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SEPTEMBER, 1969
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 route-man.

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.

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

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.
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 2,900 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 judgment; 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.

The primary intention is to give the youngster a chance to get "back on the right track".

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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/I 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
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.

```
<table>
<thead>
<tr>
<th>DATA</th>
<th>DATA</th>
<th>DATA</th>
<th>DATA</th>
<th>DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>
```

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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SEPTEMBER, 1969
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:

![Diagram of a simple list]

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:

![Diagram of a list with both FROM and TO addresses]

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-

12

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DATA-TECH

September, 1969
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 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.

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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.
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 \( A + B \rightleftharpoons C + D \) the fluxes of material are

\[
\begin{align*}
\text{flux}_1 &= k_1 (A) (B) \\
\text{flux}_2 &= k_2 (C) (D)
\end{align*}
\]

where \( (A) \) is the concentration of \( A \), etc., and the \textit{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 \textit{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.

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.

Software Age
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.

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 calculations 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 output, 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. 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.

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.

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.

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.

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.
Better believe it—in fact, why not look into it?

Everywhere? Washington or Los Angeles; San Francisco, St. Louis or New York; and points in between.

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Send your resume with salary history and salary requirements, in complete confidence to Mr. James P. O’Brien, Personnel Manager, ITT Data Services, Dept. 385-MJ, Route 17 & Garden State Parkway, Paramus, N.J. 07652.

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A Plans for Progress Equal Opportunity Employer (m/f)
put a partial tabulation on the scope
language has a considerable degree
information retrieval system of some
planned options for interaction, this
sort.
It is sometimes desirable to
with the corresponding computer
economical and convenient manner.
curves. It is sometimes desirable to
display experimental points together
or to display a full tabulation piece­
with the ability to specify what is to be
displayed. It is possible to go fur­
ther 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 calcu­
lations are part of automatic proc­
level, so that the individual calcu­
ses which include optimization tech­
and exploration of the
properties of a given model. An ex­
treme example, approaching the field
of artificial intelligence, would occur
in trying to fit a given experimental
curve by a given simulated mechan­
ism. The computer could be pro­
grammed to find the best fit and de­
cide, by manipulating the set of
numbers being used, that the agree­
ment is unsatisfactory because of
systematic deviations which cannot
be corrected. The computer could
then indicate how that mechanism
would have to be revised, or per­
haps it could make the revision itself.
It is unlikely that such programs
can be made completely independ­
ent of human intervention in the
near future. Experience with opti­
ization 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 valu­
able 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.

CALCULUS AND THE COMPU­
ter Revolution by Richard
W. Hamming, Houghton Mifflin
Company, 72 pages, 1968. $1.75.

Most mathematics courses are ob­
solete 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 sit­
uation before he began writing. Ac­
cording 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 evi­
dently re-wrote and expanded the
original at the urging of his sup­
porters.

Calculus and the Computer Revo­
lution 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 dif­
ferential 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 mathe­
matics. 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 num­
ber-processing machines—they are
more accurately described as symbol­
manipulating machines.” It is hoped,
he adds, that many of the more com­
mon misconceptions about compu­
ters will be cleared up for the stu­
dent.
In my view, Mr. Hamming’s de­
velopment of these aims, together
with his analytical presentation of
the relationship between math and
computer, makes this a valuable
contribution to the student’s under­
standing of an important topic.

THE FINAL PROGRAMME by
Michael Moorcock, Avon Original.
919 pages. $1.95 paperback. 60¢.
The “earthshaking consequences”
that result between the union of the
the main characters in this science
dition, 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.

Jerry is a 27-year old failed priest,
electric guitarist, ascetic and hedon­
ist who is the counterpart of Miss
Brunner, who is a sharp-faced, at­
tractive young woman who is a com­
puter programmer “of some experi­
ence 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
hungrily processing—this—self-re­
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 pur­
pose 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-
It happens all the time at ESP

Alakazam! Instead of the usual white rabbit, the magician's hat produces unexpectedly, a hundred dollar bill. Even the magician is amazed. It's better than magic! It's serendipity, the good fortune of finding more than is sought.

You'll find serendipity in abundance at ESP. The explanation is in logic not legerdemain.

Electronic Systems Personnel is firmly established as the unchallenged leader in the field of EDP personnel placement. With offices in 20 major American and Canadian cities, we serve thousands more EDP installations than any similar service. So, we have thousands more career opportunities, which naturally attracts thousands more computer professionals. Thus, we prove the old adage that "nothing succeeds like success" for you and for us.

Whether you're an EDP professional looking for a career opportunity, or an EDP career opportunity looking for a professional, obviously you're more likely to find what you want at ESP.

And... with serendipity on your side... alakazam!
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 prefaccs 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 which 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.


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.

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**Reading List**

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


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


**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.


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*September, 1969*
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?

<table>
<thead>
<tr>
<th>White</th>
<th>Black</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 P-Q4</td>
<td>P-Q4</td>
</tr>
<tr>
<td>2 P-K3</td>
<td>P-K3</td>
</tr>
<tr>
<td>3 B-N5 ch</td>
<td>P-QB3</td>
</tr>
<tr>
<td>4 B-R4</td>
<td>Q-R4 ch</td>
</tr>
<tr>
<td>5 N-QB3</td>
<td>B-N5</td>
</tr>
<tr>
<td>6 N-K2 ?</td>
<td>QxR</td>
</tr>
<tr>
<td>7 O-O</td>
<td>Q-B3</td>
</tr>
<tr>
<td>8 B-Q2</td>
<td>BxN</td>
</tr>
<tr>
<td>9 P-QR3</td>
<td>BxN</td>
</tr>
<tr>
<td>10 NxN</td>
<td>Q-Q1</td>
</tr>
<tr>
<td>11 Q-K2</td>
<td>N-K5</td>
</tr>
<tr>
<td>12 NxN</td>
<td>Pxn</td>
</tr>
<tr>
<td>13 Q-N4</td>
<td>Q-N3</td>
</tr>
<tr>
<td>14 QxP (K5)</td>
<td>R-PxQ</td>
</tr>
<tr>
<td>15 QxQ</td>
<td>R-KR3</td>
</tr>
<tr>
<td>16 P-K4</td>
<td>B-Q2</td>
</tr>
<tr>
<td>17 P-K5</td>
<td>B-N3</td>
</tr>
<tr>
<td>18 B-R5 ?</td>
<td>P-N3</td>
</tr>
<tr>
<td>19 B-B3</td>
<td>P-QB4</td>
</tr>
<tr>
<td>20 P-QN4</td>
<td>B-N4</td>
</tr>
<tr>
<td>21 KR-Q1</td>
<td>PxQP</td>
</tr>
</tbody>
</table>

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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SEPTEMBER, 1969

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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. Droegge 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 S. A. 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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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

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.

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

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

Honeywell has announced another key-tape 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 magnetic 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 feeding). 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.

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

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The all new 1969 Edition of Source Edp's Computer Salary Survey and Career Planning Guide is now available containing up-to-the-minute information vital to every computer professional. Subjects include:
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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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Chemical Company

SENIOR SYSTEMS ANALYST 16,000
Heavy accounting experience

SYSTEMS ANALYST 15,000
Manufacturing bkdg.

PROGRAMMER ANALYST 15,000
Listed manufacturing co.

SYSTEMS PROGRAMMER 15,000
Telecommunications, MVT/AFT

PROGRAMMER 14,000
Ex-p 360/40 DOS COBOL/BAL

MANUAL SYSTEMS 13,000
Conversion experience

PROGRAMMER 12,000
1 yr. 360 COBOL, DISC

Mail resume to your nearest R-H office.
annual career guide section

Your index to the nation's primary employers of EDP managers and personnel
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.
Indiana Blvd., Indianapolis, Ind. 48573
(317) 782-3206

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

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

(4) Electronic Central Office Telecommunications Switching Systems Development.

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

(6) 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 addressed. 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
primary employers

ALASKA

DEPT. OF ADMINISTRATION, ALASKA, STATE
OF, DIV. OF PERSONNEL
Pouch C, Juneau, Alaska 99801
(907) 586-5334
Keith Angier, Director, Division of
Data Processing* Empl: Total this location 8; Total EDP Employees 4; Programmers 5.
Centralized state computer facility, commercial applications development.
IBM 360/40.

ARIZONA

von LAUTZ CO.
3144 Vista Del Forte Dr., Tucson, Ariz. 85716
(520) 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, X5731
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.
360/65 plus special purpose analog/digital hybrids.

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.

CHAFFEE 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, application 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.
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* Empl: Total EDP Employees 30; Programmers 3; Analysts 8; Operators 1.
Software development, proprietary software.
Compiler development, information retrieval systems (quick query), inscript 15 compilers, digital simulation models, training courses.
Generally use the customers equipment.

COPELEY 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, computer graphics, 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
Empl: Total this location 121; 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 21168.

DIGITAL DEVELOPMENT CORP.
5575 Kearny Villa Rd., San Diego, Calif. 92123
(714) 278–9920
T. L. Azarof, 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. Personnel 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) 755–2181, ext. 646
Boaz 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
3300 W. 108th St., Inglewood, Calif. 90304
(213) 871–3232
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. 90021
(213) 664–3317
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 hospitals (hybrid) patient monitoring, R/D, software development and engineering, banking.
CDC 6500, analog hybrid computer, interactive graphics, OCR, telecommunications, and medium scale business systems.

INFORMATICS INC.
5430 Van Nuys Blvd., Sherman Oaks, Calif. 91401
(213) 783–7500
Jacqueline Zanich, 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) 365–981
John L. McTop, 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, Personnel 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.

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.

LOCKHEED MISSILES & SPACE CO.
Div. of Lockheed Aircraft Corporation
P. O. Box 504, Sunnyvale, Calif. 94088
(408) 743–2200
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 1101.

LOGICON INC.
1075 Camino del Rio South, San Diego, Calif. 92110
(714) 291–4240
G. W. Kazok, 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) 749–6406
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 Admin.*
Empl: Total this location 80; Total EDP Employees 10; Programmers 4; Analysts 4; Operators 2.
Consulting engineers.
Stress analysis, dynamic response analysis, las—
bar distribution, low cost home pricing pro-
gram, 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.
EmpI: Total this location 440; Total EDP Em-
ployees 5; Programmers 3; Analyst 1.
Medical diagnostic equipment.
Real-time computer control of machine op-
erations. Instrumentation data processing.
Sigma 5/7, CAIC P 808/816, IBM 1130

MELLONEICS SYSTEMS DEVELOPMENT DIV.
Litton Industries
1001 W. Maude Ave., Sunnyvale, Calif. 94086
(408) 245-0795
Rus Kliessig, Industrial Relations Mgr.*
EmpI: Total this location 650; Total EDP Em-
ployees 500; Programmers 200; Analysts 200.
Software and prototype hardware, data con-
version equipment, locomotive terminals S19 test
devices and systems, voice input systems.
Computer programming: real time, C&C sys-
tems, operating systems, monitors, executives.
Systems analysis; full spectrum services.
360/50.

MOORE ASSOCIATES
Div. The Tucker Co.
815 American St., San Carlos, Calif. 94070
(415) 591-5363
John W. Wattenbarger, Vice Pres., Engineering
EmpI: Total this location 100; Total EDP Em-
ployees 7; Programmers 4; Analysts 2; Op-
erator 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.*
EmpI: Total this location 4,000; Total EDP Em-
ployees 50—60; Programmers 30; Analy-
Iasts 20; Operators 18; Software Development
50.
Research, design, development, engineering and
mgd. of EDP NCR century systems.
All NCR EDP systems.

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

NESS CONSULTANTS
Div. Nuss Industries, Inc.
4322 Waverley St., Palo Alto, Calif. 94301
(415) 322-4626
Ricardo J. Alfaro, V. P., General Mgr.*
EmpI: Total this location 35; Total EDP Em-
ployees 10 by year end 1969.
Software consultants, programming, EDP sys-
tems design.
Scientific programming
Use client hardware or rented time on IBM
360's/CDC.

NORTHROK CORP.
3901 W. Broadway, Hawthorne, Calif. 90250
(213) 675-4611
P. L. Brody, Supervisor, Tech. Personnel
EmpI: Total this location 25,000; Total EDP Em-
ployees 500.
Product manufactured—commercial and mili-
tary communications—electronics-aircraft.
Commercial; corporate finance, manufacturing
MIS, and material.
OS360/65.

RALPH M. PARSONS CO.
617 W. 7th St., Los Angeles, Calif. 90111
(213) 629-2484
Mrs. Virginia F. Thuroess, Prof. Tech. Rec-
ruiter.*
EmpI: Total this location 2,000; Total EDP Em-
ployees 60; Programmers 11; Analysts 9; Op-
erators 7.
Engineers and constructors.
Management information systems, business de-
velopment, engineering scientific, Burroughs
5500.

REMAR ENGINEERING COMPANY, INC.
12049 West Jefferson Blvd.,
Culver City, Calif. 90230
(213) 772-4511
W. V. Kendall, Empl. Mgr.*
EmpI: Total this location 3,900; Total EDP Em-
ployees 250.
Applied research, design, development, test,
production and sales of digital computer systems.
Development of real time, scientific and busi-
ness software.
Sigma 7, Sigma 5, Sigma 2, 940, 945.

SHARE RESEARCH CORP.
3704 State St., Santa Barbara, Calif. 93105
(805) 687-5574/870-5859
John R. Vance, Professional Empl.
EmpI: Total this location 220; Total EDP Em-
ployees 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
V. W. Kendall, Empl. Mgr.*
EmpI: Total this location 3,900, Total EDP Em-
ployees 250.
Applied research, design, development, test,
production and sales of digital computer systems.
Development of real time, scientific and busi-
ness software.

SHARE RESEARCH CORP.
3704 State St., Santa Barbara, Calif. 93105
(805) 687-5574/870-5859
Miss Martha E. Blanco, Personnel
EmpI: Total this location 14; Total EDP Em-
ployees 4.

WAYNE E. SIMON RADIATION SURVEYS CO.
163 Lamb Canyon, Beaumont, Calif. 92223
(714) 845-4002
Charles Willard Earley, Dir. of Nuclear Science
EmpI: Total this location 42; Total EDP Em-
ployees 17; Programmers 3; Analysts 2; Op-
erators 3.
Computer aided design and research, radi-
ological surveys, equipment service and cal-
ibration.
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.
EmpI: Total this location 2,500; Total EDP Em-
ployees 90; Programmers Yes; Analysts Yes;
Operators Yes.
Electronic business machines and EDP systems.
Manufacturing systems, Software development,
scientific programming, design automation and
graphic display.
IBM 360 DOS/AMOS, Honeywell 200.

STROMBERG DATAGRAPHIX, INC.
A General Dynamics Subsidiary
P. O. Box 2449, San Diego, Calif. 92112
(714) 283-6531
J. R. Calvin, Mgr. Prof. Placement*
EmpI: Total this location 1,200; Total EDP Em-
ployees 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
EmpI: Total this location 2,222; Total EDP Em-
ployees 1,729; Programmers 1,075; Analysts
142; Operators 112.
Computer software as it associates with re-
search, development and application of infor-
mentation technology and the system sciences.
Wide range of general purpose and problem-
oriented information processing tools and sys-
tems related to commercial, public and mili-
tary applications. These include basic operat-
ing systems, data management, statistical
processing and automatic control.
IBM 360/30—95, CDC 3800; a comprehen-
sive array consisting of 8 major digital sys-
tems.

TELEDYNE SYSTEMS CO.
19601 Nordhoff St., Northridge, Calif. 91324
(213) 886-2211, X2480
Bill Oldenkamp, Mgr. Employ. & Comp.*
EmpI: Total this location 1,100; Total EDP Em-
ployees 5.
Design and manufacture airborne computers,
avionics equipment utilizing micro miniature
circuity.

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.*
EmpI: Total this location 100; Total EDP Em-
ployees 5.
Engineering service.

Tustin Institute of Technology, INC.
Box Q, Santa Barbara, Calif. 93102
(805) 963-1124
Empl: Total this location 10; Total EDP Em-
ployee5.
Consultation and specialized technical educa-
tion.
Vibration and shock analysis.

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

UNIVERSAL DATA SYSTEMS, INC.
Div. The Rucker Co.
14482 Beach Blvd.
Westminster, Calif. 92683
(714) 897-1033
James J. Milanes, V. P.
EmpI: Total this location 14; Total EDP Em-
ployees 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.
Emp: Total this location 430; Total EDP Employees 8; Programmer 1; Analyst 1; Operators 2.

VARIAN ASSOCIATES
3333 Hillview Ave., Palo Alto, Calif. 94304
2700 Mitchell Dr., Div. Varian Assoc.
Aerospace and defense command and control systems, engineering and technical services, scientific and engineering.

ORDER ENTRY AND SALES ANALYSIS, QUALITY ASSURANCE, ACCOUNTS RECEIVABLE, DATA ACQUISITION, OPERATIONS RESEARCH, COMPUTER PROGRAMMING, COMPUTER PROGRAM TESTING AND VALIDATION, APPLICATION ANALYSIS, 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
Emp: 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) 388-4111
Jerry Lutzou, Adm. Asst. Data Processing
Emp: 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.
Emp: Total this location 35; Analysts 9.
Applied management systems training and education.

CONNECTICUT

AVCO LYCOMING DIV.
Avco Corp.
550 S. Main St., Stratford, Conn. 06604
(203) 378-2811
Myron Dayterko, Emp. Mgr.
Emp: 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
Emp: 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 B3200.

COMPUTER USAGE CO., INC.
51 Weaver St., Greenwich, Conn. 06830
(203) 661-4100
L. D. Lawrence, Personnel Mgr.
Emp: Total this location 30.

Corporate headquarters—computer software.

GERBER SCIENTIFIC INSTRUMENT C.
83 Gerber Road, Wapping, Conn. 06607
(203) 644-1253
Watson Peterson, Jr., Personnel Mgr.
Emp: 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
Emp: 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. Shalvy, Supervisor Prof. Emp.
Emp: 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.

TRANSOM INC.
Div. Hi-G
12 Tobey Road, Bloomfield, Conn. 06002
(203) 243-1486
Peter B. Olsen, Sales Mgr.
Emp: Total this location 50; Total EDP Employees 5.

MFG of touch-tone terminal, system design consultants, interested in enlarging sales and systems staff.

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.
Emp: 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.

DATA CRAFT CORP.
1200 N. 70th St., P. O. Box 23550, Ft. Lauderdale, Fla. 33307
(305) 932-2651
A. J. Olin, Director, Computer Development
Emp: Total this location 160; Total EDP Employees 15; Programmers 7; Analysts 2; Operators 6.

DIST. OF COLUMBIA

COMPUTER NETWORK CORP. (COMNET)
5185 MacArthur Blvd., N. W., Washington, D. C. 20016
(202) 244-9250
John R. Scary, Jr., Y. P. marketing and operations
Emp: Total this location 42; Programmers 3; Analysts 13; Operators 5.

Conversational time-sharing services. Time-sharing distribution package, BIO-MED, ALPS, etc.

IBM 360/50 time sharing system.

INPUT, INC.
(202) 398-7510
James F. Linker, Systems Director
Emp: Total this location 12; Total EDP Employees 5; Programmers N/A; 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.

Emp: Total this location 200; Total EDP Employees 20; Programmers 6; Analysts 8.

Library science, management information, safety systems engineering, scientific and technical data services. Support of contract services. MST, digitizer, 360 systems.

U. S. NAVAL INTELLIGENCE PROCESSING SYSTEM SUPPORT ACTIVITY (NIPSSA)
Naval Intelligence Processing System Support Activity (NIPSSA)
Washington, D. C. 20350
(301) 482-67

W. G. Mouttrie, Adm. Officer
Emp: 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 7900, 1401, 360/30, Honeywell 516, Univac 1004.

DELWARE

HERCULES INC.
910 Market St., Wilmington, Del. 19899
(302) 656-9811
J. O. Smith, Supervisor, Tech. Recruitment
Emp: 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.

WATTS-JOHNSON, CO.
3333 Hillview Ave., Palo Alto, Calif. 94304
(415) 326-8830
Emp: Total this location 750; Total EDP Employees 16; Programmers 4; Analysts 4; Operators 2.

Electronic devices and systems. Financial.
360-44 DOS.

NEW YORK

WESTERN DIGITAL INC.
950 Waddell & Reed St., New York, N. Y. 10007
(212) 790-5050
Eugene H. Waddell, President
Emp: Total this location 100; Total EDP Employees 20; Programmers 6; Analysts 3; Operators 5.

Computer hardware and software. IBM, IBM 370, IBM 360/67.

IBM 360/67 time sharing system.
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 corpora-
tion. Rail/track car location control, inventory con-
trol, 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 sys-
tems evaluation.
Scientific applications, commercial applications, 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 LaSalle St., Chicago, Ill. 60601
(312) 346-6686
James R. Yuzefitis, Emp. Coordinator
Empl: Total this location 250; Total EDP Em-
ployees 25.
Food service. This location is corporate head-
quarters. 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 Psinini, Recruiting Mgr.
Empl: Total this location 220; Total EDP Em-
ployees 65.
Complete stock brokerage computer service.
The only nationwide stock brokerage computer service utilizing full teleprocessing capabilities.

MONTGOMERY WARD 
Corporate Systems Div.
140 S. States St., Chicago, Ill. 60603
(312) 467-4946
M. K. Fenwick, Empl. Mgr.—Corp. Systems
Empl: Total this location 2,500-3,000; Total EDP Em-
ployees 700; Programmers 125-135; Analysts 130; Operators 123.
Catalog and retail merchandiser Chicago Corp.
HOD. Catalog order processing, subscription fulfill-
ment and inv. control, credit, traffic and ware-
house, 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, Battavia, Ill. 60510
(312) 231-6600
William Butler, Personnel Adm.
Empl: Total this location 410; Total EDP Em-
ployees 18; Programmers 11; Analysts 4; Op-
erators 3.
Construction of 200 BeV proton synchrotron for research in high energy physics. Engineering design, magnet design, radiation shielding calculations, high energy physics ex-
periment analysis, control computer applica-
tions.

SDS SIGMA 2, Varian 620/i, UNIVAC DCT/ 200 terminal; access to 360/Model 75 and CDC 6600 elsewhere.

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

PERSONAL PRODUCTS CO. 
Div. Johnson & Johnson
Kankakee River Drive, Wilmington, Ill. 60481
(815) 476-2323
J. J. Kennedy, Jr., Personnel Mgr.
Empl: Total this location 230; Total EDP Em-
ployees 6; Programmer 1; Operator 1.
MODESS® Sanitary Napkins, MEDE® 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 Em-
ployees 62; Programmers 10; Analysts 12; Operators 7.
Principal administrative offices of the corpora-
tion. 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 manage-
ment. RCS 301, 501, 3301; GE 225; UNIVAC 1005.

SANGAMO ELECTRIC CO. 
11th and Converse Sts., Springfield, Ill. 62705
(217) 544-6411
William J. Mullane, Mgr. Empl.
Total EDP Employees 16; Programmers 8; An-
alysts 5; Operators 3.
Manufactures electric meters and allied de-
tices, time switches, small transformers, spec-
ialty capacitors, power capacitors, genera-
tors, dynometers, gas telemeters, recording speedometers, and highly complex confiden-
tial electronic apparatus for the military service.
Manufacturing environment; general account-
ing; sales analysis. S/360 Model 40G.

STRUCTO DIV. 
King Seeley Thermos
Structo Drive at Route 75, Freeport, Ill. 61032
(815) 232-2111
Tom Borden, EDP Manager
Empl: Total this location 500; Total EDP Em-
ployees 13; Programmers 2; Analyst 1; Op-
erators 2.

http://www.tcm.com/sep69/sep69u.html
Mfg. live action toys, Bar-B-Q grills and aircraft looms.

Material and inventory, control, payroll and labor reporting, sales analysis, billing, accounting.

System 360 Model 25-4 disk system.

MICHIGAN

AAI CORP.

P. O. Box 6767, Baltimore, Md. 21204

(301) 666-1000


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.

G.E. 415.

CENTRAL INFORMATION PROCESSING CORP.

Div. Commercial Credit Company & Control Data Corp.

Quadangle-Village of Cross Keys, Baltimore, Md. 21210

(301) 323-7000


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 peripheral equipment.

DST SYSTEMS, INC.

11810 Parklawn Drive, Rockville, Md. 20852

(301) 949-2700


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 520L.

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.

G.E. 26S, 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 the design, functioning and performance of physical systems. The most modern analog and digital data processing equipments.

IBM 360.

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 the design, functioning and performance of physical systems. The most modern analog and digital data processing equipments.

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 5.

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 on microfilm service center.

Stromberg dataphotograph 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) 496-4951

A. L. Wade, Jr., Personnel Officer

NATIONAL SECURITY AGENCY

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; Operators 5.

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) 871-2700

Harvey Weissburg, 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., Northport 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.

SOFTWARE AGE
Systems and mathematical analysis, computer programming and data processing services. Scientific and commercial data processing.

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; Operators 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 DUE to A 360/65/75 card and disc; IBM 360-30 card, tape and disc.

BLUE CROSS-BLUE SHIELD OF MASS.
33 Federal St., Boston, Mass. 02106
(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.

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) 924-7373

M. Hadin, Gen. Mgr.
Empl: Total this location 40; Total EDP Employees 39.

Schaft angle-Bi-d counters, digital readouts coordinate digitizers.

PD P&B M digital equipment.

ATD-Seris, PC production and numerical control, IVF series digitizers.

DATAMAN ASSOCIATES
1330 Beacon St., Boston, Mass. 02115
(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.

DECITRE INC.
15 Summer Rd., Woonsocket, Mass.
(617) 757-4577

Empl: Total this location 25.

Photographic tape readers and tape programmed sequencers.

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 converters.

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 logics modules.

Software development, (systems applications, diagnostic), software support, EDP. All PDP series computers.

THE FOXBORO CO.
38 Naponset 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, PDP 88 used in process applications i.e. refining process, chemical, petroleum, power steel etc.

For commercial use 360/50, PDP 8, PDP 9, PDP 88 for process applications.

GENERAL RADIO CO.
300 Baker Ave., West Concord, Mass. 01781
(617) 367-4490

Channing Wagg, Asst. 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, system 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, Supv., 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 exercises.

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

Empl. Total this location 43; Total EDP Employees 50; Programmers 20; Analysts 14; Operators 10.

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 exercises.

H 1200, H 120 tape, disc, card reader, line printer.
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.

LUFT INSTRUMENTS, INC.
Old Winter St., Lincoln, Mass. 01773
(617) 722-3449
Joseph A. Bonville, 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 Massachusetts - Commonwealth of Massachusetts - Administration & Finance
State House, Room 109, Boston, Mass. 02133
(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) 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.

PHARMATECH SYSTEMS INC.
16171 494-2248
Robert T. Dann, Pres.
Empl: Total this location 200; Total EDP Employees 43; Programmers 14; Analysts 9; Operators 3.
Teaching-research hospital giving services to 5,000 patients annually.
Music, visual, and Medical Schools
171 Harrison Ave., Boston, Mass. 02111
(617) 524-3060, X1590
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 image scans, dosimetry for radiation therapy, research laboratory information processing. 360/30.

PHARMATECH SYSTEMS INC.
81 Washington St., Salem, Mass. 01970
(617) 524-3060, X1590
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 Employment
Empl: Total this location 1,800; Total EDP Employees 100; Programmers 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, IBM 360/44, UNIVAC 1108, and CDC 3600.

RAYTHEON CO.—EQUIPMENT DIV.
40 2nd Ave., Waltham, Mass. 02154
(617) 891-7400
Gardner H. Harris, 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., Nighth Heights, Mass.
(617) 444-7200
L. R. Anderer, Empl. Mgr.
Empl: Total this location 800; Total EDP Employees 7; Programmer 1; Analysts 3; Operators 2.
Measurement systems, simulation, data analysis.
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) 272-3430
A. R. Delo, 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
Empl: Total this location 450; Total EDP Employees 10; Operators 2.
Design and manufacture of instruments and scientific measurement systems, test equipment, design automation systems, instrumentation.

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
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. Supvr.
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. Roster, Mgr. Personnel Placement and Development
Empl: Total this location 3,100; Total EDP Employees 141; Programmers 40; Analysts 30; Operators 12.
Corporate office and automotive division—planetary drive, drive steer axles, axle housings.
Total mgmt. information system under development: planning and control on-line real-time w/ remove inquiry and input/output; payroll; financial; accounts receivable, accounts payable, etc.
Dual use: UNIVAC 1108 time-sharing multi-processors, with remote input/output; GE 215, 225, dual GE 235 and GE datanet-30.

COM-SHARE, INC.
F.D. 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 hardware 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 charged.
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

Software Age
MNISOITA AEROSPACE CORP.
P. O. Box 730; Anoka, Minn. 55303
(612) 427-3232
Walter G. Bu Miller, Personnel Mgr.
Manufacturer of government products.

3M CO. (MINNESOTA MINING & FGC. CO.)
Employment Department,
3M Company—3M Center,
St. Paul Minn. 55101
(612) 733-7587
Harry P. McLenough
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) 224-5344
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. 55310
(312) 935-5133, Ex. 8697
J. D. Schmidt, Empl. Staff
Empl. Total this location 9,000; Total EDP Employees 50; Programmers 20; Analysts 15; Operators 7.
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. Conducton Corp.
P. O. Box 426, St. Charles, Mo. 63301
(314) 723-1515
W. H. Wilson, Empl. Supervisor
Empl: Total this location 2,500; Total EDP Employee 166; Programmers 51; Analysts 84; Operators 6.
Military and commercial simulators and electronic support equipment.
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 E. Elson, 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).

SEPARATE \ 37
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NEW JERSEY

APPLIED DATA RESEARCH, INC.
Route 206 Center, Princeton, N. J. 08540
(609) 921-8550
Martin A. Gores, P.V. Empl: Total this location 80; Total EDP Employees 60. Development of prop. software, computer consulting and service bureau. Computer work to support above. IBM 360/20.

CONNECT IMPLEMENTATION CORP.
260 Goddard Way, 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 traffic, and general business systems.

CURTISS-WRIGHT CORP.
1 Passeic St., Wood-Ridge, N. J. 07075
(201) 777-2900
E. M. French, Mgr.-Selection & Placement* Empl: Total this location 8,000; Total EDP Employees 52; Programmers 21; Analysts 10; Operators 54. Aerospace components; nucleonics programs and components. Scientific (numerical, control, heat transfer, stress), commercial (financial applications, manufacturing applications). IBM S/360/30, S 360/20, CDC 6600.

DATA SYSTEMS ANALYST, 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 systems, software, proprietary software. All.

DATA USAGE CORP.
2460 Lemoine Ave., Fort Lee, N. J. 07024
(201) 461-6242
Gary Makotoff, 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 Corp.
P. O. Box 402, Rte. 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 Share). Commercial, scientific and time sharing for wide range of customers.

LEROY-JARZABEY & CO.
383 Kings Highway, Cherry Hill, N. J. 08034
(609) 667-6464
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.

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—management research, systems analysis and programming, economics, statistical 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.

NEW HAMPSHIRE

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 Corp.
P. O. Box 402, Rte. 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 Share). Commercial, scientific and time sharing for wide range of customers.

LEROY-JARZABEY & CO.
383 Kings Highway, Cherry Hill, N. J. 08034
(609) 667-6464
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.

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—management research, systems analysis and programming, economics, statistical 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.

NEW HAMPSHIRE

SANDELS ASSOCIATES, INC.
D. W. Highway, South Nashua, N. H. 03060
(603) 885-6431
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.

SOFTWARE AGE
OFFERING EDP SERVICES AND TRAINING, STOCK MARKET ANALYSES.
IBM-1130 AND TELETYPE FOR COMMUNICATION WITH TIME-SHARED COMPUTERS.

RCA INFORMATION SYSTEMS DIV.
Bldg. 202-1, Cherry Hill, N. J. 08010
John C. Rieger, Mgr., Employment
Empl: Total this location 1,500; Programmers 500; Analysts 300; Operators 100.
Home Office for Computer Manufacturing Div.

SCHERING CORP.
Bldg. 202-1, Cherry Hill, N. J. 08101
Empl: Total this location 1,400; Total EDP Employees 135; Programmers 135; Operators 9.
Ethical pharmaceutical manufacturing.
Sales, accounting, production, personnel, product distribution.
360/40, 360/30 under full OS. 1410.

E. R. SQUIBB & SONS, INC.
25 Kennedy Blvd., East Brunswick, N. J. 08816
K. S. Gray, Sr. Pers. Assistant
Empl: Total this location 271; Total EDP Employees 172; Programmers 22; Analysts 30; 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
P. Polizzano, Dir. of Pers.
Empl: Total this location 40; Total EDP Employees 6; Analysts 6.
SYS 3360 Maglaope-to-maglaope converter.
SYS 2200, 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, Varioan 620/8.

NEW YORK

AMERICAN AIRLINES
633 3rd Ave., New York, N. Y. 10017
(212) 737-1234 Ext. 304
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
Empl: Total this location 2,600; Total EDP Employees 200; Programmers 60; Analysts 40; Operators 100.
Financial—credit card and credit authorization.
Teleprocessing—RT-OS. 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) 697-1066
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, mgtm., 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) 859-5310
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 360-60-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
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.

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SEPTEMBER, 1969
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**DATA NETWORK CORP.**
460 Twelfth Ave., New York, N. Y. 10018
(212) 594-2500
Robert R. Wollch, Vice Pres Corp. Dev.
Emp.: 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.**
Topas Computer Corp.
41 E. 42nd St., New York, N. Y. 10017
984-0900
F. V. Doberty, V. P.
Consulting, systems design, programming, processing, conversion project management, proprietary packages.
Topas computer corporation is proud to introduce its accounts receivable proprietary package plus the conversion plan and people to implement it.

**DATA-TECH**
501 5th Ave., New York, N. Y.
(212) 869-1656

**DATASONICS, INC.**
Box 4553, New York, N. Y. 10017
(212) MU 20326
Jon Masterson, V. P.
Emp.: Total this location 14; Total EDP Employees 14; Programmers 6; Analysts 4; Operator 1.
Marketing proprietary software developed internally and by individuals and firms; contracted 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
Emp.: Total this location 2,200; Total EDP Employees 500; 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* 
Emp.: 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.*
Emp.: 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 360/30 computer center.
IBM 360/50.

**FACTS INC.**
345 Hudson St., New York, N. Y. 10014
(212) 0414

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Dr. Kenneth M. Ferris, Pres.*
Emp.: Total this location 62; Total EDP Employees 25; Programmers 7; Analysts 5; Operators 13.
Financial service bureau.
Portfolio in accounting, 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. Development
Emp.: Total this location 1,400; Total EDP Employees 24; Analysts 2; Operators 3; Analysts/Programmers 11.
Manufacture of preschool toys for children.
Sales, purchasing, materials control.
GE 405 16K word, four-disk, 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. 5-5815
Frank J. Stongel, Prof. Recruiting & Placement
Emp.: 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*
Emp.: 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 packages. Teleprocessing (on-line; real-time) and remote batch. Time sales and software development.
360's.

**H. T. GRANT CO.**
1441 Broadway, New York, N. Y. 10018
(212) BR 5-6411
Emp.: 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, Whitestone, N. Y. 11362
(212) 321-2300
Professional Employment Coordinator
Emp.: Total this location 1,111; Total EDP Employees 64; Programmers 9; Analysts 10; Operators 12.
Research, development and manufacturing of electronic computer equipment for government and aerospace industry.
Finance and manufacturing.
IBM 360/40 D.O.S.

**HOOKER CHEMICAL CORP.**
3 Hanover Square, New York, N. Y. 10004
(212) 874-3305
I. Freireich, Asst. V. P.
Emp.: 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.

**IBM CORP.**
1701 North Ave., Endicott, N. Y. 13760
(607) 755-2855
Dom Santoni

**INFORMATION SCIENCE INC.**
18 New Templest Ave., New York, N. Y. 10956
(914) 634-8877
D. P. Howell, Controller*
Emp.: 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 management systems.
IBM system/360 model 30-65K.

**INSCO SYSTEMS CORP.**
Div. The Continental Corp.
12 Gold St., New York, N. Y. 10038
(212) 7404
Gordon F. Gilchrist, V. P.*
Emp.: 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. Hall, V. P. of Keystone Computer Assoc. Mgr. of New York Office* 
Emp.: Total this location 23; Total EDP 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 diagnostic.

**LONGINES SYMPHONETTE**
1875 Palmer Ave., Larchmont, N. Y. 10538
(914) 834-1341
Dr. Kenneth M. Ferris, Pres.*
Emp.: 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) 473-7300
Edward H. Zeller, Dir. of Pers.
Emp.: Total this location 127; Total EDP Employees 10.
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.
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) 289-2122
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) 736-6366
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 8/1, 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:

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- Study and development of on-line systems in business data communication environment.
- Evaluation of multi-programming, multi-processor time sharing systems using simulation techniques.

**Software Programmers**

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

**Advanced Development Engineers**

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

Also senior level positions in logic and circuit design for engineers with knowledge in MSI and LSI circuitry for fourth-generation computer systems.

These positions require BSME/BSEE and five years' related experience.

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**Software Programmers**

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

**Advanced Development Engineers**

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

Also senior level positions in logic and circuit design for engineers with knowledge in MSI and LSI circuitry for fourth-generation computer systems.

These positions require BSME/BSEE and five years' related experience.

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**Software Programmers**

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

**Advanced Development Engineers**

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

Also senior level positions in logic and circuit design for engineers with knowledge in MSI and LSI circuitry for fourth-generation computer systems.

These positions require BSME/BSEE and five years' related experience.
SUN OIL CO.—DX Div.  
P. O. Box 2039, Tulsa, Okla. 74102  
(918) 583-4300  
W. H. Boggs, Coordinator of Recruiting.  
Empi: Total this location 1,500; Total EDP Employees 140; Programmers 30; Analysts 15; Operators 30.  
Government, lube oil, agriculture chemicals.  
Commercial and scientific for integrated oil company.  
360/30 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  
Empi: 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

AUBERBACH CORP.  
121 N. Broad St., Philadelphia, Pa. 19107  
(215) 491-8200  
B. A. Garner, Empl. Mgr.*  
Empi: 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  
Empi: Total this location 5000; 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., Radnor, Pa. 19603  
(215) 376-3873  
James H. Russell, D. P. Mgr.  
Empi: Total this location 1,000; Total EDP Employees 18; Programmers 8; Operators 2.  
Consulting engineers to the utility industries.  
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.  
INSTITUTE OF COMPUTER MANAGEMENT  
Div. Litton Industries  
542 Penn Ave., Pittsburgh, Pa. 15222  
(412) 261-2647  
John Tweddy, Dir. of Placement  
Empi: 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.*  
Empi: 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) 463-715  
A. J. Brendza, Adm.*  
Empi: 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*  
Empi: Total this location Corp. Headquarters—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-DESSLER CO.  
A Div. of Pullman Inc.  
441 Smithfield St., Pittsburgh, Pa. 15222  
(412) 391-4800  
Charles J. Jerasa, Supv. of Empl.

Empi: 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 col/comp 30 inch. ploter and drives.

UNIVAC, DIV. OF SPERRY RAND CORP.  
P. O. Box 8100, Philadelphia, Pa. 19101  
(215) M16-9000  
Empi. Mgr., Data Processing Div.*  
Empi: 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) UNIVAC II, 1050, 418, 9200, 9300, 9400, DCT 2000 with remote terminals.

WESTINGHOUSE INFORMATION SYSTEMS LABORATORY (WISL)  
Div. Westinghouse Electric Corp.  
2040 Andmore Blvd., Pittsburgh, Pa. 15221  
(412) 256-7325  
W. J. Young, Supv. Pers. Services  
Empi: Total this location 270; Total EDP Employees 90; Programmers 65; Analysts 75; Operators 25.  
The design, development and sale of computer-based information services and time-sharing services to a wide variety of commercial, governmental and institutional markets.

Programmers—We know where you can find a better job.

Work in the most dynamic EDP community in the country where the nation’s top companies are hungrily looking for skilled programmers. Like you.

Personal and professional growth is rapid. Salaries are high and the diversification of opportunities is unsurpassed.

We work closely with over 300 national companies headquartered here who have exciting programming and systems openings. Applications programmers, systems programmers, software programmers—are the people these companies need. Drew has been chosen to supply them with the necessary talent.

Send us your resume and we’ll give you the inside story on all of these openings.

Do it today. This could be the start of bigger and better things.
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

LESSEON 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, PLI 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 some—except 1 secretary and 4 at managerial level; Programmers 20; Analysts 8; Operators 2.
Software firm.
Contract programming, consulting, package development. Some 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. Poden, 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 McDurmott, Empl. Supv.*
Empl: Total this location 7,600; Total EDP Employees 156; Programmers 75; Analysts 45; Operators 36.
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 7; Operators 67 (includes Keypunch Oper.).
Public utility (sale and distribution of gas).
Business and scientific.
IBM 360/20, 40, 50, full QSO program languages used: ALC, PLI, Fortran IV, RPG.

LTV ELECTROSYSTMS, 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—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. 77006
(713) 98—7561
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) HUB—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 systems.
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—5919
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.*

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WE AT U. S. CAREER RECRUITERS ARE EXTREMELY PROUD TO ANNOUNCE THE ADDITION OF OUR NEW COMPUTERIZED RETRIEVAL SYSTEM. IT IS OUR PLEASURE TO EXTEND TO OUR TWENTY-THOUSAND ACCOUNTS FROM COAST TO COAST A BETTER SERVICE. DUE TO THE GREAT MANY JOB OPENINGS THAT WE HAVE LISTED IN THE AREAS OF DATA PROCESSING, ENGINEERING AND DRAFTING, IT BECAME NECESSARY TO UTILIZE A MORE EFFICIENT SYSTEM. WHETHER YOU ARE THE READER, REPRESENT A FIRM SEEKING NEW EMPLOYEES, OR YOU ARE AN INDIVIDUAL SEEKING A BETTER WORKING OPPORTUNITY, THEN YOU CANNOT AFFORD NOT TO INQUIRE ABOUT OUR SERVICE.

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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1 Q-N7, P-Q3; 2 Q-K3ch, K-Q4; 3 R-B5 or P-Q4; 2 Q-K7ch, K-Q5; 3 Q-K3 or K-K3; 2 Q-Q4, P-Q3; 3 Q-K4 or K-KS; 2 Q-B5 etc.

Solution to Problem 19
1 N-B4, P-K6ch; 2 N-Q5 or BxN; 2 RxB or KxN; 2 B-K6 or NxN; 2 BxP

Solution to Problem 20
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List computer hardware knowledge (names of systems, tape, disk, terminals, etc.): ______________________________________________________________________

Programming specialties and years of experience (commercial, scientific, theoretical, experimental, analog, etc.): ______________________________________________________________________

Systems programming on which you have had development experience (compilers, assemblers, executives, monitors, O.S., etc. Indicate for what computer): ______________________________________________________________________

Programming languages used and extent of experience (COBOL, FORTRAN, etc.): ______________________________________________________________________

Applications programmed (aerospace, banking, insurance, math subroutines, compilers, etc.): ______________________________________________________________________

Systems analysis experience (card design, flow charting, operation analysis, etc.): ______________________________________________________________________

EDP management experience (include years and number of people reporting to you): ______________________________________________________________________

SALARY: ____________________________ DATE OF AVAILABILITY: ____________________________

EDUCATION: Indicate major as well as degree unless self-explanatory.

Degrees ____________________________ Years ____________________________ Schools ____________________________

EMPLOYMENT: Indicate present employment and previous jobs below.

Employer ____________________________ City ____________________________ Years ____________________________ to ____________________________

City ____________________________ Years ____________________________ to ____________________________

City ____________________________ Years ____________________________ to ____________________________

Title or Function ____________________________ Name ____________________________ Signature ____________________________

Home Address ____________________________ Home Phone ____________________________

(state) ____________________________ (ZIP code) ____________________________ Age ____________________________ U. S. Citizen? ____________________________

Security Clearance ____________________________ Marital Status ____________________________

Military Status ____________________________ Location Preference ____________________________

BE SURE YOU HAVE CHECKED ON REVERSE SIDE THE COMPANIES YOU WANT TO SEE THIS INQUIRY.

PUT FORM IN STAMPED ENVELOPE AND MAIL TO:

SEPTEMBER, 1969

SOFTWARE AGE
MAGAZINE
P. O. BOX 2076
2211 FORDEM AVE., MADISON, WIS. 53701

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Fill in the confidential inquiry form on the other side of this sheet. This form provides all the information advertisers require to screen applicants. If further information is desired, you will hear from the advertiser direct. Then, check below the boxes of those companies to which you want copies of your form sent. Mail to Software Age, P.O. Box 2076, 2211 Fordem Avenue, Madison, Wisconsin 53701. (Please do not send us your own resume. We will only process this form. A new form must be filled out for each issue in which you are answering ads.)

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