



software age

SEPTEMBER 1968



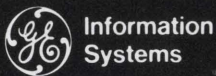
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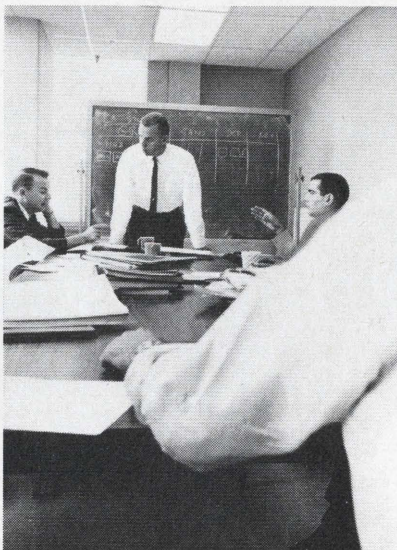
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# editorial

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■ Once again, the proposal has been revived to form a "public interest" corporation (ala-TVA or Aerospace Corp.) to operate the nation's postal system on a more businesslike basis.

At the present state of postal service, *any* proposal for *change* has a certain amount of appeal.

However, we cannot envision the Congress turning the postal service over to such a body without saddling the new "corporation" with the same asinine regulations which currently make it impossible for the government itself to perform the job.

We would like to offer another alternative. Why does not the government issue a Request for Proposals from private industry? Let it be a requirement of the RFP that each proposal must include at least one class of mail (special restrictions as to dimensions, labeling, etc., being acceptable) on which overnight delivery anywhere within the contiguous states is guaranteed.

Let it *not* be a requirement that the proposed service be financially self-sustaining; but that it should offer substantially improved service, at present mail volume, without requiring a subsidy of more than \$500-million/year or some other fixed limit.

The applicability of the "systems" approach to many other problems of government—land usage, transit and highway needs, crime control, etc.—has been recognized. Why not let some of the expertise developed in

industry, in aerospace and defense work, be put to work on *this* problem? Surely no operation of any such magnitude was ever in such crying *need* of system.

We suspect that at least 20 firms might be willing to perform preliminary studies and submit preliminary proposals mainly or entirely at their own expense. Any real government expense would begin with sharing the cost of developing the two or three most promising proposals in a "run-off" like that used in the SST

■ The revolting power ploy of the USSR on the heels of last month's IFIP meeting casts serious doubt on the wisdom of the site committee. There would seem more than adequate reason for the free-nation member groups to demand a new choice of site. It has been made obvious that NO nation having any connection whatsoever with the USSR is in any position to insure the safety of delegates to any conference scheduled within its borders.

The cannon fire from Edinburgh Castle last month was a *salute*. Frankly, I find it difficult to consider attending a meeting where the cannon fire (as demonstrated in Prague) is likely to be real and directed against the citizenry.

If IFIP's site committee does not rescind its choice immediately, the national member groups should announce their intention to boycott the planned Yugoslavian session.

Josep Broz Tito has been rather luckier than most in his efforts to run a republic in the shadow of the alleged "union of republics," but who is to say whether Moscow's then-current troika may decide to pull the string while IFIP-71 is in progress? The track record of those who have attempted to be, simultaneously, communist and free is not impressive!

competition or in various other space and defense undertakings.

Responsible officials of companies which might be interested in preparing such preliminary proposals for improved postal service are invited to notify us of their interest and we pledge to make this interest known to both the Executive and Legislative departments. Write: H. L. Rothra, Pres., PRESS-TECH, Inc., 1020 Church St., Evanston, Ill. 60201. ■

■ We have had many enthusiastic comments about our July cover by Artist Alan Daugherty depicting the manifold role of the computer in modern industrial management.

A few persons (while still hailing Daugherty's imaginative representation) objected to one of his anthropomorphic machines shown in an attitude of prayer.

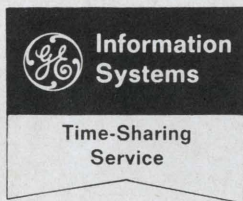
It is interesting that, in submitting this art, Daugherty noted that there might be some such objections but defended his inclusion of the vignette this way:

"Believe me, there's no sacrilege intended. I did quite a bit of research into what management tasks the computer is now performing; and my overall conclusion from what I learned is expressed there: If the computer is going to take over every other function of management, somebody *better* program it for this final human function!" ■



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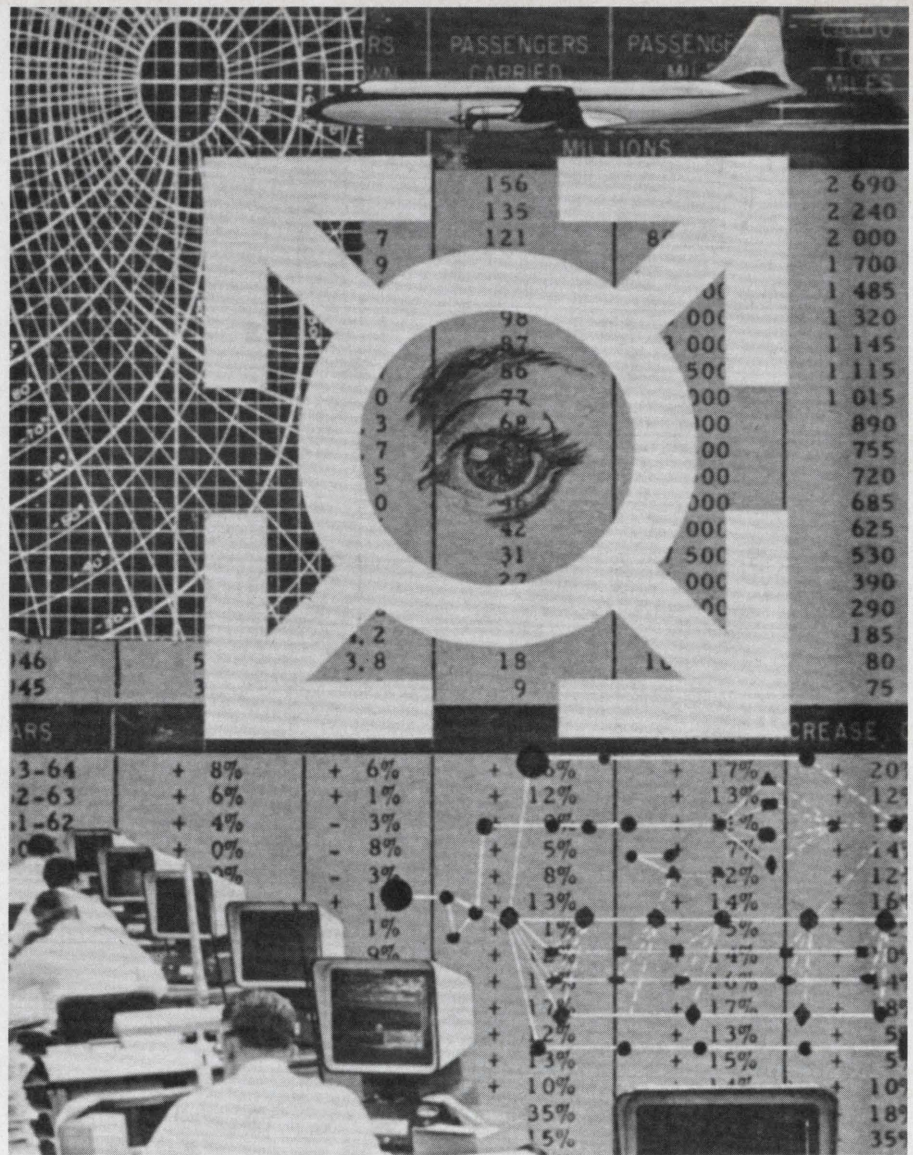
# A Compact Finite State Machine For Program Control

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Informatics, Inc.  
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The principles of a finite state machine are reviewed herein and a compact version of the representative transition and output tables is developed. Then an application is discussed wherein a finite state machine is used to control the dispatching of programs in a large file management system.

Work reported herein was performed as the Data Storage Level Changer, sponsored by Rome Air Development Center, Griffiss Air Force Base, Rome, New York, under Contract Number AF3 (602)—3794.

■ Much has appeared in the literature regarding and describing finite-state machines. Gill, in his book, gave a very definitive description of finite-state machines as well as describing techniques for analysis using such representations (1). Burks and Wang describe several interesting types of finite-state machines (2). Thus the notion of a finite-state machine is not particularly new. Nor, for that matter, is the idea of using a finite-state machine to control a complicated computer process. Heistand has given an excellent description of such an application (3). However, in all such applications your author has seen there has been one recurrent problem—the design of the transition tables was such as to foster a great deal of waste space. It is the purpose of this article to show a new form



for these tables which eliminates this problem without increasing the complexity of the programs which exercise the tables. For the benefit of those who are not overly familiar with finite-state machines, in the first part of this paper we will first review the principles of such a machine, then display the usual form for the transition tables and discuss ways in which they can be made more compact. The second part of the paper describes how the technique is used in the Data Storage Level Changer of the INTIP System.

### Description of Finite-State Machine

Any system displaying the following four characteristics can be considered as a finite-state machine:

- (1) There is a finite set of discrete inputs.
- (2) There is a finite output set.
- (3) There is a finite set of states.

- (4) There are a pair of characterizing functions by which the output and the next state, respectively, are determined as functions of the current state and the current input.

Such a system generally assumes a time  $t_0$ , corresponding to the initial state  $S_0$ . The system remains in this state until an input is received (or until the received input is sampled.) Then, utilizing the functions in (4), an output is generated and a new state is determined. Implicit in this new state is the significant history of how the system got to that state. This process continues to conclusion, with each output and next state being determined by the current state of input.

### Implementation Techniques

One of the more obvious means of representing the functions charac-



Current State	Input			
	1	2	3	4
1	-	3	2	3
2	-	-	3	-
3	-	1	4	2
4	2	1	-	-

Figure 1. Next State Matrix

terizing a given finite-state machine is by use of transition tables in the form of matrices. For example, the function relating current state and input to next state could be represented by a matrix wherein each row represents a current state and each column represents an input. Then the intersection of current state row and input column would contain the next state (Fig. 1). A similar matrix could be used to determine the output. If there is a relationship between the new state and the output such that for every new state there is one and only one output, this second matrix could be replaced by a simple table associating output with next state (Fig. 2).

Next State	Output
1	A
2	B
3	A
4	C

Figure 2. Output Table

The main disadvantage in the use of a matrix such as is shown in Figure 1, is that it can be wasteful of space. This is because some inputs might not be possible in a given state in which event those input entries for that state are void. For example, note that 7 of the possible entries in the matrix in Figure 1 are void; this represents approximately 55% of the total space requirement.

Word 1	5
Word 2	4
Word 3	5
Word 4	5
Word 5	1
Word 6	8
Word 7	4
Word 8	4
Word 9	1

Figure 4. Linear Transition Table

In this example each kind of input was assigned a unique number, but note that no single state expected more than three of the four different kinds of input. Therefore, if the assignment of numbers to types of input was made locally rather than universally, the matrix could be reduced from 4x4 to 4x3, i.e., one column could be eliminated. The matrix would then appear as in Figure 3.

Current State	Input		
	1	2	3
1	3	2	3
2	3	-	-
3	1	4	2
4	2	1	-

Figure 3. Compact Next State Matrix

However, even in this compact form, 3 entries are blank representing a 25% waste. In general, the dimensions of such a matrix are  $m \times n$  where  $m$  is the number of states and  $n$  is the maximum number of distinct inputs which could be received while in any one state. It can be seen readily that if there is not a high degree of uniformity in the number of inputs receivably by each of the states, the amount of waste space in the matrix can be rather high. Taking a somewhat extreme example, assume a 10 state machine in which one state could receive 6 different inputs but the remaining 9 states could each receive only 2 different inputs. The matrix for this system would then be 60% void.

By reorganizing the data in the matrix into a linear array, eliminating void entries, and substituting the address of the state record in place of the state number itself, further reductions can be effected. Such an array would consist of a string of

Input 1	State 1 Record
Input 2	State 1 Record
Input 3	State 1 Record
Input 1	State 2 Record
Input 1	State 2 Record
Input 2	State 3 Record
Input 3	State 3 Record
Input 1	State 4 Record
Input 2	State 4 Record

state records where each state record is one row from the compact matrix (with void entries deleted). Figure 4 shows such a representation of the system in Figure 3.

Comparison of Figures 3 and 4 reveals that they are indeed equivalent. Note that if the system were in state 1 and received a number 1 input, the matrix indicates that the next state should be 3 whereas the table indicates that the next state record starts in word 5 of the table which is indeed the origin of the state 3 record. Further comparison is left as an exercise for the reader. The only difference with respect to operating methods is that in the case of the matrix, one remembers the current state number and determines by algorithm where the corresponding row starts whereas in the case of the table, one remembers the address of the origin of current state record and obtains directly the address of the origin of the next state record.

The last several paragraphs have only concerned themselves with the determination of the next state. However, the determination of the output can be performed in somewhat the same manner. If there is no simplifying relationship between next state and output such as enabled the construction of a table shown in Figure 2, i.e., if the output is strictly as function of current state and input rather than a function of next state, then the table in Figure 4 can simply be doubled in size so as to incorporate the output (Figure 5). Note that the space savings is still the same percentage because we now have a table twice as big as that in Figure 4 replacing two matrices, each as big as the one in Figure 3.

Again, an inspection reveals that if the system were in state 1 and received a number 1 input, the table would produce the origin of the state 3 record (word 9) as well as the output A. However, if the current state were 1 and a number 3 input were received, although the next state address would again be 9 (state 3), the output would be C.

Just as the compact table in Figure 2 was made possible by a strict relationship between next state and output, so the same relationship



Word 1	9	Input 1	
Word 2	A	Output 1	
Word 3	7	Input 2	State 1 Record
Word 4	B	Output 2	
Word 5	9	Input 3	
Word 6	C	Output 3	
Word 7	9	Input 1	State 2 Record
Word 8	C	Output 1	
Word 9	1	Input 1	
Word 10	A	Output 1	
Word 11	15	Input 2	State 3 Record
Word 12	D	Output 2	
Word 13	7	Input 3	
Word 14	B	Output 3	
Word 15	7	Input 1	
Word 16	E	Output 1	State 4 Record
Word 17	1	Input 2	
Word 18	A	Output 2	

Figure 5. Transition Table Incorporating Outputs

would enable the reduction of the table in Figure 5. In this case rather than treating the output as a function of the current state and input, it is treated as a function of the next state and inserted as the first word of each state record (Figure 6).

As shown by this table, if the system were in state 1 and received a number 1 input, the next state record would begin in word 7 (state 3) and the output (found in word 7) would be A. Thus we now have two techniques (Figures 5 and 6) for representing the characterizing functions of a finite-state machine, one which can be used when there is a strict relationship between next state and output and one for the more

general case. Yet both techniques are, at worst, as efficient as the matrix method and generally are much more efficient.

#### Application

Thus far we have concerned ourselves only with the somewhat abstract concept of finite-state automata and an interesting exercise in table construction. However, let us examine an actual application of the techniques developed. We will use the technique shown in Figure 6.

One of the primary functions of the Data Storage Level Changer (DSLCL) in the INTIP (INTegrated Information Processing) System (4) is the processing of file commands

sent to it by other computers in the system. The processing of any given file command can be considered to consist of a number of discrete routines, some of which may be utilized more than once for a given command and some of which might also be used in the processing of other commands. These routines were identified and coded as separate entities. The sequence in which these routines are to be used is data dependent, i.e., the routines operate on the file command parameters and/or DSLCL indices and upon the completion of any routine (say A), based on determinations made internal to that routine, one might want to go to routine B or C. Furthermore, if routine A is used again at a later point in the processing of this command, the same two conditions dictate that the next routine should be D or E, respectively. Likewise, if one were processing a different command which utilized routine A, these two conditions might indicate the need for routine F or G, respectively.

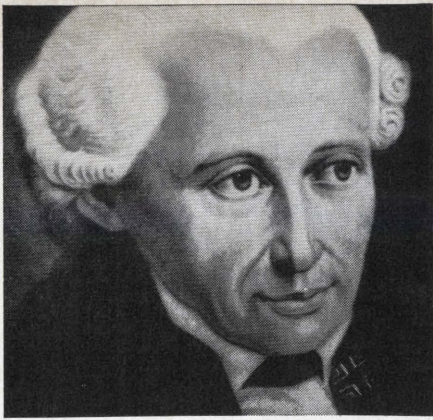
One way in which the above capabilities would be provided would be to write each routine as a closed subroutine with multiple return points and then write a driving routine which calls upon the routines in the necessary order. However, this approach requires that such a driver be written for each type of command. Furthermore, system requirements make it mandatory to be able to process multiple file commands in parallel, including even multiple instances of the same type of command with possibly different parameters. This imposes the additional requirements on the driver that means must be provided for keeping track external to the driver itself of the progress of each user. Such a driver while not too difficult to write, could not be easily modified. For the above reasons it was decided to use a finite-state machine for the driver. This simply required a transition table of the type shown in Figure 6 for each type of command and a relatively simple routine capable of exercising all such tables. The state, input, and output for each command are retained in the respective entry for that command in a list called the Command Process Queue.

Each command processor routine is written as an open subroutine

Word 1	A	Output	
Word 2	7	Input 1	State 1 Record
Word 3	5	Input 2	
Word 4	7	Input 3	
Word 5	B	Output	State 2 Record
Word 6	7	Input 1	
Word 7	A	Output	
Word 8	1	Input 1	State 3 Record
Word 9	11	Input 2	
Word 10	7	Input 3	
Word 11	C	Output	State 4 Record
Word 12	7	Input 1	
Word 13	1	Input 2	

Figure 6. Transition Table with Outputs as function of next state

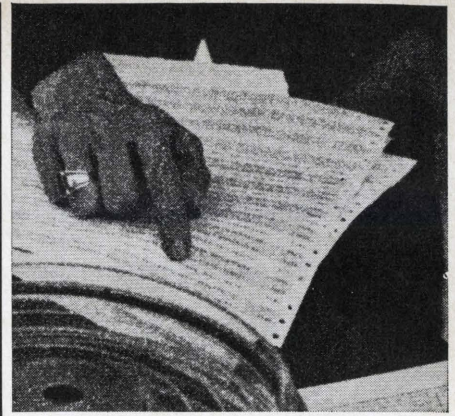




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which operates on some parameters in the command and/or the contents of one or more of the DSLC indices and, based on this operation, selects an exit number and then transfers to some fixed location in the DSLC Executive. This exit number is some number from 1 to p where there are p different possible exit conditions associated with this routine. The exit number serves as the input to the finite-state machine which, utilizing this number and the current state, determines the output and the next state. The output, in this case, is the identification of the next such routine to be entered.

The standard unit of storage in the INTIP System is a block of 6144 bits which, in the PDP-8 (the computer on which the DSLC is implemented), is 512 words of 12 bits each. Such a block, if it contains any DSLC programs or tables, is referred to as a program module. The command processor routines are generally considerably smaller than one block allowing two or more to be packed in one program module. Therefore n (variable) routines are inserted in a program module with the first n words of the module specifying the origin of each of the n routines within that module; a transfer vector table, if you will. A unique routine identification consists of the module number and the address of one of the transfer vectors. Thus the output (word 1 of each state record of the process control table, Figure 6) of the finite state machine consists of the ordered pair: module number, transfer vector number.

The control of the processing of a command then is carried out in the following fashion:

(1) Upon receipt of a command the appropriate process control table is selected, the system is set to state 1, and the finite-state machine (hereafter called the process control routine) produces the corresponding command processor routine identification.

(2) The command processor routine performs its task, selects the appropriate exit number to be used as input to the process control routine, and returns to the executive.

(3) The process control routine, utilizing the current state and the input, determines the next state and the associated output (next com-

mand processor routine identification).

(4) Steps (2) and (3) are repeated for successive command is completed. Completion is indicated to the process control routine when the input number, as applied to the current state record, produces a next state record address of 7777 $\delta$ .

#### Additional Features

Each process control transition table is stored in an aforementioned 512 word program module. Since it is entirely possible for such a table to exceed the length of one program module, provision had to be made for continuation of the table to another module. This is done by the insertion of a three word continuation record in place of any state record for which there is no room. The first word of this record contains 7777 $\delta$  identifying it as a continuation record. The second word contains the module number of the program module to which the table is continued and the third word contains the address within that module of the origin of the state record for which there was no room in the original module.

In analyzing the steps required in the processing of any given command one can usually identify what might be considered subprocesses, i.e., a string of steps that are used repeatedly in the same sequence and in the same sense. Similar subprocesses can be identified as being common to the processing of several commands though not necessarily repeated in any one command. By extracting from the transition table for a given command that portion which represents such a subprocess and making it into a separate transition table callable by the original table, the original table can be reduced in size substantially. Such a sub-process table is represented in the original table by a special state record in which the first word is 7700 $\delta$  identifying it as a sub-process call. The second and third words identify the origin of the subprocess transition table in the same manner as the continuation record. There follows one word for each possible exit condition from the subprocess. Each such word contains the address of the next state record to be selected in the event the corresponding exit is chosen. When a

sub-process call is encountered, the module number of the current transition table and the origin of the current state record in that module are stored in a push-down list and the new transition table is activated. The return from a sub-process to the calling process is indicated by a special state record in the sub-process transition table. The first word of this record contains a 7070 $\delta$  identifying it as a sub-process exit. The second word contains the exit number to be used in determining the address of the next state record in the calling process transition table (identified in the last entry of the push-down list). The use of a push-down list enables the nesting of sub-processes, i.e., allowing one subprocess to utilize another subprocess. The degree of such nesting is limited only by the size of the push-down list.

#### Conclusion

The analysis presented above plus the experience gained in the implementation of the process control function as a finite-state machine indicate there are some distinct advantages to be derived from the application of the technique.

- (1) The logic of the command processor system is contained in a table where it is more easily modified than a program where modifications can be traumatic.
- (2) Representation of logic in the form of a finite-state machine lends itself more readily to analysis than the more obscure form of a program.

The objection to the waste space generally associated with the matrix form of transition tables is largely ameliorated by use of the linear array described above. ■

#### REFERENCES

1. Gill, A. *Introduction to the Theory of Finite State Machines*. McGraw-Hill, New York, 1962.
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# software age resume center at FJCC

San Francisco, California, St. Francis Hotel  
Union Square

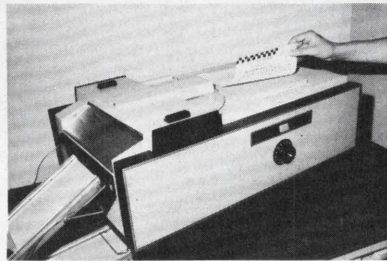
10:00 A. M., Monday, December 9—5:00 P. M., Wednesday, December 11

(Over 75 Local and National Companies will be participating)

SOFTWARE AGE magazine is sponsoring a *free* employment center during the upcoming FJCC Show in San Francisco, December 9–11, 1968. The S/A RESUME CENTER will be located at the St. Francis Hotel, Union Square. The center opens Monday, December 9 at 10:00 A.M. and will continue to be the hub of employment activity until 5:00 P.M., Wednesday, December 11.



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San Francisco, California, St. Francis Hotel, Union Square

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# TROUBLE-TRAN PRESENTS XTRAN'S ADVENTURES IN FORTRAN

Send your ANSWER to the problems posed here in each issue to:

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**software age**

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You can also profit by submitting PROBLEMS for this feature. If your problem in FORTRAN programming is selected for use in this feature, you will receive **\$25.00**

#### Contest Rules:

1. USA Standard FORTRAN is assumed.
2. CDC-6000 FORTRAN and IBM System/360 FORTRAN IV (level H) are used in verifying answers.

The correct answer bearing the earliest postmark will net the reader submitting it **\$25.00**

The second correct answer with earliest postmark wins **\$15.00**



By GEORGE N. VASSILAKIS  
of TRW's Software and Computing Center

SEPTEMBER, 1968

## PROBLEM OF THE MONTH

Here is a good one for those who think that prior TROUBLE-TRAN problems have been too easy or too *compiler depended*.

Given two subroutines (A, B) such that subroutine A contains a statement numbered 100 and subroutine A calls subroutine B, show the coding that would enable subroutine B to transfer to subroutine A at statement 100 without subroutine B using the RETURN or CALL statements. The position of statement 10 is irrelevant.

C . . . MAIN	SUBROUTINE A	SUBROUTINE B
CALL A	.	.
STOP	IF(1.GT.O) GO TO 10	.
END	100 WRITE (3,110)	.
	110 FORMAT (14H RIGHT YOU ARE)	IF(1.LT.O) RETURN
	RETURN	END
	10 .	
	CALL B	
	END	

## ANSWER TO LAST MONTH'S PROBLEM

"THOU SHALL NEVER USE LITERALS IN A CALL STATEMENT."

The problem was intended to illustrate what may happen when literals are used as arguments in a CALL statement and the corresponding DUMMY argument in the subroutine changes value, which in turn changes the literal in the calling routine and any subsequent use of that literal leads to trouble. This happens when a programmer uses a subroutine written by someone else and the user knows only the calling sequence and not what is inside the routine.

After statement CALL XTRAN (2,K) is executed, the literal 2 is changed to O and K (which corresponds to J in the subroutine) equals 20.

The integer 2 in DO 10 J=1,K,2 is not the same as the 2 in CALL XTRAN (2,K). In the case of the DO statement the integer 2 is imbedded in the instruction that is used to increment the index register. This is done at compile time and can not be altered during execution.

The correct answer to our problem is: The message "YOU ARE WRONG" will be printed 10 times.

P. S. Some TROUBLE-TRAN readers have complained about the fact that these problems are too *compiler depended*. I agree with them, but I also feel this column helps to point out the differences in compilers and the fact that FORTRAN is not as machine independent as some people think.

If my readers are interested, I would like to alternate the publication of these problems with FORTRAN Algorithms that may be of interest to many readers. Perhaps, Software Age could pay \$25.00 for each algorithm that is accepted for publication. Please write if you like this idea.

XTRAN



# Encode/Decode Facility for FORTRAN IV\*

CHARLES ERWIN COHN

Argonne National Laboratory  
Argonne, Illinois

■ The FORTRAN-IV formatted READ and WRITE statements cause transfer of alpha-numeric data to or from the external input or output device selected by the unit number. However, for some applications it is convenient if such data can be transferred, instead, to or from an area in memory, so that further operations can be performed on it. These are the functions performed by the ENCODE and DECODE statements in some versions of FORTRAN.

Such facilities can be added to a FORTRAN-IV system by adding a suitable I/O subroutine to the library, appropriating a unit number that is not otherwise used. The subroutine is written to transfer the data to or from an array. Such a routine has been written for the FORTRAN-IV system on our DDP-24 computer.

The array is designated by the statement

```
CALL BUFDEF(M,N)
```

where M is the name of the integer array that receives or supplies the alpha-numeric data. N is an integer constant or variable indicating the number of data words transferred. It must not be larger than the length of the array M and must never be greater than the length of the buffer area used by the I/O conversion routines. These assignments apply to all subsequent operations until altered by another CALL BUFDEF statement. The number of characters

per word (four for the DDP-24) depends on the particular computer.

The unit number 8 was here selected for this use. The statement

```
READ(8,n) list
```

takes N words of alpha-numeric data from the array M, and converts them according to FORMAT statement n to fulfill the list. In the process, the input-output buffer area is loaded with N words of data from M. If N is less than the buffer length, the remainder of the buffer area is filled with space codes. The contents of M are not altered. (If the list and FORMAT statement are such as to call for multi-line input, the contents of M are transmitted repeatedly.)

Going in the other direction, the statement

```
WRITE(8,n) list
```

converts the list according to FORMAT statement n, and stores the first N words of the result in the array M. (If the list and FORMAT statement produce multi-line output, the output from later lines will overwrite that from earlier lines.)

*Example:* An example of the usage of this facility is as follows: Suppose an input deck contains eight different types of data cards, randomly intermixed. Each type must be read with a different list and FORMAT statement. The types are distinguished by an index digit, from 1 through 8, punched in Column 1. A card with 9 in Column 1 indicates the end of the deck.

The deck may be read by the following coding, which assumes four

characters per word, and 3 as the card-reader unit number:

```
DIMENSION MBUF(20), ...
```

```
...  
CALL BUFDEF(MBUF,20)
```

```
...  
10 READ(3,20)(MBUF(I),I=1,20)
```

```
20 FORMAT(20A4)
```

```
30 READ(8,31)INDEX
```

```
31 FORMAT(I1)
```

```
GO TO(11,12,13,14,15,16,17,  
18,19),INDEX
```

```
11 READ(8,21)list 1
```

```
21 FORMAT(1X, ...)
```

```
...  
GO TO 10
```

```
12 READ(8,22)list 2
```

```
22 FORMAT(1X, ...)
```

```
...  
GO TO 10
```

```
...  
...  
...  
19 ...
```

Here, statement 10 reads the information on a card into the array MBUF in alpha-numeric form. Statement 30 then decodes the first column to obtain the index digit. A computed GO TO branches to the appropriate READ statement (11 through 18) for the particular card. The information in MBUF is then decoded according to the appropriate format (with the first column now ignored in each case) and loaded into the appropriate list. After the information is processed, return is made to statement 10 to read another card. When a card is read having an index digit of 9, control passes to the remainder of the program, starting with statement 19. ■

\* Work performed under the auspices of the U. S. Atomic Energy Commission.



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## HAWAII

A rare opportunity to relocate to our most beautiful state. Prefer individuals with experience in one of the following: 360; COBOL; JOVIAL, COMMAND/CONTROL. This large international firm will pay excellent salaries, relocation costs plus benefits, and a 17% cost of living differential.

## EUROPE

A large international firm is seeking senior technical individuals (\$18-\$30,000) in the following categories: 1. London—on-line banking systems; 2. Paris—real time communications or reservations; 3. Switzerland—real time banking systems; 4. Algeria—petroleum systems; 5. Madrid—banking systems. A marketing personality and communications in the native tongue would be helpful but not necessary.

## SAIGON

A rare chance for high earnings and tax-free benefits is offered by this international organization. High salaries, excellent per diem, plus 75% cost of living and additional overtime; this is a two year assignment, and is tax-free. Experience on IBM 360/40/50/65, or COBOL or COMMAND SYSTEMS will qualify. Your choice of stateside assignment after your tour is complete. Many programmers can have \$60-80,000 saved by the time they return.

## MANAGEMENT

Over 30 of the nation's leading computer manufacturers, users and consultants are currently seeking managers in a diversity of applications. Salaries range from \$18,000 to \$75,000, from project leaders to vice presidents; many also offer liberal stock options and executive benefit plans.

## TIME SHARING

A large chain of data centers is currently being established in 30 major cities. Prefer programmers with non-scientific applications who desire to be trained on time-sharing applications. All management is staffed internally; rapid professional and financial advancement is virtually assured.

## INFORMATION SYSTEMS

A large computer-oriented company with an international network of data centers is seeking computer personnel: junior programmers, senior programmers, systems analyst, designers, and managers to staff their rapidly growing systems. Opportunities exist in 17 states and 8 foreign countries. Salaries range from \$8,400 to \$24,000. This is a chance to participate in total systems design and implementation from the ground up. Outstanding benefits.

## BUSINESS

Several programmers and analysts who have experience in manufacturing industries are needed to staff a new and rapidly growing multi-computer complex. Areas such as accounting, inventory/production control, and general manufacturing applications would be helpful. This progressive firm pays excellent salaries and gives their professionals 4½ weeks vacation and liberal bonuses, plus a fully company-paid benefit package.

## SCIENTIFIC

Should have a degree in Math, Physics or Engineering, and a knowledge of FORTRON. Apply your academic background to all facets of the latest state-of-the-art advances. This is a large, non-profit organization paying outstanding salaries, 4 weeks vacation, and extended academic leave in a stimulating university-affiliated environment.

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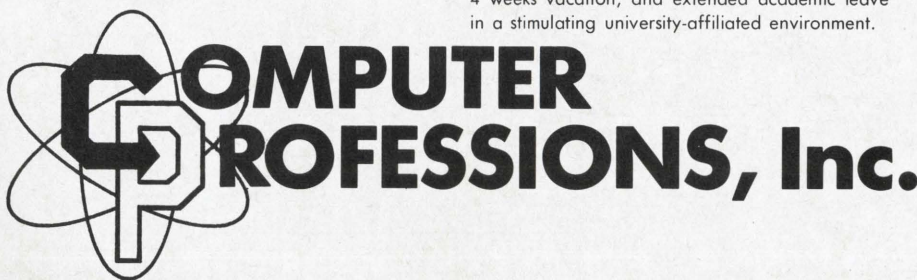
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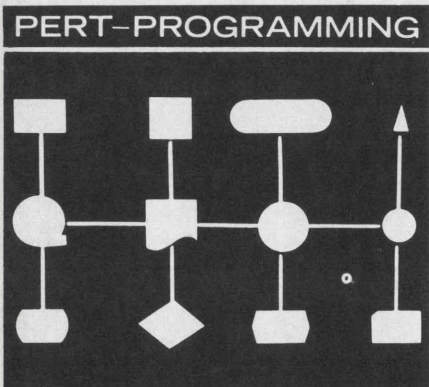


# new products

SIAM—a geographic data base file handler that permits access by street and intersections was announced by Systems Science Corp. The system is designed to operate on the IBM/360 computer and the RCA SPECTRA/70.

SIAM is designed to provide street and intersection access to computer stored urban data bases. According to Systems Science Corp., organizations such as local governments, law enforcement agencies, emergency service organizations, and public utilities that maintain urban data bases, will now be able to quickly search and retrieve information by street address, intersecting street designation, or by the coordinates of a premise address.

For more information, circle No. 60 on the Reader Service Card



## MAGNETIC SYMBOLS

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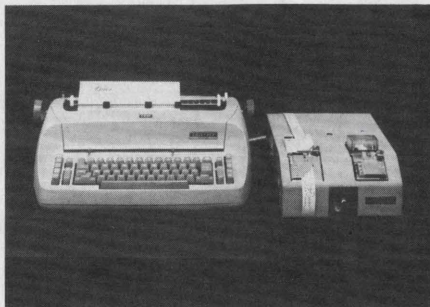
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For more information, circle No. 65 on the Reader Service Card

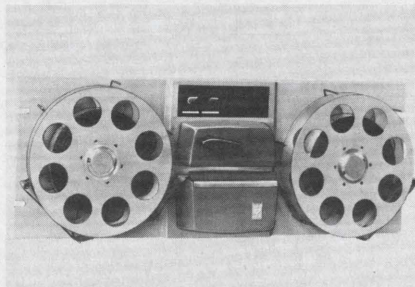


Hardly changed from before the days when computers were as big as a house, the BSC 007 Hand Punch requires no electrical outlet, and it can be used to punch cards right at the work location in the office, keypunch room, computer room or even at home.

Manufactured by International Computers and Tabulators, Ltd., the 007 is marketed in the United States by Business Supplies Corporation of America. It has a standard keyboard with fifteen keys.

For more information, circle No. 61 on the Reader Service Card

\* \* \*



A Tape Reader/Spooler that operates at 300 characters per second has been announced by Ferranti-Packard Electric Limited, Electronics Division. Designated the Type 4010/4020, the unit is intended to be used in the input to digital computers, numerical control of machine tools, automatic testing and checkout equipment, automatic message transmission and industrial process control.

The 4010/4020 tape reader/spooler can store 800 feet of 0.0025" paper tape and rewind it at the rate of 40 inches/second. It can stop on character at 300 characters/second, with stop/start speeds from 0 to 240 characters/second, and is capable of handling tapes up to an 8-channel width.

The unit comes in a standard 19" rack size and is 7" high. It is durably mounted on a 3/4" aluminum panel.

For more information, circle No. 62 on the Reader Service Card

EPSCO, Incorporated, has introduced its Edityper 200 System, an all-solid state automatic typewriting system with editing capabilities and single or dual punch and reader.

Designed for higher reliability and easier maintenance, the Edityper 200 is a modular design to which can be added readers and punches.

Information used repeatedly is recorded on a punched paper tape and stored for future use. The original text has to be typed only once. Reproduction, at the rate of up to 175 words a minute, is completed automatically on the tape. The Edityper System can be programmed to stop at any point in the text to permit revisions, additions or deletions.

The punch and reader unit can be connected to add a dual reader. When not used in its automatic mode, the Edityper 200 automatic typewriter serves as a standard IBM Selectric typewriter. Five keys have been added to each side of the basic keyboard.

The Edityper 200 System can be used as a data terminal as well as for applications in business office procedures and volume letter-writing.

For more information, circle No. 63 on the Reader Service Card

\* \* \*

The 3M Company has announced expansion of its Scotch brand computer tape line to include a new "Guaranteed Performance" tape.

To be known as "777GP", the tape utilizes the same binder formulation and oxide coating as Scotch brand "777" computer tape and differs only in the certification process. New "777GP" is electronically tested throughout the entire manufacturing process which, according to 3M, provides a reliable computer tape that no longer requires the bit-by-bit individual roll certification.

As a result the "777GP" will be offered to users at a lower price. The original Scotch brand "777" will continue to be offered as part of the 3M computer tape line.

777GP is designed for, and fully compatible with the new third generation computers and offers long term dependability over thousands of passes and is fully compatible through all bit densities to 3200 FCL.

For more information, circle No. 64 on the Reader Service Card



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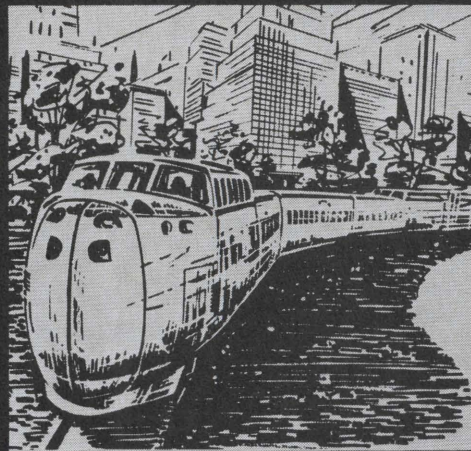
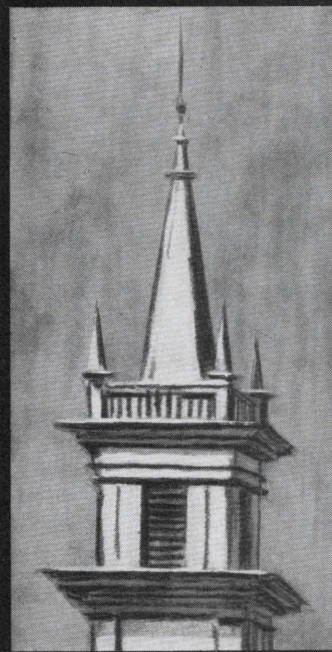
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**Basic systems training for programmers**  
 . . . a prospectus from Systemation, Inc. tells about a new 25 week on-the-job training program. The training is designed to qualify a programmer to do administrative systems work in the data processing department.

It covers 17 basic areas of administrative systems work which are covered with 125 study units. The course was written by Leslie H. Matthies, Executive Director of The Foundation for Administrative Research and W. Norman Wood, Assistant Director.

For more information, circle No. 66  
 on the Reader Service Card

**Color coded data processing folders** designed for inter-office transporting or storing of tapes, tab cards or edge punched cards with related documents are presently being marketed by Dresser Products Incorporated, Providence, R. I. These folders are available with left or right side to equalize file buildup. Standard size folders are available in green, orange, brown, pink, yellow, blue and manila for color coding by department, product, operation or other classifications. Legal size folders are also available in 2 styles.

For more information, circle No. 67  
 on the Reader Service Card

An advanced proprietary program and related services capable of automating systems design and providing management information for computer evaluation and selection has been announced by Software Products Corporation.

The new system, called CASE (Computer Aided System Evaluation), is currently being offered as an integral part of a consulting service.

A principal feature of the CASE System, which uses a large scale computer to perform repetitive simulation of a user's workload on specific hardware/software configurations, is its use of the "man in the loop" concept.

After each simulation, CASE presents output to a system analyst which suggests ways to improve the system. The analyst can then make both design and configuration changes with simple control card revisions and repeat the process until the optimum combination of system design and configuration has been achieved.

The system can be used to simulate 3rd generation computers of any manufacturer, including multiprogramming/multiprocessing systems and for a mixture of business, scientific, and real-time applications. The simulator is designed for a large scale computer with at least 65k words of memory and is currently demonstrable.

For more information, circle No. 68  
 on the Reader Service Card

Datacraft Corporation has announced a high performance, general purpose digital computer system designated the Series 6000 which it is said, will perform more than 1,500,000 operations per second. A full line of compatible peripheral equipment will also be introduced by the company. The heart of Series 6000 is the DC-6024 digital computer which is designed for use in simulator, process control and scientific applications including multi-programming, time sharing, real-time and off-line uses.

The basic DC-6024 processing unit includes five 24 bit general purpose registers, three of which may also be used as index registers; 4K-word memory (12,288 bytes); hardware multiply/divide/square root; and four true levels of priority interrupt. The basic I/O includes an ASR-33 Teletype.

Add and subtract time for fixed point is 1.2 microseconds; multiply and divide times are 4.8 and 9.0 microseconds respectively for full length operands, and hardware square root is 8.4 microseconds. Floating point hardware is optional.

The DC-6024 uses the international and American (ASCII) standard codes for information interchange.

The mainframe and memory cycle time is 600 nanoseconds, said to be the fastest in a 24 bit machine. The memory may be expanded up to 65K words (196,608 bytes) in 4K or 8K word increments. The Central Processing Unit (CPU) can address memory at the word, byte and double word levels. It also has multilevel indexing and indirect addressing.

In excess of 500 instructions are available including more than 120 generic types. Standard instruction capabilities include: register/register manipulation, operation and algebraic compares and double precision load, store, add and subtract. Instructions are also included for stack manipulation and complete external interrupt control.

For more information, circle No. 69  
 on the Reader Service Card

A new 3500 series magnetic tape recorder/reproducer which incorporates both reel-to-reel and loop operation has been developed and is being marketed by Sangamo Electric Company.

The new recorder/reproducer features a loop adapter which can be used to record or reproduce in a continuous loop mode. The adapter consists of a tape storage bin, independent capstan servo-mechanisms for tape control, a power supply and a vacuum system. A tape loop, up to 150 feet, is easily formed and is under tension in the head area only. This method increases tape loop life substantially over that of conventional multi-roller transports.

The vacuum tape tensioning system cleans the tape prior to its contact with the head area and a winding device provides a convenient means of removing the loop for storage.

The new unit utilizes a bi-directional, low-mass, fast-response drive system, any six adjacent automatically switched tape speeds from 15/16 to 120 ips, high recording density and accepts up to 16-inch reels.

For more information, circle No. 70  
 on the Reader Service Card

Jonker Corporation (Information Retrieval Systems) of Gaithersburg, Maryland, has announced the development of a new, completely automatic data entry machine, the J410.

This new machine allows the user to convert punched cards directly into Jonker term cards. Each Jonker card represents a single characteristic, an "inverted" approach to information handling.

The desired punched cards are fed into the card reader, which transmits the accession number to the J410's electronic circuits. The J410 is thereby directed to the appropriate matrix location and the hole is drilled in the Jonker card.

Entry is performed automatically, on a term-by-term basis. Accession numbers can be entered into 25 Jonker cards simultaneously at an input speed up to 3,000 entries per hour.

The J410 is 60" long, by 30" wide, by 51" high, and weighs 400 pounds.

For more information, circle No. 71  
 on the Reader Service Card

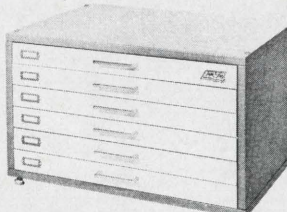
A user-oriented on-line FORTRAN programming system is now available for INTERDATA Model 3 and Model 4 digital computers. The system is a sub-set of ASA Basic FORTRAN having free format input/output and two dimensional arrays. All values are real and global.

INTERDATA FORTRAN features a direct or "desk calculator" mode of operation as well as stored program mode. The interactive feature eliminates the tedious phases of tape preparation, compiling, and object program loading. No program preparation other than keyboard entry of source statements is required; corrections are made while programs remain in core.

For more information, circle No. 72  
 on the Reader Service Card

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how to use the index of . . .

# primary employers

## WHAT FACTS ARE INDEXED?

The purpose of the SOFTWARE AGE Career Guide is to provide you with a concise and informative index to the nation's primary employers of programmers, analysts, EDP managers and operators. This directory is made for your continual reference throughout the year.

In this section, listings of primary employers include:

### ALPHA SOFTWARE COMPANY

Div. of American Software Products, Inc.  
Indiana Blvd., Indianapolis, Ind. 48573  
(317) 782-3206

Darrel W. Faucett, Computer Personnel Relations\*

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Electronic Central Office Telecommunications Switching Systems Development.

Optimize equipment and information utilization associated with electronic switching systems, and maximize traffic economies through analysis of engineering information.  
360/50, 360/40, 360/30, 360/20.

See Ad Page 99

1. company name and division
2. mailing address and phone number
3. name and in-house mailing address of company representative to whom applications should be addressed

4. an asterisk (\*) indicating company brochures available by writing the company representative
5. total, technical and software employment figures
6. brief description of operations, services and/or products manufactured
7. principal computer applications at this location
8. major EDP equipment located and used at this location

The names of those companies who are advertising in this issue appear in **extra-bold face type**, and an additional line in the listing states where to find their advertisement.

For fastest results, we strongly urge you to use the indicated in-house address for all your correspondence with the company.

## HOW IS THE INDEX ORGANIZED?

The main index section is a geo-alpha listing; it is organized alphabetically by state and the companies alphabetized within each state.

If you are interested in a particular region only, we have provided a

State Index on page 22 to directly refer you to your prime area. We have also included a simple, alphabetical, company-name index (with state location following) on page 22.

## HOW TO USE THE INDEX

As an example of how to use this directory, let us assume that you are interested in the ABC Company. First, you turn to the Alphabetical Index and find that the ABC Company is located in California. Second, you check the State Index to find where the California listings start.

If the company name is in **extra-bold type**, you know that the company has an advertisement in this issue detailing its needs. And, by the bold-italic reference line at the end of the listing, you know where to look for their ad.

If an asterisk (\*) follows the name and in-house address of the contact man, you know that you can obtain literature or brochures on software employment with the company by writing the indicated individual.

To answer *listings* in our primary index section, send your resume directly to the company. To answer *advertisements* in the magazine, you may send your own resume directly to the company or send our Confidential Inquiry Form on page 69 to us and we will duplicate and forward it to the advertisers you indicate.

## INDEX OF EMPLOYMENT AND SEARCH AGENCIES

If you care to use an employment or search agency, use our index on page 65.

# annual career guide section



Your index to the nation's primary employers of software personnel



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# ALPHABETICAL INDEX OF EMPLOYERS

To find any particular employer by name alone, check this alphabetical index. Following the name of the company, division or organization, you will find the state in which located. In the state index (below) you may find the page on which listings for that state begin. (Boldfaced listings indicate advertisers in this issue.)

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— J —

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— K —

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 Keystone Computer Associates, Inc. . Pa.  
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— L —

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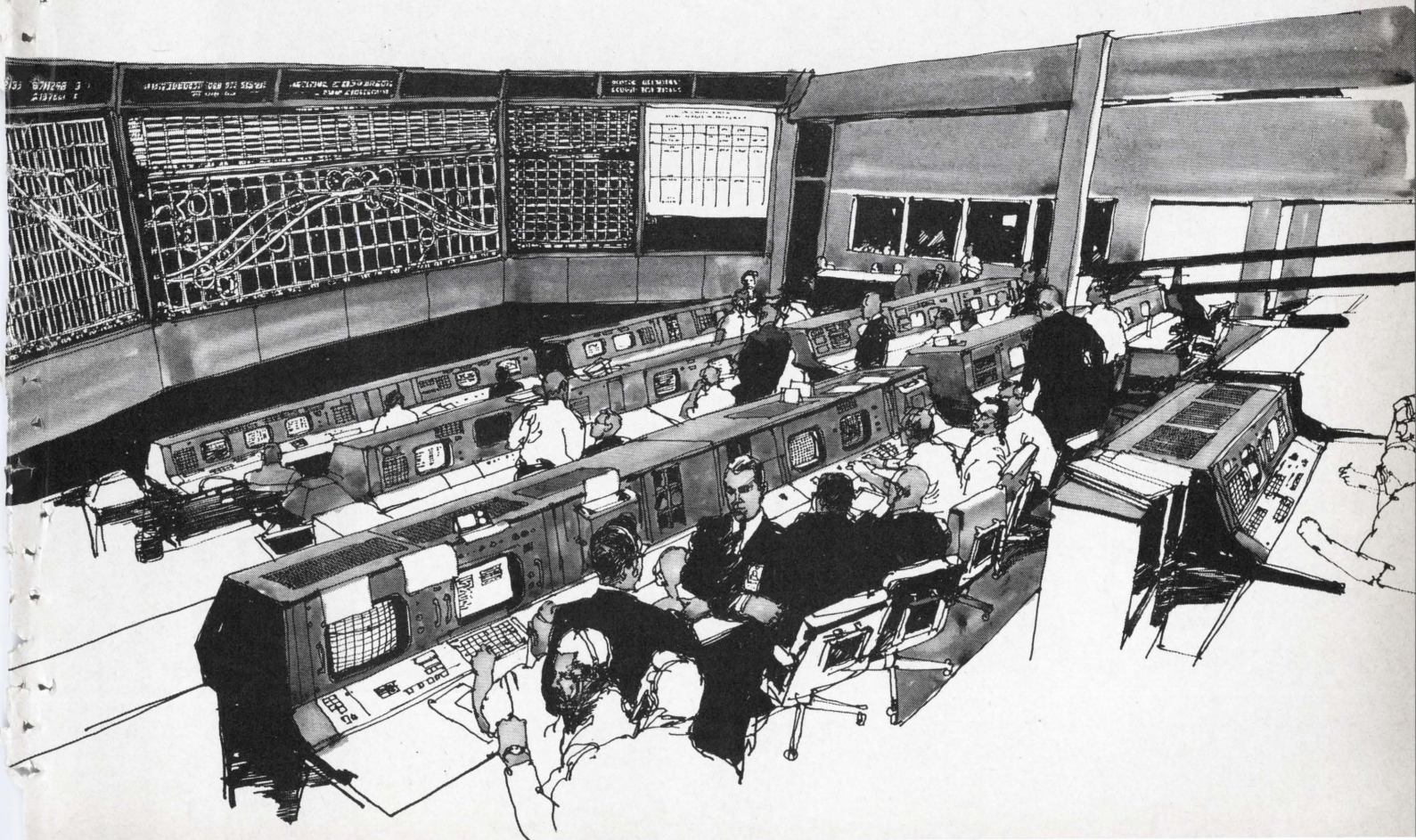
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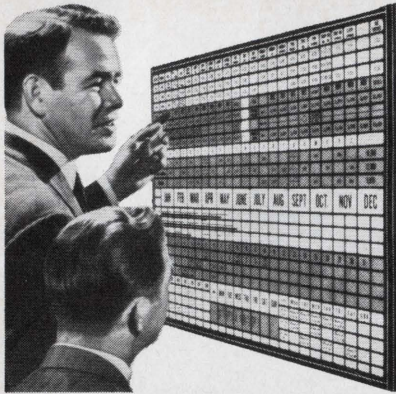
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### — R —

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Rogers Corp. ....Conn.  
Rohr Corp. ....Calif.

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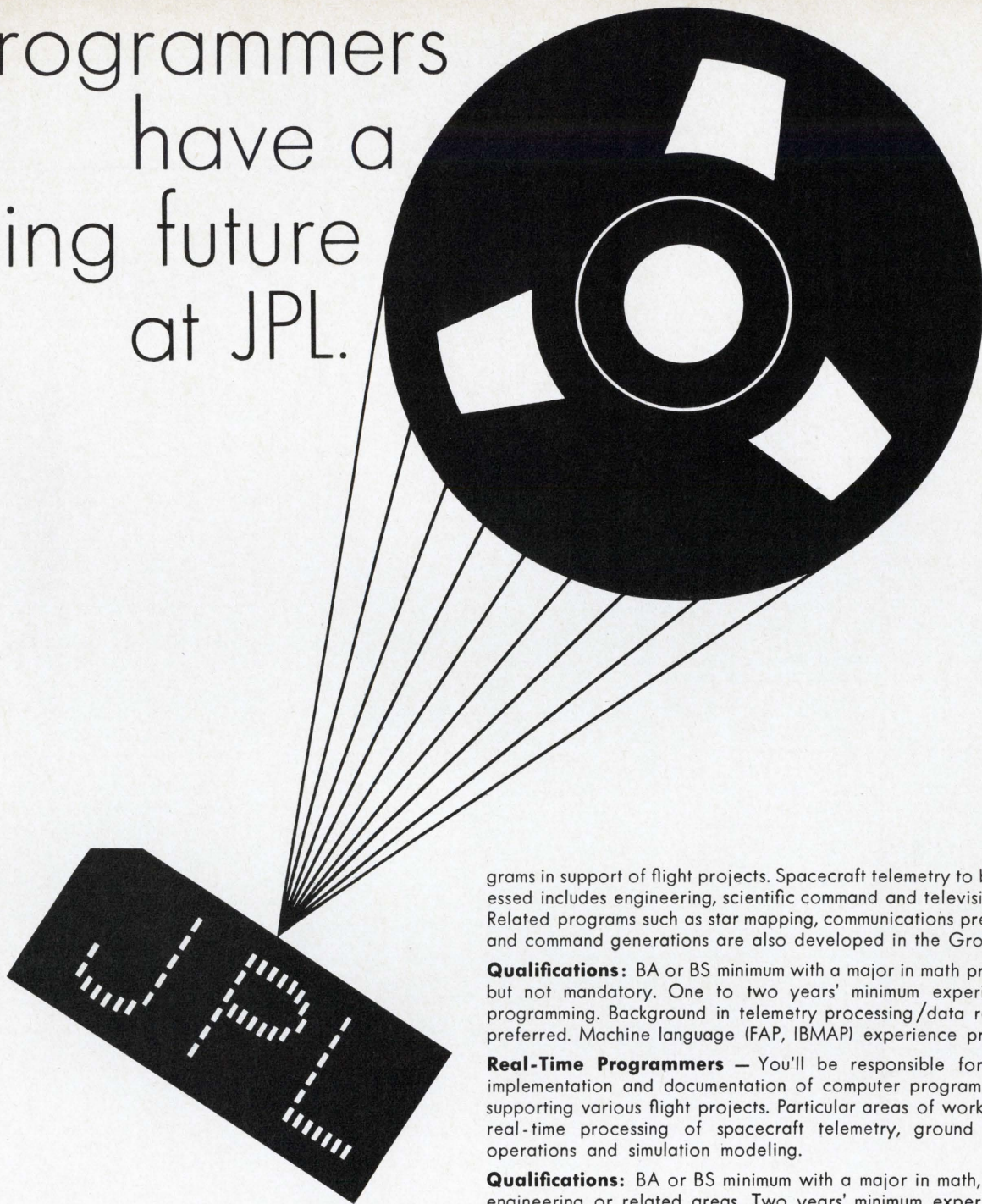
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**System Programmers** — You'll be responsible for design, implementation and conversion of computer programs for real-time data processing and control function in large general-purpose computers.

**Qualifications:** BS in math plus three years' experience with real-time data reduction systems desirable.

**Data Reduction and Processing Programmers** — You'll work in JPL's Flight Telemetry Processing Group designing, developing, implementing and documenting telemetry processing computer pro-

grams in support of flight projects. Spacecraft telemetry to be processed includes engineering, scientific command and television data. Related programs such as star mapping, communications predictions and command generations are also developed in the Group.

**Qualifications:** BA or BS minimum with a major in math preferred, but not mandatory. One to two years' minimum experience in programming. Background in telemetry processing/data reduction preferred. Machine language (FAP, IBCMAP) experience preferred.

**Real-Time Programmers** — You'll be responsible for design, implementation and documentation of computer program systems supporting various flight projects. Particular areas of work include real-time processing of spacecraft telemetry, ground support operations and simulation modeling.

**Qualifications:** BA or BS minimum with a major in math, physics, engineering or related areas. Two years' minimum experience in programming with experience in real-time applications on medium to large scale computers. Machine language experience required.

**Software Research and Advanced Development Programmers** — You'll do independent research and advanced development in computer program applications such as real time spacecraft simulation, telemetry data storage and retrieval, and analytical mathematics by time-shared computers.

**Qualifications:** Programmer/Analysts with advanced degrees, MS or beyond, and at least four years' experience in technical computer applications.

Send your resume in confidence to Mr. Wallace Peterson, Supervisor, Employment.



## JET PROPULSION LABORATORY

4800 Oak Grove Dr., Pasadena, Calif. 91103

Attention: Professional Staffing Dept. 611

"An equal opportunity employer." • Jet Propulsion Laboratory is operated by the California Institute of Technology for the National Aeronautics and Space Administration.



# primary employers

See Page 21 for instructions on how to use our Directory of Primary Employers.

## ALABAMA

### BROWN ENGINEERING—A TELEDYNE CO.

Research Park  
Huntsville, Ala. 35807  
(205) 532-1316

G. F. Sedberry, Personnel Director\*

Empl: Total this location 1,800; Total EDP Employees 130; Programmers 40; Analysts 80; Operators 10.

Data processing, services systems analysis, management services.

Business application.

IBM 360/30, 360/50.

## ARIZONA

### GENERAL ELECTRIC COMPANY— INFO SYSTEMS SALES & SERVICE

13430 N. Black Canyon Highway,  
Phoenix, Ariz. 85029

(602) 941-3563

G. C. Parker, Spec. Personnel Practices\*

Empl: Total this location 6,000; Total EDP Employees 6,000.

See Ad 2nd Cover

## CALIFORNIA

### AEROJET—GENERAL CORPORATION

Div. of General Tire and Rubber Company  
P. O. Box 15847, Sacramento, Calif. 95813  
(916) 355-6340

D. E. Cook, Mgr., Empl.\*

Empl: Total this location 7,200; Total EDP Employees 230; Programmers 75; Analysts 40; Operators 80.

Manufacturer of Rocket Engine Systems, solid, liquid and nuclear.

Scientific and business.

IBM 360.

### THE AEROSPACE CORP.

P. O. Box 95085, Los Angeles, Calif. 90045  
(213) 648-5000

S. L. Robinson, Empl. Mgr.\*

Empl: Total this location 2,916; Total EDP Employees 145; Programmers 35; Analysts 79; Operators 31.

Systems engineering and technical direction of ballistic and military space programs, together with applied, theoretical and experimental research.

Engineering and business applications.

IBM 360/30-40; CDC 6400 & 6600.

### ANALOG-DIGITAL SYSTEMS DIV.—CONTROL DATA CORPORATION

4455 Eastgate Mall, San Diego, Calif. 92037  
(714) 453-2500

George Savage, Empl. Supvr.

Empl: Total this location 480; Total EDP Employees 75; Programmers 55; Operators 8.

Analog-Signal processing equipment such as Analog-Digital, Digital-Analog Converters, Multiplexers.

Systems design in (1) Process Control, (2) Highspeed Data Acquisition, (3) Simulation Applications Programming; Standard software development.

CDC 1700; CC 3100, 3200, 3300.

### BLUE CROSS OF SOUTHERN CALIFORNIA

4777 Sunset Blvd.,  
Los Angeles, Calif. 90027  
(213) 666-3117

Gene R. Corkill, Employment Representative.  
Empl: Total this location 1,350; Total EDP Employees 35; Programmers 12; Analysts 9; Operators NA.

Group health coverage—medicare/medi-cal intermediary.

Financial systems, accounting, COBOL, Blue Cross claims processing and payment system, COBOL medicare claims processing and payment system, Easy II. Medi-cal claims processing and payment system, Easy II.  
Honeywell 1400 and H-2200.

See Ad Page 62

### BOURNS, INC.

6135 Magnolia Ave., Riverside, Calif. 92506  
(714) 684-1700

Richard Smith, Mgr.

Empl: Total this location 1,500; Total EDP Employees 43; Programmers 13; Analysts 10; Operators 20.

Electronic components.

Finance, payroll, personnel, engineering, Q.C. test and insp. data.

Spectra 70, 1400 series.

### BURROUGHS CORP., BUSINESS MACHINES GROUP

460 Sierra Madre Villa,  
Pasadena, Calif. 91109  
(213) 355-8061

T. E. Ramsay, Empl. Repr.

Empl: Total this location 3,100; Total EDP Employees 147; Programmers 91; Analysts 11; Operators 29.

Commercial digital computer systems.

Software design and development, design automation, engineering design applications, business applications.

Burroughs 2500/3500 computer systems and B 5500 system.

See Ad Page 46

### CALIFORNIA COMPUTER PRODUCTS, INC.

305 N. Muller St., Anaheim, Calif. 92803  
(714) 635-6502

Ed Smith, Personnel Administrator\*

Empl: Total this location 760; Total EDP Employees 80; Programmers 40; Analysts 20; Operators 4.

Digital computer plotting systems.

Hundreds of digital plotter applications. Software is developed in a wide variety of scientific and business applications covering fields in essence as wide as are the applications of digital computer.

GE 425, IBM 1130.

### CHAFFEY UNION HIGH SCHOOL DISTRICT

211 W. Fifth St., Ontario, Calif. 91762  
(714) 986-2711

G. Michael Jaynes, Dir. of Data Processing

Empl: Total this location 1,300; Total EDP Employees 7; Programmers 2; Analysts 1; Operators 4.

Education.

Business applications and pupil personnel accounting with future applications in student problem solving environment.

IBM 1401—disk oriented.

### CODE, INC.

8939 S. Sepulveda Blvd.,  
Los Angeles, Calif. 90045  
(213) 670-2200

Clifford D. Bruhn, Empl. Mgr.

Empl: Total this location 10; Total EDP Employees 9; Analysts 9.

Computer programming systems.

Operating systems, scientific and business programming and assembly languages.

IBM, CDC.

### COLLINS RADIO CO.

Newport Beach Div.

19700 San Joaquin, Newport Beach, Calif.

(714) 833-0600

Phil Chamberlin, Mgr., Prof. Empl.

Empl: Total this location 1,900; Total EDP Employees 90; Programmers 60; Analysts 15; Operators 15.

Communication systems using company's computer, modems and termination units.

Computer used as an automatic message switching device in a teletype network. Teletype message switching and direct digital control programs are developed at the Newport facility.

Bryant disc files, Potter tape drives, Data Products printers, CDC card readers.

### COMPUTER INDUSTRIES, INC.

Graphic Systems Division

14761 Califa St., Van Nuys, Calif. 91401

(213) 781-7100

### COMPUTER SCIENCES DIV.—COMPUTER SCIENCES CORPORATION

650 N. Sepulveda Blvd.,  
El Segundo, Calif. 90245

(213) 678-8592

Richard Neumann, Mgr. Employment\*

Empl: Total this location 3,000; Total EDP Employees 800; Programmers 780; Operators 20.

Computer software.

Commercial, scientific, command and control, systems.

IBM 360.

### COMPUTING & SOFTWARE, INC.

8155 Van Nuys Blvd., Suite 250,  
Panorama City, Calif. 91402

(213) 988-3400

Bill Barancik, V. P.\*

Empl: Total this location 2,000; Total EDP Employees 1,250.

Commercial and scientific data processing. Computer software development and training in data processing field.

Custom programming: feasibility studies, system analysis, programming and maintenance services. Software packages: commercial applications, scientific applications, systems.

IBM, CDC, Univac.

### CONSOLIDATED ANALYSIS CENTERS INC.

225 Santa Monica Blvd.,  
Santa Monica, Calif. 90401

(213) 451-5771

Joseph S. Annino, Mgr. Systems Programming

Empl: Total this location 23; Total EDP Employees 14; Programmers 3; Analysts 6; Operators 2.

Software development.

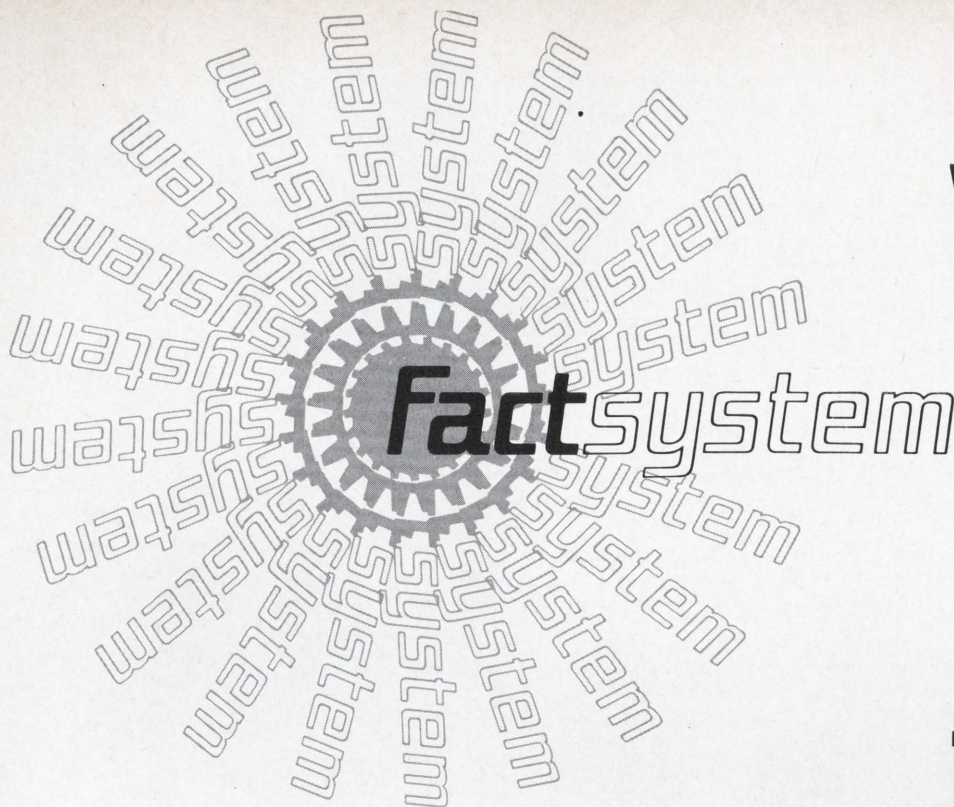
Information retrieval, digital simulation, compiler development.

### CYBERNETIC SYSTEMS, INC.

395 Vernon, Oakland, Calif. 94610  
(415) 655-5066

P. Lamasney, Vice Pres.





# **we dare you to fight the system . . .**

. . . the system that says **any** program is good enough as long as it works. At Factsystem, you'll **have** to fight the system . . . we're not looking for programmers to just write **any** program — we want creative individuals who will write the **best** program.

We can offer you a fresh new approach to your job, working with stimulating people, in a creative atmosphere. Our whole business relies on people with ideas . . . with ability . . . with imagination, who are ready to accept a challenge and turn out the best possible solution for universal application. Factsystem's management information software package — uniquely integrated and comprehensive, is applicable to virtually any commercial structure. As a professional in the computer field, you'll understand how this concept challenges your capabilities — gives you room for growth — room to put your ideas to work.

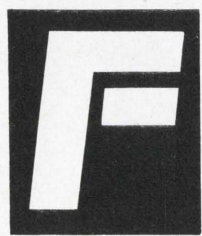
We need qualified individuals for these positions:

PROGRAMMERS . . . with at least one year of experience on 360 and a working knowledge of 360 COBOL and/or assembly language.

SENIOR PROGRAMMERS . . . with heavy experience on IBM 360 for systems software — OS, DOS, TP.

SYSTEMS ANALYSTS . . . with a minimum of 5 years experience in systems analysis, and knowledge of programming. The specific areas: accounting and financial analysis, IMPAC and BMP, production scheduling, simulation and management science. Knowledge of IBM 360 series helpful.

You can grow with us and share in profits based on your creative contribution. Now is the time to get into this great new branch of a going industry. We have an excellent benefit package that includes free hospitalization and insurance. Send your resume or call collect in complete confidence. David Fay (312) 944-2530



## **Factsystem** Inc.

**Programmed for Informed Management**

612 North Michigan Avenue, Chicago, Illinois 60611, Area Code 312 944-2530



Empl: Total this location 10; Total EDP Employees 8; Programmers 2; Analysts 6.  
EDP consulting.  
Real time commercial applications.

**DATA TECHNOLOGY INSTRUMENT CO., DIV. OF DATA TECHNOLOGY CORPORATION**  
2370 Charleston Road,  
Mountain View, Calif. 94040  
(415) 964-2600

George Glenn, Marketing Mgr., Computer Div.\*  
Empl: Total this location 200; Total EDP Employees 4; Programmers 1.  
Digital voltmeters, digital panel meters, A to D small computers and logic cards converters, digital interface equipment, low level measuring systems, transducer interface.

#### DIGITEK CORPORATION

5410 West Imperial Highway,  
Los Angeles, Calif. 90045  
(213) 644-4421

Jack A. Strong, Exec. Vice Pres.  
Empl: Total this location 80; Total EDP Employees 80; Programmers 50; Analysts 15.  
Entire spectrum of Computer Sciences software.

#### ELECTRAC, INC.

1614 Orangethorpe Ave.,  
Anaheim, Calif. 92801  
(714) 879-6021

Tracking filters, tracking receivers, tracking demodulators, PCM bit synchronizers.

#### FAIRCHILD CAMERA & INSTRUMENT CORP., FAIRCHILD SEMICONDUCTOR

313 Fairchild Drive,  
Mountain View, Calif. 94040  
(415) 962-2833

M. E. Hawkins, Supervisor of Professional Employment\*

Empl: Total this location 7,000; Total EDP Employees 128; Programmers 10; Analysts 19; Operators 14.

Design, develop, and mfg. of silicon semiconductor devices.

O.R., mfg., scientific (E.E.) and commercial.  
360/30, 360/50.

#### FARRINGTON MANUFACTURING CO.

1545 Wilshire Boulevard,  
Los Angeles, Calif. 90017  
(213) 483-2215

Marketing.  
Optical character recognition.

#### FMC CORPORATION

P. O. Box 760, San Jose, Calif. 95106  
(408) 289-2914

D. J. Lowe, Empl. Supvr.\*

Empl: Total this location 4,500; Total EDP Employees 100; Programmers 15; Analysts 14; Operators 9.

Machinery fabrication.

IBM 360 used primarily, business applications.  
IBM 360

#### FRIDEN, INC.

Div. of the Singer Co.  
2350 Washington Ave.,  
San Leandro, Calif. 94577  
(415) 357-6800

Mr. George W. Tansill, Empl. Mgr.

Empl: Total this location 2,500; Total EDP Employees 90; Programmers Yes; Analysts Yes; Operators Yes.

Electronic business machines and EDP systems. Manufacturing systems, Software development, scientific programming, design automation and graphic displays.

IBM 360 DOS/MOS, Honeywell 200.

#### GENERAL DYNAMICS—ELECTRONICS DIV.

P. O. Box 127, San Diego, Calif. 92112  
(714) 298-4641

Vincent Finley, Professional Placement\*

Empl: Total this location 900; Total EDP Employees 40; Programmers 24; Analysts 14; Operators 2.

Airborne and ground radar; transponders; tracking systems.

Scientific programming; real time; data communications.  
Univac 1230.

#### GENERAL ELECTRIC CO.—NUCLEAR ENERGY DIV.

175 Curtner Ave., San Jose, Calif. 95125  
(408) 297-3000

J. J. Leonard, Professional Placement.

Empl: Total this location 3,600; Total EDP Employees 145; Programmers 45; Analysts 30; Operators 60.

Nuclear reactors, fuels, instrumentation.

Nuclear reactor simulation and analysis, thermohydraulics, dynamic and stability analysis, general scientific, management decisions and forecasting, nuclear plant monitors.

GE-635 (Large GE-635 with remote terminal GE-115's).

#### HEWLETT—PACKARD CO.

1501 Page Mill Road, Palo Alto, Calif. 94304  
(415) 326-7000

N. O. Williams, Prof. Empl. Mgr.\*

Empl: Total this location 5,000; Total EDP Employees 80; Programmers 20; Analysts 15; Operators 5.

Small digital computers and electronic test instrumentation.

Electronic test systems, data acquisition, scientific and commercial applications.

HP-2116, HP-2115, HP-2114, HP-2000, IBM-360/40.

#### HUGHES AIRCRAFT CO.

P. O. Box 3310, Fullerton, Calif. 92633  
(714) 871-3232

D. K. Horton, Supervisor, Professional Staffing

Empl: Total this location 6,500; Total EDP Employees 700; Programmers 125; Analysts 100; Operators 25.

Computer systems, digital data processing systems, tactical air defense and space support systems, land-and ship-based frequency-scanning and inertialles multitrack 3-D radar systems, communication, electronic displays and systems analysis.

Real time air defense and air traffic control systems, data reduction, aircraft performance data curve fitting, simulations of tracking and weapon control systems, management information systems.

Hughes 3118, Hughes 4118, IBM 360/50, GE 635.

#### HUGHES AIRCRAFT CO., FIELD SERVICE AND SUPPORT DIVISION

P. O. Box 90515, Los Angeles, Calif. 90009  
(213) 670-1515

John G. Wilhite, Professional Recruiter.\*

Empl: Total this location 1,800; Total EDP Employees 38; Programmers 12; Analysts 5; Operators 6.

Aerospace electronics.

#### INFORMATICS INC.

5430 Van Nuys Blvd.,  
Sherman Oaks, Calif. 91403  
(213) 783-7500

Robert F. Foster, Mgr./Adm.\*

Empl: Total this location 165; Total EDP Employees 140; Programmers 60; Analysts 80.

Computer systems analysis and programming for commercial and scientific applications. Use a variety of computers, generally located at customers' sites.

See Ad Page 54

#### INFORMATION DEVELOPMENT COMPANY

1621 East Seventeenth Street,  
Santa Ana, Calif. 92701  
(714) 547-8861

George J. Vasilakos, Exec. Vice-Pres.

Empl: Total this location 60; Programmers 50.

Software consulting.

#### INFO SCI INC.

Box 464, Menlo Park, Calif. 94025  
(415) 365-1111

Mr. John L. McTap, Office Supvr.

Empl: Total this location 14; Total EDP Employees 14; Programmers 8; Analysts 6.  
Consulting services, systems analysis and design services, programming services, documentation services, with stress on the commercial applications and on management information systems.

Statistical programs (proprietary), and custom-designed programs.

#### JET PROPULSION LABORATORY

Div. of California Institute of Technology  
4800 Oak Grove Dr., Pasadena, Calif. 91103  
(213) 354-3830

M. Wallace Peterson, Empl. Supvr.

Empl: Total this location 4,000.

Responsible for conceiving, designing and supervising the fabrication, testing and instrumentation of spacecraft for the nation's unmanned lunar and planetary explorations, and for communications with the spacecraft, flight operations, and data handling.

See Ad Page 27

#### LAWRENCE RADIATION LABORATORY

Div. of University of California

P. O. Box 808 65-69, Livermore, Calif. 94550  
(415) 447-1100

Mr. John Gloeckler, Pers. Rep.\*

Empl: Total this location 5,700; Total Scientific EDP 190; Total Administrative EDP 26; Programmers 125; Analysts 4; Operators 87.

Nuclear research and development.

Scientific research and administrative data processing.

IBM, CDC, PDP, Remington Rand.

#### LOCKHEED AIRCRAFT CORPORATION—

LOCKHEED—CALIFORNIA COMPANY

P. O. Box 551, Burbank, Calif. 91503  
(213) 847-6978

C. R. Alexander, Prof. Empl. Supvr.

Empl: Total this location 22,500; Total EDP Employees 270; Programmers 150; Analysts 70; Operators 30.

Military and commercial aircraft and helicopter.

Cost accounting, work measurement, logistics, material inventory, order control.

IBM 7080, IBM 360-65, NCR 315, RCA-Spectra 45.

#### LOGICON, INC.

255 W. 5th Street, San Pedro, Calif. 90733  
(213) 831-0611

George E. Kellenberger, Pers. Admin.\*

Empl: Total this location 230; Total EDP Employees 150; Programmers 110; Analysts 40.

Systems engineering and computer sciences. Data acquisition and control information systems, training and simulation, scientific analyses.

Includes almost all major computer systems both commercial and military.

#### MAGNAVOX RESEARCH LABORATORIES

Government & Industrial Products Division  
2829 Maricopa St., Torrance, Calif. 90503

(213) 328-0770

Fred A. Peters, Supvr., Empl.

R&D digital antijam pseudo-noise communication systems.

#### MANAGEMENT SCIENCES DIV., URS SYSTEMS CORPORATION

1819 Trousdale Drive,  
Burlingame, Calif. 94010

(415) 697-9641

Robert A. Harker, General Manager\*

Empl: Total this location 56; Total EDP Employees 56; Programmers 25; Analysts 15; Operators 2.

Computer software systems analysis, design programming, documentation and training.

Management information systems development including administrative, accounting and inventory systems; language and conversion techniques, operating research.

All—depending on client.



# WE'RE LOOKING FOR PEOPLE WITH PROBLEMS

We have plenty of solutions. What we need are problems...and people who are good at thinking them up.

We're lucky to have some of the most outstanding software people in the country out here in Sunnyvale, California. And we need the best. Because our assignment is the total information system segment of orbiting satellite systems. Includes planning, commanding, data management and post flight analysis. We not only design information systems to fill present needs, but anticipate and project information system segments of space systems that will most likely be needed in 1970 or '75.

It should come as no surprise to learn we have more operational software development and more operating on-orbit experience in complex spacecraft than anyone in America.

Now, since most people are trained as problem-solvers, the people we hire will be quite extraordinary. In a way, we're asking for trouble. That is, we're asking for people who habitually create more problems than they're worth...to most other companies.

What we'll do when we find them is make their problems worth more. With us,

they'll be creating more worth than problems, even though they're still creating problems.

Get it?

If you do, you may have real problems. The kind we're looking for.

If you're one of the professionals with a degree in EE, Physics or Math and have 2-10 years applicable experience, see if you can create problems for us in any of the following areas:

**MATH SPECIALISTS—COMPUTER APPLICATIONS** Provide detail design, development, maintenance, modification and improvements for command and control, event and data evaluation computer programs for use on assigned satellite projects.

**PROGRAMMERS** Coordinate with systems engineers, ops analysis engineers, and users and/or the customer to determine basic requirements for computer program development and modification. Document, design, flow chart, code, check-out and validate computer programs.

**ANALYSIS ENGINEERS—COMMAND AND CONTROL** Provide technical coordination to assure compatibility of computer software programs and data base for op-

erational vehicles and on-orbit operational support for the hardware/software interface areas. Background in analysis and operation of airborne systems and sub-systems with emphasis on digital command and telemetry systems. Knowledge of computers, associated software. An understanding of software logic and Jovial language required.

**SPECIALISTS — VALIDATION AND TEST** Establish test procedures, at the system, sub-system, and module level from preliminary and final design specifications of software programs. Conduct extensive validation tests to ensure compatibility with all developed programs.

Please send details of your educational background and experience, including salary requirements, to Mr. I. Cutter, General Electric Co., Space Systems, Room 168-J, 1003 West Maude Ave., Sunnyvale, California 94086.

Command & Information Systems  
Operations

**SPACE SYSTEMS**

**GENERAL  ELECTRIC**

An Equal Opportunity Employer (M/F)



**MEDICAL METHODS RESEARCH, PERMANENTE MEDICAL GROUP**

3779 Piedmont Ave., Oakland, Calif. 94611  
(415) 653-6121

Mr. Lou S. Davis, Mgr., Computer Center\*  
Empl: Total this location 75; Total EDP Employees 42; Programmers 18; Analysts 3; Operators 20.

Medical service and medical research. Medical information systems, medical data acquisition, processing, retrieval and research. 2 IBM 360/50's, Telecommunication terminals, Sanders clini-call system.

**NUCLEAR RESEARCH INSTRUMENTS**

Div. of Houston Fearless Corporation  
2800 Seventh St., Berkeley, Calif. 94710  
(415) 841-7012

Barrett C. Jennings, Adm. Mgr.  
Empl: Total this location 44; Total EDP Employees 2; Programmers 2.  
Precision photogrammetric measuring devices involving computer controls.  
Control of precision measuring equipment.  
Minneapolis Honeywell 516; SDS 910.

**PHILCO-FORD CORP., SPACE & RE-ENTRY SYSTEMS DIV.**

3870 Fabian Way, Bldg. L,  
Palo Alto, Calif. 94303  
(415) 326-4350

Gus Dedo, Prof. Empl. Specialist  
Empl: Total this location 1,500; Total EDP Employees 35; Programmers 15; Analysts 12; Operators 8.  
Research and development of space electronics instrumentation, communications satellites and re-entry capsules.  
Management information systems, simulation exercises, scientific problem solution.  
IBM 360/40

**PROGRAMMING SCIENCES CORP.**

14937 Ventura Blvd.,  
Sherman Oaks, Calif. 91403  
(213) 783-1441

Victor Sampson, Corporate Administrator\*  
Systems analysis, computer software.  
Full spectrum of computer software: systems, real-time, scientific/engr. and commercial applications, compilers, exec. systems, language processors and proprietary program development.

**PLANNING RESEARCH CORP.**

1100 Glendon Ave., Los Angeles, Calif. 90024  
(213) 479-7725

Frank S. Dietz, Jr., Admin., Prof. Staffing\*  
Empl: Total this location 300; Total EDP Employees 55; Programmers 20; Analysts 35.  
Computer systems design and software.  
Commercial (i.e. management information systems, information storage and retrieval, automatic stock brokerage, inventory control, accounting), Scientific (i.e. orbit and trajectory determination, math modeling and simulation, numerical analysis), Systems Software (i.e. assemblers, compilers and operating systems in various languages), Real Time, Bio-Medical. Any and all types of equipment as dictated by given projects.

**ROCKETDYNE-NORTH AMERICAN ROCKWELL CORPORATION**

6633 Canoga Ave., Canoga Park, Calif. 90005  
(213) 884-3114

Norm S. White, Employment Supvr.\*  
Empl: Total this location 9,500; Total EDP Employees 450.

Propulsion systems research and development.

Present areas of activity include multi-processing, multi-programming, on-line teleprocessing, large random access data-base files, graphics, time sharing, digital high speed data transmission, advanced data collection systems, large-scale scientific/business applications, mgt. info. system.  
IBM 360 system.

**ROHR CORP.**

P. O. Box 878, Chula Vista, Calif. 92012  
(714) 422-7111

S. M. Main, Supvr.—Professional Placement  
Empl: Total this location 9,347; Total EDP Employees 200; Programmers 50; Analysts 25; Operators 25.

Aerospace—manufacturing of major aircraft components.

Management information, WIP, materiel, engineering, etc. Strong N/C and automated warehouse.

On line-mass storage-multiple programming system. 360, models 65 and 50, 512K, four 2314's, 16 tapes, 3 printers. 200 touchtone phones and 16 CRTS on line in operation over one year.

**SAN DIEGO CITY SCHOOLS**

4100 Normal St., San Diego, Calif. 92103  
(714) 298-4681

Martin Leahy, Pers. Analyst\*  
Empl: Total this location 13,000; Total EDP Employees 30; Programmers/Analysts (combined jobs) 12; Operators 12.

Management information system concept; major business applications in 3 functional areas: financial information, personnel information, pupil information.

Real-time financial control system; fully integrated personnel/payroll system; combined purchasing—warehousing—distribution system; comprehensive student record, modular class scheduling and grade reporting systems; computer-assisted instruction. Developmental work in telecommunications applied to above areas. IBM 360/30, 64K, tape/disk, tie-in with Digi-tek Optical scanner, almost exclusive use of COBOL.

**SCIENTIFIC DATA SYSTEMS, INC.**

701 South Aviation Boulevard,  
El Segundo, Calif. 90245  
(213) 772-4511

W. V. Kendall, Empl. Mgr.\*  
Empl: Total this location 3,900; Total EDP Employees 250.

Applied research, design, development, test, production and sales of digital computer systems.

Development of real time, scientific and business software.  
Sigma 7, Sigma 5, Sigma 2, 940, 945.

**SPACE NUCLEAR CORPORATION**

10884 Santa Monica Boulevard,  
Los Angeles, Calif. 90025  
(213) 474-4538

William Coleman, President\*  
Empl: Total this location 11; Total EDP Employees 9; Programmers 5; Analysts 4.  
Programming services.

On-line systems, data analysis and reduction, financial data and management information.  
360/30.

**STANFORD LINEAR ACCELERATOR CENTER**

P. O. Box 4349, Stanford, Calif. 94305  
G. F. Renner

See Ad Page 41

**STELLARMETRICS—AN AYDIN COMPANY**

416 E. Cota St., Santa Barbara, Calif. 93102  
(805) 963-3566

M. K. Aldrich, Pers. Admin.  
Empl: Total this location 100; Total EDP Employees 1; Programmers 1.  
Computer peripheral telemetry ground stations.

PAM and PCM computer-controlled equipment fabricated for direct computer interface where computer processing of flight or test data is required.

**STROMBERG DATAGRAPHICS, INC.**

A Subsidiary of General Dynamics  
P. O. Box 2449, San Diego, Calif. 92112  
(714) 298-8331, ext. 301

J. R. Colvin, Personnel Adm. Mgr.

Empl: Total this location 1,228; Total EDP Employees 43; Programmers 6; Analysts 34; Operators 3.

Micromation printers, microfilm and microfiche inquiry stations; film processors and copiers. Source document records, engineering drawings, manufacturing activity, catalogues, engineering drawings. (Positions for systems analysts are nationwide).

Compatible with most existing computer-generated magnetic tapes, including third-generation systems.

**TELEDYNE SYSTEMS CO.**

Div. of Teledyne Inc.  
19601 Nordhoff St., Northridge, Calif. 91324  
(213) 886-2211

J. W. Oldenkamp, Mgr. Prof. Empl.

Empl: Total this location 1,500; Programmers 8; Analysts 4; Operators 5.

Avionic computers and support equipment, integrated helicopter Avionic systems.

Scientific and business programming, Cobal, Bal, Fortran II & IV.  
IBM 360, MOD 30 & 40, DOS systems.

**TRW SYSTEMS**

One Space Park, Redondo Beach, Calif.  
(213) 679-8711

D. Wong, Prof. Placement

Empl: Total this location 16,000; Total EDP Employees 1,000.

Design and build satellites, systems engineering, spacecraft propulsion, operations analysis, applied research, electronics, civil systems. Information systems, mathematical techniques, mission analysis, signal analysis, engineering analysis, real time applications.

CDC 6500, IBM 7094, IBM 360/65, IBM 1800, SDS 930 serving 50 remote terminals.

**UNITED COMPUTING CORP.**

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Redondo Beach, Calif. 90277  
(213) 376-8438

C. T. Shepherd, Vice Pres.\*

Empl: Total this location 26; Total EDP Employees 24; Programmers 14; Analysts 10.

Systems design and program development for real time, business, scientific, computer software and numerical control applications.  
360/65, Sigma 5/7, L-3050, PDP 8, B-300, B-5500, 1108, 3200 and others.

**UNIVAC DIVISION OF SPERRY RAND CORPORATION**

1901 Avenue of the Stars, Suite No. 940,  
Los Angeles, Calif. 90067

(213) 277-0565

J. K. Bury, Regional Personnel Supvr.\*

Empl: Total this location 1,000 (serviced from this location).

Computers—3 Regional Services: Marketing and Field Engineering.

See above—Primarily Marketing and Field Engineering.

**UNIVERSAL DATA SYSTEMS, INCORPORATED —THE RUCKER COMPANY**

14482 Beach Boulevard, Suite No. B,  
Westminster, Calif. 92683

(714) 897-1033

James J. Milanese, Vice-Pres.\*

Empl: Total this location 9; Total EDP Employees 9; Analysts 7.

Information systems consulting, scientific and engineering programming, operations research, process control system design, orbit determination, simulation and process control programs. Weapons systems analysis, wargaming.

**VARIAN AEROGRAPH, VARIAN ASSOCIATES**

2700 Mitchell Drive,  
Walnut Creek, Calif. 94598

(415) 939-2400

Terry L. Beckley, Personnel Mgr.\*

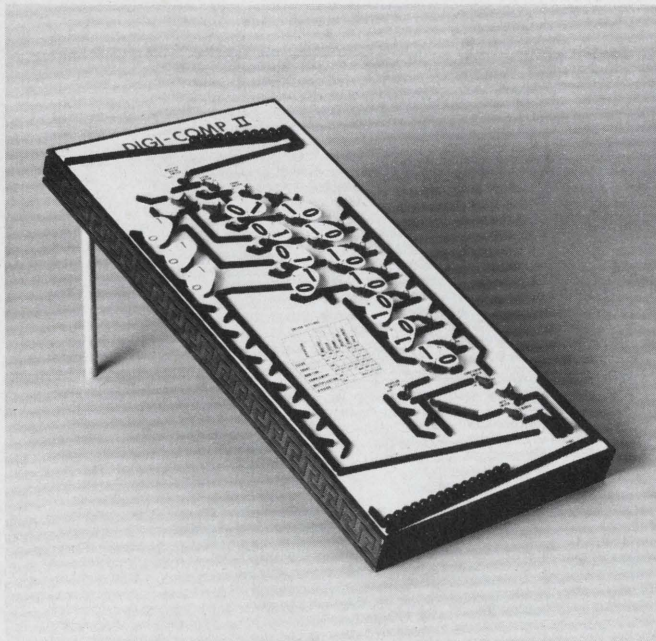
Empl: Total this location 350; Total EDP Employees 12; Programmer 1; Analysts 2; Operators 9.



# Now...

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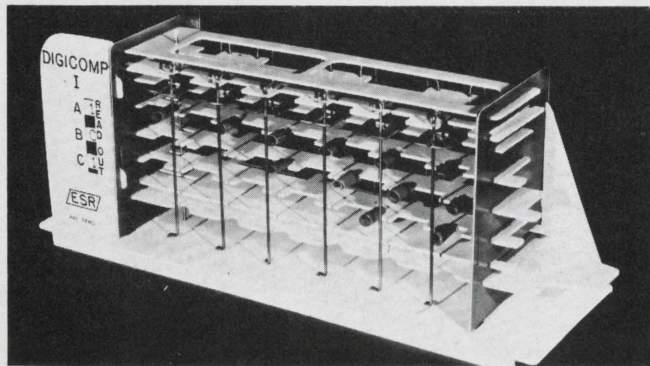
enormously more "sophisticated" as additional "switches" and "core positions" permit many more decisions and "branching" possibilities.



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

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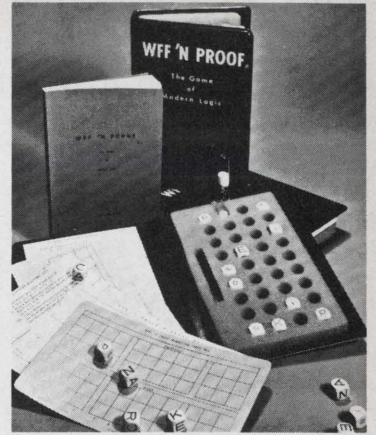
## DIGICOMP-I COMPUTER



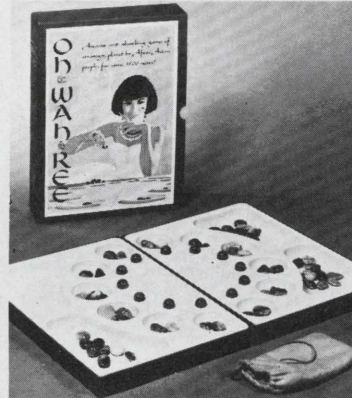
Ingenious mechanical equivalent of an electronic digital computer. Can be "programmed" to perform, individually, every operation of a digital computer. Best thing ever for teaching binary math, how a computer operates, how and why problems must be broken down for machine solution. In kit form—1 hr. to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

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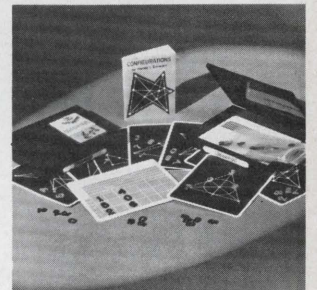
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Another famous "bookshelf" game, package matches that of Oh-Wah-Ree. A stimulating game with a fascinating chess-like strategy of move and countermove. Two or four players.

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(415) 326-8830

J. W. Waste, Sr. Personnel Administrator  
Empl: Total this location 1,600; Total EDP Employees 25; Programmers 4; Analysts 8; Operators 4.

Research, development and manufacturing of microwave device systems and solid state electronics.

Financial and manufacturing.  
Univac 1005.

**WESTERN OPERATIONS INC.**  
120 Montgomery St.,  
San Francisco, Calif. 94104  
(415) 981-1131

Clyde A. Carrell, Dir. of Project Management\*  
Empl: Total this location 75; Total EDP Employees 50; Programmers 26; Analysts 12; Operators 12.

Application Software.

Financial, banking, mutual funds, manufacturing, hospital, engineering, and accounting.  
IBM 360, Models 20, 30, 40, 50, and 65.

## COLORADO

**NATIONAL CENTER FOR ATMOSPHERIC RESEARCH**  
P. O. Box 1470, Boulder, Colo. 80302  
(303) 444-5151

David Robertson\*

Empl: Total this location 500; Total EDP Employees 40; Programmers 25; Analysts 5; Operators 9.

Meteorological research.

Numerical models in atmospheric science.

Control Data 6600 Computer.

**SYSTEMATION, INC.**

P. O. Box 730,  
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Hank Green, Mktg. V. P.\*

Empl: Total this location 30.

Basic systems course for programmers—an on-the-job training program by mail.

**UNIVERSITY OF COLORADO GRADUATE SCHOOL COMPUTING CENTER**  
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Ray Pitsker, Mgr.

Empl: Total this location 22; Total EDP Employees 22; Programmers 8; Analysts 4; Operators 10.

Computing services.

Scientific research.

CDC 6400 with Graphic I/O.

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**AVCO LYCOMING DIV. OF AVCO CORP.**  
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Aubrey R. Morrison, Pers. Mgr.

Empl: Total this location 10,000; Total EDP Employees 90; Programmers 29; Analysts 6; Operators 13.

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Gas turbine engines, re-entry vehicles, constant speed drives.

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Harold Landfield, Manager, Technical Publications\*

Peripheral computer products.

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69 Walnut St., Stamford, Conn. 06904  
(203) 327-3000

Christopher P. Wales, Mgr., Prof. & Tech. Empl.  
Empl: Total this location 3,000; Total EDP Employees 40; Programmers 12; Analysts 12; Operators 10.

Postage meters, automated paper handling equipment, copier products.

Manufacturing and business applications.

2—IBM 360/30 tape and disc.

**PRATT & WHITNEY AIRCRAFT**

East Hartford, Conn. 06108

H. M. Heldmann, Professional Placement

See Ad Page 44

**ROGERS CORP.**

Main St., Rogers, Conn. 06263  
(203) 774-9605

Robert A. Poor, Mgr. Personnel Development  
Empl: Total this location 800; Total EDP Employees 6; Programmers 1; Analysts 2; Operators 3.

Two divisions here—1) paper products, 2) electrical components.

Production and inventory control.

360/20 IBM.

**SIKORSKY AIRCRAFT, UNITED AIRCRAFT CORP.**

North Main Street, Stratford, Conn. 06602  
(203) 378-6361

Leo J. Shalvoy, Supvr. Professional Employment\*

Empl: Total this location 10,500; Management Information Systems 150; Total EDP Employees: Technical Computing 36; Programmers 25; Analysts 56; Operators 17.

VTOL aircraft.

Manufacturing, production control, accounting, engineering analysis.

IBM 360 Model 65, Model 40, Model 30;

UNIVAC 1108; PDP 10 Model 40, AD 4

Analog.

See Ad Page 19

## DELAWARE

**SCI-TEK COMPUTER CENTER, INC.**

1707 Gilpin Ave., Wilmington, Del. 19806  
(302) 652-3967

R. W. Schultheis, Jr., Gen. Mgr.

Empl: Total this location 50; Total EDP Employees 30.

Scientific/Engineering computational services.

UNIVAC 1107.

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A Subsidiary of Control Data Corp.

5272 River Road, Washington, D. C. 20016  
(301) 652-2268

Robert H. Meyer, Vice Pres.—Pers.\*

Empl: Total this location 250; Total EDP Employees 200; Programmers 125; Analysts 75.

Computer related professional services.

Design automation, management systems, mathematical programming, operations research, scientific and engineering systems

analysis, statistical analysis, project mgt. systems, urban studies, economics and econometrics, market research.

CDC, IBM, GE.

**COMPUTER SCIENCE AND SYSTEMS—JOHN I. THOMPSON & COMPANY**

1118 22d St., NW, Washington, D. C. 20019  
(202) 337-4200

Robert S. Vandiver, Sr. Vice Pres.\*

Empl: Total this location 225; Total EDP Employees 20; Programmers 5; Analysts 4; Operators 3.

Engineering design, systems analysis, library sciences.

Support services for above products.

IBM 360/30 with 5 tape drives/2 disk packs; EAM.

**COMRESS, INC.**

2120 Bladensburg Rd., N.E.,  
Washington, D. C. 20018  
(202) 529-0360

James M. Hayes, Pers. Mgr.\*

Empl: Total this location 120; Programmers 25; Analysts 20; Operators 6.

EDP consulting.

EDP feasibility studies systems design, systems analysis, commercial applications programming, development of proprietary software.

UNIVAC 1050.

**DATA SCIENCES, INCORPORATED**

1225 Connecticut Ave., N. W.,  
Washington, D. C. 20036  
(202) 659-2929

Robert W. Roth, Vice Pres.\*

Empl: Total this location 7; Total EDP Employees 6; Programmers 1; Analysts 2; Operators 1.

Magnetic tape to microfilm services including microfilm plotting and microfilm oriented information and retrieval system.

Software systems and studies in general support of microfilming.

**GENERAL SERVICES ADMINISTRATION**

18th and F Streets, N. W.,  
Washington, D. C. 20405  
343-4012

(Mrs.) Patricia S. Haight, Pers. Mgmt.\*

Empl: Total this location 4,000; Total EDP Employees 300; Programmers 200; Analysts 100.

Business oriented services for federal agencies.

Accounting, supply, telecommunications, buildings construction.

GE, IBM, Honeywell.

**TRW SYSTEMS**

Div. of TRW, Inc.

1735 Eye St., Washington, D. C. 20006  
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Donald C. Bird, Empl. Mgr.\*

Empl: Total this location 500; Total EDP Employees 65; Programmers and Analysts 30; Operators 16.

R & D.

Management Info. Sys., Scientific Applications.  
360 mod. 40.

**U. S. ATOMIC ENERGY COMMISSION**

Washington, D. C. 20545  
(301) 973-4091

E. E. Hamilton, Coordinator of Recruitment

Empl: Total this location 2,000; Total EDP Employees 57; Programmers 8; Analysts 10; Operators 7; Other 32.

Administering the nation's atomic energy program.

Agency wide automated management information systems.

IBM 360/50.

**U. S. BUREAU OF NAVAL PERSONNEL**

Chief of Naval Personnel, Navy Department  
Washington, D. C. 20370

(202) OX 4-4441



Miss Marion Moss  
Empl: Total this location 1,900; Total EDP Employees 300.  
Bureau headquarters for military personnel management.  
EDP applications include management information systems, personnel data dissemination systems and financial systems.  
IBM 360, models 30 and 40; IBM 7080.

**U. S. GEOLOGICAL SURVEY, COMPUTER CENTER DIVISION**

Div. of Department of Interior  
18th and C Streets, N. W.  
Washington, D. C. 20242  
(202) 343-3318

Charles D. Ritter, Adm. Officer\*  
Empl: Total this location 2,400; Total EDP Employees 100; Programmers 15; Analysts 15; Operators 15.

Fact finding and research relating to the collection and interpretation of information about the mineral, water and land resources of the nation.

Water data collection, water resources management, lunar exploration, earth-orbiting mapping satellites, volcanology, earthquake prediction, marine geology and hydrology, X-ray crystallography, analytical aerotriangulation, photogrammetry, seismic studies, mineralogy, geochemistry, paleontology, large data base and information system management, business data processing and many others.

IBM System 360/Model 65.

**U. S. NAVAL COMMAND SYSTEMS SUPPORT ACTIVITY**

Washington Navy Yard  
Washington, D. C. 20390  
(202) OX 3-4200

Jack Salvail, Director, Management Analysis Staff.

Empl: Total this location 500; Total EDP Employees 400 (Programmers, Analysts, Engineers, Mathematicians, and Operations Research Analysts).

The Chief of Naval Operations' central organization for design, development and implementation of command information systems for support of naval commands throughout the world.

Modern generation IBM, CDC and UNIVAC Computer, BUNKO-RAMO displays, disk operations, audio communications networks.

**U. S. NAVAL INTELLIGENCE PROCESSING SYSTEM SUPPORT ACTIVITY**

Washington, D. C. 20350  
(Oxford) 48304

Mr. William G. Moultrie, Administrative Office  
Empl: Total this location 144; Total EDP Employees 67; Programmers 27; Analysts 12; Operators 28.

Naval intelligence automated systems.  
Automated wall display, cathode ray tube graphical communications, data communications, on-line programming and the correlation of information.

IBM 7090, 1401, 369/30, UNIVAC 1004

**U. S. NAVAL MATERIEL COMMAND SUPPORT ACTIVITY**

Data Processing Group, Code SA-14, Room 1W-21, Washington, D. C. 20360  
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Elaine Ream  
Empl: Total this location 315; Programmers and Analysts 140; Operators 100.

Centralized computer organization serving five naval Systems Commands headquarters.  
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IBM 360, 7074; RCA 3301-501-301; NCR 315, 304.

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**OUR CONTACTS WILL HELP YOU.** We serve over 200 clients with current openings in the area of our metropolitan

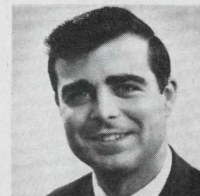
Washington, D. C. headquarters, plus thousands nationally . . . in every one of the 50 states . . . and overseas, too. We have had long associations with many of these clients, and we visit their facilities and installations repeatedly.

**OUR FREE SALARY ANALYSIS CAN MEAN A GREAT DEAL TO YOU.** Are you short-changing your career? Should you be earning much more than you are making now? After an in-depth interview and thorough discussion of your capabilities and objectives, we can help you make the most of the opportunities in today's computer community.

**A RESUME IS NOT REQUIRED. CONTACT US TODAY.** Resumes and application forms often obscure more than they reveal. Just call us or write us, and we'll take it from there.

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**JAMES F. RYAN** came to us from IBM's Federal Systems Division (Gaithersburg, Maryland) after 9 years with IBM, most recently as Professional Employment Manager. He is a graduate of Georgetown University.



**AL STARR** came to us from a position as Personnel Director with Computer Usage Development Corporation, before which he held management positions with Control Data Corporation, Computer Science Corporation, Vitro Laboratories and RCA. A graduate of Long Island University, he has more than 12 years of computer-oriented technical recruiting background.



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400 Maryland Avenue, S. W.,  
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(202) 962-2233  
Jaxon Taylor, Exec. Officer, Office of Mgmt. Info.\*

Empl: Total this location 3,080; Total EDP Employees 66; Programmers 27; Analysts 25.  
U. S. Government.  
Educational statistics and management information systems.  
RCA 3301.

**WASHINGTON DATA EXCHANGE**  
Div. of American Data Exchange, Inc.  
1025 15th Street, N. W.,  
Washington, D. C. 20005  
(202) 659-8460

Byron Thompson, Staff Consultant\*  
Empl: Total this location 5.  
International Personnel Brokers utilizing automated systems techniques in the exchange of information between industry and interested individuals.  
(Honeywell computer and equipment at home office in Canada). Washington is a sales office.

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Allen Kaplan, Pers. Admin.\*  
Empl: Total this location 300.  
Supply professional technical help to the electronics and commercial industries.

**DATACRAFT CORP.**  
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Fort Lauderdale, Fla. 33307  
(305) 565-9441

Personnel Manager  
Empl: Total this location 90; Total EDP Employees 10; Programmers 6; Analysts 3; Operators 1.  
Manufacture of digital computers and associated peripheral equipment.  
Payroll/Inventory.  
Datacraft 6024 Computer, IBM Key Punch, Soroban Card Reader, Paper Tape Punch/RDR, 1000 LPM Line Printer.

**EASTERN AIR LINES INC.**  
Miami International Airport, Miami, Fla. 33148  
(305) 634-3571

Robert O. Hach, Senior Management Recruiting Specialist\*  
Empl: Total this location 10,000; Total EDP Employees 553; Operators 253; Programmers/Analysts 226.  
Passenger name record, flight planning, schedules, forecasts, revenue, payrolls, inventory.  
Six 360/65.

**ELECTRONIC COMMUNICATIONS, INC.**  
1501-72nd Street North,  
St. Petersburg, Fla. 33733  
(813) 347-1121

P. R. Jordan, Empl. Supvr.\*  
Empl: Total this location 2,250; Total EDP Employees 41; Programmers 13; Analysts 5; Operators 9.  
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cost summary, budget analysis, cost act'g extending through communications, manufacturing, bill/material, work orders, product scheduling, scientific, technical, engineering.  
IBM 360, six discs, dual job stream, IBM 1130, scientific computer.

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Div. of Weston Instruments, Inc.—A Schlumberger Company  
P. O. Box 3041, Sarasota, Fla. 33578  
(813) 958-0811

Leslie Welter, Mgr., Employment Practices\*  
Empl: Total this location 672; Total EDP Employees 19; Programmers 5; Analysts 5; Operators 8.  
Aerospace telemetry products and systems—including computerized data acquisition and processing systems.

1. Software generation for computer-controlled telemetry and aerospace data acquisition.  
2. Business-operations for Marketing, Engineering, Accounting, Manufacturing, Material Planning, etc.  
EMR 210 Computer, EMR 6130 16-bit hi-speed computer, various EMR computers for customer interface, IBM 360/30 4-disk for business and accounting.

**ITT FEDERAL ELECTRIC CORP.**  
Cape Royal Bldg., Suite 501,  
Cocoa Beach, Fla. 32931  
L. A. Hamilton

See Ad Page 43

**RADIATION INC.**  
Subsidiary of Harris Intertype  
P. O. Box 37, Melbourne, Fla. 32901  
(305) 727-4000

C. A. King, Professional Employment\*  
Empl: Total this location 4,100; Total EDP Employees 125; Programmers 45; Analysts 15; Operators 10.  
Information Handling Systems, Supervisory Control Systems, Microelectronics.  
Business and Engineering Applications, Systems Simulation, Circuit Analysis, Computer Aided Design, Fault Isolation Analysis.  
IBM 360/50, UNIVAC 1218, Sigma II, various analog units.

See Ad Page 55

## GEORGIA

**SUMMEROUR & ASSOCIATES, INC.**  
230 Peachtree Street, Suite 1217,  
Atlanta, Ga. 30303  
(404) 577-4632

Charles C. Kauffman, Jr., Dir. of Pers. Serv.  
Empl: Total this location 22; Total EDP Employees 2.  
Management consultants.  
Survey and application of information systems to meet present and projected needs of clients in apparel manufacturing.

## IDAHO

**PHILLIPS PETROLEUM CO.—ATOMIC ENERGY DIV.**

P. O. Box 2067, Idaho Falls, Idaho 83401  
(208) 522-6640 Ext. 1491  
Morris Hillyard, Personnel Mgr.  
Empl: Total this location 600; Total EDP Employees 110; Programmers 30; Analysts 35; Operators 45.  
Nuclear Reactor Safety Program Analysis.  
Reactor Code Development, General Scientific and Engineering, Management Information Systems, General Commercial Systems.  
IBM 7044, CDC 1604, CDC 3100, IBM 360-Mod. 75.

## ILLINOIS

**ABBOTT LABORATORIES**  
14th St. and Sheridan Road,  
North Chicago, Ill.  
(312) 336-3080  
George Musson, Prof. Recrt.\*

Empl: Total this location 5,500; Total EDP Employees 70; Programmers 25; Analysts 15; Operators 20.  
Drug research and manufacture, also corporate headquarters.  
Business: Sales, Marketing, Accounting, Inventory and Production. Research: Real Time.  
GE 425, IBM 1800.

**ARGONNE NATIONAL LABORATORY**  
9700 South Cass Ave., Argonne, Ill. 60439  
(312) 739-7711 Ext. 3765  
Professional Placement.  
Empl: Total this location 5,700; Total EDP Employees 180; Programmers 50; Operators 35.  
Research and development.  
All types of scientific and engineering problems.  
Control Data 3600; IBM 360/50/75; including graphic equipment and remote terminals.

**ARMOUR-DIAL, INC.**  
100 S. Wacker Dr., Chicago, Ill. 60606  
(312) 346-4700  
Thomas G. Paulick, Pers. Supvr.\*  
Empl: Total this location 1,500; Total EDP Employees 30; Programmers 9; Analysts 7; Operators 10.  
(Consumer) foods, household products, beauty care, and pharmaceuticals.  
Accounting, marketing, sales reporting, production scheduling, distribution, inventory control, personnel.  
IBM 360/30.

**BAXTER LABORATORIES, INC.**  
6301 West Lincoln Ave.,  
Morton Grove, Ill. 60053  
(312) 965-4700  
Gerald P. Hanlon, Prof. Empl. Rep.\*  
Empl: Total this location 1,400; Total EDP Employees 60; Programmers 11; Analysts 8; Operators 7.  
Pharmaceutical and medical specialties.  
Order entry, inventory control, general accounting, sales analysis, sales forecasting and production planning.  
360 model 30, 1401 G/360 model 40 on order, 1800 on order.

**CAYWOOD-SCHILLER, ASSOCIATES**  
401 N. Michigan Ave., Chicago, Ill. 60611  
(312) 527-4450  
H. L. Kohn, Admin. Mgr.  
Empl: Total this location 45; Total EDP Employees 35; Analysts 30.  
Operations, research consulting.  
Mathematical modelling, statistical analyses, production scheduling, simulations and LP, software development.  
IBM 360 all mods., 7094, CDC 3600, IBM 1620.

**CHICAGO, ROCK ISLAND & PACIFIC R.R. CO.**  
745 South LaSalle St., Chicago, Ill. 60605  
(312) WA2-3200  
George Sabo, Dir., Data Systems  
Empl: Total this location 500; Total EDP Employees 112; Programmers 27; Analysts 12; Operators 51.  
Railroad data.  
Marketing, operating and car tracing reports.  
Payroll, disbursements, responsibility accounting, car accounting and revenue statistics.  
IBM 360 Computer Model 30 and IBM 360 Computer Model 40.

**COMPUTER PROCESSING UNLIMITED, INC.**  
232 East Ohio Street, 2nd Floor,  
Chicago, Ill. 60611  
(312) 943-5636  
George Vittek, V. P., Systems & Programming\*  
Empl: Total this location 13; Total EDP Employees 13; Programmers 4; Analysts 4; Operators 3.  
Information processing through E.D.P. services (on mainly IBM equipment); systems design, development, implementation; software generation, programming commercial and scientific; time sales, 3rd party leasing.







System generation and maintenance, contract consulting and systems engineering, contract programming, computer time sales and brokering, third party leasing; accounts receivable, B.M.P. implementation, impact, school scheduling, PERT, etc.  
Own IBM S/360-30 with 1401 compatibility, EAM—All, brokering on most all Systems 360 and Honeywell equipment, package implementations.

#### COMPUTER USAGE DEVELOPMENT CORP.

Div. of Computer Usage Company  
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(312) 427-8934

J. Sommerhauser, Branch Mgr.\*  
Empl: Total this location 40; Total EDP Employees 40; Programmers 30; Analysts 30; Operators 2.  
Management, analysis, programming.  
All principal computer applications.  
All major EDP equipment used.

#### CONTINENTAL CAN CO.

Div. of Chicago Technical Center  
1200 W. 76th St., Chicago, Ill. 60620  
(312) 846-7000

J. G. Mikota, Supv., Prof. Recruit.  
Empl: Total this location 1,000; Total EDP Employees 40; Programmers 10; Analysts 8; Operators 8.

Research and development in the packaging industry.

Production control, inventory control, part replacement systems, purchasing, all material systems.

360/40 23/14 disk drives 27/80 terminals  
10/30 data collections.

See Ad Page 53

#### DATA DYNE INDUSTRIES, INC.

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Chicago, Ill. 60606  
(312) 263-2419

Charles V. Peebles, Pres.  
Data processing services, consulting, programming, etc.  
Commercial and scientific applications.  
S/360, 1400, H-200.

#### DEERE & COMPANY

John Deere Road, Moline, Ill. 61265  
(309) 792-4126

J. R. Brotman, Placement Coordinator\*  
Empl: Total this location 1,500; Total EDP Employees 107; Programmers 36; Analysts 46; Operators 21.  
Farm Equipment, Lawn & Garden, and Industrial Equipment.  
I.B.M.

#### DE SOTO, INC.

1700 S. Mt. Prospect Rd.,  
Des Plaines, Ill. 60018  
(312) 296-6611

Elton L. McGehee, Pers. Adm.  
Empl: Total this location 400; Total EDP Employees 23; Programmers 4; Analysts 2; Operators 6.

Chemical products.  
Payroll, order entry, billings, accounts receivables and payables, promotions.  
2—120 Honeywell computers with 4-tape drives on each system plus on-line IBM equipment.

#### FACTSYSTEM, INC.

612 No. Michigan Ave., Chicago, Ill. 60611  
(312) 944-2530

Robert B. Dickson, Mgr., Systems Div.  
Empl: Total this location 30; Total EDP Employees 16; Programmers 11; Analysts 3; Operators 2.  
Service Bureau using proprietary software.  
General Ledger, Payroll, Accts. Rec., Accts. Pay., Inventory, Cost Acctg., Production Control, Invoicing, Sales Analysis.  
IBM 360/20; 360/30 with tape and disk.  
See Ad Page 29

#### THE HALLICRAFTERS CO.

Subsidiary of Northrop Corporation  
600 Hicks Road, Rolling Meadows, Ill. 60008  
(312) 259-9600

Roy C. Anderson, Mgr., Prof. Empl.  
Empl: Total this location 900; Total EDP Employees 45.  
Electronic systems. Hardware.  
Management information systems. Business controls, manufacturing systems, etc.  
IBM 360/30 and 40. Disc.  
See Ad Page 56

#### HARRIS TRUST AND SAVINGS BANK

111 West Monroe St., Chicago, Ill. 60690  
(312) 461-2121

D. Bruce Frobes, Pers. Asst.  
Empl: Total this location 2,612; Total EDP Employees 184; Programmers 65; Analysts 20; Operators 35.

Information systems for financial institution and banking services.

Demand deposit accounting systems, trust accounting systems, investment systems, payroll systems for clients, installment credit system, charge card system.

UNIVAC III, UNIVAC 418 On-Line, IBM 36-/30, Burroughs B-5500, B-3500, Unit Record.

#### IIT RESEARCH INSTITUTE

10 West 35th St., Chicago, Ill. 60616  
J. F. Collins, Pers. Mgr.\*

Empl: Total this location 1,800; Total EDP Employees 120; Programmers 40; Analysts 150; Operators 15.

Research, development, and product engineering.

Engineering and scientific, also software system development.

IBM 7094 and peripheral computers.

#### ILLINOIS DEPARTMENT OF PERSONNEL

RECRUITMENT SECTION  
623 East Adams St., Springfield, Ill. 62706  
(217) 525-7121

Robert P. Gosnell, Recruitment Supervisor  
Empl: Total this location, over 40,000 in Merit System agencies located state-wide; Total EDP Employees 193; Programmers 82; Analysts 20; Operators 91.

The Illinois Department of Personnel has administrative responsibility for the personnel services of the Merit System agencies, and recruitment of staff for State Government positions.

IBM System 360/40.

#### INTERNATIONAL HARVESTER COMPANY

401 North Michigan Ave., Chicago, Ill. 60611  
(312) 527-0200

L. E. Morris, Supvr., College Relations  
Empl: Total this location 114,000; Total EDP Employees 1,294; Programmers and Analysts 446; Operators 828.

Motor trucks; farm equipment; construction equipment; industrial/material handling equipment; steel; twine; aerospace components; gasoline, diesel, and gas turbine engines. Broad range of administrative data processing with emphasis on accounting and finance, and marketing; inventory control; extensive real-time applications; teleprocessing research and product design, test and development engineering applications, systems.  
IBM Systems/360 Models 20, 30, 40, 50, 65.

#### MASTECH INC.

7026 W. North Ave., Chicago, Ill. 60635  
(312) 622-9444

Dennis Duffey, Dir. of Data Processing\*  
Empl: Total this location 100; Total EDP Employees 30; Programmers 20; Analysts 10.  
EDP consulting, systems help, programming aid, software packages.  
Accounts receivable, letter writing, payroll packages.  
360-30.

#### MONTGOMERY WARD—CORPORATE DATA CENTER

6th Floor, 140 S. State St.,  
Chicago, Ill. 60603  
(312) 467-4941

M. K. Fenwick, Pers. Rep.\*  
Empl: Total this location 110,000; Total EDP Employees 600; Programmers 110; Analysts 110; Operators 125.

Retail and catalog merchandising, manufacturing, insurance, credit corporation and bank. Retail and catalog merchandising, credit, accounting, payroll, employee benefits, parts distribution, inventory control, traffic, order processing and sales forecasting.

9 360's mods. 30, 40 and 50 tele processing, optical scanning, highspeed label making and retail tag converter.

See Ad Page 45

#### NUCLEAR—CHICAGO CORP.

Subsidiary of G. D. Searle & Co.  
333 East Howard Ave., Des Plaines, Ill. 60018  
(312) 827-4456

Jack W. Keenan, Placement Mgr.  
Empl: Total this location 600; Total EDP Employees 21; Programmers 3; Analysts 2; Operators 10.

Manufacturer of radiation detection and measuring instrumentation for medical electronics and research.

Various applications.

360/30.

#### SCIENCE/SYSTEMS

P. O. Box 1176, Evanston, Ill. 60204

Dale Fawcett, Mgr.  
Empl: Total this location 220; Total EDP Employees 15; Programmers 1; Analysts 1; Operators 3.

Scientific games and toys.  
List maintenance, accounting, sales analyses.  
IBM 360/20 with tape.

#### SIMULATORS, INC.

3611 Commercial Dr., Northbrook, Ill. 60062  
(312) 272-6310

A. Erickson, Pers. Dir.  
Empl: Total this location 103.  
240/720 Series Analog/Hybrid Computers.  
Design, engineering and manufacturing.  
Own products.

#### SINCLAIR REFINING COMPANY

155 N. Wacker Drive, Chicago, Ill. 60606  
(312) F16-5900 Ext. 352

W. H. Sands, Empl. Mgr.\*  
Empl: Total this location 1,200; Total EDP Employees 120.

Regional HQ's—21 state marketing area.  
Credit card accounting, marketing mgmt. reporting real time on line system (Sinclair Petrochemicals).  
360/65, Spectra 70/45.

#### STRUCTO MANUFACTURING

Div. of King Seeley Thermos  
Highway 75 East, Freeport, Ill. 61032  
(815) 232-9582

Tom Bordner, EDP Supvr.  
Empl: Total this location 700; Total EDP Employees 13; Programmers 3; Analysts 1; Operators 2.

Live action toys, barbeque grills, and art craft looms.

Billing, inventory control, payroll, accounts payable, purchasing, accounting.  
4 Drive 1401 Disk System—360/25 on order.

#### UNITED AIRLINES

P. O. Box 66100, O'Hare Int'l Airport  
Chicago, Ill. 60666  
(312) 437-2300

Timothy C. Sullivan, Sup. of Emp.  
Empl: Total this location 46,000; Total EDP Employees 200.  
World's largest domestic air carrier.  
To develop a total management information



system including reservations, flight operations, crew scheduling, credit card billing systems, inventory control, traffic statistics, etc. Univac 1108-11, IBM 360/30, 40, and 50, IBM 7070, 7074 and 1401. Optical scanners and micro-filming.

#### U. S. ARMY WEAPONS COMMAND

Rock Island, Ill. 61201

(309) 794-5150

Robert I. Whitecotton, Placement Specialist  
Empl: Total this location 7,700; Total EDP Employees 250; Programmers 50; Analysts 25; Operators 50.

U. S. Army Installation responsible for the research, development, design, procurement and supply of conventional armament systems.

Maintaining up-to-date status of repair and replacement parts and sub assemblies on a world-wide basis for inventory management purposes.

RCA 3301, RCA 301, RCA 501, GE 225, UNIVAC 1005.

#### U. S. GYPSUM CO.

101 S. Wacker Dr., Chicago, Ill. 60606

(312) 321-4390

C. E. Sahlen, Empl. Mgr.

Empl: Total this location 1,000; Total EDP Employees 75; Programmers 10; Analysts 5; Operators 10.

Manufacturer of building materials.

Analysis of markets, sales, profits, and transportation. Miscellaneous financial.

UNIVAC III.

#### WESTERN ELECTRIC CO., INC.

Div. of American Telephone & Telegraph Company

Naperville & Warrenville Roads,

Naperville, Ill. 60540

(312) 682-3206

Robert J. Mele, Engineering Personnel Relations\*

Empl: Total this location 400; Total EDP Employees 70; Programmers 50; Analysts 20.

Electronic Central Office Telecommunications Switching Systems Development.

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

360/50, 360/40, 360/30, 360/20.

See Ad Page 51

## INDIANA

#### AMERICAN FLETCHER NATIONAL BANK AND TRUST COMPANY

Indianapolis, Ind. 46204

(317) 633-2175

Norman J. McKinnon, Vice Pres.\*

Empl: Total this location 1,600; Total EDP Employees 175-200; Programmers 13; Analysts 10; Operators 29.

Full service banking.

Demand deposit accounting, trust, savings accounting, payroll services, mortgage loan, account reconciliation, and installment credit.

IBM 360/40, IBM 360/30, IBM 1460, and supportive tab and keypunch equipment.

#### BENDIX CORPORATION—SOUTH BEND REGIONAL DATA CENTER

401 Bendix Drive, South Bend, Ind. 46620

(219) 233-4141

R. S. Morrison, Empl. Supvr.

Empl: Total this location 8,000; Total EDP Employees 130; Programmers 20; Analysts 15; Operators 24.

Service Divisions engaged in manufacturing missile aircraft and automotive equipment.

Provide both engineering and commercial applications to four local divisions of The Bendix Corporation.

IBM 360/30 and 40; C.D.C. G-20 plus analog and hybrid units.

## Programmers/Analysts

# DEVELOP YOUR OWN IDEAS IN TIME-SHARING APPLICATIONS



Mechanical engineering, structural engineering, numerical control, medical information retrieval, legal research, statistics, finance, library science . . . RTS\* (ITT's time-sharing system) will include all these and more.

Reactive Terminal Service (RTS), a conversational time-sharing system developed by ITT Data Services, is bringing data processing to the doorstep of scientists, businessmen, men in the professions—nationwide.

And with increased demand for RTS applications packages, new opportunities have arisen for application oriented specialists at our Paramus, New Jersey headquarters.

- If you have a Bachelor's or Master's degree in business, economics, the sciences, engineering, or operations research, and
- if you have had 5 years' experience related to your specialty since your degree, and
- if 2 of those years have been in programming with some exposure to time-sharing systems

then we'd like to talk to you about the challenges of developing specialized applications for this system.

Send your resume, in confidence, to Mr. Charles E. Johnson, ITT Data Services, Dept. 399-MJ, Box 402, Rte. 17 & Garden State Parkway, Paramus, New Jersey 07652. A plans for progress equal opportunity employer (m/f).

\* A service mark of ITT Data Services, a Division of International Telephone and Telegraph Corporation.

# ITT

DATA SERVICES



## PHILCO-FORD

Appliance Div., State Road #1,  
Connersville, Ind. 47331  
Robert Chesnov

See Ad Page 58

## IOWA

### BLUE CROSS-BLUE SHIELD

Liberty Building, Des Moines, Iowa 50309  
(515) 244-8961

Personnel Dept.

Empl: Total this location 700; Total EDP Employees 150; Programmers 16; Analysts 5; Operators 10.

Health insurance.

Random storage and retrieval of information with CRT display.

IBM 360/50, 2314, 2260.

### COLLINS RADIO CO

5200 "C" Avenue, N. E.,  
Cedar Rapids, Iowa, 52302  
(319) 365-8411

B. L. Bennett, Professional Employment

Empl: Total this location 12,000; Total EDP Employees 322; Programmers 40; Analysts 22; Operations & Data Conversion 260.

Communications, Computer and Electronic Services & Systems.

Material control, Process manufacturing, General Accounting, Electronic switching.

5-7074, 12-Collins 8401, 4-C8500 (Collins 3rd. Generation).

## KANSAS

### THE BOEING COMPANY-WICHITA DIV.

3801 S. Oliver, Wichita, Kan. 67210  
(316) MV7-2239

Gerald Caywood, Professional Employment Mgr.

Design, Development, Manufacture, Test of Aerospace Components and Assemblies, including Commercial Jetliners, Vertical Lift Aircraft and Space Boosters.

Scientific, Commercial, Software Computing Systems. Programming Engineering Applications (Structural Analysis, Digital Simulation, Fluid Dynamics, Propulsion Systems Analysis) with emphasis on Integrated Systems Approach.

## KENTUCKY

### SPINDLETOP RESEARCH, INC.

Iron Works Road, Lexington, Ky. 40505  
(606) 252-5535

D. W. Rogers, Mgr., Rel. Services\*

Empl: Total this location 75; Total EDP Employees 3; Programmers 1; Analysts 2.

Applied research.

## LOUISIANA

### PENNZOIL UNITED, INC., RESEARCH DEPT.

P. O. Box 1407, Shreveport, La. 71102  
(318) 861-4531

James R. Stewart, Sr. Research Associate

Empl: Total this location 55; Total EDP Employees 10; Programmers 2; Analysts 5; Operators 3.

Research Scientific, Engineering, Operations Research.

GE 225.

## MARYLAND

### COMPUTER USAGE DEVELOPMENT CORP.

Div. of Computer Usage Co., Inc.  
7315 Wisconsin Ave., Bethesda, Md. 20014  
(301) 656-0200

Donald L. Capron, Jr., Personnel Director\*

Empl: Total this location 200; Total EDP Employees 175; Programmers 100; Analysts 75. Software consultant D.P., M.I.S., O.R., software systems.

Operating systems, info. processing languages, economic and transportation modeling, social and mgmt. info. systems.

All major mfgs.

### DELTA DATA SYSTEMS, INC.

9903 Rhode Island Ave.,  
College Park, Md. 20741  
(301) 935-3144

Stuart M. Trooskin, Dir. of Plans and Programs\*

Empl: Total this location 30; Total EDP Employees 22; Programmers 14; Analysts 8.

Commercial and scientific programming services, systems design, systems analysis, automation training and consulting.

Information systems, war gaming, mathematical simulation, survey analysis, statistical reports, configuration management, and system conversion.

### GLENN ENGINEERING SERVICES, INC.

5706 Frederick Ave., Rockville, Md. 20852  
(301) 427-3830

Frank D. Augustino, Mgr., Data Services

Empl: Total this location 30; Total EDP Employees 12; Programmers 2; Analysts 1; Operators 5.

Data reduction and analysis.

Analog to digital conversion of strip charts, maps, 16 and 35 mm film, photos, graphs, etc.

Gerber, Auto-trol, Benson-Lehner, and EAI Data Reduction Systems.

See Ad Page 24

### IBM CORP.

Federal Systems Div.  
18100 Frederick Pike,  
Gaithersburg, Md. 20760  
(301) 921-7724

James W. Dunn, Mgr., Professional Recruitment\*

Design and Development of Advanced Information-Handling Systems for the Federal Government.

### INFORMATION AND COMMUNICATION APPLICATIONS, INC.

134 Congressional Lane, Rockville, Md. 20852  
(301) 427-1011

Alan H. Blumenthal, Director of System Services\*

Empl: Total this location 19; Total EDP Employees 19; Programmers 3; Analysts 14.

Systems analysis, design, and implementation. Communication systems, file management, medical automation, hospital information systems, scientific applications.

IBM, Univac, CDC, Honeywell.

### NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Div. of Goddard Space Flight Center  
Glenn Dale Road, Greenbelt, Md. 20771  
(301) 982-4319

Gary R. Purvis, Head, Placement Branch

Empl: Total this location, approx. 3,600; To-Empl: Total this location, approx. 3,600; Programmers, approx. 250; Analysts, approx. 100.

Conducts unmanned spacecraft and sounding rocket experiments in basic and applied research. Operate the Space Tracking and Data Acquisition Network and Manned Space Flight Network, NASA worldwide satellite tracking, data acquisition and data reduction networks. Determination of operational trajectory, attitude, spacecraft control and support computations for satellite programs. Mission tracking systems. Celestial mechanics studies. Analysis of spacecraft data.

IBM 360 and 7094, Univac 1108, CDC 3600. Equal Opportunity Employer. All positions are within the Federal Competitive Service.

### NATIONAL INSTITUTES OF HEALTH-DIV. OF COMPUTER RESEARCH & TECHNOLOGY

9000 Rockville Pike, Bldg. 12A, Room 2019,  
Bethesda, Md. 20014

(301) 496-6951

A. L. Wade, Jr., Personnel Officer

### SCIENTIFIC COMPUTER APPLICATIONS, INC.

100 Old Annapolis Boulevard,  
Severna Park, Md. 21146  
(301) 647-7868

Warren G. Miller, Pres.\*

Empl: Total this location 12; Total EDP Employees 8; Programmers 4; Analysts 4; Operators 4.

Programming, software and mathematical modeling.

Radio Frequency Interference Studies. Mathematical Modeling. Follow-on Interfacing and Programming.

WNG 320/370 Digital Computer.

### SYSTEMS SCIENCE CORP.

1104 Spring St., Silver Spring, Md. 20910  
(301) 587-4242

William C. Cunningham, Vice Pres.\*

Empl: Total this location 75; Total EDP Employees 40; Programmers 20; Analysts 15; Operators 5.

Systems analysis, computer programming. Operation reservation, systems consulting.

State and local systems development (police information systems); proprietary systems development, including time-sharing applications. 360/40.

### VITRO CORPORATION OF AMERICA-VITRO LABORATORIES

14000 Georgia Ave., Silver Spring, Md. 20910  
Harvey Weisberg, Empl. Mgr.

Empl: Total this location 2,500; Total EDP Employees 150.

Systems engineering.

Systems simulation, math modeling.

360/30/40-7090.

### WOLF RESEARCH & DEVELOPMENT CORP.

5801 Annapolis Rd., Bladensburg, Md. 20710  
(301) 779-2800

H. F. Wilder, Personnel Mgr.

Empl: Total this location 230; Total EDP Employees 150; Programmers 93; Analysts 57.

Systems Analysis & Design, Applied Mathematical Analysis, Data Reduction & Analysis, Software Development, Computer Programming, Computer Application Studies, Facility Management & Operation, Training, Documentation.

## MASSACHUSETTS

### ADAGE, INC.

1079 Commonwealth Avenue,  
Boston, Mass. 02215  
(617) 783-1100

Larry Murphy, Empl. Adm.\*

Empl: Total this location 250; Total EDP Employees 40; Programmers 25; Analysts 10; Operators 5.

Digital processor, computer graphics systems. Computer graphics.

DPRZ, AGT/30.

### ANALYSIS & COMPUTER SYSTEMS, INC.

Second Ave. Northwest Park,  
Burlington, Mass. 01803  
(617) 272-5000

William A. Delaney, Pres.\*

Empl: Total this location 51; Total EDP Employees 50; Programmers 35; Analysts 15.

Math Analysis, Systems Analysis, Computer Programming and Data Reduction.

### CYBETRONICS, INC.

132 Calvary St., Waltham, Mass. 02154  
(617) 899-0012

W. B. Maritz, Treasurer.

Empl: Total this location 85; Total EDP Em-

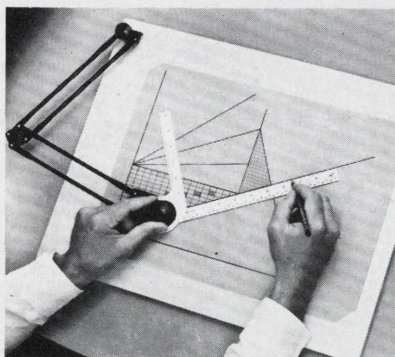


# New!

## PORTABLE DRAFTING MACHINE

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- ★ PLANT
- ★ FIELD
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No longer need you struggle with loose T-square, triangles, protractor and scales when you want to make precise sketches in-plant, in-flight, in the field or at home. The DRAFTETTE® gives you the familiar convenience of your office board in compact, portable form. The #9-B provides interchangeable 6 x 9" scale, 360° protractor reading in 5° increments. Scale calibrated in 16ths or in 50ths and millimeters (specify scale desired in ordering). May be purchased ready-mounted on 16 x 21" light-weight board or unmounted to attach to your own board or to a pad of paper. When not in use, can be folded like a jack-knife to fit into desk or brief-case.

- #9-B—Including Board .... \$19.90
- #9—Same without Board 15.90
- Extra 6" x 9" Scales ..... 4.50
- Extra 4" x 5" Scales ..... 3.00
- Carrying Case for #9-B .. 2.75

SCIENCE/SYSTEMS

P. O. Box 1176, Evanston, Ill. 60204

employees 4; Programmers 1; Analysts 1; Operators 2.

Computer products.  
Commercial.  
Burroughs.

### DATAMAN ASSOCIATES

1330 Beacon St., Boston, Mass. 02146  
(617) 232-2253

Phocion Lellos, Pres.\*

Empl: Total this location 20; Total EDP Employees 16; Programmers 7; Analysts 4; Engineers 5.

Contract EDP personnel services. Sub-contract consulting computer personnel, software and hardware.

Business and scientific applications.

See Ad Page 60

### DATA TECHNOLOGY, INC.

65 Grove St., Watertown, Mass. 02172  
(617) 924-1773

Philip Blake, Mgr.

Empl: Total this location 50.

UPD-2 Computerized Digitizer Programmer.

Computerized Digitizer Programmer for N/C tape preparation.

PDP-8/S computer, ASR-33 Teletype, our own product line of coordinate digitizers.

### DIGITAL EQUIPMENT CORPORATION

146 Main St., Maynard, Mass.  
(617) 897-5111

P. T. Koch, Profess. Pers.

Empl: Total this location 2,300; Total EDP Employees 100.

Computers, peripherals, logic modules.

All kinds computer applications.

PDP-8, PDP-9, PDP-10.

### FACTORY MUTUAL ENGINEERING CORP.

1151 Boston Providence Turnpike,  
Norwood, Mass. 02062

(617) 762-4300

Edward C. Drake, Pers. Dir.\*

Empl: Total this location 1,000; Total EDP Employees 180.

Engineering (Insurance).

### FOXBORO CO.

38 Neponset Ave., Foxboro, Mass. 02035  
(617) 543-8750

Robert I. Ash, Supervisor, Technical Recruiting\*

Empl: Total this location 4,000; Total EDP Employees 100.

Instrumentation and Process Controls.

Process Control (Digital).

See Ad Page 65

### HONEYWELL INC., COMPUTER CONTROL DIVISION

Old Connecticut Path,  
Framingham, Mass. 01701

(617) 879-2600

J. Paul Costello, Tech. Empl. Rep.

Empl: Total this location 1,600.

Design, development and marketing of digital logic modules, memory systems, general purpose digital computers, software and memory test equipment.

Industrial Process Control simulation data acquisition, communications.

DDP-124/224/516/416, Series 632.

See Ad Page 4

### INFORMATION & SYSTEMS INSTITUTE, INC.

14 Concord Lane, Cambridge, Mass. 02138  
(617) 491-4471

Larry L. Constantine, Pres.\*

Empl: Total this location 6; Total EDP Employees 6.

Educational, consulting, and system development services in hardware and software.

Language and compiler design, integral hardware/software design, symbol processing, management decision systems.

System development on all machines.

### INTERNATIONAL DATA CORP.

Div. of Data Processing Dept.  
60 Austin St., Newton, Mass. 02160  
(617) 969-4020

# SLAC

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30 miles south of San Francisco, the Stanford Linear Accelerator Center scientists are conducting basic research in high energy physics, using spark and hydrogen bubble chamber targets.

### Mathematicians

Will organize and administer large codes, peripheral systems, and interface with other programs.

### Programmer

Will link our analysis program to the new computer system.

You can contribute to our research and become involved in developing and optimizing new and existing data programs and systems. Degree required and minimum 1-2 years' experience, using IBM 360 and FORTRAN IV.

Operated by Stanford University, this international center offers the same progressive benefits enjoyed by all professional employees of the University.

Please send résumé to:  
G. F. Renner, P.O. Box 4349,  
Stanford, California 94305.

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Employer



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1020 Church Street  
Evanston, Illinois 60201

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of the S/A ACG to:

.....  
Address .....

R. McGrath, Employment Mgr.  
Empl: Total this location 80; Total EDP Employees 16; Programmers 3; Analysts 3; Operators 7.  
Market Research and Statistical Analysis.  
Data File Processing and Analysis for Market Research.  
IBM 360/30.

**KEYSTONE COMPUTER ASSOCIATES, INC.**  
Subsidiary of University Computing Company  
375 Concord Ave., Belmont, Mass. 02178  
(617) 489-2100  
Salvatore Crisafulli, Mgr.\*  
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.

**NASA, ELECTRONICS RESEARCH CENTER**  
575 Technology Square,  
Cambridge, Mass. 02139  
(617) 494-2351  
Daniel S. Pilistine, Prof. Rectr.  
Empl: Total this location 800; Total EDP Employees 30; Programmers 20; Analysts 5; Operators 5.  
Basic and applied electronics research for NASA Space and Air missions including Guidance, Controls, Optics, Instrumentation, Computers, Microwave radiation, Components, Qualifications and Standards, Systems, Power Systems.  
Scientific programming in all of above areas including research and development towards improved software for advanced avionics and space systems. Improvements in pertinent areas of information processing, recording of raw data, data compression and transmission, pre-processing of data aboard spacecraft, data acquisition, storage and retrieval.  
IBM 7094; UNIVAC 418; Analog-Hybrid comprising three (3) GPS-390-T, Beckman 2200 Analog, SDS-9300; CDC-8130; DDP-516; Linc-8; DDP-124.

**OMEGA ASSOCIATES, LEHIGH DESIGN CO., INC.**  
1065 Main St., Waltham, Mass. 02154  
(617) 899-6150  
Edward Robinson, Div. Mgr.\*  
Empl: Total this location 600; Total EDP Employees 50; Programmers 30; Analysts 10; Operators 10.  
Software, programming services, EDP consulting applications programming.  
Scientific, business, real-time, management information systems.  
S/360.

**PHILIP HANKINS, INC.**  
Subsidiary of Wang Laboratories, Inc.  
800 Massachusetts Avenue,  
Arlington, Mass. 02174  
(617) 648-8550  
Robert Plachta, Treasurer.  
Empl: Total this location 120; Total EDP Employees 120; Programmers 35; Analysts 30; Operators and Key punch, etc. 55.  
1) Computer consulting and programming—commercial EDP, scientific programming, real time process control; 2) Data Center—360/65, 360/40, DDP-116; 3) Service Bureau.  
Consulting and Software Group does design and programming for all types of EDP applications (payroll, investment, inventory, ledger, accounting), scientific applications (mathematical, computer software, simulation), real time (process control, graphics), hardware evaluation and consulting. Data center sells machine time; business service provides service bureau functions.

IBM 360/65 (OS and 2314 disc system), 360/40 (OS, disc and tape), DDP-116 (paper-mag tape conversion), Teleshatch—remote job entry system for 360/65, printout reduction equipment.

**RAYTHEON CO., MISSILE SYSTEMS DIV.**  
Hartwell Rd., Bedford, Mass. 01730  
(617) 274-6083  
Frank Dechristopher, Empl. Mgr.  
Empl: Total this location 4,000; Total EDP Employees 200; Programmers 100; Analysts 75; Operators 25.  
Tactical defensive missile, radar and avionics systems.  
Mathematical analysis and data processing; operational programming; computer design and applications; systems and procedures; analog, digital and hybrid systems.  
Raytheon 512, 7044, 7090, 1108, 6600.

**RCA ELECTRONIC COMPONENTS DIVISION**  
150 "A" St., Needham, Mass. 02194  
(214) 444-7200  
L. P. Anderer, Empl. Mgr.  
Empl: Total this location 800-900; Total EDP Employees 10; Analysts 2; Operators 7.  
R & D and manufacturing of magnetic memory devices and systems.  
Manufacturing control system.  
IBM Punch Card Equipment. 301 Computer Installation 6/69.

**SPEAR INFORMATION SYSTEMS—SPEAR & STAFF**  
16 Babson Park Ave., Wellesley, Mass. 02154  
(617) 235-8500  
Victor V. Vurpillat, Pres.  
Empl: Total this location 90; Total EDP Employees 5; Programmers 5.  
Stock Market Analysis.  
Stock Market Analysis.  
Linc 8.

**TRANSITRON ELECTRONIC CORP.**  
168 Albion St., Wakefield, Mass. 01880  
(617) 245-4500  
W. F. Handley, Mgr., Systems/Programming\*  
Empl: Total this location 3,800; Total EDP Employees 50; Programmers 15; Operators 10.  
Semi conductor and allied products.  
Financial and manufacturing.  
360/30—65K—360/40 on order. Communication with 3—360/20.

**WARREN ASSOCIATES—THE WARREN INSTITUTE**  
433 Putnam Ave., Cambridge, Mass. 02139  
(617) 354-6875  
Jay Blum, Director\*  
Empl: Total this location 10; Total EDP Employees 6; Programmers 4; Analysts 2.  
EDP Systems and Management Consultants.  
Computer software for IBM 360, Honeywell 1800 Series, etc. Bionics and Medical Applications our specialty. EDP Training Programs also available.

**WASHINGTON ENGINEERING SERVICES CO., INC.**  
68 Rogers St., Cambridge, Mass. 02142  
(617) 492-6760  
Z. W. Kohorn, Tech. Dir.  
Empl: Total this location 20; Total EDP Employees 16; Programmers 6; Analysts 5.  
Company serves as a consultant in the field of Information Management.  
Systems analysis, design, and implementation.

**WOLF RESEARCH & DEVELOPMENT CORP.**  
Subsidiary of EG&G, Inc.  
P. O. Box 36, West Concord, Mass. 01781  
(617) 646-8192 or 369-2111  
Harold L. Coonrad, Pers. Mgr., Boston Div.\*  
Empl: Total this location 110; Total EDP Employees 106; Programmers 17; Analysts 47; Operators 42.  
Computer programming; consulting; R & D studies. Mathematical, physical, and management analysis. Systems analysis, design and



engineering. Facility management and operations.

Information systems; software systems; computer graphics. Real-time control; on-line interaction; data reduction; simulation. Various aerospace, scientific, and commercial applications of digital and analog computers. None at this site. All major makes and models used, off-site.

## MICHIGAN

**ANN ARBOR COMPUTER CORPORATION**  
415 West Huron, Ann Arbor, Mich. 48103  
(313) 761-2151

Larry Rottarr, Pers. Mgr.

Empl: Total this location 30; Total EDP Employees 10; Programmers 5; Analysts 3; Operators 2.

Design and implementation of fully programmed computer control systems for instrumentation and control.

Material Handling Controllers, Machine-Tool Controllers, Natural Gas Flow Measurement, Engine Horsepower and Efficiency Measurement, etc.

IBM 1800, IBM 1130, H-P 2100 Series, PDP-8.

**AUTOMOBILE CLUB OF MICHIGAN**  
150 Bagley Ave., Detroit, Mich. 48226  
(313) 963-2911

D. E. Schmeiser, Pers. Asst.

Empl: Total this location 2,800; Programmers 15; Analysts 25.

Insurance.

Insurance, Club Work.

IBM 360/30, 40, 50.

**BAKER PERKINS INC.**  
1000 Hess St., Saginaw, Mich. 48601  
(517) 752-4121

Charles A. Shelley, Pers. Supvr.

Empl: Total this location 1,000; Total EDP Employees 12; Programmers 3; Operators 4.

Processing Equipment for Food and Chemical Industries, e.g., Ovens, Mixers, Centrifugals, Storage and Handling Equipment.

Production Control. Bill of material exp. Payroll General.

360-20.

**THE BENDIX CORPORATION**  
1104 Fisher Bldg., Detroit, Mich. 48202  
(313) 875-5000, Ext. 371

L. B. Dooley, Mgr. of Prof. Placement\*

Empl: Total this location 500; Total EDP Employees 250; Programmers 50; Analysts 50; Operators 25.

Aerospace/Automotive/Electronic.

Commercial—Accounting, Production Control, Inventory Control, Sales Forecasting.

IBM 360, Real Time on Line Multi-Processing—COBOL and Fortran languages.

**BURROUGHS CORP.**  
P. O. Box 299, Detroit, Mich. 48232  
Ext. 8301, 875-2260

Robert M. Coyner, Pers. Mgr., Corp. General Office\*

Empl: Total nationwide 42,000; Total EDP Employees nationwide 2,000.

Electronic business machines, Information processing systems, general and special purpose small, medium, and large scale digital computers.

Scientific, Management Science, Financial, Manufacturing, Engineering, Inventory Control and Materials Contract.

B-3500, B-5500, B-6500, B-8500.

**CLARK EQUIPMENT CO.**  
324 East Dewey, Buchanan, Mich. 49007  
(616) 697-8000

John Raster, Salaried Personnel Coordinator  
Empl: Total this location 2,958; Total EDP Employees 144; Analyst Programmers 48; Analysts 13; Operators 25.

## PROGRAMMERS—SYSTEMS/SCIENTIFIC/COMMERCIAL



*You'll be programming  
the moon,  
and doing everything  
under the sun.*

● The closer the moon gets, the more exciting the work becomes. Important as they are, the successful Apollo-Saturn launches and the space journey of the lunar module are only preludes to the main task facing the NASA/industry team—putting men on the moon.

This is what you'll be programming. The moon shot and computation of all the factors that will assist NASA in the operation and maintenance of the communications and instrumentation which are the nervous system of the Kennedy Space Center. As a prime contractor this is the responsibility of ITT-Federal Electric Corporation's 1500-man team.

We'll give you the tools. For scientific, engineering and administrative support you can call upon two GE 635 multi-programmed digital computer systems with 16 magnetic tape units, 128K word storage, a 788K word drum and real-time input/output controllers on each system. We also use an IBM

7010 computer system for financial management and an IBM 1050 connected to a separate IBM 1440-7010 computer system for a real-time 30K item inventory system.

The work offers unparalleled opportunities for programmers. So does the living. There's something new to do every day...and the climate to do it in. You'll be living in the heart of Florida's fabled East Coast, at a cost well below the national average. There's boating, surfing, superb fishing, hunting, and golf. If you're more sedentary, you can cultivate the soothing art of shell collecting. Federal Electric Corporation, in Florida, is a great place to indulge your family while you're giving your career a big thrust forward.

Please forward your resume, including salary history, in complete confidence to Mr. L. A. Hamilton, Federal Electric Corporation, Suite 501, Cape Royal Building, Cocoa Beach, Fla. 32931.

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Pratt & Whitney Aircraft is the world's leading producer of dependable jet engines. Now, more than ever, continuing expansion, diversification and promotion from within afford every opportunity for healthy growth and achievement for EDP professionals with up to ten years experience. Attractive openings exist at all levels of responsibility; preference will be given to applicants with recent experience using assembly language and/or COBOL.

A multiplicity of projects vary from simple card systems to complex on-line systems involving such projects as a Full Production Information System, Automated Financial Analysis and Reporting, and an Integrated Material Control System, including procurement, forecasting and scheduling. Tools include 360 models 20, 30, 40, and 50; tapes and random devices; data collection equipment; on-line facilities; DOS and OS.

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A**  
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Corporate office and automotive division—planetary drive, drive steer axles, axle housings.

Material planning and control—financial processing—payroll—A/R—A/P (etc.) G.E. 215, 225 and 235 systems, communications computer, dual Univac 1108 now being installed. Full 3rd generation time sharer will replace 12 existing computers.

#### COM-PETE, INC.

15 Research Drive, Ann Arbor, Mich. 48103  
(313) 761-3133

J. G. Perkins, Pres.

Empl: Total this location 3; Total EDP Employees 3.

Management of data handling services for the petroleum distribution industry.

Accounting and scheduling.

Com-Share, Inc.'s SDS 940 time-sharing equipment.

#### COM-SHARE, INCORPORATED

1919 West Stadium Blvd.,  
Ann Arbor, Mich. 48106

(313) 769-2900

Robert E. Snavelly, Exec. Dir. of Marketing\*

Empl: Total this location 75; Total EDP Employees 50; Programmers 40; Operators 10.

Commercial Time-Sharing Service.

Commercial Time-Sharing Service.

SDS 940.

#### DATA PRODUCTS, INC.

29365 Northwestern Hwy.,  
Southfield, Mich. 48075

(313) 358-1455

Macy J. Price, Pres.\*

Empl: Total this location 30.

Data Processing Auxiliaries.

#### INTERNAL REVENUE SERVICE DATA CENTER UNITED STATES TREASURY DEPT.

6230 John R., Detroit, Mich. 48202

(313) 875-9800

Rodger Wood, Chief, Placement and Employee Relations Section\*

Empl: Total this location 900; Total EDP Employees 250; Programmers 160; Analysis 40; Operators 50.

Payroll applications, taxpayer studies, statistical studies, personnel reporting programs. General business applications—reports, payroll for 100,000 employees, some software development.

IBM 7074, Honeywell H-200, 3rd generation equipment planned soon.

#### LEAR SIEGLER, INC.—INSTRUMENT DIVISION

4141 Eastern Ave.,  
Grand Rapids, Mich. 49508

(616) 241-8672

W. R. Short, Prof. Empl.\*

Empl: Total this location 4,000; Total EDP Employees 27; Programmers 20; Analysts 7.

Navigation systems, R&D and manufacturing.

Scientific programming as well as business type EDP.

IBM system 360/30 and IBM system 360/50.

#### TECHNIQUES, INC.

738 Wealthy, S.E., Grand Rapids, Mich. 49503

(616) 456-7685

Joseph G. Smentkowski, Pres.

Empl: Total this location 30; Total EDP Employees 4; Programmers 2; Analysts 1; Operators 1.

Engineering Consultants.

Scientific Programming.

IBM 1420, IBM 360.

## MINNESOTA

#### CONTROL DATA CORPORATION

8100 34th Ave. South,  
Minneapolis, Minn. 55440

(612) 888-5555



B. E. Grylewicz, Staffing Programs Coordinator\*  
Empl: Total this location 20,000.  
Complete line of EDP computer systems, industrial computer control systems and computer directed communication systems.

#### EMR—COMPUTER

8001 Bloomington Freeway,  
Bloomington, Minn. 55420  
Peter J. Schroth, Asst. Mgr. of Pers.  
Empl: Total this location 450; Programmers 50; Analysts 12; Operators 5.  
Design and assembly of computers.  
Scientific.  
Computers designed and built by EMR.

#### MINNESOTA AEROSPACE CORPORATION

P. O. Box 730, West Hy 10,  
Anoka, Minn. 55303  
(612) 427-1970  
Empl: Total this location 468-25.  
Defense Contracts with NASA, Defense General Supply Center, Defense Personnel Support Center, NCAR, White Sands Missile Range and many others.  
IBM.

#### MINNESOTA MINING & MANUFACTURING COMPANY (3M COMPANY)

Employment Department, 3M Company—3M Center, St. Paul, Minn. 55101  
(612) 733-1038  
Jerry A. Buegler, Special Reprt. Supvr.\*  
Empl: Total nationwide 53,000; Total EDP Employees 200; Programmers 60; Analysts 60; Operators 35.  
3M manufactures over 35,000 varied products in chemistry, electronics, electro-mechanical, materials, etc.  
Engineering, research, marketing, administrative, personnel.  
Primarily IBM equipment.

#### PILLSBURY CO.

608 Second Avenue South,  
Minneapolis, Minn. 55402  
(612) 330-4357  
Gregory S. Collier, Supvr., Reprt. and Placmt.  
Empl: Total this location 1,750; Total EDP Employees 300; Programmers 40; Analysts 75; Operators 20.  
Corporate Headquarters.  
Corporate Headquarters, operations, programming, and systems analysis; software development; all aspects of time sharing systems.  
GE 635 and numerous GE 200 systems, GE Data Net 30.

#### UNIVERSITY OF MINNESOTA

Dept. of Civil Service Personnel  
Room 4, Morrill Hall,  
Minneapolis, Minn. 55455  
(612) 373-2093  
Paul E. Rydning, Pers. Serv. Rep.  
Empl: Total this location 7,000; Total EDP Employees 110; Programmers 40; Analysts 10; Operators 60.  
Big Ten University serving the state and nation through education, research, and service.  
Business administration and research.  
IBM 360—Series 50; IBM 360—Series 30; CDC 6600, 3300, 3200, 3100, and miscellaneous.

#### UNIVAC, FEDERAL SYSTEMS DIVISION

Div. of Sperry Rand Corporation  
Univac Park, P. O. Box 3525,  
St. Paul, Minn. 55101  
(612) 647-4144  
Robert K. Patterson, Empl. Mgr.  
Empl: Total this location 7,000.  
Data processing systems for the Department of Defense, NASA, FAA and other elements of the U.S. Government.  
Navy systems, NASA systems, NIKE X, and others.  
Complete UNIVAC line of militarized computers and 1108.  
See Ad Page 27

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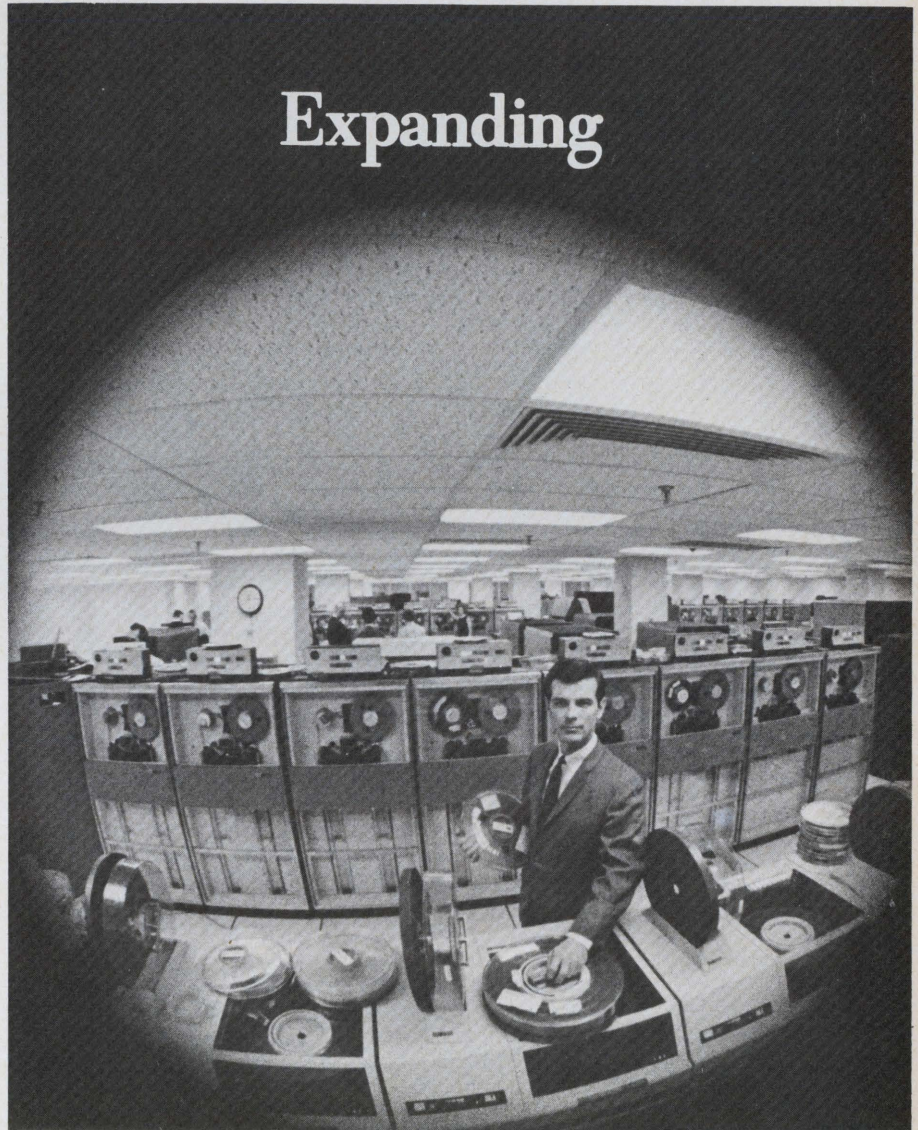
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P. O. Box 7305, Kansas City, Mo. 64116  
(816) GL3-1400

Gene Switzer, Pers. Rep.\*

Empl: Total this location 775; Total EDP Employees 75; Programmers 18; Analysts 6; Operators 12.

Petroleum, fertilizer, agricultural chemicals, feed, farm supplies, etc.

Business applications.

IBM 360 models 30 and 50.

**FEDERAL BARGE LINES, INC.**

Div. of Pott Industries, Inc.

611 East Marceau St., St. Louis, Mo. 63111  
(314) 832-4000

R. A. Heldmann, D. P. Mgr.

Empl: Total this location 1000; Total EDP Employees 12; Operator Programmers 4.

Shipbuilding and river transportation.

General business applications.

IBM 360 model 20 card system.

**MCDONNELL AUTOMATION COMPANY**

Div. of McDonnell Douglas Corporation  
Box 516, St. Louis, Mo. 63166

(314) 232 8021

W. R. Wardle, Prof. Empl.\*

Empl: Total this location 1,400; Total EDP Employees 1,400; Programmers 34%; Analysts 7%; Operators 44%; Administrative 13%; Marketing 2%.

Commercial data services. Data handling and computing for McDonnell Douglas.

Applications and services virtually unlimited.

Digital, analog and special computers; laboratory data acquisition and reduction equip-

ment; flight test data reduction equipment. Data Drome equipment (RCA, CDC, all Models IBM 360, GE).

**MIDWEST RESEARCH INSTITUTE**

425 Volker Blvd., Kansas City, Mo. 64110  
(816) 56-0202

Martin N. Schuler, Mgr. Staff Development

Empl: Total this location 430; Total EDP Employees 18; Programmers 9; Analysts 4; Operators 5.

Consulting and support of Research Activities resulting from Contract Research for Industry and Government.

Digital simulations, computer-assessed-menu-planning, automation studies, forecasting, programming and analysis support for research in the hard sciences and economics, information retrieval.

IBM System 360/30, Remote 1050's, Off-Line Plotter.

**TRANS WORLD AIRLINES, INC.**

1735 Baltimore, Kansas City, Mo. 64108  
(816) 471-4400

George D. Owen, Sr. Interviewer

Empl: Total this location 10,500, 40,000 system wide; Total EDP Employees this location 550; Programmers 70; Analysts 42; Operators 136.

Finance operations, technical services, purchasing, aircraft overhaul, reservation sys.

Real-time, on-line, engineering and finance applications.

IBM 360-65; 360-40's, 360-30's, 360-20; RCA 301's; IBM 1030; IBM 7074; RE1 Scanner and others.

## NEW HAMPSHIRE

**SANDERS ASSOCIATES, INC.**

95 Canal St., Nashua, N. H. 03060  
883-3321, Ext. 3863

Michael L. O'Connell, Mgr., Corporate Software Support

Empl: Total this location 9,000; Total EDP Employees 250; Programmers 80; Analysts 20; Operators 50.

Electronics research, development, and manufacture.

Financial, engineering, marketing, administrative and manufacturing.

IBM system/360, Models 50, 40, 30.

## NEW JERSEY

**ABLE COMPUTER SYSTEMS, INC.**

1329 Birch Hill Rd., Mountainside, N. J. 07092  
(201) 233-6956

Personnel Dept.\*

Empl: Total this location 20; Total EDP Employees 20; Programmers 6; Analysts 14.

Consulting for S/360 computer systems design and programming (Cobol, Bal, RPG, Fortran) All commercial applications and most scientific. S/360 (all models).

**AIRCO/B.O.C. CRYOGENIC PLANTS CORP.**

575 Mountain Ave., Murray Hill, N. J. 07971  
(201) 464-6800

R. H. Fursdon, Mgr., Admin.

Empl: Total this location 120; Total EDP Employees 2; Analysts 2.

Engineering design and construction.

Engineering design—simulation and optimization of cryogenic processes.

Time share machines—IBM 1130, 360-50.

**APPLIED DATA RESEARCH, INC.**

Route 206 Center, Princeton, N. J. 08540  
(609) 921-8550

Warren F. Spalding, Vice Pres.

Empl: Total this location 45; Total EDP Employees 40; Programmers 40; Analysts 40.

Programming and systems analysis and consulting services.

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460 Sierra Madre Villa, Pasadena, California 91109

we are looking for number-one professionals who will enjoy rewards to match their talent and contributions. Since Burroughs has always practiced the policy of promotion from within, you will find that there could not be a better time to call us. You will discover that Burroughs growth can mean advancement advantages, pride of achievement and renewed dedication to your career commitment.

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Information retrieval, executive and compiler construction, other diversified commercial and systems applications  
None.

**BECTON, DICKINSON AND COMPANY—  
BECTON-DICKINSON DIV.**  
Rutherford, N. J. 07070  
(201) 939-9000

Richard C. Brogan, Employee Relations Repr.  
Empl: Total this location 4,000; Total EDP Employees 20; Programmers 8; Analysts 8; Operators 4.  
Diversified manufacturer of medical, surgical, hospital, laboratory, coated fabrics and electronic products.  
Order/Billing. Sales Analysis. Financial Reporting.  
360/30—65K—4 Tape—4 Disk.

**BELL TELEPHONE LABORATORIES, INCORPORATED**  
Div. of Research and Development Unit of the Bell System  
Mountain Ave., Murray Hill, N. J. 07974  
(201) 582-3000  
R. H. Taylor, Dir. Empl.  
Empl: Total (All Locs.) 16,000; Total EDP Employees (All Locs.) 1,425; Programmers 900; Analysts 400; Operators 125.  
Communications research and development. Computing sciences research, computer modeling and systems analysis. Development of special languages, and machine aids to design and manufacture.  
GE-600 series, IBM 360/30, 40, 65; and computer graphic equipment.

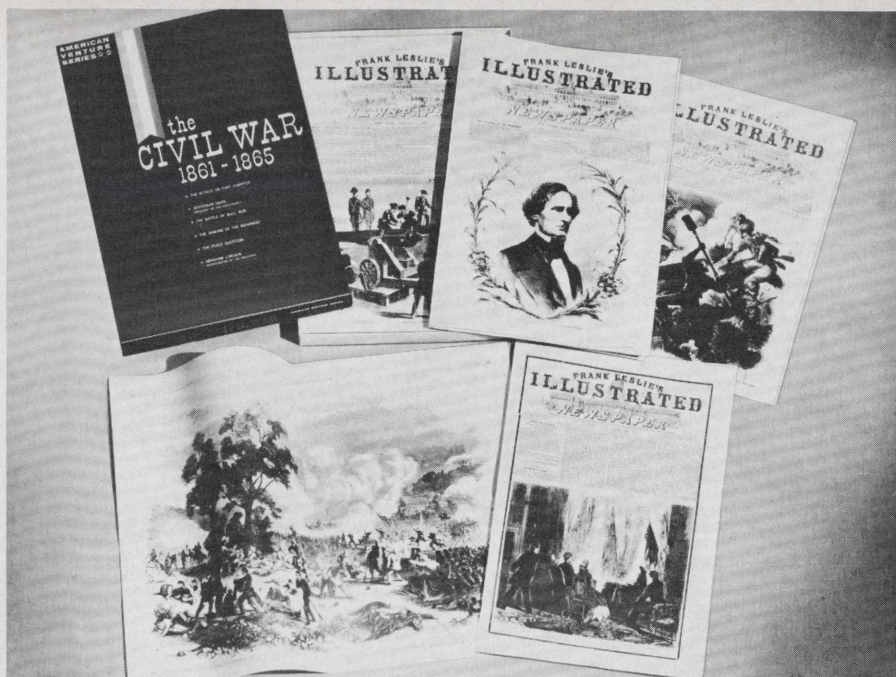
**BLUE CROSS—BLUE SHIELD OF NEW JERSEY**  
500 Broad St., Newark, N. J. 07101  
(201) 662-2319  
W. Scott McCann, Management Placement Administrator  
Empl: Total this location 1,350; Total EDP Employees 180; Programmers 45; Analysts 25; Operators 18.  
Health and medical-surgical benefits—prepaid. Claims, enrollment, billing, statistics.  
s/360 1120, 30, 40, 50; IBM 7074, 1401; tape/disk systems including 2314 and 2321; remote inquiry with 2260's.

**COMMUNITYTYPE CORP.**  
320 Essex St., Stirling, N. J. 07980  
(201) 647-5040  
Mr. Walter Hladky, Chief Engineer or Mr. Norman E. Lambert, Director of Manufacturing.  
Empl: Total this location 25.  
Data communication systems. (Type of work available: solid state design engineers, assembly production engineers, technicians, engineering aides, draftsmen, production line assemblies).

**CONCEPT IMPLEMENTATION CORPORATION**  
260 Godwin Ave., Wyckoff, N. J. 07481  
(212) 565-6892; (201) 447-1020  
H. John Lydick, Dir. of Oper.\*  
Empl: Total this location 17; Total EDP Employees 17; Analysts 17.  
Computer consultants—business logistics applications.  
Business logistics applications—transportation distribution and control.  
IBM S/360—30/40/50.

**CONRAC CORP.**  
32 Fairfield Place, West Caldwell, N. J. 07006  
(201) 226-5780  
John F. Poepoe, Data Processing Mgr.  
Empl: Total this location 300; Total EDP Employees 6; Programmers 1; Analysts 1; Operators 1.  
Data Recorders.  
Accounting and Manufacturing.  
360/20.

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V. C. A. Bitter, Jr., Pers. Dir.  
Empl: Total this location 61; Programmers 6;  
Analysts 6; Operators 1.  
Builders of custom real-time computer systems  
and computer related equipment.

**DATA SYSTEMS ANALYSTS, INC.**  
North Park Drive, Pennsauken, N. J. 08109  
(609) 665-6088; (215) 925-9550  
Mrs. E. Giammona, Pers. Dept.

Empl: Total 76; Programmers and Analysts 62.  
Programs and systems; design and implementa-  
tion; programmer training; data processing  
service. (Area of concentration—real-time, on-  
line systems.)

Systems experience—includes airline systems,  
management systems, command and control,  
on-line remote graphics, process control sys-  
tems, store and forward switching, weapons  
systems, system simulators.

**DECISION SYSTEMS INC.**  
East 66 Midland Ave., Paramus, N. J. 07652  
(201) 261-8900

Joseph F. Fox, Mgr. Admin.\*  
Empl: Total this location 65; Total EDP Em-  
ployees 50.

Systems analysis, computer programming  
audio-visual equipment.  
Scientific and commercial applications.

**ELECTRONICS ASSOCIATES, INC.**

185 Monmouth Parkway,  
West Long Branch, N. J. 07764  
(201) 229-1100

Thomas J. Murdock, Empl. Rep.\*  
Empl: Total this location 1,800; Total EDP Em-  
ployees 50.  
Analog, digital and hybrid computers; periph-  
eral equipment; and high quality components  
for computers.

Engineering applications, simulation and man-  
agement information and control systems.  
All EAI analog and analog/hybrid computers;  
IBM 360 for management information.

**ESSO MATHEMATICS & SYSTEMS, INC.**

P. O. Box 101, Park Avenue,  
Florham Park, N. J. 07932  
(201) 474-6217

Bruce R. Jones, Empl. Repr.\*  
Empl: Total this location 500; Programmers 7;  
Analysts 140; Operators 51.  
Software Development, Hardware Analysis,  
Computer Operations, Simulation, Optimiza-  
tion, Operations Research.

Long Range Corporate Planning, Logistics  
Planning, Marketing Applications, General  
Purpose Commercial/Technical Applications,  
Math Analysis and Systems Applications to  
Design and Operations Analysis.  
O/S 360/65 and 50, IBM 1440.

**HARVARD INDUSTRIES, INC.**

Div. of Frequency Engineering Laboratories  
P. O. Box 527, Farmingdale, N. J. 07727  
(201) 938-9221

Howard Furman, Supvr., Prof. Empl.  
Empl: Total this location 1,100; Total EDP Em-  
ployees 30; Programmers 6; Analysts 3; Op-  
erators 6.

Electronic systems and equipment.  
Engineering applications, circuit analysis, and  
business applications.  
IBM 360/30; IBM 1130; various peripheral  
equipment.

**HOFFMANN-LA ROCHE INC.**

340 Kingsland St., Nutley, N. J. 07110  
(201) 235-3401

Robert A. Wald, Associate Personnel Man-  
ager—Administration  
Pharmaceuticals, fine chemicals, vitamins, and  
aromatic.  
Scientific commercial operations research.  
G.E. 635, IBM 360-30, Honeywell 120,  
Univac 1004.

**INGERSOLL RAND RESEARCH, INC.**

Div. of Ingersoll Rand Co.  
P. O. Box 301, Princeton, N. J. 08540  
(609) 921-9103

Ben M. Goodman, Mgr., Scientific Data Proc-  
essing

Empl: Total this location 100; Total EDP Em-  
ployees 6; Programmers 3; Analysts 2; Op-  
erators 1.

Research.  
Engineering and scientific.  
CDC 8090 terminal to CDC 6600.

**ITT DATA SERVICES**

Div. of International Telephone & Telegraph,  
Inc.

P. O. Box 402, Rt. 17 and Garden State  
Parkway, Paramus, N. J. 07652  
(201) 268-8700

John J. Mulvey, Professional Staffing Repre-  
sentative

Empl: Total this location 718; Total EDP Em-  
ployees 419 (including sales & management);  
Programmers 50; Analysts 102; Operators 53.  
Programming and Computer Services (Batch &  
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 See Ad Page 11

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Empl: Total this location 6,945; Total EDP Employees 234; Programmers 124; Analysts 19; Operators 65.  
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Empl: Total this location 3297; Total EDP Employees 80; Programmers 30; Analysts 10; Operators 14.  
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See Ad Page 48

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IBM 1400, 360/30-40, Honeywell 200 Series, Univac 1004 or 9000 Series, Med. Scale NCR, Burroughs or G.E.

See Ad Page 64

**SCM CORPORATION**

299 Park Ave., New York, N. Y. 10017  
(212) 752-2700

D. R. Hollis, Corp. Dir. of Systems

Empl: Total this location 400; Total Systems Employees 10; Programmers 2; Analysts 8.

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O.R. Support, Methods.

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Data Processing Service Organization.

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Div. of Strategic Systems Inc.  
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Empl: Total 280; Total EDP 25; Programmers 2; Analysts 2; Operators 15; Mgrs. 6.

Data centers for sale of computer time, service work, packaged applications, keypunching. Letter writing, software compile and debugging, hospital applications.

Two IBM 360/30's, one IBM 360/40.

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Empl: Total this location 50; Total EDP Employees 40; Programmers 15; Analysts 25.

EDP Consultants, Systems Analysts, and Programmers.  
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716-1600

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Empl: Total this location 2,200; Total EDP Employees 90; Programmers 35; Analysts 8; Operators 30.

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Empl: Total this location 100.

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Empl: Total this location 450; Total EDP Employees 20; Programmers 2; Analysts 1; Operators 5.

Printing.

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IBM 360/20.

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See Ad Page 5

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Empl: Total this location 914; Total EDP Employees 61; Programmers 32; Analysts 9; Operators 9.

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Information retrieval, scientific applications, management science applications, commercial applications.

IBM 360/40, NCR 315.

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See Ad Page 71

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2—IBM 360-50; 1—IBM 360-40; 1—IBM 360-30.

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R. G. Carter, Asst. Manager—Industrial Relations\*

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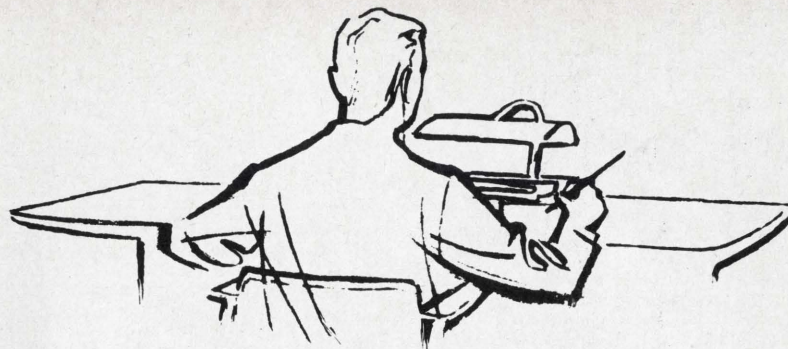
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IBM 360.

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Jim Boswall, Placement Director  
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ployees 131; Programmers-Analysts 37; Operators 11.  
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360/50.

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IBM 360/30, IBM 360/50.

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James R. Shea, Dir., Data Processing  
Empl: Total EDP Employees 52; Analysts 12; Operators 9.

Sport and Casual Clothing.  
Inventory Management, Production Control and Sales Analysis.  
IBM 360-40, 360-20, (2314 Files).

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Lance W. Clifford, Vice Pres.  
Empl: Total this location 10; Total EDP Employees 9; Programmers 5; Analysts 3; Operators 1.

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Commercial Aviation—Business Applications.  
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IBM 360.

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CYRUS WM. RICE & CO. 15 Noble Ave., Pittsburgh, Pa. 15205 (412) 921-6000 W. E. Bell, Mgr. of Operations Research Empl: Total this location 46; Total EDP Employees 5; Programmers 3; Analysts 2; Operators 3. Consulting engineering, research, testing and analytical services in various areas of water management such as water reuse and conservation methods, corrosion and deposit controls, pollution abatement systems, water quality controls, water resources studies, and potable and process water treatment processes. Information handling and retrieval for Materials Evaluation Report System (Saline water effects on materials of construction). Data handling, model building, and projections of the treatment costs for industrial waste water profiles (Systems analysis approach). Information handling of laboratory data, study calculations and report tabulations. One GE 200 console terminal directly connected to GE 255 time sharing series and PDP 10 computers. Rent time on IBM 360, 1130 and 7090 computers.

DATA MANAGEMENT SERVICES INC. —COMPUTER DIVISION 1515 Locust St., Philadelphia, Pa. 19102 (215) 546-0901 Jean Bender, Branch Manager\* See Ad Page 57

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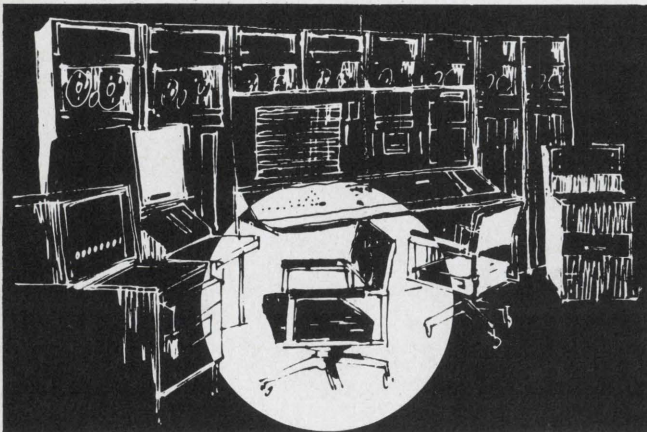
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See Ad Page 67

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Operations Research.

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Empl: Total this location 55; Total EDP Employees 55; Programmers 15; Analysts 20; Operators 6.

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### ELECTRONIC SYSTEMS PERSONNEL AGENCY

3700 Wilshire Blvd., Los Angeles, Calif.  
(213) 388-3205  
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### SOURCE EDP

Suite 1102, 3470 Wilshire Boulevard,  
Los Angeles, Calif. 90005  
(213) 386-5500  
Robert Davis\*  
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### SOURCE EDP

Suite 1300, 111 Pine Street,  
San Francisco, Calif. 94111  
(415) 434-2410  
Mike Parr\*

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Steven Weber, Branch Mgr.  
Employment placement service.  
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### ROBERT HALF PERSONNEL AGENCIES

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Dan Krane.  
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Washington, D. C. 20014  
(301) 657-2760  
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Joseph Fitzgerald, Consultant  
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Washington, D. C. 20006  
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Chester J. Kulik, Pres.  
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John R. Ford, President

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Chicago, Ill. 60606  
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David N. Grimes, V. P.\*  
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## MARYLAND

### CHARLES A. BINSWANGER ASSOCIATES, INC.

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(301) 728-5000  
Gene H. Novak, Pres.  
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### COMPUTER CAREERS INC.

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Bethesda, Md. 20014  
(301) 654-9225  
Edward W. MacLaren, Jr., Pres.  
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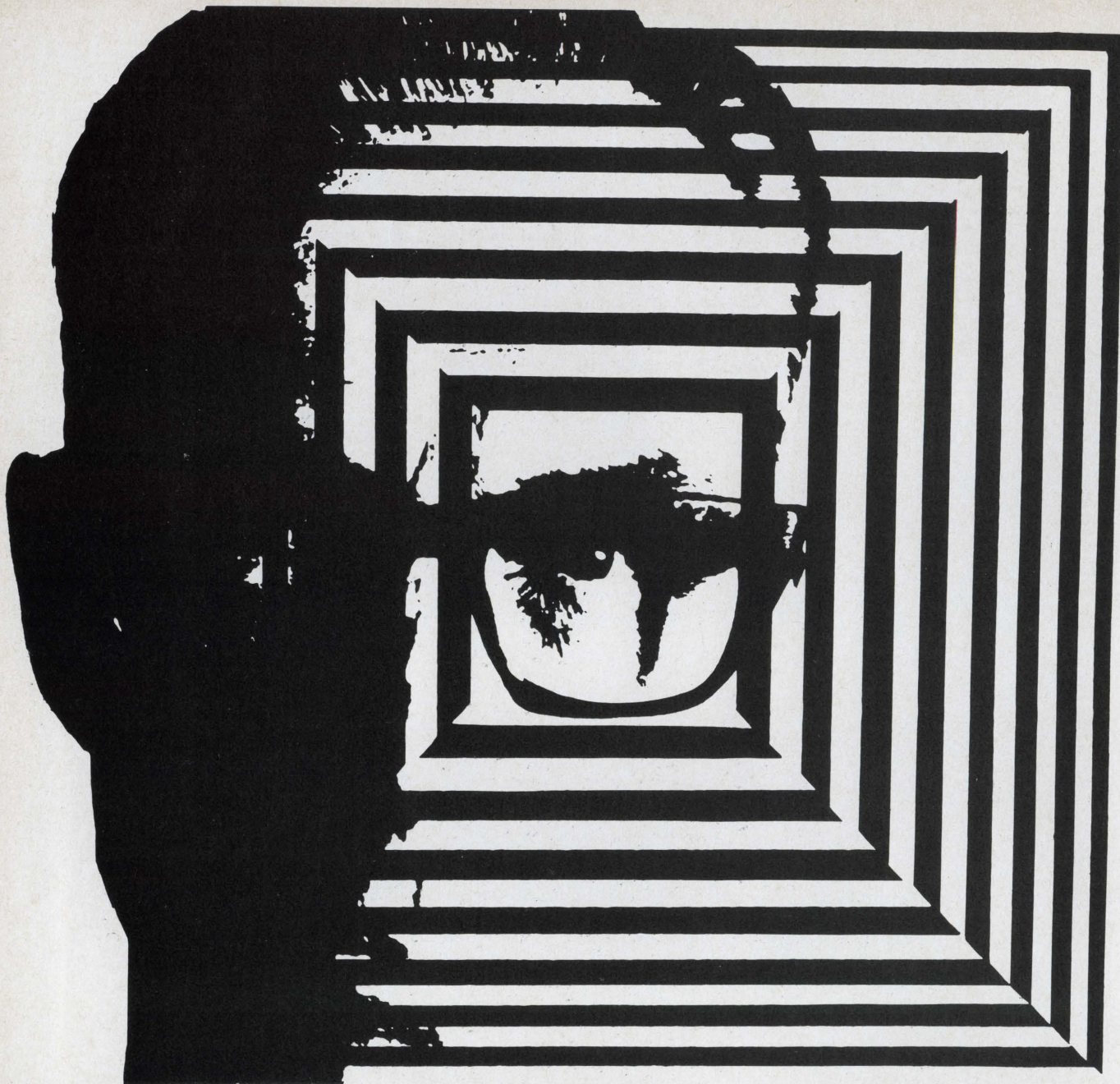
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Years _____	_____	_____
Schools _____	_____	_____

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Employer _____	_____	_____
City _____	_____	_____
Years _____ to _____	_____ to _____	_____ to _____
Title or Function _____	_____	_____

Name \_\_\_\_\_ Age \_\_\_\_\_

Home Address \_\_\_\_\_ Home Phone \_\_\_\_\_

\_\_\_\_\_ (city) \_\_\_\_\_ (state) \_\_\_\_\_ (ZIP code) U.S. Citizen? \_\_\_\_\_

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