-line, real time management information system and large scale financial data base/statistical research system.
OS-360/30-50-65's, 2314's Video display, tape and disk 1401, 7074. Complete in-house data entry and operations.

CAMBRIDGE INFORMATION SYSTEMS, INC.
68 Rogers St., Cambridge, Mass. 02142
(617) 492–6760
Philip L. Pelletier, Business Mgr.*
Empl: Total this location 10; Total EDP Employees 8; Programmers 3; Analysts 5.
Consultants in the field of management information systems analysis, design, and implementation.
Where advisable, the systems designed are computer-based. Equipment used will depend upon what customer has, or what we feel will best meet his needs. Programming will mostly be inventory control or other management types, with some in electronic test sequence generation.
33 ASR TTY fiber optics reader.

DATA TECHNOLOGY, INC.
65 Grove St., Watertown, Mass. 02172
(617) 924–1773
M. Hodin, Gen. Mgr.
Empl: Total this location 40; Total EDP Employees 39.
Schaft angle-Bi-d counters, digital readouts coordinate digitizers.
PD P8L M digital equipment.
ATD-Seris, PC production and numerical control, ITD seris digitizers.

DATAMAN ASSOCIATES
1330 Beacon St., Boston, Mass. 02146
(617) 232–2253
Phocion Lellos, Pres.
Empl: Total this location 20; Total EDP Employees 15; Programmers 7; Analysts 2; Engineers 6.
Contract programming and engineering consulting services. Business and scientific applications, software and hardware.

DECITEK INC.
15 Sagamore Rd., Worcester, Mass.
(617) 757–4577
R. B. Cummings, Emp. Mgr.*
Empl: Total this location 25.
Photoelectric tape readers and tape programmed sequence controllers.

DENNISON MFG. CO.
300 Howard St., Framingham, Mass. 01701
(617) 879–0511
William A. Schultz, Jr., Personnel Rep., Exempt Employment*
Empl: Total this location 3,000; Total EDP Employees 75; Programmers 8; Analysts 7; Operators 6.
Paper convertors.
Order entry, invoicing, air, revenue, general ledger, budgeting and expense control, P&L, bill of materials, inventory management, sales reporting, cost accounting.
Two Honeywell H400s, One H1200.

DIGITAL EQUIPMENT CORP.
146 Main St., Maynard, Mass. 01754
(617) 897–5111
P. T. Koch, Supv. Professional Placement*
Empl: Total this location 3,000.
Computers, computer systems, peripherals, and logic modules.
Software development, (systems, applications, diagnostic), software support, EDP.
All PDP series computers.

THE FOXBORO CO.
38 Neponset Ave., Foxboro, Mass. 02035
(617) 543–8750
Thomas J. Bryant, Jr., Professional Placement Coordinator*
Empl: Total this location 4,000.
Process control instrumentation including analog and digital equipment.
360-50 used for financial, manufacturing, inventory and sales order functions: PDP 8, PDP 9, PCP 88 used in process applications i.e. refining process, chemical, petroleum, power steel etc.
For commercial use 360/50, PDP 8, PDP 9, PCP 88 for process applications.

GENERAL RADIO CO.
300 Baker Ave., West Concord, Mass. 01781
(617) 369–4400
Channing Wagg, Assst. to Personnel Dir.
Empl: Total this location 800; Programmers 4; Analysts 3; Operators 4.
Electronic test equipment.
Variety of business applications.
360/30.

PHILIP HAWKINS, INC. (PHI)
Wang Laboratories, Inc.
800 Massachusetts Ave.,
Arlington, Mass. 02174
(617) 648–8550
Dr. Murray E. Sherry, V. P.
Empl: Total this location 155; Total EDP Employees 155; Programmers 75; Analysts 25; Operators 55.
Consulting, systems design, programming, data center, service bureau, proprietary software development and marketing.
Scientific and mathematical, commercial EDP, real-time and on-line control, computer operating systems and product line software, systems programming.
IBM 360/65, 360/20, Honeywell DDP-116, IBM 2780.

HONEYWELL–COMPUTER CONTROL DIV.
Old Connecticut Path,
Framingham, Mass. 01701
(617) 879–2600
D. Clark Willmott, Supvr., Empl. Services*
Empl: Total this location 1,600; Total EDP Employees 50; Programmers 20; Analysts 20; Operators 10. Does not include 150 scientific programmers.
Special and general systems for industrial and process control, simulation, biomedical and communications industries.
Design, manufacture and marketing of general purpose computers, logic modules, memories and memory exercisers.
H 1200, H 120—tape, disc, card reader, line printer.

KEYSTONE COMPUTER ASSOCIATES, INC.
375 Concord Ave., Belmont, Mass. 02178
(617) 489–2100
Henry S. Son, Mgr. New England Regional Office*

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- **Analysts**
- **D. P. Management**

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LUFT INSTRUMENTS, INC.
Old Winter St., Lincoln, Mass. 01773
(617) 259–9215
Ludwig Luft, Pres.
Empl: Total this location 25; Total EDP Employees 2; Programmer 1; Analyst 1.
Hybrid electronic controls for automation.
Application engineering for manufactured control equipment.
LUFT master controllers and accessories.

MASSACHUSETTS—COMPTROLLER'S DIV.
Commonwealth of Massachusetts–Administration & Finance
State House, Room 109,
Boston, Mass. 02133
(617) 722–3449
Joseph A. Banville, Chief of Methods; Systems and Procedures
Empl: Total this location 200; Total EDP Employees 43; Programmers 14; Analysts 9; Operators 9.
Accounting for state government for the state of Mass.
Budgeting control, personnel–civil service employee master file, payroll, legislative bill status and retail.
RCA Spectra 70/45 8 tape drives, 262K, 10 disk drives, 1 mass storage unit, 10 CRT units, card reader, card punch, 2 printers.

NASA, ELECTRONICS RESEARCH CENTER
575 Technology Square,
Cambridge, Mass. 02139
(617) 494–2248
Daniel S. Pilistine, Professional Recruiter*
Empl: Total this location 800; Total EDP Employees 30; Programmers 20; Analysts 5; Operators 5.
Electronics research and advanced technology for NASA space and air missions including guidance, controls, optics, instrumentation, computers, microwave radiation, components, power systems, microcircuits, aircraft hazard avoidance, and communications and navigation satellite programs.
Scientific programming in all of above areas including research and development towards improved software for advanced avionics and space systems. Improvements in pertinent areas of information processing, recording of raw data, data compression and transmission, preprocessing of data aboard spacecraft, data acquisition, storage and retrieval.
IBM 360/75; UNIVAC 418; analog-hybrid comprising three (3) GPS-390-T, Beckman 2200 analog, SDS-9300; CDC-8130; DDP-516; Linc-8; DDP-124.

NEW ENGLAND MEDICAL CENTER HOSPITALS
Clinical and teaching facility of Tufts Dental and Medical Schools
171 Harrison Ave., Boston, Mass. 02111
(617) 542–5600, X156
James C. Crowley, Empl. Mgr.
Empl: Total this location 2,200; Total EDP Employees 28; Programmers 8; Analysts 5; Operators 3.
Teaching—research hospital giving services to 145,000 patients annually.
Patient billings, general accounting system, payroll, etc. Scientific: image processing, radio isotope scans dosymetry for radiation therapy, research laboratory information processing.
360/30.

PHARMATECH SYSTEMS INC.
81 Washington St., Salem, Mass. 01970
(617) 745–5040
Robert T. Dann, Pres.
Empl: Total this location 10; Total EDP Employees 10; Programmers 2; Analysts 5.
Marketing information system design, development and operation.
Development of systems interrelating selling and advertising with sales results using behavioral models, graphic presentation and exception reporting.
CDC 3150, CDC 6600.

RAYTHEON CO. EQUIPMENT DIV.
528 Boston Post Rd., Sudbury, Mass. 02776
(617) 443–6632
John C. Jones, Mgr. of Emplyment*
Empl: Total this location 1,800; Total EDP Employees 100; Pragemmers 80; Analysts 80; Operators 20.
Guidance computers, radar display and data processing.
General programming for engineering and scientific applications including simulations and real time.
Time sharing, LBM 360/44, UNIVAC 1108, and CDC 3600.

RAYTHEON CO.—EQUIPMENT DIV.
40 2nd Ave., Waltham, Mass. 02154
(617) 891–7400
Gardner H. Morris, Mgr. of Professional and Exec. Recruiting
Empl: Total this location 13,000; Total EDP Employees 400.
Electronic systems.

RCA MEMORY PRODUCTS DIV.
150 "A" St., Neight Heights, Mass.
(617) 444–7200
L. P. Anderer, Empl. Mgr.*
Empl: Total this location 800; Total EDP Employees 7; Programmer 1; Analysts 3; Operators 3.
Design, development, and manufacturing magnetic memory devices and systems.
Stockroom inventory, factory labor reporting, general ledger, production planning and mfg. control, quality control defect, factory output and movement, engr. projects.
IBM unit record.

SIGNATRON, INC.
Miller Bldg., 594 Marrett Road,
Lexington, Mass. 02173
(617) 862–3365
Dr. Nicolas Johnson, Dir. Mgmt. Data Systems Div.*
Empl: Total this location 27; Total EDP Employees 13; Programmers 5; Analysts 6; Operators 2.
Management information systems, simulation, data analysis.
Installment credit package; stock appraisal package; financial analysis software; operations research; applications program.
IBM 1130; IBM 7094; IBM 360/20, 30, 40, 50, 65; CDC 3200; CDC 3600; PDP-8.

SYNERGETICS CORP.
Second Ave., Burlington, Mass. 01803
(617) 272–3450
A. R. DeVoto, Pres.
Empl: Total this location 6; Total EDP Employees 6; Programmers 7; Analysts 6.
Software services, proprietary programs, system implementation aids.

TERADYNE, INC.
183 Essex St., Boston, Mass. 02111
(617) 426–6560
Mrs. Marilyn Hammond, Pers. Mgr.
Empl: Total this location 450; Total EDP Employees 10; Operators 2.
Design and manufacture of instruments and computer operated systems for testing integrated circuits, transistors, capacitors and diodes.
Design of system software for computer-operated component testing systems.
PDP-8.

MICHIGAN

ANN ARBOR COMPUTER CORP.
415 W. Huron St., Ann Arbor, Mich. 48103
(313) 761–2151
L. Rottarr, Controller
Empl: Total this location 42; Total EDP Employees 22; Programmers 16; Analysts 4; Operators 2.
Design, build and install digital custom computer systems and software services.
IBM-1130, H/P-2114, PDP-8.

AUTOMOBILE CLUB OF MICHIGAN
150 Bagley Ave., Detroit, Mich. 48043
(313) 963–2911
D. E. Schmeiser, Empl. Adm.
Empl: Total this location 3,000; Total EDP Employees 57 (analysts and programmers).
Insurance.
IBM 360-30, 40, 50.

BAKER PERKINS INC.
1000 Hess Ave., Saginaw, Mich. 48601
(517) 752–4121
Charles A. Shelley, Pers. Supv.
Empl: Total this location 900; Total EDP Employees 16; Programmers 3; Analysts 2; Operators 6.
Processing equipment for food and chemical industries.
Stock status, payroll, bill of material (engineering), processing, accounts payable, sales analysis, order entry, personnel census.
360/20.

CLARK EQUIPMENT CO.
324 E. Dewey, Buchanan, Mich. 49107
(616) 697–8000
John M. Raster, Mgr. Personnel Placement and Development
Empl: Total this location 3,100; Total EDP Employees 141; Programms 40; Analysts 30; Operators 12.
Corporate office and automotive division—planetary drive, drive steer axles, axle housings.
Total mgmt. information system under development; material planning and control on-line real-time w/remove inquiry and input/out; payroll; financial; accounts receivable, accounts payable, etc.
Dual UNIVAC 1108 time-sharing multi-processors, with remote input/output; GE 215, 225, dual GE 235 and GE datanet-30.

COM-SHARE, INC.
P. O. Box 1588, Ann Arbor, Mich. 48106
(313) 761–4040
William H. Lossing, Personnel Mgr.
Empl: Total this location 125; Total EDP Employees 64; Programmers 26; Operators 11.
Operations and maintenance of computer harware operations center and normal corporate headquarters functions.
Conversational time-sharing.
SDS 940.

DATA PROCESSING SERVICES OF DETROIT
2990 W. Grand Blvd., Suite 406,
Detroit, Mich. 48202
(313) 871–7222
Harley A. Pebbles, Director
Empl: Total this location 5; Total EDP Employees 4; Programmers 1; Analysts 3.
Consulting, systems design, programming, software, processing.
Software development, theatre reservations systems, credit life insurance applications, rate chart production.
360/40, 360/30, 360/20.

INTERNAL REVENUE SERVICE DATA CENTER
Treasury Dept.
6230 John R St., Detroit, Mich. 48202
(313) 875–9800, Ext. 50 or 51

Mrs. Diane C. Herrmann, Personnel Staffing and Employee Relations Specialist*
Empl: Total this location 1,000; Total EDP Employees 400; Programmers 131; Analysts 47; Operators 59.
Desponsible for the production of tax tables and statistics used in conducting economic and fiscal analysis. Research into the tax system of the United States is done here as well as the preparation of the biweekly payroll for some 90,000 treasury department employees.
Payroll, statistics of income, limited scientific applications.
IBM 7074; H-200 third generation equipment expected in 1970.

MICHIGAN BLUE SHIELD
441 E. Jefferson, Detroit, Mich. 48226
(313) 965–3122
A. Lane, Personnel Rep.
Empl: Total this location 1,550; Total EDP Employees 90; Programmers 20; Analysts 20; Operators 20.
Pre-paid medical insurance (largest in Michigan)—5½ million subscribers.
Commercial files.
Claims processing, billing, customer and subscriber services.
Honeywell 2200; future plans extensive with large growth anticipated.

WHIRLPOOL CORP.
Administrative Center,
Benton Harbor, Mich. 49022
(616) 925–0651
Donald Dygert, Mgr. Salaried Personnel
Empl: Total this location 22,889; Total EDP Employees 115; Programmers 22; Analysts 29; Operators 64.
Corporate office.
Physical distribution (order processing, inventory control, billing)
RCA S 70/45.

MINNESOTA

CONTROL DATA CORP.
8100 34th Ave. South,
Minneapolis, Minn. 55440
(612) 888–5555
B. E. Grylewicz, Manager, Corporate Staffing Services
Empl: Total this location 44,913; Programmers 1,343; Analysts 1,006; Operators 326.
Complete line of EDP computer systems, industrial computer control systems and computer directed communication systems.

FIRST COMPUTER CORP.
First Bank System,
Corporate Headquarters,
800 E First Nat. Bank Bldg.,
St. Paul, Minn. 55101
(612) 221–9788
Ernest J. Costello, Personnel Rep.*
Empl: Total this location 320; Total EDP Employees 300; Programmers 40; Analysts 30; Operators 50.
Exclusively data processing.
Business applications, M.I.S., financial reporting, economic analyses.
IBM 360's, Burroughs 5500's, twelve systems of various configurations.

GRACO INC.
P. O. Box 1441, Minneapolis, Minn. 55440
(612) 336–9331
David Schlee, Empl. Mgr.
Empl: Total this location 1,000; Total EDP Employees 5; Programmers 5; Analysts 6; Operators 5.
Industrial pumping equipment, lubricating equipment.
Manufacturing systems.
IBM 360-40.

MINNESOTA AEROSPACE CORP.
P. O. Box 730; Anoka, Minn. 55303
(612) 427–1970
Walter G. Bu Miller, Personnel Mgr.
Manufacturer of government products.

3M CO. (MINNESOTA MINING & MFG. CO.)
Employment Department,
3M Company—3M Center,
St. Paul Minn. 55101
(612) 733–7587
Harry P. McLenighan
Empl: Total this location 58,000; Total EDP Employees 210; Programmers 65; Analysts 65; Operators 40.
3M manufactures over 35,000 varied products in chemistry, electronics, electro-mechanical, materials, etc.
Engineering, research, marketing, administrative, personnel.
Primarily IBM equipment.

MINNESOTA MUTUAL LIFE INSURANCE CO.
345 Cedar St., St. Paul, Minn. 55101
(612) 224–5544
Wayne Weig, Empl. Mgr.
Empl: Total this location 600; Total EDP Employees 50; Programmers 20; Analysts 10; Operators 8.
Life insurance (group, health, and ordinary).
Insurance record keeping, principal computer application, billing, collections, actuarial studies, general record keeping.
IBM 360/30 and IBM 360/40.

ORDNANCE
Honeywell, Inc.
600 2nd St. North, Hopkins, Minn. 55343
(612) 935–5133, Ex. 8697
J. D. Schmidt, Empl. Staff*
Empl: Total this location 9,000; Total EDP Employees 40; Programmers 15; Analysts 14; Operators 11.
Tactical weapon systems and aerospace support equipment.
Purchasing, labor reporting, inventory requirements, generation production processing, project cost control, configuration management.
H-200 (12K and 65K), H-2200 (65K).

MISSOURI

CONDUCTION—MISSOURI
Div. Conduction Corp.
P. O. Box 426, St. Charles, Mo. 63301
(314) 723–1515
W. H. Wilson, Empl. Supervisor
Empl: Total this location 2,600; Total EDP Employee 166; Programmers 51; Analysts 84; Operators 8.
Military and commercial simulators and electronic support systems.
Commercial standard applications—aircraft control, flight and navigation systems and models.
360/MOD 20 with MCFM, 360/MOD 20 with tele-custom designer high speed real-time computing equipment.

KANSAS CITY, MISSOURI, CITY OF
414 E. 12th St., Kansas City, Mo. 64106
Westwood 4–2000
Kenneth F. Ruhnke, Mgr. Computer Facilities
Empl: Total this location 5,000; Total EDP Employees 65; Programmers 15; Analysts 5; Operators 12.
Government.
Payroll, leave accounting, general taxes, earnings tax, occupation licenses, motor vehicle licenses, utility billing.
IBM 360 model 30 (two).

SEARCHING???

In-House Consultant _____ **22–26K**
Distribution Systems exp.
Project Leaders _____ **16–19K**
Commercial applics.
Systems Analysts _____ **13–17K**
Accting/Mfg. applics.
Systems Analysts _____ **To 20K**
Plan, create, design, new applics.
Programmer Analysts _____ **13–16K**
Cobol/Bal for Software

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FARMLAND INDUSTRIES
3315 N. Oak Twfy.,
Kansas City, Mo. 64116
(816) GL 3–1400
Gene Switzer, College Recruitment Rep.*
Empl: Total this location 1,100; Total EDP Employee 60; Programmers 18; Analysts 3; Operators 8.

McDONNELL AUTOMATION CO.
Div. McDonnell Douglas Corp.
P. O. Box 516, St. Louis, Mo. 63166
(314) 232–8161
L. M. Lamphear, Pers. Admin.*
Empl: Total this location 35,000; Total EDP Employees 1,200; Programmers 400; Analysts 100; Operators 110.
Aircraft.
Commercial and scientific.
IBM 360/65/75; CDC 6400.

MONSANTO
800 N. Lindbergh Blvd.,
St. Louis, Mo. 63166

ST. LOUIS COUNTY
7900 Forsyth Blvd., Clayton, Mo. 63105
(314) VO3–6360, Ext. 446
St. Louis County Div. of Personnel, 8008 Carondelet, Clayton, Mo.
Empl: Total this location 2,800; Total EDP Employees 40; Programmers 7; Analysts 4; Operators 8.
Government organization.
Payroll–personnel information systems, property assessment and tax collection, land use file for planning, retirement plan, some law enforcement activities.
IBM 360-40.

TRANS WORLD AIRLINES, INC.
1735 Baltimore, Kansas City, Mo. 64108
(816) 471–4400
John Vazbys, Mgr. Pers. Adm.*
Empl: Total this location 14,000; Total EDP Employees 320; Programmers 30; Analysts 60; Operators 170.
Transportation systems.
Engineering, communications, reservations, revenue accounting, payroll, marketing information system, credit card applications, operations research, inventory-purchasing, maintenance control, flight operations.
3 IBM 360-65's; 2 IBM 360-50's; 4 IBM 360-30's; 2 RCA 301's; REI optical character rdr; PDP 1 store and forward.

US ARMY AVIATION SYSTEMS COMMAND
P. O. Box 209, St. Louis, Mo. 63166
(314) 268–6960
Herman H. Walbert, Personnel Staffing Specialist Civilian Personnel Division
Empl: Total this location 4,000; Total EDP Employees 304; Programmers 54; Analysts 49; Operators 79.
Design and development, production and maintenance, engineering and procurement, cataloging and standardization, new equipment training for all Army aircraft.
360/65, 7080, 1440 and 1401 systems.

NEW HAMPSHIRE

SANDERS ASSOCIATES, INC.
D. W. Highway, South Nashua, N. H. 03060
(603) 885–4638
M. L. O'Connell, Mgr. Corporate Software Support*
Empl: Total this location 8,000; Total EDP Employees 200; Programmers 75; Analysts 50; Operators 75.
Electronics equipment.
Managing, support, engineering, administration, financial, marketing.
S360/50, PDP-10.

NEW JERSEY

APPLIED DATA RESEARCH, INC.
Route 206 Center, Princeton, N. J. 08540
(609) 921–8550
Martin A. Goetz, V.P.
Empl: Total this location 80; Total EDP Employees 60.
Development of prop. software, computer consulting and service bureau.
Computer work to support above.
IBM 360/50.

COMPUTER INVESTMENTS & LEASING CORP.
9 Tanner St., Haddonfield, N. J. 08033
(609) 428–7040
G. R. Cicconi, Pres.*
Empl: Total this location 20; Total EDP Employees 20; Programmers 16; Analysts 2; Operators 2.
Program packages.
Contract programming, service bureau, computer time leasing.
RCA 70/45 and peripheral equipment.

CONCEPT IMPLEMENTATION CORP.
260 Godwin Ave., Wyckoff, N. J. 07481
(201) 447–1020
H. J. Lydick, Dir. of Oper.
Empl: Total this location 18; Total EDP Employees 17; Analysts 17.
Programming, systems, and consulting services. Traffic control, production control, freight revenue, and general business systems.

CURTISS–WRIGHT CORP.
1 Passaic St., Wood-Ridge, N. J. 07075
(201) 777–2900
E. M. French, Mgr.–Selection & Placement*
Empl: Total this location 5,000; Total EDP Employees 85; Programmers 21; Analysts 10; Operators 54.
Aerospace components; nuclear programs and components.
Scientific (numerical, control, heat transfer, stress), commercial (financial applications, manufacturing applications).
IBM S/360/30, S 360/44, Honeywell 1250.

DATA SYSTEMS ANALYSTS, INC.
Cooper Parkway Office Bldg.—North Park Dr., Pennsauken, N. J. 08109
(609) 665–6088
Charles H. Margolin, Pres.
Empl: Total this location 100; Programmers 50; Analysts 50.
Software, consulting.
Computer controlled communications, system software, proprietary software.
All.

DATA USAGE CORP.
2460 Lemoine Ave., Fort Lee, N. J. 07024
(201) 461–6242
Gary Mokotoff, Pres.
Empl: Total this location 10; Total EDP Employees 10; Programmers 2; Analysts 3; Operators 2.
Proprietary software packages.
Service bureau, software R&D.
Univac 9300.

FREQUENCY ENGINEERING LABORATORIES
Div. of Harvard Industries, Inc.
P. O. Box 527, Farmingdale, N. J. 07727
(201) 938–9221
Howard Furman, Supvr., Prof. Empl.
Empl: Total this location 1,400; Total EDP Employees 30; Programmers 14; Analysts 7; Operators 6.
Electronic systems.
General business, scientific problems, electronic systems analysis.
IBM 300–30, IBM 1130.

INGERSOLL RAND RESEARCH, INC.
Div. of Research Center
P. O. Box 301, Princeton, N. J. 08540
(609) 921–9103 Ext. 247
C. G. Blatchley, Mgr., Engineering Sales
Empl: Total this location 100; Total EDP Employees 5; Programmers, 3; Analysts 1; Operators 1.
Research.
Scientific.
CDC 6600 via time sharing terminal.

ITT DATA SERVICES
Div. of International Telephone & Telegraph, Inc.
P. O. Box 402, Rt. 17 and Garden State Parkway, Paramus, N. J. 07652
(201) 268–8700
John J. Mulvey, Professional Staffing Representative
Empl: Total this location 718; Total EDP Employees 419 (including sales & management); Programmers 50; Analysts 102; Operators 53.
Programming and Computer Services (Batch & Time Sharing).
Commercial, scientific and time sharing for wide range of customers.
360/30, 40, 50, 65, 67.

ITT DEFENSE COMMUNICATIONS DIV.
Div. of International Telephone and Telegraph Corp.
492 River Rd., Nutley, N. J. 07110
(201) 284–2391
G. B. McKenna, Mgr. of Empl.
Empl: Total this location 1,200; Total EDP Employees 50; Programmers 40; Analysts 10.
Communications equipment.
Business and real time message switching.
360/50.

ARTHUR S. KRANZLEY AND CO.
383 Kings Highway, Cherry Hill, N. J. 08034
(609) 667–4644
Asher Barmish, Dir., Pers.
Empl: Total this location 88; Total EDP Employees 60; Programmers 35; Analysts 25; Operators 2.
Consulting, program development.
Accounts receivable, credit authorization, diversified commercial data processing.
IBM 360/40.

LENOX–FUGLE ELECTRONICS, INC.
100 Sylvania Place,
South Plainfield, N. J. 07080
(201) 756–1164, 1165
Henry J. Lenox, Pres.*
Empl: Total this location 35.
Design and manufacture subminiature shielded axial inductors for computers and allied equipment.

MATHEMATICA
1 Palmer Square, Princeton, N. J. 08540
(609) 924–2586
Reginald Barrow, Sr. Consultant*
Empl: Total this location 120; Total EDP Employees 15; Programmers 5; Analysts 10.
Management sciences consulting—operations research, systems analysis and programming, economic studies, and mathematical analysis.
Management sciences processing, modeling, and simulation, client data management and problem solutions.
IBM 360/40–50–65–67, GE 625/635, other large scale systems.

PRINCETON INFORMATRIX, INC.
One Palmer Square, Princeton, N. J. 08540
(609) 924–1279
J. K. Hanawalt, Mgr./Pers.
Empl: Total this location 15; Programmers 7; Analysts 3; Operators 3.
Computer consultants: Scientific and commercial programming, EDP services, training of computer operators and programmers, stock market analyses.

Offering EDP services and training, stock market analyses.
IBM-1130 and teletypes for communication with time-shared computers.

RCA INFORMATION SYSTEMS DIV.
Bldg. 202-1, Cherry Hill, N. J. 08101
(609) 662–1930
John C. Riener, Mgr., Employment
Empl: Total this location 1,500; Programmers 500; Analysts 500; Operators 100.
Home Office for Computer Manufacturing Div.

SCHERING CORP.
1011 Morris Ave., Union, N. J. 07003
(201) 351–2700
K. A. King, Pers. Mgr.
Empl: Total this location 1,400; Total EDP Employees 135; Programmers 22; Analysts 10; Operators 9.
Ethical pharmaceutical manufacturing.
Sales, accounting, production, personnel, product distribution.
360/40, 360/30 under full O.S. 1410.

E. R. SQUIBB & SONS, INC.
25 Kennedy Blvd., East Brunswick, N. J. 08816
(201) 846–2300
J. S. Gray, Sr. Pers. Assistant
Empl: Total this location 271; Total EDP Employees 172; Programmers 20; Analysts 35; Operators 12.
Research, manufacture and distribution of pharmaceuticals.
Commercial and scientific applications relating to the production of pharmaceutical products.
IBM 360–30, 40 and 50.

SYS ASSOCIATES, INC.
2460 Lemoine Ave., Fort Lee, N. J. 07024
(201) 947–3200
P. Polizzano, Dir. of Pers.
Empl: Total this location 40; Total EDP Employees 6; Analysts 6.
SYS 3360 Magtape-to-magtape converter. SYS 2113 Extender (converts IBM 1130 to real time data acquisition computer), other interface systems.
Data acquisition, data communications hardware; operating systems, management information systems (software).
IBM 1130, Varian 62o/i.

NEW YORK

AMERICAN AIRLINES
633 3rd Ave., New York, N. Y. 10017
(212) TN7–1234 Ext. 3841
Walter T. McCudden, Empl. Rep.
Empl: Total this location 3,000; Total EDP Employees 536; Programmers 150; Analysts 77; Operators 166.
Real-time passenger reservation system; commercial applications; flight, equipment and crew scheduling, operations research.
360/30, 40, 65, CDC 3300, REI optical scanner.

AMERICAN EXPRESS CO.
770 Broadway, New York, N. Y. 10017
(212) 677–1111
J. R. Bingle, Sr. Employment Rep.
Empl: Total this location 2,600; Total EDP Employees 200; Programmers 60; Analysts 40; Operators 100.
Financial—credit card and credit authorization.
Teleprocessing—R/T—O.S. MV8 commercial oriented and communications.
IBM 360/20's, 30's, 40's and 65's.

BENCH COMPUTER ASSO., DIV. OF SPECIAL STUDIES, INC.
55 W. 44th St., New York, N. Y. 10036
(212) 697–1006
George D. H. Hertzberg, V. P.
Empl: Total EDP Employees 57 (includes consultants); Consultants 29; Programmers 22; Analysts 6.
Management science—O/R consulting, systems analysis, programming services.
Operations research, inventory control, production control, forecasting, mathematical models and simulation, mgmt. info. systems, maintenance mgmt., accounting applications—all industries; media analysis—advertising industry; subscription and fulfillment—publishing industry; back office and investment analysis—brokerage and banking; maintenance and containerization problems, traffic routing control—transportation industry; fiscal control, manpower studies, PERT/CPM, time-sharing, urban development—state, local and federal government agencies.

BRANDON APPLIED SYSTEMS, INC.
1700 Broadway, New York, N. Y. 10019
(212) 757–2100
Robert London, V.P.*
Empl: Total 325; Programmers 100; Analysts 75; Operators 10.
Consulting, education and training, systems design, programming, proprietary software, market and product planning, data processing, publishing, printing.
General commercial.
Honeywell 200, Burroughs 2500/3500.

COMPUTER DATA APPLICATIONS INC.
801–2nd Ave., New York, N. Y. 10017
(212) 889–5210
W. G. Harthorn, Exec. V.P.*
Empl: Total this location 10; Total EDP Employees 10; Programmers 2; Analysts 2.
EDP consulting, feasibility studies, contract programming, systems design and installation, facilities management, software design and applications studies.
IBM 360–65—off site.

COMPUTER GUIDANCE CORP.
777 Third Ave., New York, N. Y. 10017
(212) 758–3760
J. P. Tutunjian, Vice Pres.
Empl: Total this location 12; Total EDP Employees 12; Analysts 12.
Data processing consulting.
MIS, various commercial and scientific.
360.

COMPUTER PROCEDURES CORP.
Div. Colonial Commercial Corp.
181 S. Franklin Ave.,
Valley Stream L. I., N. Y. 11581
(516) 791–2000
Miss Shirley Fay, V. P.
Empl: Total this location 125; Total EDP Employees 21; Programmers 8; Analysts 2; Operators 5; Clerical 6.
Specialized computer services.
Commercial data processing.
IBM system 360/30 65K, disk and tape.

COMPUTER SYSTEMS DIV., GRAPHIC CONTROLS CORP.
189 Van Rensselaer St., Buffalo, N. Y. 14210
(716) 853–7500
Norman M. Schueckler, V. P. and Div. Gen. Mgr.
Empl: Total this location 500; Total EDP Employees 55; Programmers 5; Analysts 18; Operators 7; Salesmen 10.
Suppliers of single source remote terminal computing capabilities and technical support staff for systems design and programming in various application areas.
Financial analysis, accounting, management information systems, scientific and engineering analysis.
Two GE-265 time-sharing systems; PDP-10/50; IBM 1440; and IBM 360/50.

Professional
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(212) 594–2500
Robert B. Wallach, Vice Pres Corp. Dev.
Empl: Total this location 70; Total EDP Employees 30; Programmers 12; Analysts 8; Operators 10.
Time sharing applications.
IBM 360/67, SDS 940, GE 440.

DATA SYSTEMS DIV.
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DATA-TECH

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Box 4553, New York, N. Y. 10017
(212) MU 20326
Jon Masterson, V. P.
Empl: Total this location 14; Total EDP Employees 14; Programmers 6; Analysts 4; Operator 1.
Marketing proprietary software developed internally and by individuals and firms; contract programming; computer services.
Investment record keeping and accounting; portfolio evaluation; systems software; financial applications; real-time and time sharing software.
PDP 10; 360.

EBASCO SERVICES INC.
2 Rector St., New York, N. Y. 10006
(212) 344–4400
Miss Margaret Berkery, Pers. Specialist
Empl: Total this location 2,200; Total EDP Employees 50+; Programmers 17; Analysts 15; Operators 15.
Consulting engineers to the electric utility industry.
Management information systems and mathematical and procedural analyses and programming of engineering, scientific, and business problems for both analog and digital computer solutions.
Burroughs B-5500.

EDP RESOURCES, INC.
One North Broadway,
White Plains, N. Y. 10601
(914) 428–4388
Richard J. Doyle, Associate*
Empl: Total this location 25.
Computer services—computer leasing; facilities management; systems design and implementation; communications input/output systems design; data processing consultation and education.
IBM system/360.

E. P. G. COMPUTER SERVICES, INC.
369 Lexington Ave., New York, N. Y. 10017
(212) 682–5255
Personnel Dept.*
Empl: Total this location 70; Total EDP Employees 70; Programmers 30; Analysts 40; Operators 4.
Data processing consulting firm, along with operating a large-scale IBM 360/50 computer center.
IBM 360/50.

FACTS INC.
Subsidiary of J. P. Morgan & Co. Inc.
345 Hudson St., New York, N. Y. 10014
(924) 0414
Dr. Kenneth M. Ferrin, Pres.*
Empl: Total this location 62; Total EDP Employees 25; Programmers 7; Analysts 5; Operators 13.
Financial service bureau.
Portfolio record keeping, stock market analysis, supplier of stock market data.
Control data CDC 3100.

FISHER–PRICE TOYS, INC.
606 Girard Ave., East Aurora, N. Y. 14052
(716) 652–7000
Miss Ruth Penman, Mgr. Empl. Development
Empl: Total this location 1,400; Total EDP Employees 24; Analysts 2; Operators 3; Analyst/Programmers 11.
Manufacture of preschool toys for children.
Sales, payroll, forecasting, materials control.
GE-405 16K word, four-disc, four-tape.

GENERAL ELECTRIC CO.
Large Generator & Motor Dept. & Medium AC Motor Dept.
1 River Road, Bldg 41, Room 109,
Schenectady, N. Y. 12305
(518) 374–2211, Ext. 5–3815
Frank J. Stangel, Prof. Recruiting & Placement
Empl: Total this location 4,000; Total EDP Employees 75; Programmers 15; Analysts 15; Operators 45.
AC/DC electric motors and generators, synchronous and induction motors, high speed motors, hydro-electric generators.
Engineering, manufacturing, finance applications.
GE 600, GE 115 DOS.

GRACE COMPUTER SERVICES
Div. W. Grace & Co.
3 Hanover Square, New York, N. Y. 10004
(212) 344–1200
Peter McMurray, Prof. Personnel*
Empl: Total this location 2,500; Total EDP Employees 95; Programmers 18; Analysts 5; Operators 20.
Data centers (3) and EDP support computer supplies.
All commercial applications and finance industry pacakages. Teleprocessing (on-line; real-time) and remote batch. Time sales and software development.
360's.

W. T. GRANT CO.
1441 Broadway, New York, N. Y. 10018
(212) BR 5–6411
Edward Alter, Pers. Mgr.*
Empl: Total this location 1,200; Total EDP Employees 130; Programmers 17; Analysts 9; Operators 6.
Retailing organization—executive offices.
Accounting, payroll, inventory, warehousing, credit (accounts receivable).
360/30, 360/40 tape disk, IBM 1287 optical scanners.

HAZELTINE CORP.
59–25 Little Neck Parkway,
Little Neck, N. Y. 11362
(212) 321–2300
Professional Employment Coordinator
Empl: Total this location 1,111; Total EDP Employees 64; Programmers 9; Analysts 10; Operators 12.
Research, development and manufacturing of electronic equipment for government and aerospace industry.
Finance and manufacturing.
IBM 360/40 D.O.S.

HOOKER CHEMICAL CORP.
Subsidiary of Occidental Petroleum
M.P.O. Box 8, Niagara Falls, N. Y. 14302
A. V. Thorpe, Mgr. I. R. Corp.*
Empl: Total this location 429; Total EDP Employees 65; Programmers 15; Analysts 15; Operators 35.
Administrative.
Commercial and scientific.
360/40, 360/30 and 1130 IBM.

IBM CORP.
1701 North St., Endicott, N. Y. 13760
(607) 755–2855
Dom Santoni

INFORMATION SCIENCE INC.
18 New Tempstead Rd.,
New York, N. Y. 10956
(914) 634–8877
D. P. Howell, Controller*
Empl: Total this location 60; Total EDP Employees 50; Programmers 20; Analysts 20; Operators 7.
Systems development, contract programming, computer time.
Human resource systems, personnel data systems, skills inventory, payroll, church manpower systems.
IBM system/360 model 30-65K.

INSCO SYSTEMS CORP., THE
Div. The Continental Corp.
12 Gold St., New York, N. Y. 10038
(212) 7404
Gordon F. Gilchrest, V. P.*
Empl: Total this location 325; Total EDP Employees 155 (excluding administrative, clerical, librarians and data entry), Programmers 80; Analysts 40; Operators 35.
Business systems and data processing services.
Automated policy writing systems, property and casualty insurance systems, payroll and personnel, budget and expense control.
Four IBM 360/50 (512K); two IBM 360/30 IBM 2314's—full operating system; teleprocessing to and from 29 cities in the U. S.

KEYSTONE COMPUTER ASSOCIATES, INC.
1700 Broadway, New York, N. Y. 10019
(212) 581–7144
Marvin B. Heit, V. P. of Keystone Computer Assoc. Mgr. of New York Office*
Empl: Total this location 23; Total EDPP Employees 22.
Computer programming and systems design, operations research, systems analysis and systems evaluation.
Operating systems, executive programs, input/output systems, sort/merge packages, utility programs, assemblers, compilers, problem-oriented, languages, real-time applications scientific applications, commercial applications, process control, hardware diagnostics.

LONGINES SYMPHONETTE
1875 Palmer Ave., Larchmont, N. Y. 10538
(914) 834–6800
I. Freireich, Asst. V. P.
Empl: Total this location 350; Total EDP Employees 35; Programmers 7; Analysts 3; Operators 16.
Mail order records.
A/R, promotional.
H-2200. 360-30, Farrington scanner.

McL ASSOCIATES
200 East 66 St., New York, N. Y. 10021
(212) 838–0295
Kevin McLoughlin, Pres.*
Empl: Total this location under 10; Total EDP Employees under 10.
Consulting to management and companies in all industries and geographical locations. Information system models.

THE MUTUAL LIFE INSURANCE CO. OF NEW YORK
Service Center; One MONY Plaza,
Syracuse, N. Y. 13202
(315) 473–3000
Edward H. Zeller, Dir. of Pers.
Empl: Total this location 500; Total EDP Employees 127; Programmers 50; Analysts 15; Operators 62.
Insurance—policyholder service, company data processing operations.
Business applications, communications, research.
Two 512K 360/50s, 2314 disc drives, 2321 data cells, 7070, 1410.

NATIONAL LEAD CO.
111 Broadway, New York, N. Y. 10006
(212) 732–9400
Jude T. Rich, Supv. Employee Relations
Empl: Total this location, corporate 27,000, NYC 450; Total EDP Employees 40; Programmers 15; Analysts 15; Operators 10.
Primary industries—pigments, paints, metals, die castings, nuclear energy.
Payroll, accounts payable and receivable, production scheduling and control, production planning, inventory, forecasting.
360/40, 20.

OYER PROFESSIONAL COMPUTER SERVICES, INC.
Subsidiary Computer Age Industries, Inc.
369 Lexington Ave., New York, N. Y. 10017
(212) 687–9280
Paul D. Oyer, Pres.*
Empl: Total this location 16; Total EDP Employees 12; Programmers 4; Analysts 6; Operators 2.
Computer education, research and development.
General business, engineering and time sharing.
IBM 360/30.

PARZEN RESEARCH (DIV. OF OVITRON CORP.)
48 Urban Ave., Westbury, N. Y. 11590
(516) 334–3900
McKinley Collins, Gen. Mgr.
Electronic research and development.

PROGRAMMING SCIENCES CORP.
5 E. 42nd St., New York, N. Y. 10017
(212) 869–1600
William Lindner, Operations Mgr.
Empl: Total this location 105; Total EDP Employees 88; Programmers 30; Analysts 58.
Data processing consultant encompassing 60th commercial and scientific applications.

ROYALPAR INDUSTRIES
136 Lexington Ave., New York, N. Y. 10016
(212) 421–1515
John Vitelli, V. P.
Empl: Total this location 80.
Technical services.
Computer controlled typesetting, engineering computations in the fields of structures, process design, simulation.
360/30, UNIVAC 9300.

S & H INFORMATION SYSTEMS, INC.
Div. Syska & Hennessy, Inc.
144 E. 39th St., New York, N. Y. 10016
(212) 689–2320
William Davidson, Pers. Dir.
Total EDP Employees 12; Programmers 8; Analysts 2; Operators 2.
Software and education for mechanical and electrical engineers in environmental design.
IBM 1130.

STRATEGIC TIME-SHARING, INC.
Div. Strategic Systems, Inc.
132 W. 31st St., New York, N. Y. 10001
(212) 736–6266
Joseph J. Fox, Empl. Rel. Mgr.*
Empl: Total this location 50; Total EDP Employees 40; Programmers 25; Analysts 10; Operators 5.
Time sharing services, software design and development.
Conversational problem-solving, information storage and retrieval and generation of management reports for engineers, scientists and financial community. Variety of languages available.
PDP 8/I, TSS-8, peripherals including high speed printers, mag. tapes, bulk storage units.

WORLDWIDE COMPUTER SERVICES INC.
280 N. Central Park Ave.,
Hartsdale, N. Y. 10530
(914) 428–0284
Jerald Greenberg, Pres.*
Empl: Total this location 12; Total EDP Employees 11; Programmers 4; Analysts 7.

BUSINESS SYSTEMS ANALYSTS AND PROGRAMMERS

Junior and senior level positions available for systems analysts and programmers who have several years' experience in any of the following areas: engineering specifications, bills of material, engineering change control, inventory control, production planning, quality control, cost determination, cost control, payroll, accounting.
Prefer degree in business or related disciplines and experience in multi-programming, direct-access storage, disc files or large-storage media and thorough knowledge of COBOL.

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Junior and senior level positions available for ENGINEERS, ANALYSTS and PROGRAMMERS who have several years' experience in any of the following areas:

Systems analysis and evaluation of business systems. Selected applicants will determine and participate in the establishment of either small processor systems or a large multi-processing system.

Study and development of on-line systems in business data communication environment.

Evaluation of multi-programming, multi-processor time sharing systems using simulation techniques.

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Positions available for senior MECHANICAL and ELECTRONIC engineers with strong experience in high-speed mechanisms and mechanical, hydraulic, and electro-mechanical mechanisms.

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To design, code, de-bug and document operating systems software or on-line executive software modules. Prefer degree in business or a science discipline and/or experience in systems programming.

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Subsidiary of El Paso Natural Gas
P. O. Box 12234,
Research Triangle Park, N. C. 27709
(919) 549–8211
Clinton J. Busacca, Pers. Supt.
Empl: Total this location 350; Total EDP Employees 80; Programmers 13; Analysts 13; Operators 9.
Corporate administration and research and development.
Commercial, linear programming, color matching and process control.
System 360/40 and IBM 1130.

DURHAM LIFE INSURANCE CO.
P. O. Box 1801, Raleigh, N. C. 27602
(919) 832–2011
John B. Gray, V. P.
Empl: Total this location 180; Total EDP Employees 27; Programmers 5; Analysts 4.
Life insurance home office.
Poiicy records maintenance; premium billing and accounting; policy reserves; mortgage loan accounting; general ledger accounting.
RCA Spectra 70/35 tape system.

R. J. REYNOLDS TOBACCO CO.
401 N. Main St. W.,
Winston–Salem, N. C. 27101
(919) 767–2963
Charles H. Jennings, Mgr. Corporate Empl.*
Empl: Total this location 18,000; Total EDP Employees 115; Programmers 15; Analysts 22; Operators 17.
Tobacco and metal products mfg. at this location but data processing is a corporate function and also serves the foods co.
Billing and related functions, payrolls, general and cost accounting, stockholder accounting, inventory control (OQ & OP) purchasing.
360/40-128K tape and desk, 360/30-64K tape and desk, 1401-16K tape.

OHIO

ARVIN SYSTEMS, INC.
Wholly owned subsid. Arvin Industries, Inc.
1771 Springfield St., Dayton, Ohio 45403
(513) 254–6177
F. Hand, V. P., Operations
Empl: Total this location 108; Total EDP Employees 20% EDP trained.
X-Y plotters, automatic trimmers, digital micro-positioning eqpt., non-des. test.

AUTOMATED INFORMATION AND MANAGEMENT SYSTEMS (A.I.M.S.)
Div. of Ballou Office Service, Inc.
705 Transportation Bldg.,
Cincinnati, Ohio 45202
(513) 621–9721
J. D. Ballou, Pres.

CHEMICAL ABSTRACTS SERVICE
Div. American Chemical Society
2540 Olentangy River Rd.
Columbus, Ohio 43210
(614) 293–7412
Stanley M. Scott, Pers. Assist.*
Empl: Total this location 1,000; Total EDP Employees 72; Programmers 37; Analysts 8; Operators 13.
Publisher of chemical information services—main products are chemical abstracts, chemical-biological activities, and polymer science and technology.
Organization, product preparation, and search and retrieval of chemical information.
2 IBM 360 model 50, IBM 2314 disc drive, IBM 2280. Photocomposition unit.

FASSON PRODUCTS
Div. Avery Products Corp.
250 Chester St., Painesville, Ohio 44077
(216) 352–4444
Empl: Total this location 600; Total EDP Employees 20.
Base material for pressure-sensitive labels and forms; pin-feed, ink-encapsulated etc. We do no printing only supply material to roll label printers of our products. Pressure sensitives for wide variety of applications.

LIBBEY, OWENS, FORD CO.
811 Madison Ave., Toledo, Ohio 43624
(419) 242–5781
Robert L. Naylor, Dir. Salaried Administration*
Empl: Total this location 15,879; Total EDP Employees 132; Programmers 25; Analysts 8; Operators 24.
Glass manufacture and subisidiary products.
Corporate information systems.
360/40, 360/30, 360/20.

LIEBERT CORP.
6700 Huntley Rd., Columbus, Ohio 43229
(614) 888–0246
Ralph Liebert, Pres.
Empl: Total this location 78; Total EDP Employees 15.
Controls for computer room air conditioning and complete units.
Accounting inventory control.

MARATHON OIL CO.
539 S. Main St., Findlay, Ohio 45840
(419) 422–2121
James H. Abbott, Recruitment and Placement Coordinator*
Empl: Total this location 1,900; Total EDP Employees 241; Programmers 15; Analysts 126; Operators 100.
This is the corporate headquarters of a fully integrated international oil company.
Operations research, engineering systems analysis, business systems analysis, computor operations.
IBM 360, 40, 50, 65

MARION POWER SHOVEL CO. INC.
Div. Pittsburg Coke & Chemical Co.
617 W. Center St., Marion, Ohio 43302
(614) 383–5211
R. G. Carter, Asst. Mgr. Industrial Relations*
Empl: Total this location 1,841; Total EDP Employees 22; Programmers 6; Analysts 4; Operators 5.
Shovels, draglines and associated mining equipment.
Production and inventory control, sales analysis, payroll, labor, finance.
IBM 360/30.

THE WM. S. MERRELL CO.
Div. Richardson–Merrell Inc.
110 E. Amity Rd., Cincinnati, Ohio 45215
(513) 821–3811
Clyde J. Mahon, Asst. Pers. Mgr.
Empl: Total this location 1,250; Total EDP Employees 24; Programmers 8; Analysts 2; Operators 5.
Ethical pharmaceutical manufacturing.
Research and development—scientific applications; O.S.; all commercial.
360/40 and peripheral.

NATIONAL CASH REGISTER CO.
Marketing
Main and K Sts., Dayton, Ohio 45409
(513) 449–2281
Robert A. Ackerman, Mgr. Executive and Professional Placement.
Empl: Total this location 18,000; Total EDP Employees 2,400; Programmers 520; Analysts 237; Opertors 118.
EDP equip. accounting mach. All types business equip.
Business.
NRC 315 century series.

OWENS–ILLINOIS, INC.
Technical Center
1700 N. Westwood Ave.,
Toledo, Ohio 43607
(419) 242–6543
J. H. Harmon, Experienced Professional Employment
Empl: Total this location 1,700.
Research and development.
Scientific applications, operations, research, manufacturing systems.
RCA, IBM, CDC.

SYSTEMS RESEARCH LABORATORIES, INC.
7001 Indian Ripple Rd., Dayton, Ohio 45440
(513) 426–6000
Jim D. Moore, Recruit. Rep.*
Empl: Total this location 440; Total EDP Employees 25; Programmers 5; Analysts 5; Operators 10.
Research and development.
Military acquisition and analysis systems.
IBM 7094, DEC PDP 1 and 8, Mark II.

YOUNGSTOWN SHEET AND TUBE CO.
Div. Lykes–Youngstown Corp.
7655 Market St., P. O. Box 900
Youngstown, Ohio 44501
(216) 758–6411, Ext. 611
David Davis II, Adm. Supervisor of Research
Empl: Total this location 164; Total EDP Employees 5; Programmers 2; Analysts 2; Operator 1.
Basic steel producer.
Simulation of mill processes for control purposes.
Analog, digital, and future hybrid computing equipment.

OKLAHOMA

DATA RESEARCH CORP.
4515 S. Yale, Tulsa, Okla. 74135
(918) 627–1953
Leo A. McIntire, Vice Pres. Marketing and Operations*
Empl: Total this location 25; Total EDP Employees 17; Programmers 3; Analysts 2; Operators 12.
Time-sharing.
Engineering, scientic.
CDC 6400 and 200 user terminals.

DALE L. GULLEY & ASSOC., INC.
803 S. Detroit, Tulsa, Okla. 74120
(918) 582–7218
Dale Gulley, Owner
Empl: Total this location 5; Total EDP Employees 5; Programmers 3; Operators 2.
Computer software, engineering.
Engineering, manuf. applications.
IBM 1130.

SKELLY OIL CO.
P. O. Box 1650, Oil Center Bldg.,
Tulsa, Okla. 74102
(918) LU–4–2311
James D. Boswell, Placement Director*
Empl: Total this location 800; Total EDP Employees 130; Programmers and Analysts 36; Operators 19.
Central office.
Business and scientific.
360/50.

SUN OIL CO.–DX Div.
P. O. Box 2039, Tulsa, Okla. 74102
(918) 583–4300
W. H. Boggs, Coordinator of Recruiting.
Empl: Total this location 1,500; Total EDP Employees 140; Programmers 30; Analysts 15; Operators 30.
Gasoline, lube oil, agriculture chemicals.
Commercial and scientific for integrated oil company.
360/50 512K OS MUT, 2 360/30's.

OREGON

BOISE CASCADE COMPUTING, INC.
4475 S. W Scholls Ferry Rd.,
Portland, Ore. 97225
(503) 292–9261
Lance Clifford
Empl: Total this location 12; Total EDP Employees 9; Programmers 3; Analysts 6; Operator 1.
Data processing software and consulting services.
Commercial systems.
IBM 360's (all models)

PENNSYLVANIA

AUERBACH CORP.
121 N. Broad St., Philadelphia, Pa. 19107
(215) 491–8200
B. A. Garner, Empl. Mgr.*
Empl: Total this location 300; Total EDP Employees 175; Programmers 50; Analysts 125.
Systems design and consulting in field of information sciences.

BURROUGHS CORP.
Paoli, Pa. 19301
(215) 4–4400
Howard Barron, Mgr.—Salaried Personnel*
Empl: Total this location 500; Total EDP Employees 125; Programmers 80; Analysts 25; Operators 20.
Large commercial computer design and manufacturer.
Design of computer for commercial application.
Burroughs 3500, 5500, 6500, 8500.

GILBERT ASSOCIATES INC.
525 Lancaster Ave., Reading, Pa. 19603
(215) 376–3873
James H. Russell, D. P. Mgr.
Empl: Total this location 1,000; Total EDP Employees 18; Programmers 8; Operators 2.
Consulting engineers to the utility industries (power, water, etc.)
Wide variety of technical applications for design of nuclear and conventional power plants.
Programmers must have technical BS or BA degree or higher.
Currently 360/30. Will be 360/44 by November.

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Div. Litton Industries
542 Penn Ave., Pittsburgh, Pa. 15222
(412) 261–2647
John Tweardy, Dir. of Placement
Empl: Total this location 40; Total EDP Employees 30; Instructors 30.
Data processing school.
360 Model 25.

KEYSTONE COMPUTER ASSOCIATES, INC.
1055 Virginia Dr.,
Fort Washington, Pa. 19034
(215) 643–3800
R. T. Cottrill, Sec. and Treas.*
Empl: Total this location 62; Total EDP Employees 52.
Computer programming and systems design, operations research, systems analysis and systems evaluation.
Operating systems, executive programs, input/output systems, sort/merge packages, utility programs, assemblers, compilers, problem-oriented languages, real-time applications, scientific applications, commercial applications, process control, hardware diagnostics.

KPA TIME-SHARING, INC.
Div. KPA Nuclear, Inc.
Lincoln Bank Bldg., Large, Pa. 15025
(412) 462–7515
A. J. Brendza, Adm.*
Empl: Total this location 50; Total EDP Employees 19; Programmers 8; Analysts 5; Operators 3.
On line time-sharing services.
CDC 6600.

SUN OIL CO.
1608 Walnut St., Philadelphia, Pa. 19103
(215) K1 61600, Ex. 765
J. Robert Burns, Pers. Recruiter*
Empl: Total this location Corp. Headquarter—1,600 Employees; Total EDP Employees 200; Programmers 75; Analysts 25; Operators 40.
Sun Oil Company is a fully diversified manufacturer of petroleum products. These efforts are directed and coordinated at our center city location in Philadelphia.
A wide variety of both commercial and technical applications including time sharing, scheduling, accounting, remote batch efforts, and simulation.
GE 635; Univac 1108.

SWINDELL–DRESSLER CO.
A Div. of Pullman Inc.
441 Smithfield St., Pittsburgh, Pa. 15222
(412) 391–4800
Charles J. Jerasa, Supv. of Empl.
Empl: Total this location 1,000; Total EDP Employees 20; Programmers 5; Analysts 6; Operators 5.
Consulting engineering firm.
Engineering design systems, management information systems, project scheduling and control, commercial and financial applications.
IBM system 360/44, tape and disk oriented cal/comp 30 inch. plotter and drives.

UNIVAC, DIV. OF SPERRY RAND CORP.
P. O. Box 8100, Philadelphia, Pa. 19101
(215) MI6–9000
Empl. Mgr., Data Processing Div.*
Empl: Total this location 3,200; Total EDP Employees 500; Programmers 251; Analysts 37; Operators 88.
Engineering Research, Systems Programming and Peripheral Equipment Manufacturing.
Software Development and Diagnostic Programming on 418 III and 9000 series systems.
1004 with remote terminals, 1107 (thin film memory) UNAC II, 1050, 418, 9200, 9300, 9400, DCT 2000 with remote terminals.

WESTINGHOUSE INFORMATION SYSTEMS LABORATORY (WISL)
Div. Westinghouse Electric Corp.
2040 Ardmore Blvd., Pittsburgh, Pa. 15221
(412) 256–7325
W. J. Young, Supv. Pers. Services
Empl: Total this location 270; Total EDP Employees 90; Programmers 65; Analysts 75; Operators 25.
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Applications range from manufacturing, engineering, and industrial areas to socio-oriented, public applications in connection with service institutions and federal, state, and local government organizations .
IBM 360/50, 360/75, 1130 RCA Spectra 70/46, CDC 6600, PRODAC 580.

RHODE ISLAND

LEESONA CORP.
Warwick, R. I. 02887
(401) 739–7100
W. L. McGarry, Jr., Mgr. Prof. Placement
Empl: Total this location 2,450; Total EDP Employees 53; Programmers 11; Analysts 6; Operators 8.
Development and manufacture of automated textile machinery.
Inventory control and other manufacturing applications; accounting procedures and other financial applications; general business information systems.
IBM 360/40 disk/tape system using Cobol, PL-1 and Fortran IV; teleprocessing.

TENNESSEE

NORVEL SYSTEMS, INC.
100 N. Main, Memphis, Tenn. 38103
(901) 525–157
Harold Hill, Exec. Vice Pres.*
Empl: Total this location 30 (35); Total EDP Employees same—except 1 secretary and 4 at managerial level; Programmers 20; Analysts 8; Operators 2.
Software firm.
Contract programming, consulting, package development, facilities management; every phase of systems and programming support offered.
360/30 IBM, DOS, 65K, 5 disks and 4 tapes.

TEXAS

COLLINS RADIO COMPANY
Dallas, Tex. 75207
(214) 235–9511
D. C. Peden, Mgr. Prof. Empl.*
Empl: Total this location 7,600; Total EDP Employees 156; Programmers 75; Analysts 45; Operators 36.
Communications, computation, control equipment, software and peripheral devices.
Factory automation, all business applications, software development, automatic testing.
Collins C system.

DRESSER SYSTEMS, INC.
Div. of Dresser Industries, Inc.
P. O. Box 2928, Houston, Tex. 77001
(713) 782–4950
Jon McDurmitt, Empl. Supv.*
Empl: Total this location 650; Total EDP Employees 33; Programmers 20; Analysts 5; Operators 8.
Electronic manufacture of geophysical systems, supervisory control systems, flow measurement systems.
IBM 360–50/DOS and special purpose small 16 B.T. word machines for supervisory control system application.
IBM 360/50 DOS and small 16 B.T. word machines.

F & M SYSTEMS CO.
P. O. Box 45068, Dallas, Tex. 75235
R. J. Finley

LONE STAR GAS CO.
301 South Harwood St., Dallas, Tex. 75201
(214) 741–3711
Charles Zeller, College Relations Rep.*
Empl: Total this location 1,000; Total EDP Employees 100; Programmers 18; Analysts 15; Operators 67 (includes Keypunch Oper.).
Public utility (sale and distribution of gas).
Business and scientific.
IBM 360/20, 40, 50; full OS program languages used: ALC, PLI, Fortran IV, RPG.

LTV ELECTROSYSTEMS, INC.
Subsidiary of Ling–Temco–Vought, Inc.
P. O. Box 6118, Dallas, Tex. 75222
(214) 276–7111
B. G. Hickey, Mgr. Corporate Technical Placement*
Empl: Total this location 6,000; Total EDP Employees 300; Programmers 150; Analysts 100; Operators 50.
Research and development of advanced military electronic systems, real time scientific and business programming, business analysts, systems analysts.
Business management systems, logistics and inventory systems, engineering support, real time command and control systems.
IBM-306—Mod. 40, 50, 65, Ambilog 200, and additional applications with different special purpose digital computers.

MANDREL INDUSTRIES, INC.
Div. of Ampex Corp.
P. O. Box 36306, Houston, Tex. 77036
(713) PR 4–7561
Wayne H. Lee, Pers. Mgr.
Empl: Total this location 800; Total EDP Employees 94; Programmers 10; Analysts 7; Operators 23.
Seismic contracting/processing, electronic manufacturing, cable manufacturing and electric sorting manufacturing.
Scientific (seismic), commercial (for company use).
IBM (360) (commercial), CDC 3300, CDC 1700.

PHILCO–FORD CORPORATION
Div. of Electronics Group—Philco Houston Operations
1002 Gemini Ave., Houston, Tex. 77058
(713) HU8–1270
Janet L. Willis, Empl. Supv.
Empl: Total this location 1,255; Programmers 60; Analysts 50; Operators 35.
Support for Mission Control Center at Manned Spacecraft Center, Houston. Design, development, maintenance and operation of supervisory control centers.
Information processing and real time programming for command and control.

RECOGNITION EQUIPMENT INC.
P. O. Box 22307, Dallas, Tex. 75222
(214) 638–5500
Dick Davies, Pers. Adm.*
Empl: Total this location 1,800; Total EDP Employees 95; Programmers 50; Analysts 55; Operators 6.
Optical character recognition equipment for high speed computer input.
Software development, engineering applications, commercial applications.
All optical character recognition equipment made by Recognition Equipment Incorporated and a 360/44.

UTAH

EIMCO CORP.
Div. of Envirotech Corp.
537 West 6th South,
Salt Lake City, Utah 84101
(801) 521–2000
Leland N. Smith, Mgr. Programming
Empl: Total this location 1,500; Total EDP Employees 40; Programmers 6; Analysts 3; Operators 5.
Heavy manufacturing of mining equipment and filter processing.
Accounting and manufacturing applications including inventory control.
IBM 360, MOD 30, 65 K, D.O.S. with disk and tape.

HERCULES, INC.
Div. of Hercules, Inc., Wilmington, Del.
P. O. Box 98, Salt Lake City, Utah 84044
(801) 297–5911
James R. Wray, Mgr. Computation Dept.
Empl: Total this location 1,500; Total EDP Employees 86; Programmers 30; Analysts 8; Operators 15.
Solid fuel rocket motors.
Scientific and engineering applications related to chemical propulsion and rocket motor design, material accountability, cost control, configuration management.
Two IBM 360 Model 50's and analog equipment.

VIRGINIA

APPLIED DATA RESEARCH INC.
2425 Wilson Blvd., Suite 200,
Arlington, Va. 22201
(703) 524–9650
James Lee Taylor, Jr., Admin.
Empl: Total this location 85; Total EDP Employees 68; Programmers 37; Analysts 12; Operators 14.
Software development, applications programming consultants to government and private industry.
IBM 360/40G, 360/40H, 2314.

COMMONWEALTH DATA SERVICES, INC.
5001 W. Broad St., Richmond, Va. 23230
(703) 288–6045
N. M. Demos, V.P.*
Empl: Total this location 15.
Systems analysis, consulting, program packages, contract programming.
Data center.
IBM 360/25.

KEYSTONE COMPUTER ASSOCIATES, INC.
6201 Leesburg Pike, Falls Church, Va. 22044
(703) 533–8810
Willard W. Perry, Mgr. Systems Evaluation*
Computer programming and systems design, operations research, systems analysis and systems evaluation.
Operating systems, executive programs, input/output systems, sort/merge packages, utility programs, assemblers, compilers, problem-oriented languages, real-time applications, scientific applications, commercial applications, process control, hardware diagnostics.

RESEARCH ANALYSIS CORP.
Westgate Industrial Park, McLean, Va. 22101
(703) 893–5900
John G. Burke, Placement Mgr.*
Empl: Total this location 650; Total EDP Employees 32; Programmers 10; Analysts 14; Operators 5.
Operations research, systems analysis.
Semi-automatic gaming systems; data retrieval, display and manipulation; simulation models (logistics, transportation, construction); inventory analysis; social systems; public communications and safety systems.
CDC 6400 and ancillary equipment.

SYSTEM DEVELOPMENT CORP.
5720 Columbia Pike,
Falls Church, Va. 22041
(703) 481–2220
Fred C. Aaron, East Coast Empl. Mgr.*

Empl: Total this location 250; Total EDP Employees 125; Programmers 60; Analysts 65.
Software support for commercial, military, and public systems.
Data base management products, time-sharing services, programming services, simulation, systems design and analysis, command and control, compilers and operating systems.
360/30, 360 65/67 IH disk, drum, tape telecommunications.

VIRGINIA POLYTECHNIC INSTITUTE
Computing Center—Burruss Hall,
Blacksburg, Va. 24061
(703) 552–6381
O. L. Gibson, Jr., Mgr. Systems Software
Empl: Total this location 3,000; Total EDP Employees 60; Programmers 6; Analysts 12; Operators 14.
Education and research.
Engineering and scientific Fortran, operations research, simulation, statistics, administrative Cobol, computer science Watfor, PL/1, Cobol, Snobol, Algol teaching aids, and RJE and conversational terminals.
Mod 50/65 ASP-OS-MFT/MVT; 2314's, 2740's and 1130's as RJE terminals.

WASHINGTON

WASHINGTON, STATE OF
Olympia, Wash. 98501
753–5465
Empl: Total this location 19,000; Programmers 35; Analysts 120; Operators 400.
Applications include all state agency information systems (agency independent and centralized), crime information system, legislative reporting system, judicial courts system, educational reporting systems; on-line telecommunications networks.
Equipment: 360 MOD. 20, 30's, 40's, 50's, SPECTRA 70's, 1401's, 1620, 1130.

WISCONSIN

A. C. ELECTRONICS
Div. of GMC
7929 S. Howell Ave., Milwaukee, Wis. 53201
(414) 762–7000
R. W. Schroeder, Professional Employment
Empl: Total this location 5,500; Total EDP Employees 200.
Research, Development, Design, and Production of Inertial Guidance/Navigation, and Control Systems for airborne, land, and sea vehicle application.
Scientific applications include missile trajectory simulations, flight test data reduction, graphical techniques, design automation, process control, and programmed automatic checkout systems for airborne computer software.
IBM 360/65/40/20, EAI 8800 and 231R analog, Sigma 5 and 7 and hybrid interface unit.

ALLIS–CHALMERS SYSTEMS & DATA PROCESSING DIV.
1126 S. 70 St., West Allis, Wis. 53214
(414) 475–2616
Dr. P. B. Henderson, Director*
Empl: Total this location 35,000; Total EDP Employees 600; Programmers 100; Analysts 100; Operators 400.
Machinery and equipment for mining, agriculture, transportation, electric utility, paper, hydraulic, consumers, process industries and space.
Manufacturing, marketing, engineering, finance, accounting, and administration systems; scientific and engineering analysis.
IBM models 20, 30, 40, 50 at 13 centers in eastern United States.

J. I. CASE CO.
Div. Tenneco Inc.
25th and Mead Sts., Racine, Wis. 53403
(414) 636–7148
William H. Descher, Supervisor Empl.*
Empl: Total this location 3,000; Total EDP Employees 40; Programmers 10; Analysts 6; Operators 24.
Manufacture engines, transmissions, and agricultural tractors.
All areas.
IBM 360.

GLOBE–UNION INC.
Box 591, Milwaukee, Wis. 53201
(414) 228–2342
Jack Abell, Prof. Placement Coordinator*
Empl: Total this location 750; Total EDP Employees 40; Programmers 15; Analysts 15; Operators 25.
Electronic components, automobile and specialty batteries, hospital financial control service.
Business manufacturing and hospital.
Honeywell 200 and 2200.

HARLEY–DAVIDSON MOTOR CO., INC.
Div. American Machine & Foundry Co.
P. O. Box 653, Milwaukee, Wis. 53201
(414) 342–4680
John R. Joerg, Personnal Supervisor*
Empl: Total this location 1,740; Programmers 6; Analysts 3; Operators 9.
Manufacturer of motorcycles, golf cars, utilicars and servi-cars.
Bills of material, inventory control, open production orders scheduling, service parts forecasting, production planning, payroll, accounting, sales order processing.
IBM computer model S/360 model 30 with 65K, 5-2311 disk drives, one 2540 reader punch, and one 1403; 1100 lines per minute printer.

JOHNSON SERVICE CO.
518 N. Jefferson St., Milwaukee, Wis. 53201
(414) 276–9200
James J. Robersen*
Empl: Total this location 1,200; Total EDP Employees 22; Programmers 6; Analysts 9; Operators 7.
Environmental controls—mfg. and installation.
Production control system, accounting systems, nation wide branch TP network.
B-3500—2 systems.

NORTHWESTERN NATIONAL INSURANCE GROUP
Div. NN Corp.
731 North Jackson St.,
Milwaukee, Wis. 53202
(414) 271–8570, Ext. 348
Gerald Williquette, Asst. to Dir. of Personnel
Empl: Total this location 375; Total EDP Employees 69; Programmers 18; Analysts 6; Operators 6.
Insurance.
Accounting, PALIS (property and liability insurance system), personnel, investment, MIS (management info. system), scanner applications and telecommunications study.
IBM 360/40, 5MAI magnetic tape drives, 3-2111 disc drives, 2321 data cell, CDC 915 optical page reader, 2540 reader/punch and 1403 printer. (On order: telecommunications equip. and one 2311 disc drive.

RAY-O-VAC DIV. ESB INC.
212 E. Washington Ave.,
Madison, Wis. 53703
(608) 255–7201
D. G. McKenzie, Personnel Mgr.
Empl: Total this location 240; Total EDP Employees 49; Programmers 7; Analysts 7; Operators 6.
Dry cell batteries and flashlights.
Invoicing, accounts receivable, sales statistics, inventory control, payroll and accounts payable.
System 360/30.

Requests for information from and resumes for the companies listed in the ANNUAL CAREER GUIDE should be sent directly to the company representative named in the listing, NOT to Software Age.

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Atlanta, Ga. 30303 (404) 523–2961

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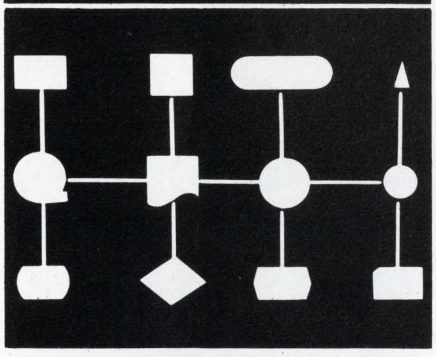

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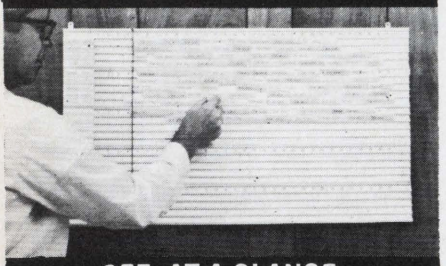

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