

software age

APRIL 1970

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# software age

APRIL, 1970

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SOFTWARE AGE is published monthly by

## press tech inc.

2211 Fordem Avenue, Madison, Wisconsin 53701  
 Subscription free to qualified readers. Others, 10/yr. Individual  
 copies, \$1. Foreign subscriptions, \$15/yr.  
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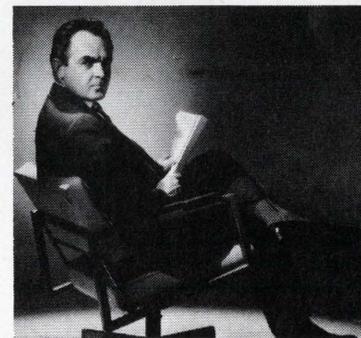
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**TROUBLE-TRAN  
PRESENTS  
XTRAN'S  
ADVENTURES  
IN  
FORTRAN**



By GEORGE N. VASSILAKIS

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

TROUBLE-TRAN EDITOR

## software age

P. O. Box 2076  
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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 \$50.00

### TROUBLE-TRAN'S Objectives:

1. To have fun.
2. To promote USA Standard FORTRAN by pointing out differences and inconsistencies of existing FORTRAN Compilers.
3. To alert programmers to the physical limitations of hardware.

# PROBLEM OF THE MONTH

Here is a problem you will enjoy. Since it was submitted by XTRAN and he is not eligible for the \$50.00 prize, there will be five \$10.00 prizes awarded to the best five explanations of this problem.

## PROBLEM 24: 8BEANS Submitted by XTRAN.

### Main Program

```
COMMØN /X/X(100)
COMMØN /Y/Y(100)
DATA X(1)/6H8BEANS/
```

```
CALL XTRAN
STØP
END
```

### Subroutine

```
SUBRØUTINE XTRAN
COMMØN /Y/Y(100)
10 Y(1) = X(1)
WRITE(6,99) Y(1)
99 FØRMAT(E15.6)
RETURN
END
```

- Will it compile?
- Will it execute?
- What will it print for Y(1)?

## ANSWER TO PROBLEM 22:

First we must apologize to Mario DeNobili. Any similarity between the problem he submitted and the problem published was purely coincidental.

Even though I type with two fingers, I managed to type the problem correctly. However, someone apparently thought the logical IF statement was too long and, for aesthetic reasons, he decided to print it on two lines. The result, of course, was catastrophic.

To avoid similar problems in the future, I have requested that, from now on, all coding is photo-reduced from the material I submit.

The key statement was:

```
IF(K.EQ.O.OR.XTRAN(.FALSE.)) K=K+1
```

This statement was preceded by the statement  $K=O$ . The variable K appeared in COMMON storage and its value was increased by 2 inside XTRAN. The problem was to find out the value of K after the execution of the logical IF statement.

The answer was compiler dependent, and I have received answers to all possible values of K, which were  $K=1, 2$ , or  $3$ . Perhaps the biggest surprise was the B5500 FORTRAN compiler, which accepted the problem as it was published.

This is another example where the FORTRAN compiler has no way of detecting the fact that rules have been violated. The USA Standard FORTRAN clearly states that:

"The evaluation of functions appearing in an expression may not validly alter the value of any other element within the expression, assignment statement, or CALL statement in which the function reference appears."

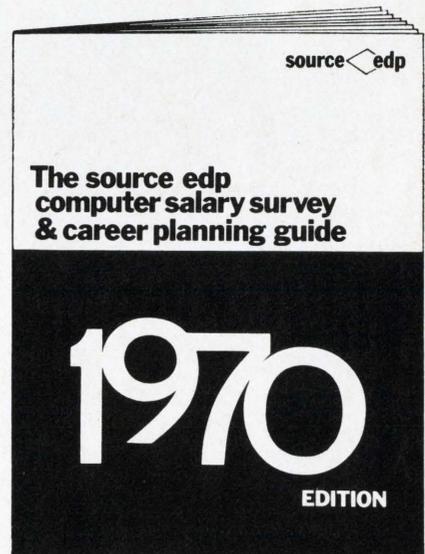
# Dynamic 1970 opportunities for computer professionals.

## And the salaries they command.

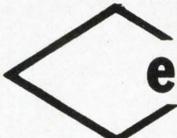
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# NEW APPLICATIONS

## Electric Communications to Aid Traffic Safety Flow

Motorists of the future may have a number of electronic communications systems to improve safety and traffic flow, a General Motors research executive told delegates to the 17th International Scientific Congress on Electronics recently. Edward F. Weller, head of the Electronics and Instrumentation Department of GM Research Laboratories, Warren, Mich., explained that the electronic drive aids were designed in response to two developments: 1) a tremendous increase in traffic density in industrial nations, and 2) declining costs of electronic circuitry.

Speaking at Rome's Palazzo dei Congressi, Weller stated that electronic communication systems were a means of easing the tasks of drivers confronted with a great increase in traffic density. He told delegates that General Motors has been experimenting with such systems for more than a decade and described some of GM's work in this area.

Audio signaling, a roadside low frequency system that presents emergency information or news of traffic conditions through the car radio speaker, was an early pioneering effort of GM Research, Weller reported. The system has been employed during the past four years at an intersection of two major freeways near Hannover, West Germany. Earlier, the system was tested and the results documented by the Georgia Institute of Technology. Similar in purpose to audio signaling is the visual signing system, which displays road signs on a TV-like dashboard screen.

The in-car communications center—called "DAIR" for Driver Aid Information and Routing—incorporates audio and visual signing along with route guidance and coded and voice communication. The DAIR system has been installed on a limited test basis at the General Motors Technical Center, Warren, Mich.



**Help for Jet-Age Joe . . .** Automatic computer-aided passenger check-in devices for air travelers are being developed by Sperry Rand Corporation's Univac Division to ease crowded conditions at terminals as air travel triples in the 1970's. The self-service devices include credit card verifier, left, and ticket encoder, right. Automatic passenger processing systems may also include talking computers, which would provide flight schedules, reservations service, and flight status reports.

## Computer Accessed Via Satellite

Timesharing via satellite was demonstrated recently during the Third Hawaiian International Conference on System Sciences at the University of Hawaii Monoa Campus. Computer Communications, Inc., Inglewood, Calif., provided a remote CRT terminal at the Hawaii campus which exchanged data at 2,000 bits per second via the Lani Bird Satellite with an IBM System 360, Model 91, computer operated by the Campus Computing Network at UCLA. The transmission was "technically excellent and the demonstration was extremely successful", according to UCLA spokesmen attending the conference.

The Campus Computing Network at UCLA supports instructional and research activities at the university. In addition, UCLA is a member of a consortium sharing valuable personnel and equipment with other schools not having these capabilities. The facility at UCLA currently operates 24 hours per day, seven days a week, handling thousands of jobs for UCLA and other colleges and universities throughout California. Future subscribers to UCLA's network may type an inquiry on their terminal in Hawaii and in seconds receive a reply from Los Angeles by way of transpacific telephone circuits.

## Computerized Medical Data System Announced

A new computer system for transmitting medical and health care claims information electronically to and from doctors' offices was recently unveiled. Installation of the system will start in May.

The system, developed jointly by Western Data Products and Blue Shield of Virginia, will cut health care claims costs (for Blue Shield and Medicaid) by over \$1 million a year in Virginia alone and could achieve savings near \$60 million a year throughout the country.

In addition, the new device's ability to give doctors access to a wide range of medical data, including symptoms—diagnosis, drug compatibility, burn therapy and other information useful in treating patients, was demonstrated.

## Computer Tracks Maze to Federal Funds

A way for states and cities to cut straight to the heart of the Federal money maze and to get answers in seconds to critical questions on funding was announced recently in Washington. Details of FAIR—Federal Assistance Information Reporting—were described by officers of Computer & Business Management, Inc.

CBM's announcement was made simultaneously with a report on FAIR given at the National Governors Conference by Gov. Arch A. Moore, Jr., of West Virginia, first state to place FAIR in operation. J. L. Marchbanks, CBM vice president, said FAIR makes it possible for the first time for administrators to determine immediately the specific availability of funds for state or local projects, who grants the funds, and how to qualify and apply for them.

Marchbanks said, "FAIR incorporates the most complete file in existence on Federal assistance programs—some six million bits of information on more than 1500 separate programs offered by some 121 Federal departments and agencies."

The information is contained on master computers programmed to receive and answer questions in English via compact remote access terminals. FAIR's data is updated weekly by a Washington-based team of researchers, program analysts and computer specialists. CBM administers the FAIR service from its Washington office. The consulting firm is headquartered in Cleveland.



Part of the equipment used for updating FAIR.



**Computer Helps Company Map Utility Poles, Pipelines . . .** A Texas company is mapping power lines in far-away Wyoming and tracing oil pipelines in the Alaska wilderness with a computer that never leaves San Antonio. Tobin Aerial Survey Co. uses an IBM 1130 system and a plotting device to generate these specialized maps. The information is gathered primarily from aerial photographs.

The utilities maps are so specific that each transformer and pole is shown, along with its exact longitude, latitude and elevation. Pipelines thousands of miles long are mapped in similar detail.

## Attache-Case Terminals to 'Talk' to Computer

Manufacturers' representatives with portable terminals soon will be able to converse with a "talking" computer from any standard telephone in the country. Lithonia Lighting, a division of National Service Industries, Conyers, Ga., has ordered 205 of the new IBM 2721 portable audio terminals. The 2721, IBM's first fully portable computer terminal, was introduced in late January. To accommodate the terminals, Lithonia will add a "voice-answerback" unit to the System/360 Model 40 installed at its headquarters here. This device translates electronic impulses from the computer into spoken words, using a pre-recorded, stored vocabulary.

## Announce Electro-Optical Memory Film Breakthrough

Advanced Patent Technology, Inc., Las Vegas, announced the fabrication of a thin film rare earth ferro-electric crystalline material to replace the grown crystals which are suitable for electro-optical computer memories. This is the result of research based on the patents of Alvin A. Snaper, vice president and director of the company.

The substance, verified by an independent research laboratory, Sloan Research Industries, Inc., of Santa Barbara, is composed of Barium Titanate using the RF sputtering process on a quartz substrate. A layer of this material provides the basis for a computer memory component which will change and hold the condition of polarized light as its storage medium. The significant feature of the film, according to Snaper, is its ability to "erase" information and change its condition at the speed of light.

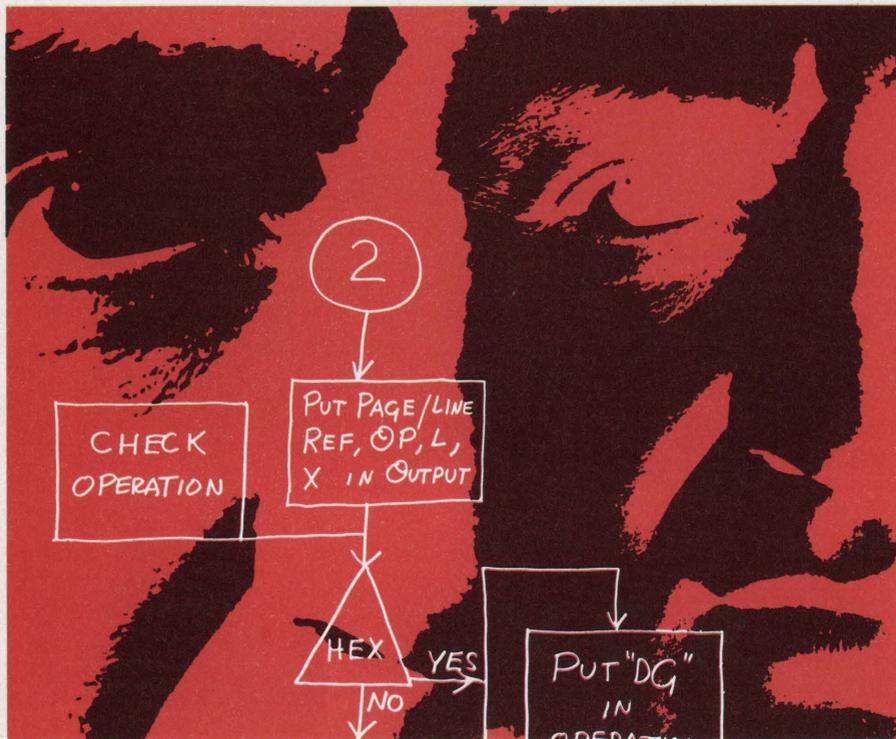
## Data System Speeds Wall Street Cash Reports

Did you ever call your broker the first thing in the morning after a heavy trading day and ask him for an up-to-date cash report on your account? How long did he keep you waiting before he returned your call? One hour, four hours, a day or more?

E. F. Hutton, one of the nation's largest investment firms, has taken a big step to eliminate this annoying and sometimes costly delay. They have installed a Digitronics high-speed data communications system to transmit margin status reports to their West Coast offices. Their West Coast customers can now get an up-to-date cash picture of their account before the New York Exchange opens.

# Non-defense, non-stop programming opportunities

## at NCR Electronics Division in Los Angeles



NCR Electronics Division is the largest, fastest-moving commercial computer manufacturing facility in Southern California and one of the most advanced in the world. Here, you can share new fourth-generation challenges with men who have already placed some of the world's most sophisticated digital systems hardware and software on the market—people who have pioneered high-speed thin-film technology, advanced disc memories, monolithic integrated circuitry and automatic production techniques. NCR means business in 121 countries. The NCR Electronics Division can mean a non-stop, non-defense, no-limit future for you today.

### CURRENT OPPORTUNITIES SYSTEMS FORMULATION

Various positions involving systems study and analysis; formulation and preparation of functional specification for computer peripheral equipment with emphasis on disc files; evaluation of multi-programming, multi-processor time-sharing systems using simulation techniques; formulation of on-line, real-time systems; competitive analysis; recommendation of product line approaches. Positions require a degree in mathematics, business or engineering plus 2-5 years' applicable experience.

### PROGRAMMING Software Development

Several positions involving origination, design, development and implementation of complex software systems; development of original

functional design and processing techniques; design and implementation of state-of-the-art data base/file management software and a large-scale on-line multi-programming executive; design, flowcharting, coding and implementation of on-line executive software modules. Positions require degree in business or science plus 2-5 years' applicable experience.

### Diagnostics

Work involves creative use of existing computer logic for automatic diagnosis of hardware malfunctions. Specific activities include writing programs to de-bug function specifications and/or programs to verify hardware capability; writing test outlines; coding, de-bugging and documenting programs. Positions require a degree in computer science, mathematics or electronic engineering plus 2-5 years' applicable experience and familiarity with both hardware and software.

### ARRANGE NOW FOR SICC INTERVIEW

To schedule an appointment at the Spring Joint Computer Conference in Atlantic City, May 5-7, or in your area, send resume, including salary history, to Steve Williams at the address below.



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### Musical Work Composed With Aid of a Computer

An 11-minute modernistic musical composition written by a Greek-born composer with the aid of a computer was performed by a symphony orchestra for the first time in the U.S., February 7, "ST/48 for 48 Players," a 1962 work of Iannis Xenakis, was played by the Pro Arte Symphony Orchestra, under the direction of Eleazar de Carvalho at the Holstra University Playhouse, Hempstead, L.I., N.Y.

Composer Xenakis, a mathematician, engineer and architect, who holds a degree in civil engineering from Ecole Polytechnique, Athens, also has studied computer programming. His musical composition was produced in two steps. First, he wrote a computer program based on a set of mathematical laws concerning random variables. This program, in turn, directed a random number generator program stored within the computer which picked numbers representing musical notes at random. The selection of the random variables which produced the final composition took an IBM 7090 computer one minute.

### Computerized Signal System to Control Vehicle Traffic

One of the midwest's first computer-controlled traffic signal systems will begin improving the flow of vehicle traffic in Fort Wayne, Ind., early next year. An IBM 1800 data acquisition and control system, to be installed in the new \$10-million City-County Building under construction, will allow swift adjustment to traffic conditions of some 260 signals over 585 miles of city streets.

Mayor Harold S. Zeis said the computerized system will assure drivers that signal light cycles will complement what is happening on the road at all times. "Programmed to activate as many as 500 different traffic patterns, the computer will help eliminate lengthy traffic tie-ups," he added. Studies of similar computer-controlled traffic projects in other cities indicate a 20 percent, or greater, improvement in the flow of traffic, according to Thomas Manny, city director of traffic engineering.



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**Systems programmers:** Develop operating systems, assemblers, compilers, monitors, math libraries, customer liaison, etc. Need two to five years related experience; technical degree or equivalent.

**Application programmers:** Develop assembly language software for data acquisition, process control, automated checkout, communications, etc. Need two years related experience; technical degree or equivalent.

**Electrical engineers:** Mainframe and peripheral logic design, digital systems design, analog and digital circuit design, manufacturing project engineering. Need BSEE degree; three to five years related experience.

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## Computers Combat Credit Card Fraud

They are handy, convenient, eliminate carrying large sums of cash and relieve the burden on the banks of processing an ever-increasing avalanche of checks. But the ubiquitous credit cards now being issued in ever growing numbers of oil companies, banks, department stores, hotel chains, restaurant associations, auto rental companies and airlines are also attracting the petty thief and the organized crime syndicates. Losses due to stolen credit cards are now estimated at upwards of \$200 million a year.

Fortunately, not everything is going for the criminal elements. One concern has decided to bring the latest advances in technology into the battle against credit card crime. National Data Corp., Atlanta, has enlisted the aid of two large-scale Sperry Rand Univac 494 Real-Time Computer Systems to act as electronic sentries to thwart those crooks using stolen credit cards issued by most of the nation's major oil companies and the Interbank Card Assoc. serving 20 million card-holders and some 400,000 participating merchants.

In the memory drums of the computers are contained lists, updated daily, of numbers of all stolen or lost credit cards issued by the oil companies and members of the Interbank Card Assoc. In addition, numbers of cards cancelled because of credit problems are also recorded.



Operators of UNISCOPE terminals at National Data Corp.'s Cherry Hill, N.J., center receive telephone calls to verify credit cards from gasoline stations and department stores throughout the Northeast United States. Normally, an answer verifying if the card is "good" is received within 20 seconds from the computer.

## Audio-Visual Learning System Employs Applied Reflex Conditioning

What is claimed to be the most rapid and effective method of learning the skill of touch typing ever developed is currently being marketed by Automated Instructions, Inc. of Englewood Cliffs, N.J. The system uses a revolutionary application of the Pavlovian reflex conditioning technique to make the student absorb a touch typing capability through color motion pictures and light and sound signals.

The system is individually programmed and was perfected after 15,000 student hours of classroom instruction. Each pupil may progress at his natural rate of absorption; the stresses, tensions and frustrations of conventional typing courses are eliminated.

The first phase of student training makes use of 12 twenty-minute color motion picture cartridges for rear or front-screen projection. Reacting some 5,000 times to a psychologically programmed repetition of precision lights, sympathetic sound instruction and rhythmic command signals, the average pupil absorbs the keyboard in four hours. Six additional hours enable him to touch-type at approximately 15-20 words per minute.

The second phase of the training is designed to increase finger dexterity and speed by controlled copy-typing with the student's pace governed by audible instruction through

pre-recorded taped cassettes. Further training in this second phase will provide speeds up to 60 words per minute.



Automated Instruction's individually programmed touch typing course allows each pupil to progress at his natural rate of absorption.

## New Computer Program to Teach College Grads

A new program aimed at helping college graduates, especially those from small colleges, understand what computers can and cannot do has been set up by the Middle Atlantic Educational and Research Center (MERC), located at Lancaster, Pa. on the campus of Franklin and Marshall College.

The program, known as the Professional Training and Development Program (PTD), is expected to be of special interest to industry as well as to education. It was launched in February under industrial grants from AMP, Inc. of Harrisburg and the Howmet Corp. of Lancaster. Other participants will be enrolled in the MERC program as funding becomes available. According to MERC officials, PTD will have a multiplying effect and ultimately could reach several million college students.

"With computers playing an ever increasing role in all phases of modern living, no graduating college student can be considered fully educated and ready to make his way in society without at least a working knowledge of computers and their capabilities," said Andres Llana, Jr., director of the MERC project, a regional non-profit, time-sharing computer utility.

## Computer Speeding Answers to Customer Inquiries

A computerized information system is providing answers at the push of a button to service questions asked by some 340,000 customers of Consumers Power Company. The customer information system has been initiated by the company in its Jackson, Grand Rapids and West Wayne Divisions in Michigan, and plans are underway to expand the system to the Kalamazoo, Pontiac, South Oakland and Macomb Divisions. The system will later be expanded to include gas and electric customers throughout the state. Consumers Power is one of the ten largest utilities in the nation. Its 83 offices in Michigan serve some 1.6 million customers.

The service is provided through the use of TV-like computer terminals connected via telephone lines to an IBM System/360 Model 50. Terminals used in the three areas are located in downtown branch offices as well as the Consumers Power corporate office here. Additional remote terminals will be added at other locations as the system expands.

## New Service for Instant Appraisal of Warrants Versus Common Stock

A new service which evaluates the investment merit of warrants relative to the investment merit of associated common stock has been announced by TransNet Corp., Red Bank, N.J. The user enters information about the warrants and common stock into a teletype terminal located in his office. The data is transmitted over regular telephone lines to TransNet's time sharing computer and, within seconds, a chart is printed on the user's terminal showing the warrant's position relative to its expected value over a complete range of stock prices.

The program uses a thoroughly tested formula to arrive at the expected value line to which the warrant price can be compared. The investment merit of warrants depends on the investment merit of the common stock into which they can be converted and on technical factors which may cause them to trade at especially high or low values relative to their expected premium above their conversion value.

# SYSTEMS ANALYSTS/PROGRAMMERS

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# FINANCIAL CURRENTS

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Establishment of a branch office of *Business Consultants Inc.* in Los Angeles has been formally approved by the Japanese Government.

*Business Consultants Inc.* is the first company among the software houses in Japan to receive such Government approval. Major objectives of the operation in the Los Angeles office include keeping close contact with various organizations in the U.S. and performing marketing activities to make contracts in the area of systems development.

Signing of two computer leases having a combined value of \$3.74 million was announced recently by *Systems Capital Ltd.*, London, a wholly-owned subsidiary of *Systems Capital Corp.*

David R. Castley, director of *Systems Capital, Ltd.*, said both leases involve G.E.I.S. GE-615 computer systems. One contract, valued at \$1.84 million, is with *Ford Motor Company Ltd.* The other, valued at \$1.9 million, is with *Sanaco Computer Services*, one of Britain's largest service bureau organizations, which is owned by Smith and Nephew Associated Companies Group (*Sanaco*).

*Park Electrochemical*, Great Neck, N.Y., recently announced the formation of a new subsidiary, *Dielectric Polymers, Inc.* (DPI), which will manufacture specialized polymers for dielectric materials and films for the electronic industry, as well as other applications. *Park Electrochemical* primarily designs and manufactures copper clad electronic circuit boards upon which sophisticated printed circuits are produced for computers and advanced electronic equipment.

*Auerbach Corp.*, an international computer systems design, consulting and publishing organization, has announced the acquisition of *Automated Systems Corp.*, Washington, D.C., for an exchange of privately held stock. *Automated Systems Corp.* provides personnel and capability in contract and applications programming and program implementation. The firm will be operated under the name of *Automated Systems Corp.* as a division of *Auerbach Associates, Inc.*, the consulting subsidiary of *Auerbach Corp.*

*Leasepac Corp.*, Cleveland-based computer disk pack leasing company, announces a new computer tape leasing plan that enables computer tape users to obtain a complete library of new tapes over a three year period. Called "Tape-MARC" (Tape-Management and Replenishment Concept), the plan provides for *Leasepac* to purchase the entire computer tape library of a company at book value—or a mutually agreed upon price—and lease tapes back to the customer on a programmed basis.

*Datamation Services, Inc.*, has agreed in principle to sell *Computer Systems and Education Corp.* (CSEC) to *Northeast Computer Systems, Inc.*, of Hartford, Conn. according to Thomas T. Connors, *Datamation* president.

Connors said that *Northeast Computer Systems* has agreed to purchase from *Datamation* all the issued and outstanding capital stock of CSEC for an undisclosed sum. In addition, *Datamation* has agreed to forgive certain advances made by it to CSEC, and has taken over the liability of CSEC under a bank loan.

*COMSERV*, the Philadelphia-based computer utility, has signed a 1.7 million dollar contract with the *Burroughs Corp.* for the new *Burroughs' TC500* terminals. *COMSERV* is developing the software necessary to interface the *TC500* with its *XDS Sigma 7* computer system.

The formation of *Bridge Data Products, Inc.* to design, develop, and manufacture computer peripheral equipment has been announced by John H. Benetz, chairman of the Board, and Lewis E. Sauerwein, Jr., company president.

The company has been closely identified with the computer field since 1956 when it undertook the development of card punch dies and toggle systems for RCA. Subsequently, *Bridge* completely redesigned and produced card punch and card reader mechanisms for RCA. In 1962, the company developed a 200 card per minute card punch and a 600 card per minute card reader for sale to *Philco, RCA*, and *Univac*. Design and development of its new multi-card card reader started in 1969. Patents are pending on the new desk top card reader, and the company is presently developing a data recorder (keypunch), and a card sorter for the new *IBM System/3* card.

*Computer Technology Inc.* (CT) recently announced it has finalized the sale of its wholly-owned subsidiary, *Service Technology Corp.* (STC), to *LTV Aerospace Corp.* *Douglass M. Parnell, Jr.*, CR's president and chief executive officer, said that the company has received \$2,234,000 cash for STC. He said the price is based on STC's net equity book value on Dec. 31, 1969.

The transaction was consummated pursuant to an option granted to CT as part of the recent purchase agreement by which *University Computing Company* acquired a minority interest in CT from *LTV Aerospace Corporation*, *Parnell* said. After the sale of STC, CT employs about 1400 people and operates some 50 computer systems in Dallas, Chicago, Detroit, New York, Atlanta and Jacksonville, Fla. It offers computer facilities management services to commercial and industrial users, including total design, development, programming and operation of customer data processing systems.

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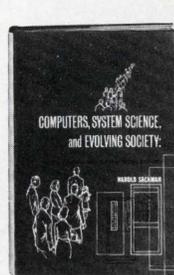
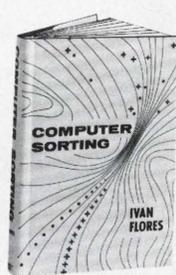
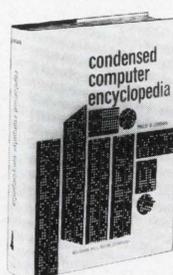
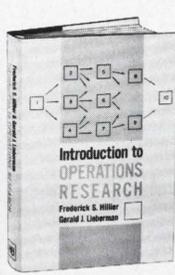
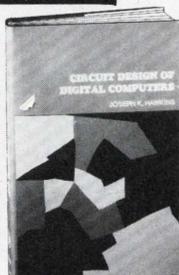
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Hallmark Data Systems, Inc., Chicago, has acquired *Communications Real Time, Inc.* (CRT), Elmhurst, Ill. The announcement was made by Hallmark president, Philip C. Miller. CRT serves data processing operations in the areas of communications, operating systems, systems design and programming. Hallmark Data Systems, Inc. specializes in communications, education packages, video tape training programs and computer services.

Compace Corp. recently announced the completion of an agreement with *International Computer Business Network* involving the Compace Versicom 2400 System. ICBN will market a special version of the Compace Versicom 2400 remote batch terminal system. The agreement provides that ICBN may purchase up to 100 systems over a two-year period for resale to its customers with supporting software. ICBN plans to lease their total package to EDP Service Center businesses for about \$1200 per month plus maintenance.

Athena Systems, Inc. has been formed in Bedford, Mass. to provide low-cost devices which will read existing credit cards. The new company will manufacture and market a line of credit card readers for industrial and retail use. The industrial market, estimated at \$15 million over the next three years, includes badge reading, data collection and certain types of inventory applications. In retail uses, the Athena card reader is expected to be employed at gas stations, airline counters and department stores.

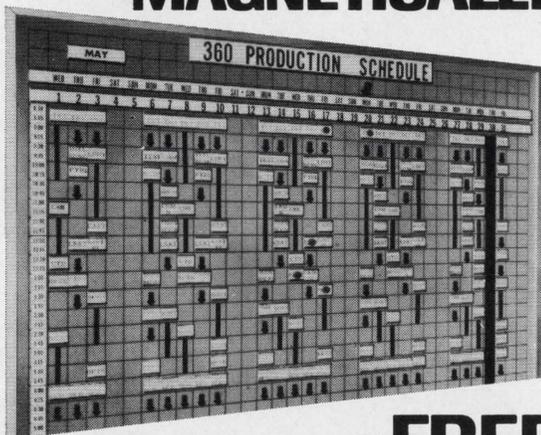
Micro Computer Inc. has been formed to develop and manufacture dedicated computerized systems, which have been configured around the proprietary low-cost, general purpose micro computer. The company was founded in April, 1969, and started operation in July, 1969, in Reseda, Calif. MCI recently moved to its current facility in North Hollywood to provide space for the production of its first product, which is a computerized Numerical Control (N/C) system for machines.

The formation of *Computer Audit Corp.*, a computer software development and distribution firm based in the Washington metropolitan area has been announced by Thomas P. Bianco, president and chairman of the board. Computer Audit acquires fully developed and operational software packages for marketing. The units currently being handled by the firm are all generic to computers and application independent.

*Interactive Data Corp.* and *Innovative Systems Development, Inc.* have reached an agreement in principle whereby Innovative will become a computer systems and consulting company within the Interactive corporate framework. Joseph J. Gal, chairman of Interactive Data, said that the new subsidiary, to be renamed Innovative Software, Inc., will be concerned primarily with the design, development, implementation and operation of custom-tailored, large-scale data systems as they apply to financial, accounting, management and manufacturing operations.

continued on page 30

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## THE DREAM OF THE PRESENT DAY

The Japanese software industry has a major spotlight in this issue of Software Age, including excerpts from a report by Mr. Shigeru Otsuka, Executive Director of the Japan Trade Center. Although the United States holds a wide dominance in world-wide software development . . . we believe it's a worthwhile exercise for the "leaders" to observe the "followers" progress.

We found Mr. Otsuka's commentary a *candid report* on Japanese dependence upon manufacturers for software support, a reluctance to purchase independent software, and what he described as a "low level" of applications. Indeed, he concluded that Japanese software "lags some 10 years behind the United States."

Before we presume to go "ho-hum" about the Japanese, however, *take notice* of a few other items in Mr. Otsuka's report . . . like a government ministry considering "comprehensive programs" in areas as accelerated standardization for data processing . . . and encouragement of a computer-based information services industry. His references suggest that both government and business regard software as a *separate industry* with its own special significance in the continued acceleration of Japan's national economy.

We accept Mr. Otsuka's premise that Japan is probably 10 years behind the West in software sophistication, and we may be reading too much into his remarks as the "concentrated interest of all our business." But, we have seen what the Japanese *can accomplish* when their government and industry selects what they call "an immediate target" and attack it with a team effort. Their achievements in the electronics, steel, chemical and optics industries are only a few examples of their "concentrated" approach.

*Hold on:* We are not suggesting that Japanese software will soon flood the United States market or *that* their solutions involving a government team effort are preferred to our own system of independent problem solving. We do believe, however, that the Japanese are *well worth observing* in their efforts to "encourage" a strong software industry.

We accept not only Mr. Otsuka's statements as evidence of their intention to rapidly foster a progressive software industry, but we also note with interest that the Japanese are featuring one of their most elaborate exhibits at EXPO '70 on their "Dream of The Present Day" . . . of *imaginative software* applications in our human society, well beyond routine accounting functions.

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## THE SOFTWARE

### the dream of today's japan at expo-70's "computopia"

*The dramatic Furakawa Pavillion (see cover illustration) at Japan's EXPO '70 underscores Japanese national interest in computer implications as reviewed in the accompanying "Status Report on the Software Industry in Japan."*

*Expected to be a key attraction at EXPO '70, the Furakawa Pavillion features a 7-story reproduction of a thousand-year-old pagoda temple, together with a "Computopia" projecting the role of the computer in human society. The adjoining structures of the temple and computer exhibit are united under the poetic theme, "Dream of the Ancient Time and The Dream of The Present Day."*

*At "Computopia," visitors will see demonstrations of voice recognition and reproduction of the human voice by use of computers, and dress design by computer among other applications.*

*The pagoda is an exact reproduction of the Todaiji Temple of Nara and built in a garden surrounded by a pond. The pagoda is erected on a platform with exhibit rooms underneath.*

*According to the Japan Trade Center, New York, Japan intends to use EXPO '70 as a model of an "informationalized" society, in which nearly everything will be done with the aid of a computer. The aim is to come up with a revolutionary new form of city planning that will, at the same time, help solve the complex information handling problems associated with a giant world's fair.*

*At EXPO '70, all available information about buildings, roads, exhibits, visitors, the weather, etc., will be fed into five huge electronic computers making up the Management Information System (MIS). As a result, for example, it will take only seconds to reunite a lost child with his parents. All crucial facts about the child—such as age, color and style of clothing, facial appearance and other physical characteristics will be stored by the computer. When his parents inquire at EXPO's Center for Lost Children, the child's face will immediately appear on a TV screen. The same system will be used to speed up return of lost articles.*

*The Japan World Exposition, which opened March 15 and will be conducted through September 13, 1970, is expected to attract over 30 million visitors. The first ever held in Asia, EXPO '70 already ranks as one of the spectacular of world expositions held since 1851, including Montreal's EXPO '67. The site of EXPO '70 is Osaka, Japan's second largest city and considered the industrial and business center of the nation.*



# INDUSTRY IN JAPAN

With the Japanese economy anticipating continued sharp, accelerated expansion, both government and business in Japan regard the development of its software industry with an "anxious and enthusiastic attitude," according to Shigeru Otsuka, Executive Director of the Japan Trade Center. Mr. Otsuka reviewed the status of the Japanese software industry and reported developments concerning the "concentrated interest of all our businesses."

Mr. Otsuka reported that the utilization of computers in Japan remains largely at the accounting function level for a majority of the over 35,000 installations in the country. He concluded that current prospects for independent software would be limited to a few large-scale computer applications. He noted that a few exceptional computer users are importing specific programs from overseas software houses.

In reviewing the development of independent software support, he stated that software houses were first instituted in Japan in 1966. There were only 14 software houses in operation in 1969 and only 2 of the registered reached annual sales of nearly 3 million dollars. Further, only 9 companies of 14 are truly independent, with the balance having an affiliation with computer manufacturers.

Software houses in Japan specialize in programming, systems analysis, engineering design and other consultant activities. Although the development of software is expected

to advance with expanded EDP applications, it is also anticipated that the major portion of software development will continue to be shared by the five major computer makers in Japan: Hitachi, Nippon Electric, Fuji Tsushinki, Toshiba, Oki, and Mitsubishi. With even the large-scale manufacturers, the proportion of production cost for software as against hardware remains well below American standards with Japanese manufacturers spending 25% for software development and 75% for hardware.

Mr. Otsuka noted that application software supplied by the Japanese manufacturers is "not always adequate and satisfying to its user." Although manufacturers have concentrated on relatively basic programs for systemization as engineering calculations, econometric analysis, and other sub-routines, users also require manufacturers to become involved in development of more sophisticated applications for hardware although the manufacturer is not held liable under standards of ordinary business practice.

## MIS is "first" at world's fair

The monitoring panel of the data communication system for EXPO '70 was developed by the Nippon Telegraph and Telephone Public Corp. (NTT).



## SOFTWARE . . .

Most computer users in Japan remain inclined to consider software as an accessory to computers which is delivered free of charge with hardware. However, the "future pricing policy for hardware and software in leading countries like the United States are expected to become a more decisive and influential factor," according to Mr. Otsuka.

### Government Promotes Software Industry

The Japan Trade Center executive did indicate an expanding government interest in what he earlier described as the "concentrated interest of all our businesses in software developments." He reported that the Japanese government is exploring administrative policy for promoting data processing under the Ministry of International Trade and Industry. The Ministry's Council on Industrial Structure recommended comprehensive governmental steps for encouragement of data processing and computer-based information services. The report included current status and forecasts on training for data processing, development of EDP techniques, acceleration of standardization, studies of remote data processing services, general promotion of the computer-based information services industry, and diversification and sophistication of data processing in the governmental sector.

The Japanese parliament also became actively involved in the promotion of EDP when the ruling Liberal-Democrat party formed a league of parliamentary members to promote computer-based information services as an industry. A study team of parliamentary members was formed to visit the United States to inspect leading EDP facilities.

Mr. Otsuka implied a close in-

volvement between governmental and industry interests in future software for information services. "It goes without saying," he stated, "that under these circumstances, software or computer programming will be able to secure unlimited demand in the years to come, playing all the more important roles in the prosperity of data processing and computer-based information services industry. It is by this reason that we do believe the necessity of fostering a software industry in Japan as an immediate target."

Mr. Otsuka continued with several critical observations about the current Japanese software market:

- (1) Many Japanese computer users are apprehensive about additional application software that might "leave idle" expensive hardware for experimentation, therefore inviting criticism that computers ". . . prove to be nothing but just a waste of money."
- (2) Computer manufacturers are involved in the development of application software to the extent that there is "little room for the survival of independent software houses now in Japan."
- (3) Because of manufacturer software support, most computer users are accustomed to accepting software as a manufacturer's service and not prepared to acquire outside software at an additional cost.
- (4) To date, even though report activity continues, no substantial investment has been made by the government to encourage a separate software industry, including national or municipal projects that might benefit by computerization.

Although Mr. Otsuka rated the role of the government as users of software as "both insignificant and negligible in Japan," he did report remote information and data processing networks existing in the government sector including: a nationwide employment placement system, unemployment insurance system, logistics and stock compiling control system, system for meteorological data and information, criminalological checking, illegal acquisitions of

drivers' licenses and licenses for gun holders, a traffic control system, a control system for consumer markets, and an air pollution control system in the EXPO '70 city of Osaka.

### Trade Director Forecasts Future EDP Applications

Mr. Otsuka also introduced forecasts in the future pattern of Japan's EDP application as reported by the Japan Electronic Data Processing and Development Center. Included were both long- and short-term weather forecasts, stock market activity, traffic control information, hospital reservation data, and scientific and technical data retrieval.

He concluded his report with a reference to American business potential in Japan and recommended procedures for approaching the Japan software market:

"When you export computer programming to Japan, you are required to obtain an approval from the government for import of technical know-how into Japan. In case you intend to set up your own subsidiary in Japan, you need to obtain a sanction from the government under the Foreign Investment Law. Your potential customers might be large-sized enterprises which have so far imported computers from the United States.

"It appears to me that the Japanese policy, so far as the operation of the Foreign Investment Law is concerned, would be based on an evaluation that the participation by foreign companies is an expansion in demand. An enhancement in technological level for computer software is really something to be appreciated, but repercussion, if any, arising from such participation, should be so adjusted that the domestic infant industry could also co-exist.

"Needless to say, the Japanese economy has grown up and continues to grow with the American technological support and economic participation. This kind of economic tie-up will continue to be indispensable for the prosperity of a new industry life software in Japan. I am firmly convinced that it will not be a long way before we can share mutual prosperity and further development in the field of the software industry where we are all deeply concerned."

---

**Editor's Note . . .** this story and the preceding editorial received an unexpected side light in this issue in the "Financial Currents" report . . . with the announcement that the Japanese Government has formally approved the first U.S. branch office of a Japanese software house, Business Consultants, Inc., in Los Angeles.

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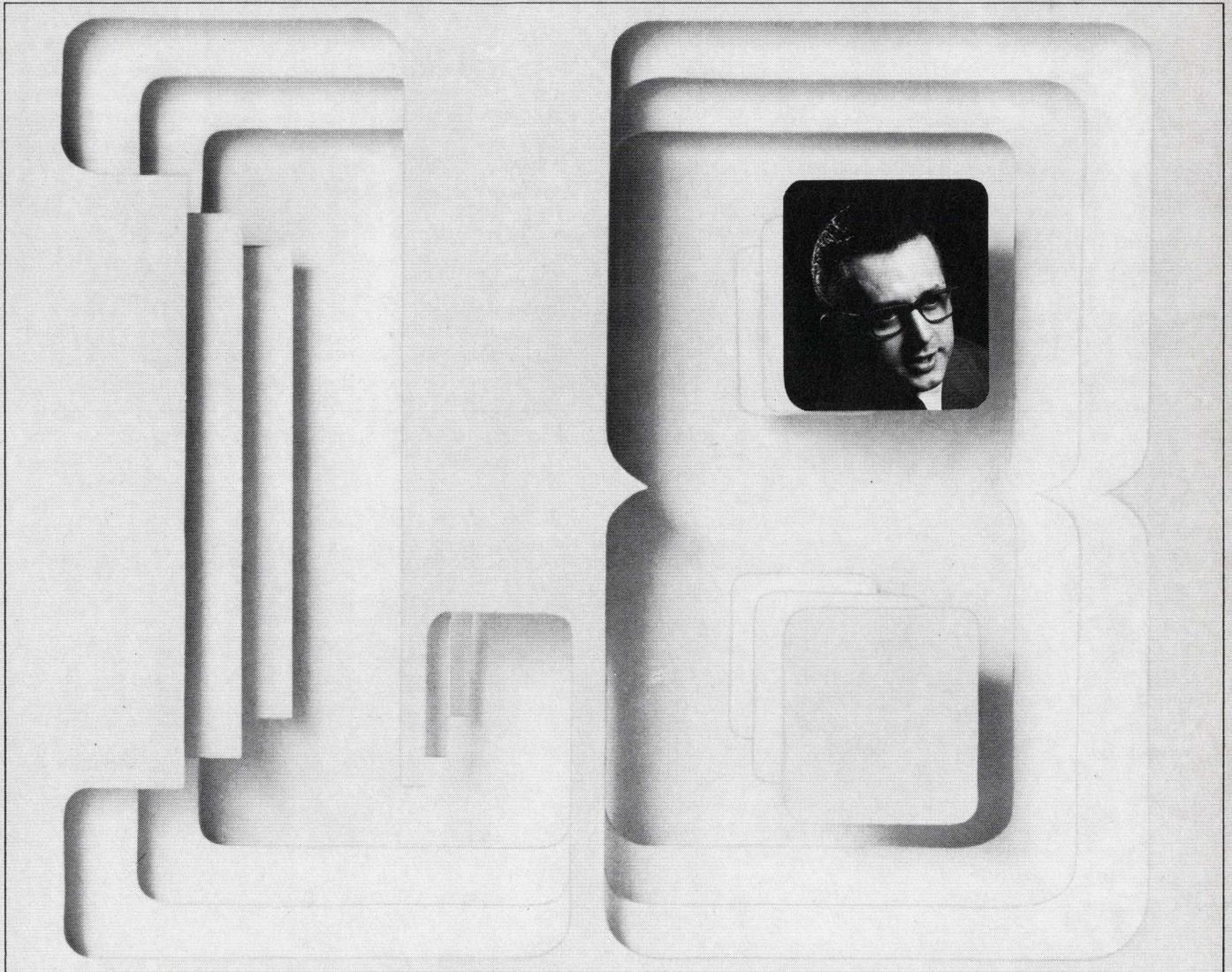
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# MPL:MACRO PRE-COMPILING LANGUAGE

**an outgrowth of  
need for pre-compiling  
higher level languages**

**MARSHALL NOLAN**

University of Nebraska Computing Center

*Macro Pre-compiling Language is an outgrowth of the need for precompiling in some of the higher-level languages, since only a limited number of higher-level languages have precompile facilities. MPL has been implemented on an IBM 360, but the ideas are simple enough to implement on any machine. As all programming reports suggest, the basic purpose of MPL is to make the job easier for programmers. MPL appeals to commercial, scientific and software programmers as a basic tool.*

*IBMers, CDCers, DSers, and other users in software development will be interested to note that MPL is capable of accepting all languages as input and generating output code in any pre-specified format. Taken to its logical conclusion, MPL easily becomes a generalized short-hand language generator. This fact alone makes MPL useful to those not wishing to learn someone else's short-hand language. One could even conceive of general MPL macros being written for some special purpose on an originator's host machine and run on the MPL of a different host machine, thus allowing easy simulation of any language. For general use, a small library of often-used coding (only the variable names changing in the code) could be kept for insertion in the source stream at precompile time.*

Macro Pre-compiling Language is a system of generating standard prewritten code and inserting it into the input stream for compile or assembly. MPL/360 is language independent; a free-format processor with few rules necessary for its successful run. Although in the present implementation there are extra options for running MPL, only five necessary MPL control cards exist, the formats of which can be shown best by example.

All MPL control cards must start with a sacred symbol in column one: MPL/360 has chosen "|" ("or" symbol). The five types of control card are:

```
| MDEF  
| MEND  
| LABEL = macroname  
| LIST = . . . parameters.  
| macroname
```

"| MDEF" is required at the onset of the data stream followed by macro definitions, in turn trailed by the final "| MEND" card, next followed by the original source stream. The last card in the list above ("| macroname") is embedded in the source stream giving reference to the MPL macro defined under the "| LABEL =" header.

Example input streams have been set up to show MPL facilities in two common languages, FORTRAN and COBOL. The below two FORTRAN MPL macro examples were written to compute averages of numbers and do I/O, as follows:

```
| MDEF  
| LABEL = AVERAGE,LIST = AVR,ARRAY,NUMBER  
C *****  
C COMPUTER AVERAGE  
C *****  
SUM = 0.0  
I = 1  
1 SUM = SUM + ARRAY(I)  
I = I + 1  
IF(I.LE.NUMBER)GOTO1  
AVR = SUM/NUMBER  
WRITE(6,200)ARRAY,SUM,AVR  
| LABEL = FILEWK,LIST = 10,#,FMT,ARRAY  
| MEND  
10( #,FMT)ARRAY
```

Here you will notice the use of both "LABEL" and "LIST" on the same card. Now using the original source stream of:

```
C  
C THIS PROGRAM AVERAGES 1000 NUMBERS  
C  
REAL*4 X(1000)  
NUMBER = 1000  
2 CONTINUE  
| FILEWK,READ,5,'100,END = 69',X  
| AVERAGE,AVG,X,1000  
GOTO2  
69 STOP  
END
```

(Strings are processed as you noticed on the card: | FILEWK,READ,...) With only the format statements 100 and 200 remaining, the following, is the MPL expanded source code for input to the FORTRAN compiler:

```
C  
C THIS PROGRAM AVERAGES 1000 NUMBERS  
C  
REAL*4 X(1000)  
NUMBER = 1000  
2 CONTINUE  
READ(5,100,END = 69)X  
C *****  
C COMPUTE AVERAGE  
C *****
```

```

SUM = 0.0
I = 1
1 SUM = SUM + X(I)
  I = I + 1
  IF(I.LE.NUMBER)GOTO1
  AVG = SUM/NUMBER
  WRITE(6,200)X, SUM,AVG
  GOTO2
69 STOP
  END

```

```

| FD,CARD-INPUT,80,0
| FD,TAPE-OUTPUT,80,20
| PRINTFD
  WORKING-STORAGE SECTION.
| WS,CNT,'S9(9) COMPUTATIONAL', + 1
  PROCEDURE DIVISION.
  .
  .
  .
| PRINT, " THE BOYS'S CLUB HOUSE DIED"
  .
  .
  .
  etc.

```

**COBOL Program Example**

Let's try tackling a simple COBOL program example. Let's suppose we were tired of coding all the extra that is so essential to COBOL in its present form. For instance let's review the whole front portion that is time-consuming to recode in each COBOL program. First of all, let's write a few COBOL macros:

```

| MDEF
| LABEL = START,LIST = NAME,P-ID
  IDENTIFICATION DIVISION.
  PROGRAM-ID. 'P-ID'.
  AUTHOR. NAME
  INSTALLATION. MY COMPUTER COM-
  PANY.
  DATE-WRITTEN.
  DATE-COMPILED.
  SECURITY. TOP SECRET.
  REMARKS. THIS PROGRAM WRITTEN
  WITH THE HELP OF MPL MACROS.
  ENVIRONMENT DIVISION.
  CONFIGURATION SECTION.
  SOURCE-COMPUTER. IBM-360.
  OBJECT-COMPUTER. IBM-360.
  INPUT-OUTPUT SECTION.
  FILE-CONTROL.

| LABEL = FD
| LIST = NAME,LRECL,BLK
  FD NAME
  RECORDING F
  RECORD CONTAINS LRECL CHAR-
  ACTERS
  BLOCK BLK RECORDS
  DATA RECORD NAME-REC.
  1 NAME-REC.
  2 FILLER PICTURE (LRECL).

| LABEL = PRINT
| LIST = MESSAGE
  MOVE MESSAGE
  TO PRINT-REC.
  WRITE PRINT-REC.

| LABEL = PRINTED
  FD PRINT-FILE RECORDING F
  DATA RECORD PRINT-REC.
  1 PRINT-REC X(133).

| LABEL = WS,LIST = XXX,XX,X
  77 XXX PICTURE XX, VALUE IS X

| LABEL SELECT,LIST NAME,EXTERNAL
  SELECT NAME ASSIGN TO 'EX-
  TERNAL' UTILITY.

| MEND

```

Which in turn generates the following somewhat inept coding for the COBOL compiler.

```

IDENTIFICATION DIVISION.
PROGRAM-ID. 'SAMPLE'.
AUTHOR. NOLAN.
INSTALLATION. MY COMPUTER COMPANY.
DATE-WRITTEN.
DATE-COMPILED.
SECURITY. TOP SECRET.
REMARKS. THIS PROGRAM WRITTEN WITH THE
  HELP OF MPL MACROS.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER. IBM-360.
OBJECT-COMPUTER. IBM-360.
INPUT-OUTPUT SECTION.
FILE-CONTROL.
  SELECT CARD-INPUT ASSIGN TO 'CARD' UTILITY.
  SELECT PRINT-FILE ASSIGN TO 'PRINT' UTILITY.
DATA DIVISION.
FILE SECTION.
FD CARD-INPUT
  RECORDING F
  RECORD CONTAINS 80 CHARACTERS
  BLOCK 0 RECORDS
  DATA RECORD CARD-INPUT-REC.
  1 CARD-INPUT-REC.
  2 FILLER PICTURE X(80).
FD TAPE-OUTPUT
  RECORDING F
  RECORD CONTAINS 80 CHARACTERS
  BLOCK 20 RECORDS
  DATA RECORD TAPE-OUTPUT-REC.
  1 TAPE-OUTPUT-REC.
  2 FILLER PICTURE X(80).
FD PRINT-FILE RECORDING F
  DATA RECORD PRINT-REC.
  1 PRINT-REC X(133).
WORKING-STORAGE SECTION.
77 CNT PICTURE S9(9) COMPUTATIONAL VALUE + 1
  PROCEDURE DIVISION
  .
  .
  .
  MOVE '1 THE BOY'S CLUB HOUSE DIED'
  TO PRINT-REC.
  WRITE PRINT-REC.
  .
  .
  .
  etc.

```

Now let's do the more fun portion of this short example with the following.

```

| START,NOLAN,SAMPLE
| SELECT,CARD-INPUT,CARD
| SELECT,PRINT-FILE,PRINT
  DATA DIVISION.
  FILE SECTION.

```

**In Any Case—It Works!**

Certainly COBOL buffs can think of some more imaginative COBOL MPL macros with even more savings of

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## MACRO PRE-COMPILING . . .

coding work. So sits the half-effort on COBOL MPL macro code, and if it looks a little strange it might be due either to the COBOL language available on the IBM 360/65 or it may well be the "strange" programmer. In any case—it works.

The approach to the problem of macro precompiling was simple. In order to process any language and be very general, one need only to signal that a macro is to be processed, otherwise MPL will continue outputting that which was input. MPL/360 is, therefore, implemented to check column one in the input card for a sacred symbol. An MPL/360 macro card is processed by either building a skeleton structure (as in the case when the card is between '| MDEF' and '| MEND' cards) or it is scanned and code is generated in its place optionally replacing certain variables in the skeleton macro code with the '| LIST =' parameters. The rules for running MPL/360 pre-programs in present implementation are few and simple (See Figure 1).

### MPL Pre-Program Rules

- Rule 1* All five types of MPL/360 control cards start with the "or" symbol.
- Rule 2* The macro definitions must precede the rest of the input stream headed by '| MDEF' and tailed by '| MEND'.
- Rule 3* Terminal characters for variable names and values are the single blank or comma.
- Rule 4* Use free-format on input stream except on the MPL/360 control cards.
- Rule 5* Symbol strings must be enclosed in quotes to be processed correctly as variables or values.
- Rule 6* "LIST" must be preceded by "LABEL" in the MDEF area.

MPL/360 exists per Figure one's examples and rules. The implementation and rules are the author's; but those working on different host machines can implement their own MPL/1620, MPL/7040, MPL/9000, MPL/6500, and so forth. There may even be some who wish to implement a better MPL/360.

### MPL offers

- Simple, flexible, pre-program definitions with  
Easy to use free-format,  
No language restrictions, and  
Mixing of Languages in input stream.
- Fast programmer use giving lower production cost.

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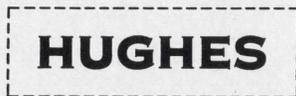
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# THE MEANING OF OPERATIONS RESEARCH

by Prof. Marvin Rothstein  
University of Connecticut, Storrs, Conn.

## a historical summary

*In recent years there has been considerable and growing interest in the use of operations research throughout many sectors of our society. The quantitative nature of this discipline has created opportunities for engineers, physicists and others with mathematical training to participate in a new type of science, namely the science of decision-making. "O.R." already has made a significant impact in business, industry, government and defense, and its methods are now standard for use in many types of management problems. This article is intended to provide an overview of O.R., with emphasis on its nature and scope.*

*Operations research is the application of mathematics and computer techniques, together with a particular methodology, to complex problems arising in the management of large systems of men, machines, materials and money. The most outstanding characteristic of operations research is its methodology, akin to what is termed "the scientific method" in the philosophy of science. O.R. addresses itself to management problems, as opposed to problems relating to a specific technology.*

*Operations research was born during World War II. Uniformed scientists with diverse backgrounds worked in special units within the armed forces, applying scientific methodology to logistics problems, radar deployment problems, tactical submarine warfare problems and other critical areas. The solutions they devised were markedly effective and made an impact right up to the top brass. Perhaps the greatest impact was upon the O.R. scientists themselves, for when these people returned to civilian life in universities and industry they "spread the word." Operations research began to be applied in the business world where it became known also as "management science." Today the two terms are used interchangeably.*

*In the first years after the war the pace of development of O.R. in the U.S. was not rapid. What spurred the growth of O.R. in the United States was the advent of the computer in the fifties. Operations research scientists quickly recognized the enormous potential of the computer for industry and adopted it as an essential tool. As increasingly significant ways of exploiting the computer were developed, the spread of O.R. accelerated. The formalization of O.R. as a discipline took place not only through new professional societies (such as the Operations Research Society of America and the Institute of Management Sciences), but by the appearance of O.R. in the curricula of universities. Today operations research is practiced and taught extensively not only in the U.S. and U.K., but also in Europe, Australia, India, Japan and Israel.*

The definition of operations research states that this discipline is directed toward complex management problems. It should be emphasized that O.R. is applied primarily to *large-scale economically significant* management problems where the expected payout, in terms of increased profits or reduced costs, can compensate many times over for the investment in highly trained people and other resources characteristically needed for the development of O.R. applications.

Some examples of its successful use will illustrate the scope and significance of typical operations research projects. H. J. Heinz applied O.R. to determine the company's most effective distribution system, including the number of warehouses, the capacities, the locations and the particular customers each warehouse should service. American Airlines applied O.R. to develop a minimal cost method of scheduling its flight crews. The Port of New York authority used O.R. to determine the most efficient way to man the toll booths at the George Washington Bridge and the Lincoln and Holland Tunnels. The uses of operations research are evidently diverse. As is often the case in the early stages of a new science, it is not yet possible to delimit the problem areas.

O.R. is characterized by its methodology, i.e., by the way it approaches a problem area. The points in that methodology are:

1. Viewing the problem area in its larger context
2. Developing a mathematical model
3. Seeking the best solution within the framework of managerial constraints
4. Testing and implementing the solution
5. Evaluating the solution after implementation

Point one has been humorously interpreted to mean that if one is faced with a problem to solve, he should first try to make it a bigger problem! But there is much sense to this approach. The operations researcher is virtually never handed a well-structured problem. More likely, when directed toward a particular organizational activity, he will be presented with *symptoms* and must himself diagnose the problem. In order to accomplish this he

## OPERATIONS . . .

must be able to look beyond the immediate prospect and take a global point of view.

### Model Abstracts Significant Elements

Point two is a critical feature of the methodology. In general, a model is an attempt to abstract the significant elements of a physical system and systematize them. The model is then used to predict the operation of the physical system under particular circumstances. For example a drawing containing a set of concentric ellipses appropriately scaled may be a suitable model of the solar system for some purposes.

In a mathematical model the descriptions take the form of mathematical equations and expressions instead of drawings; in the solar system example the ellipses might be replaced by second degree equations. The mathematical model is extremely efficient because it demands precision. One must state precisely what meaning is attached to the symbols and precisely what relationships exist among the quantities. The mathematical model then facilitates concise reasoning with the symbols in order to derive new and possible unexpected quantitative relationships.

The mathematical models of O.R. have the following form:

$$E = f(X_1, X_2, \dots; Y_1, Y_2, \dots) \\ \text{[ Constraints ]}$$

For greater clarity this symbolic form will be explained against the background of a particular physical situation to which an O.R. model could be applied, namely the flow of vehicular traffic at the toll plaza of the George Washington Bridge during the peak period of the business day. In the general model, E stands for the *effectiveness* of the system modeled. Thus in the example, E could stand for the average delay experienced by vehicular traffic at the toll plaza during the peak period. The X's are variables which can be controlled. In the illustration X<sub>1</sub> might represent the number of manned toll booths, X<sub>2</sub> the number of automatic collection machines in use, etc. The Y's represent variables not subject to managerial

control, such as the average number of vehicles arriving at the plaza during the peak period, the mix of trucks, buses and cars, the average time required to collect a toll for each type of vehicle, etc. In general the Y's must be predicted or estimated. f represents a formula which shows in mathematical language how the variables interrelate to produce the measure of effectiveness, E.

When particular values of the X's and Y's are substituted into the formula f, a particular value is obtained for E (the average delay, in the illustration). If the Y's are subject to random fluctuation, as is often the case with uncontrollable variables, then the formula f may involve concepts from probability theory.

Although the X's may be controlled by management, they usually are constrained in various ways, as

involved make it difficult to find the optimal solution. Many special branches of mathematics have evolved through the interest and importance of obtaining optimal solutions to operations research problems.

Points four and five in the O.R. methodology are at present the least developed and formalized. Testing a model requires data and calculations based upon the data. These calculations are then normally discussed with managers on a judgmental basis, for O.R. does not operate in a vacuum independent of the experience and intuitive feel of management. The O.R. scientist may develop solutions different from those which a manager could devise without benefit of science, but the solutions have to be palatable. The solutions may be unexpected—this

**“It seems likely that in the next decade the dividing line between operations research and computer methodology, already somewhat hazy, will disappear . . .”**

**Marvin Rothstein**

indicated in the general form of the O.R. model. The constraints are simply equations or inequalities involving the X's and Y's. In the example, there may be a budgetary constraint involved in operating the George Washington Bridge such that X<sub>1</sub>, (number of manned toll booths) must be considered with reference to the constraint. The objective of the O.R. model is to render explicit all significant constraints on the variables. When this is done, one may find mathematically the values which optimize the effectiveness subject to the constraints. In the case of the George Washington Bridge this means minimizing the average delay subject to the availability of facilities, personnel and funds.

### Seeking the Best Solution

Here is point three in the O.R. methodology: seeking the best solution within the framework of managerial constraints. In many instances the mathematical form of the model and the number of variables in-

is one of the great advantages of operations research—but it is important that they possess *transparency*. This means that after the solution has been derived it should be capable of rationalization in terms that the manager can understand. If this is not possible a severe obstacle to successful implementation is created, namely lack of communication. The currently accepted view is that solutions to O.R. problems should be sold to management in layman's terms.

When a satisfactory model has been developed and is ready for implementation with management concurrence, its operation must be evaluated. To determine whether it is really better than the procedure it might have replaced, sometimes both methods can be employed simultaneously. For example a model for inventory control may be implemented for certain inventory items while the older system is retained for analogous items, and a direct comparison can be made. If this approach is not feasible, trial imple-

mentation for a short period of time can be employed.

During the test phase data are collected to validate the anticipated benefits. If the system does not perform as the model predicts, the model may be too crude or the assumptions and predictions upon which it was based may be erroneous. A number of revisions are usually necessary before implementation can proceed. The time required for implementation is very often much longer than that required for problem definition and model development, and the methods of implementation may lack the precision of the other phases of the O.R. methodology. This situation has attracted the attention of many outstanding O.R. scientists in recent years and advanced theoretical work toward a more systematic methodology of implementation is under development.

### Special Math Developed

Although operations research is not properly a branch of mathematics, a number of special fields of mathematics have been developed by operations researchers working as mathematicians. The development of these fields was stimulated by the recognition that very many important management problems could be classified according to their form, and the same type of model could then be applied to all the problems in a classification. Mathematical research involves exploring the theoretical properties of these models and developing computing algorithms for determining optimal solutions. The special disciplines which have proved most useful for operations research up to the present are linear programming, queuing theory, inventory theory and simulation.

*Linear programming* characteristically is applied for models of systems where stocks of scarce resources can be utilized in a variety of ways to make different types of products. Under the assumption that all demands for products can *not* be satisfied, the problem is how to allocate the resources to the product lines so as to maximize overall profit within the framework of management policy. There are many other types of physical problems to which the "L.P." model is applicable as well. For example the crew scheduling problem of American Airlines

and the media selection problem of Batten, Barton, Durstine and Osborn were amenable to linear programming formulations.

*Queuing theory* is the study of models of waiting lines or queues. The Port of New York Authority application mentioned previously was based upon queuing theory; the queues were lines of vehicles waiting to pass the toll booths. Queuing theory has been used in telecommunications, airport traffic engineering, bank teller scheduling, and many other fields.

*Inventory theory* is the study of models of stockage points where supplies of goods are periodically depleted and replenished. It has been used in production planning, airline maintenance and military logistics, to mention several of the many applications.

*Simulation* is general technique, rather than a classification of models, which enables one to evaluate the effect of assigning particular values to the controllable variables of virtually any model. Simulation depends greatly upon the computer, and therefore much theoretical work in this field has been devoted to developing efficient computer software techniques. Simulation has been used in all types of industrial environments, for example in steel production and transportation scheduling.

All of these technical disciplines and many others associated with O.R. are now taught in the graduate school of American universities. One finds them in the curricula of mathematics departments, engineering departments, industrial engineering departments, operations research departments and *schools of business*. One of the most significant phe-

nomena of modern university education is the way in which mathematical methods are now taught to students of business. It appears to reflect the enthusiasm with which the business community has turned to operations research.

### Relationship to Computers

It is appropriate to conclude this overview of operations research with a brief discussion of its close relationship to computer methodology. Earlier it was stated that the computer was a primary factor in the growth of O.R. Partly this was because most of the mathematical techniques of operations research would be completely impractical for any real problem without the modern computer to produce the numerical results. But even more significantly, the use of computers in business has resulted in the availability of certain kinds of management information without which many O.R. projects would be meaningless. O.R. professionals would be hard pressed to enumerate applications not dependent critically upon the computer for implementation.

It is certainly unquestioned that the computer is an indispensable tool and integral part of operations research, and that computer methodology and O.R. methodology are developing hand and glove. The O.R. man today must be knowledgeable about computers right up to the point of software development. It seems likely that in the next decade the dividing line between operations research and computer methodology, already somewhat hazy, will disappear and leave the two areas combined in the form of a more general and comprehensive management science.

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# TWO APPROACHES FOR MEASURING THE PERFORMANCE OF TIME-SHARING SYSTEMS



## stimulus approach to time-sharing measurement

*Characteristics.* A time-sharing system may be viewed as a "black-box" containing a set of known functions. This black box is stimulated (receives input), reacts in an unknown manner (presumably exercising some of the known functions) and then generates a response (produces output). From the viewpoint of measurement and analysis, this conception of a time-sharing system considers the system as a composition of a few important functional variables which are all that need be understood in order to evaluate the system's behavior. The goal is to understand the effect of these functional variables so the system may be tuned for overall efficiency in a controlled and measurable manner, and may be modified for greater effectiveness within its user population. The stimulus approach is an outgrowth of the benchmark analysis techniques that have been developed for non-time-sharing systems (19-24).

*Functional Variables.* There are many functional variables that can possibly have a significant effect upon the system's behavior. The more variables that are selected for study, the finer the analysis can be; however, the complexity of the measurement process increases. A problem is to select, a priori, a reasonable set of variables. For the ADEPT implementation (7, 15, 16) the following functional variables were selected: scheduling (resource allocation) activity, swapping activity, paging activity, compute activity, inter-

active activity, I/O activity. Many of these variables are common to all time-sharing systems.

*Stimuli.* In order to activate the functional variables, appropriate stimuli must be presented to the black box in a controlled manner. These stimuli are grouped in various combinations and are incorporated into object programs to be run under time-sharing. Each program, in effect, simulates a particular class of user activity. The programs are called "benchmarks," because of their functional similarity to the benchmark techniques in non-time-sharing system evaluation.

*Response.* Throughput and response time are two characteristics of time-sharing systems that have been suggested as performance measures (1, 4, 25). Throughput is a measure of the volume of computation performed by the system. Response time is the speed with which the system responds to an interactive user. The behavioral effects of the functional variables as stimulated by the benchmarks are measured in terms of throughput and response time. Each benchmark program accumulates a count of the amount of activity it accomplished during the measurement period to obtain this measure.

**Table 1. Benchmark Programs Versus the Functional Variables Stimulated**

Functional Variable Stimulated	Program						
	1	2	3	4	5	6	7
Compute	X	X			X		X
Interactive			X	X	X		
High Speed I/O						X	X
Swapping		X		X			
Paging		X		X			
Resource Allocation	X	X	X	X	X	X	X

**Table 2. The Controlled Stimuli Contained Within Each Benchmark Program**

Stimulus	Program						
	1	2	3	4	5	6	7
Maximum Core Size		X		X			
Minimum Core Size	X		X				
Variable Page Demands		X		X			
Compute	X	X			X		X
High Speed I/O						X	X
Terminal I/O			X	X	X		

## Measurement Techniques

The stimulus approach to measurement may be used to derive three different types of measures of the system's behavior. The types of measures are dependent upon the environment in which the system runs.

**Stand-Alone Environment.** When only one object program is making demands upon the system's resources, a time-sharing system can be viewed as a batch processing system. The advantage of measuring the system performance as a batch processor is that it is possible to determine the best throughput and response time which this configuration of hardware and software could ever deliver. In order to obtain this measure, each benchmark program is run in a stand-alone environment, i.e., it is the only program running. This provides a measure of the best service the program could ever receive.

This measure of maximum performance is used as a standard value against which other time-sharing environment measures of the same benchmark can be normalized. The resultant norm is a measure of the performance degradation under a non-batch environment.

The stand-alone environment also provides a highly controlled test tool for evaluating changes to those system functional variables which are stimulated by the benchmark programs.

**Benchmark Environment.** A second method of providing a controlled stimulation of the system's functional variables is to run all the benchmark programs simultaneously in a time-sharing mode with the exclusion of real users. This simulates a "typical" user population. There are two justifications for this statement. First, each benchmark does simulate a particular user class (for instance, interactive, compute bound, large size programs, etc.). Secondly, they provide a well controlled and repeatable environment on which experiments investigating the effects of system changes upon a broad spectrum of user types may be based.

In the ADEPT implementation, the benchmark programs have been run in the benchmark environment. The measurements obtained are fairly close to those from the real world environment, thus providing some justification in considering this a model of a typical set of users. The technique has also been used to measure the effects of variable quantum-time sizes upon different user demands as represented by the benchmarks.

**Real World Environment.** The behavior of a time-sharing system when it is operating at or near its rated capacity under real world conditions can be determined by measuring the effect of the real users in terms of the

User/program dialog	{ WHAT IS THE START TIME (HHMM) ? 1428 WHAT IS THE END TIME (HHMM) ? 1433
Measurement period	BENCHMARK PROGRAM 5 IS OPERATING XXXXX XXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XX XXXXX XXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XX XXXXX XXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XX XXXXX XXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XX XXXXX XXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XX XXXXX XXXXXXXXXX XXXXXXXXXXXXXXXXXXXX BENCHMARK MEASUREMENT IS COMPLETE
Measurement summary	NUMBER OF 10 MS COMPUTE CYCLES = 004400 NUMBER OF SECONDS IN COMPUTE CYCLE = 0044.00 PERCENT OF ELAPSED TIME USED BY COMPUTE CYCLE = 14 % NUMBER LINES PRINTED = 0023    AVG CHARACTERS PER MINUTE = 082.00 AVG LINES PER MINUTE = 04.60    NUMBER CHARACTERS PRINTED = 00410 BENCHMARK ANALYSIS IS COMPLETE

Figure 1. Sample Output of Benchmark Program 5

service given to one pseudo-user. The technique involves loading the system with an almost full complement of users. Then one of the benchmark programs is run and serves as the pseudo-user. It actually simulates a user who has a constant and known demand for service. Several runs must be made with the same benchmark program and similar user populations in order to establish a statistically meaningful average, or norm, for the measurements.

### Applications:

- (1) The real world environment measures, when contrasted to the stand-alone environment measures, indicate the degree of throughput and response time degradation under varying system loads.
- (2) The range of measurements recorded in the real world environment indicate the degree to which the system load varies.
- (3) Once a norm is established for a particular user environment and benchmark program, user variations may be detected by variations in the benchmark measure. In other words, it is possible to "take a reading" of the system with respect to the volume of service being requested from it.
- (4) The benchmark environment provides an experimental test bed for examining the effects of different scheduling algorithms.
- (5) Both the stand-alone and benchmark environments can be used

for examining the effects of changes to the functional variables (such as swapping, paging, etc.) that they stimulate. Additionally, they serve as a debugging tool, since they can be used as a standard test.

### Stimulus Techniques as Applied to the SDC ADEPT Time-Sharing System

The stimulus technique was originally developed for use on ADEPT; much work has been done to measure ADEPT and to evaluate the stimulus technique (7, 29). A brief description of the application and results follows.

A total of seven benchmark programs were written. Each incorporates one or more stimuli to provide controlled stimulation of the selected functional variables. (Refer to Tables 1 and 2 for the relationships of functional variables and stimuli to the programs.)

The programs are designed to aid the user in running the test and in reducing the results (refer to Figure 1). They ask the user for the start and end times, automatically initiate the measurement period at the start time and terminate it at the end time; summarize the test results; and print them onto the terminal.

A variety of measures were obtained on ADEPT with this technique. The effect of different quantum times upon I/O throughput, compute throughput and response time was investigated using the benchmark environment.

continued on page 40

# NEW PRODUCTS

## Friden Introduces Speedy Compact Adding Machine

A memory device that prints a series of totals and a grand total on command is the key feature of the new Model 213 Adding Machine by the Friden Division of The Singer Co. The compact adding machine speeds business or financial figurework with premium features that make it adaptable to most types of accounting or management planning and control operations.

"The new Friden 213 will be directed to the application-oriented adding machine user who wants more than an add-subtract unit, but doesn't need the additional capability of a calculator," explained H. W. Bates, vice president, U.S. Sales-Office Products. "The 213's two bonus features—a memory that accumulates totals and an ability to hold the last figure entered on the keyboard—are especially useful in application such as invoice totaling, payroll deduction, inventory control and general accounting (journal footing)."

A fast printing mechanism gets entries in and out of the 213 in a hurry. Operator speed and efficiency are enhanced by the slightly concave home position keys—4, 5 and 6—on the patented Natural Way keyboard. The L-shaped zero bar assures easy entry for both right- and left-handed operators. The new adding machine has the capacity for listing 12 digits and totaling 13. Step-over multiplication is accomplished with the plus key and repeat key, and short-cut multiplying is done through use of the minus and repeat keys.

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

## New Minicomputer Compatible With Leading O.E.M. Markets

An advanced minicomputer—the first one designed to be completely interchangeable with models now dominating the small computer field—was introduced recently by Digital Computer Controls, Inc. Called the DCC-112, the new minicomputer is expected to make important changes in the established marketing patterns of small computers to manufacturers of computer systems.

The DCC-112 for the first time provides O.E.M.'s with their only second source of minicomputers which are plug, program, and mechanically interchangeable with the most widely used minicomputer.



John N. Ackley, president, Digital Computer Controls, Inc., compares one of the five printed circuit boards used in the new DCC-112 minicomputer with one of the 110 smaller types of printed circuit boards now being used in the leading minicomputer.

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

## IBM Announces Tele-Processing

Communications capabilities were announced recently for IBM System/3 that will enable the new low-cost computer to "talk" over telephone lines to other IBM computers. By means of a new communications adapter, System/3 will be able to exchange data at high speeds directly with remotely located System/3s and most models of the more powerful System/360. It also will be able to communicate indirectly through a central System/360 with the IBM 1130 and 1800 computers.

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

## Program Increases Record Selection

URS Data Sciences Co. announced recently the availability of a program that significantly increases the effectiveness of selecting records from IBM System/360 data files. FAST (File Analysis and Selection Techniques) offers a simple means to respond rapidly to special requests for retrieval of specific information from files. FAST is a sub-program used for determining which records within a given file meet the criteria established by variable sets of easily defined parameter cards.

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

## Portable CRT Terminal Announced

A new, remote, stand-alone computer terminal, introduced by Logitron, Inc. is said by the company to be the first fully-portable CRT terminal available in the industry. Weighing approximately 25 pounds, the new Logiport/1 includes a complete standard alphanumeric keyboard and an integral acoustic coupler. It can be carried about and plugged in as easily as a portable stereo, yet provides most of the operating features of bulky, high-priced console terminals. By placing a standard telephone handset on the coupler and dialing a normal voice-grade line, the Logiport/1 can be placed in instantaneous real-time communication with a time-sharing computer anywhere. A switch permits selection of 10 or 30 character per second transmission.

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

## Honeywell EDP Adds Low-Cost Computer

Honeywell Inc. has introduced a low-cost, high-performance computer in its Series 200 family of third-generation business computers. The new Model 115 disk-oriented computer provides more data-processing power and performance than similarly priced competitive systems, said Robert P. Henderson, vice president and general manager of Honeywell's Electronic Data Processing Division.

Programs and applications now run on competitive small systems can be converted for use on the Model 115 with a minimum of effort using several proven Liberator techniques, such as RPG to Cobol and Easytran. The Model 115 operates with the Mod I (Mass Storage Resident) operating System or the Disk Cobol Programming System. This new low-priced Series 200 will be marketed under the automation firm's package-pricing policy that includes systems support, software, industry-oriented application routines, education and maintenance as an integral part of the monthly rental cost.

For more information, circle No. 15  
on the Reader Service Card

## Introduce DIBOL® Language For Business Applications

A new business-oriented computer language called DIBOL, for Digital Equipment Business-Oriented Language, was introduced at the annual meeting of the American Research and Development Corp. held in Boston recently. DIBOL is designed to bring the speed and power of the PDP-8 family of small computers to small- and medium-size businesses. The PDP-8 family has pioneered the use of small computers since the first was introduced five years ago.

DIBOL is a COBOL-like language made up of three distinct components: a language processor that enables a user to state the problem in a simple manner; a data management system that operates on business files and permits a user to do input operation, sorting, and file maintenance without additional programming; and a monitor system that ties the components together and enables the user to operate the system easily.

For more information, circle No. 16  
on the Reader Service Card

## New Teletype Compatible CRT Display Terminals For Time-Sharing Use

Beehive Electrotech has announced two new Teletype compatible CRT display terminals, said to be the smallest, slenderest units available for time-sharing use. Alpha-103, an 800 character display, is Teletype interchangeable, having a 40 character per line—20 line storage capacity. Alpha-105, a 1600 character display, is a direct plug-for-plug replacement for Teletype terminals, with an 80 character per line—20 line display capability.

For more information, circle No. 17  
on the Reader Service Card

## Software Package For Contour Plotting

Houston Instrument announces the addition to its product line of a contour plotting software system thought to be the most comprehensive currently being offered in the United States. This contouring system, CONTOUR-PLOT™, has been designed and implemented in a highly modular fashion, the system utilizing a verb-oriented language that requires minimal user training and/or programming experience.

Some of the highlights of this new system include the multiple surface manipulation option, which gives a user the power of performing many operations on multiple surfaces stored within the system; isometric and three-dimensional options which allow the user to view contour plots in three-dimensional form; statistical surface fitting option, which allows analytic fitting and/or smoothing techniques applied to a given surface; and a profile plot option which allows the viewing of slices of a given contour plot.

For more information, circle No. 18  
on the Reader Service Card

## Testmaster System Speeds Critical Programming Tests

Testmaster COBOL/360 a third generation testing system available from Hoskyns Systems Research, Inc. makes the production of error-free programs practical and cost-effective, regardless of their size. Typical throughput is 200 independent tests on each of five subroutines in fifteen minutes on a 360/40.

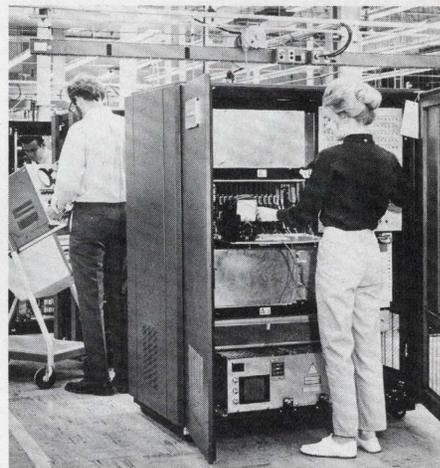
For more information, circle No. 19  
on the Reader Service Card

## Offer Complete Package For Key-Driven Terminals

Graphics is a proprietary software system for controlling key-driven display devices. The system offers medium scale data processing users the opportunity to rapidly install complex inquiry, data entry, and file update applications with minimal programming effort. Developed by Turnkey Systems Inc., the package allows programming personnel to concentrate on application programming. The more complex considerations in development of an on-line system are reduced to a level of control easily mastered by applications programmers with minimal exposure to programming systems.

The Graphics Control Program, which is written in COBOL for ease of maintenance, uses a common overlay area for all one-time system functions and application programs. It operates in a single partition (24K minimum), and interfaces with existing operating systems. Application programs can be written in any language using standard program linkages.

For more information, circle No. 20  
on the Reader Service Card



General Electric's new DATANET-500™ data communication processors undergo final tests prior to shipment. The new system combines all technological breakthroughs in communications and computer design over the past several years. GE computer experts predict the new processor can save up to 70 percent in communication line costs for large nationwide computer networks. It can serve up to 250 communications lines at the same time and can accommodate 500 to 1,500 users.

For more information, circle No. 21  
on the Reader Service Card

continued on page 41

Xerox Data Systems, Inc., El Segundo, Calif., a wholly-owned Xerox Corp. subsidiary, and Data Architects, Inc., Waltham, Mass., have reached an agreement whereby Data Architects' DAI-SECURE, a computer programming system for automating the entire back office of a stock brokerage firm, will be offered exclusively by XDS and Data Architects. The joint venture is expected to require an investment of \$9.5 million in the initial installation.

Two versions of DAI-SECURE will be offered. One, a shared service, is aimed at small and medium sized brokerage firms whose volume does not justify the acquisition of a large computer-based stand-alone system. The second is for larger brokerage firms and institutions on a stand-alone basis.

An agreement for computer services has been reached between COMNET (Computer Network Corp.), a remote computing and time sharing organization, headquartered in Washington, D.C. and NERA Systems Corp., information systems consultants with offices in Washington.

Under the terms of the agreement, jointly announced by Ralph R. Johnson, COMNET's president, and Alon Miller, vice president and general manager of NERA Systems Corporation, COMNET will provide an IBM 360 Model 65 computer system specially configured for NERA's exclusive use at specified times. This new concept of computing facilities leasing offers substantial benefits to companies such as NERA Systems Corporation that require large blocks of computer time for highly specialized jobs.

System Development Corp. (SDC) announced recently it will discontinue offering time-sharing operations at its two Datacenter service centers in Santa Monica and Falls Church, Va. Robert W. Hamer, manager of SDC's Commercial Systems Division, said the decision follows a six-month period of operations with the service centers which indicated they had a low likelihood of profitability.

Computer Image Corp., Denver, a leader in computer animation, has entered into an agreement to acquire Filmline, Inc. of Los Angeles, Bruce L. Birchard, president of Computer Image, announced recently.

Filmline, headed by its president, Charles Bordwell, is a leading West Coast producer of informational films. Its clients include, Arrow Jet General, Rohr, North American Rockwell, the U.S. Air Force, and many other leading industrial and governmental organizations.

CRC Computer Radix Corp., New York, has acquired a 30 percent interest in On Line Services, a computer software firm, for an undisclosed amount of CRC common stock. Noel Marcus, president of CRC, said that the negotiations included an option for an additional 10 percent interest at a purchase price of \$100,000 which may be exercised in the future at the discretion of Computer Radix.

On Line Services, Inc. which has developed an on-line order entry system and a generalized on-line system for accounting and other commercial uses, has assigned exclusive marketing rights to Computer Radix for both proprietary packages. An on-line program is a teleprocessing system with terminals at remote locations using telephone lines to hook up to a centrally located computer.

Marcus also said that the affiliation with On Line Services, Inc., along with the recent acquisition of Business Strategies, Inc., will expand CRC's capabilities in both on-line and time-sharing computer services. Business Strategies, Inc. is a management services firm with proprietary computer programs in real estate investment analysis.

Modern Data Techniques, Inc. recently announced an agreement to acquire Arisa Computer Services, Inc., of East Orange, N.J. William E. Griffin, MDT president, said the acquisition will be made for stock, and is subject only to Arisa meeting certain agreed-to conditions.

Arisa will become the third computer service center in the company's planned nationwide network, and also will add strength to MDT's capabilities in the design of proprietary programs, systems consulting, and input services, Griffin said.

National Software Exchange, Inc., has signed a contract with PDA Systems, Inc., New York, which calls for NSE to market two, PDA-developed programs—ALLSTAT and BAL-FIX. National Software Exchange specializes in the marketing of proprietary, field-tested software packages developed by software houses and others in the proprietary software field.

BAL-FIX is a command language which enables a programmer to perform interactive debugging of BAL programs on IBM 360 computers. ALLSTAT is a system which permits a wide range of statistical data analyses to be performed on IBM 360 computers without the need for additional programming.

Two former Ampex executives have launched a new company in Cupertino, Calif., K/Tronic, Inc., to make computer tape cassettes for a fast growing segment of the computer industry.

Jack Buchanan, president, reports that K/Tronic is already delivering "certified cassettes" to seven computer peripheral firms. Digital cassette certification is a trade term for an electronic inspection process to insure that both tape and cassette will enhance a computer system's performance and reliability.

The Computer Co., a new firm described as a full-service data processing organization, has begun operation in Richmond, Va. Its aims, according to company management, will be to "assist businesses in maximizing and optimizing their uses of data processing equipment." The company was founded by K. Daniel Moore, chairman of the Board, Walter R. T. Witschey, president, Thomas B. Neblett, vice president, and Jerry A. Enfield, vice president. All were formerly with the Data Processing Division of IBM.

The firm markets two primary services: time-sharing and facilities management. The time-sharing service called ACTION/APL, utilizes an IBM/360 computer and the newest programming language available, "A Programming Language." Within the framework of ACTION/APL, the company features a remote job entry service together with the largest library of programs in the industry.

# SOFTWARE AGE FREE PROGRAM LISTING FORM

(REVERSE MUST BE COMPLETED)

New Listing   
 Revised Listing   
 Program Wanted   
 Broker Wanted   
 Other

This program is: Utility  Systems  Scientific  Applications  Engineering  Management  Other

Title: \_\_\_\_\_ Number of Programs (if more than one)

Description: (Use reverse side if necessary)

Hardware Configuration:

Programming Language: \_\_\_\_\_ Documentation Provided: \_\_\_\_\_

On-Site Support/Debugging Available? Yes  No  Hours  Guaranteed? Yes  No

Patent No. \_\_\_\_\_ Copyrighted? Yes  No  Number of Programs Distributed \_\_\_\_\_

Check Here for Cross-Coded Reference →  ← Check Here for Cross-Coded Reference

(REVERSE MUST BE COMPLETED)

# SOFTWARE AGE FREE PROGRAM LISTING FORM

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Patent No. \_\_\_\_\_ Copyrighted? Yes  No  Number of Programs Distributed \_\_\_\_\_

Check Here for Cross-Coded Reference →  ← Check Here for Cross-Coded Reference

(REVERSE MUST BE COMPLETED)

This program is: For Sale  Lease  Franchise  | Price: \_\_\_\_\_

Name and Address of Program Owner \_\_\_\_\_

Individual Contact \_\_\_\_\_ Title \_\_\_\_\_

Firm \_\_\_\_\_ Industry \_\_\_\_\_

Street Address \_\_\_\_\_

City, State and Zip \_\_\_\_\_ Tel: (\_\_\_\_\_) \_\_\_\_\_  
(A.C.) (Number)

Additional Description (continued)		Additional Listing Forms Required _____
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This program is: For Sale  Lease  Franchise  | Price: \_\_\_\_\_

Name and Address of Program Owner \_\_\_\_\_

Individual Contact \_\_\_\_\_ Title \_\_\_\_\_

Firm \_\_\_\_\_ Industry \_\_\_\_\_

Street Address \_\_\_\_\_

City, State and Zip \_\_\_\_\_ Tel: (\_\_\_\_\_) \_\_\_\_\_  
(A.C.) (Number)

Additional Description (continued)		Additional Listing Forms Required _____
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## FREE PROGRAM LISTING PRACTICES AND PROCEDURES

**COST** . . . there is no charge for computer programs listed in SOFTWARE AGE.

**PUBLISHED** . . . the listings will appear in the first available monthly issue of the magazine.

**BROKERAGE** . . . SOFTWARE AGE does not broker computer programs nor act as an agent. As an unbiased third party, S/A is acting, solely, as a pipe-line of communications between buyers and sellers of computer programs.

**EVALUATION** . . . SOFTWARE AGE does not compare or evaluate computer programs. The degree of seller on-site support and the extent of buyer capability virtually make the evaluation of any program meaningless.

**PREREQUISITE** . . . all listings must be documented or supported to the extent of being operable by the buyer. The editors of S/A request that all forms be typed to ensure proper printing of your listing.

**ANONYMITY** . . . A cross-coded reference number will be assigned to any program whose originator wishes to remain anonymous. Buyer inquiries will be forwarded to the originator. If the originator still prefers anonymity, buyer will be notified by S/A.

**GROUPING** . . . listings will be grouped according to keyword, title, mainframe application and compatibility, industry, etc. As listings grow, more categories and definitions will be added.

## SYSTEMS SOFTWARE

### MACROS

#### BOOL \$100

A package of boolean functions accessible from FORTRAN IV. The functions are AND, exclusive OR, ones complement, right shift bits, and left shift bits.

#### 360, BAL

Peter Kuner, President  
Consentive Inc.  
3525 Lancaster Avenue  
Philadelphia, Pa. 19104  
CA101

#### DISPLAY MACRO \$25

This macro allows a BAL program to display messages on the console, printer, or both, and accept a reply from the console in one call to the macro. The message displayed can be a literal or a labeled constant. The macro uses a maximum of 200 bytes to initialize (first time only) and execute.

#### 360/30 DOS and up, BAL

Alfred L. Schoen  
71 Strawberry Hill Avenue  
Stamford, Conn. 06902  
CA102

#### DOS ASSEMBLER LANGUAGE TRACE MACRO \$5

Similar in operation to the COBOL "READY TRACE" to allow rapid program debugging. Remains part of the final program and is activated by the UPSI Job Control statement. Prints label of subroutines or statements on SYSLST when active.

#### BAL

Mrs. V. Cranwell  
70 Tamaques Way  
Westfield, N.J. 07090  
CA103

#### REPORT SPOOLING SYSTEM \$250

Consists of 3 macros invoking the report functions in a users program, and a slave printing program. Spool tape may contain up to 75 report files. Data may be copied to another tape, punched or skipped as well as being printed. Selective on-line printing is also allowed from the user program. Pagination, line spacing, overprinting is automatic.

#### 360/25 and up, BAL

R. L. Boese,  
Director of Data Processing  
Data Retrieval Corp. of America  
4222 West Capitol Drive  
Milwaukee, Wis. 53216  
CA104

#### TERMINAL INPUT/OUTPUT MODULE (TIOM) \$3,000

The Lone Star Gas Terminal Input/Output Module (TIOM) is designed to be used with user written Assembler language, operating in a teleprocessing environment, under IBM's Customer Information Control System (CICS). TIOM acts as an interface between the user program and the terminal and thus obviates the necessity for user programs to handle the mechanics of terminal read and write operations for themselves. Through the use of TIOM macro instructions, tables are prepared to contain the terminal I/O messages required by user programs, as well as certain editing criteria. TIOM then employs these tables to perform the actual terminal read/write operations and the editing of input data to the user program's specifications.

#### 360/50, OS Assembler

Vice President,  
Corporate Development & Data Systems  
Lone Star Gas Company  
301 South Harwood Street  
Dallas, Texas 75201  
CA105

#### NOVA MACRO ASSEMBLER \$2,850

The NOVA support software system consists of 1) a macro assembler, 2) binder (linkage editor), and 3) absolute core-image builder for paper tape loading. All of these components are run on the IBM 1130. The support system uses the 1130 card reader/punch and line printer for all input-output except for object paper tape to be loaded on the NOVA. The assembler has many advanced features, such as macros and literals, etc.

#### IBM 1130, BAL

Stuart Madnick  
Intercomp  
243 Vassar Street  
Cambridge, Mass. 02139  
CA106

## SUBROUTINES

#### CHECK\*PRO \$95

It is extremely important to provide the necessary protection for the checks printed at your installation. CHECK\*PRO provides this protection and adds accuracy in the least expensive way. CHECK\*PRO will convert any dollar amount to the equivalent alphabetic spelling. Users have found this invaluable in assuring the accuracy of checks and reports. Further information upon request.

#### All Configurations, COBOL

Rodger, Rogers and Kirkman  
2110 K. Street  
Sacramento, Calif. 95816  
CB107

#### PRTFAST—MAXIMUM OVERLAP PRINTING SYSTEM N/A

PRTFAST is a form of logical IOCS which is easy to use and provides maximum overlap of processing and printing on a 1403 printer

(any model). PRFAST increases throughput by incorporating advanced buffer-loop logic and core storage buffers. Information available on request.

**360/30 & up under DOS  
BAL, COBOL and PL/I**

Michael Goldfield  
International Computer Corporation  
One North Broadway  
White Plains, N.Y. 10601

CB108

**UNI-GEM**

\$6,500

UNI-GEM is a package of standard sub-routines which interface between IBM's Information Management System (IMS) and application programs operating under IMS. This set of General Message Processing Programs: (1) Provides the general message handling functions that are common among all programs that process data from remote terminals, (2) Establishes consistent formats and techniques for communication between message programs and remote users, and (3) Significantly reduces design and programming times and costs in the complex and expensive areas of—Data Acceptance, Message Formatting, Message Validation, Error Notification, and Error Correction. Further information upon request.

360 under IMS, ALP

C. T. Shepherd, Vice President  
United Computing Corporation  
22500 South Avalon Boulevard  
Carson, Calif. 90744

CB109

**UNISORT**

\$350

A sub-program which is called to pragmatically initiate the OS Sort/Merge program. UNISORT may be called by a COBOL, FORTRAN, PLI, or ALP program. The calling program passes the sort area size, as a parameter, to UNISORT; hence the sort area may be dynamically determined, and varied up or down from the size specified when the system was generated. CALL statements are allowed in UNISORT's Input and Output procedures (which is not the case with standard COBOL sorting).

360 W/OS, ALP

Peter Wait,  
Mgr., Business and Mgmt. Sys.  
United Computing Corporation  
22500 South Avalon Boulevard  
Carson, Calif. 90744

CB110

**DYDAT-FORTRAN DYNAMIC  
DATA ALLOCATOR**

\$2,000

DYDAT is a simple but effective programmer's tool for data management in programs requiring storage and manipulation of large amounts of numerical data or alphanumeric text information. DYDAT maintains FORTRAN-compatible data storage configurations so that it may be utilized as a set of user-callable subroutines to provide dynamic data allocation capabilities without requiring modification of existing data manipulation subroutines. User calling sequences to DYDAT are provided to perform the following functions: initialize data storage pool; create a dynamic array having up to three dimensions; erase a dynamic array; revise the dimensions of a dynamic array; obtain the current status of a dynamic array; and, obtain a complete dump of the dynamic arrays.

Any FORTRAN Configuration, FORTRAN IV  
Manager, Software and Special Services  
Electronic Associates, Inc.  
P. O. Box 582  
Princeton, N.J. 08540

CB111

**CALLCKPT SUBROUTINE**

\$100

This subroutine provides DOS checkpoint-restart facilities to higher level languages, as well as BAL. Up to six tapes and six disk files can be checkpointed. Three disk checkpoint areas have been set up to allow checkpoints to be saved and also provide simultaneous checkpointing of up to three programs. Modifications can be made to add tape files, disk files and checkpoint areas.

360/30 and up, DOS, BAL

Alfred L. Schoen  
71 Strawberry Hill Avenue  
Stamford, Conn. 06902

CB112

**SOFTWARE SYSTEMS**

**BAL CARD COMPILER W/NO  
INTERMEDIATE DECK**

\$200

Will allow the user to compile basic assembler language programs on a 360/20 IBM card system without having to punch an intermediate deck. Will increase compilation speed by more than 65% and at the same time it will save an average of 600 cards per compilation. Excellent for computer schools or any other business with many daily compilations. Minimum core required 8K.

360/20 Card System/8K or up, BAL

George Utset, Vice President  
Florida Computer College  
DuPont Plaza Center  
250 S.E. 4th Street  
Miami, Florida 33131

CC113

**COMTAPE/9000-RPG COMPILER  
UTILITY**

\$250

For all Univac 9200 and 9300 MOS or COS systems with a minimum of one (1), tape or disk drive. Tape resident RPG compiler produces a loadable object deck in a single pass. Bootstrap loaded program with automatic rewind feature from console eliminates handling of bulky RPG card compiler and saves enormous amount of time. Updating per manufacturer's revisions.  
Univac 9200, 9200-2, 9300, MOS, COS, BAL

Robert Bruce, Marketing  
Quantasand Automated, Inc.  
Box 107  
East Orange, N.J. 07019

CC114

**DATA FILE CONVERSIONS-DAFCON**

\$75/mo

The Data File Conversion System (DAFCON) is a series of programs which perform various manipulative functions to assist the user in tape file conversions. Through parameter cards the DAFCON programs may be specialized at run time to process: 1.) Fixed or Variable files—Honeywell and IBM. 2.) Odd or Even parity files—Honeywell and IBM. 3.) Standard labels or tape-marks. 4.) Non-standard character sets.

In addition to converting and translating any of the above mentioned files from one type to another, the DAFCON system has the ability to change blocking and to perform internal rearrangement of data fields contained in each record. Further information upon request.

Honeywell H-120, 32K, EASYCODER

Robert W. Coffin  
Span Systems, Inc.  
63 SW 93rd Avenue  
Portland, Ore. 97225

CC115

**DSI COBOL 20 COMPILER**

N/A

The DSI COBOL 20 language assures ease of learning, of using, and of program check-out, while retaining upward compatibility with the language on larger, more powerful IBM 360 equipment as well as that of many other manufacturers. It is machine-independent, yet allows the user to benefit from the strengths of his particular configuration. The language is compact without loss from the power associated with more elaborate COBOL dialects. The DSI COBOL 20 compiler was designed with the small configurations in mind, adopting the intent and meaning of the COBOL standards to the specific equipment. It takes advantage of a number of advanced techniques to optimize storage utilization, and to generate object code that provides for efficient execution. In addition, a number of unique debugging aids have been included in the compiler to reduce program production times and cost.

360/20 TPS or DPS, BAL

James A. Jewett,  
Director of Marketing Applications  
Decision Systems, Inc.  
East 66 Midland Avenue  
Paramus, N.J. 07652

CC116

**EMULATOR ASSEMBLY SYSTEM (EASY)**

\$100

Designed to enable the user of the emulator to code his jumps with labels, thereby eliminating the necessity of rewriting the program while debugging or modifying. The input is a source deck coded in a format furnished with the program. Output is a program listing and object cards. Supplied is a completed plugboard program, formats and instructions. Board and wire may be supplied by purchaser or will be furnished.

Alan H. Lake  
512 Mair Street  
Roseville, Calif. 95678

CC117

**FIOCS**

\$50

Allows user to do FORTRAN I/O through system console, usually without changes to the FORTRAN source or object module. READs and WRITEs to unit 5 or 6 are automatically diverted to the console typewriter. These two unit numbers may be changed by: (1) Reassembling FIOCS; or (2) at execution time initiating a call in the FORTRAN source program in the form: CALL IOUNIT (n<sub>1</sub>, n<sub>2</sub>), where n<sub>1</sub>, n<sub>2</sub> represent the constants or variables representing the unit numbers desired for console I/O. For example: CALL IOUNIT (19,20), READ (5,101) N, WRITE (20,102) N . . . will result in a read from the unit defined in the FT05F001 DD card, followed by a write to the console typewriter. If no calls to IOUNIT are made in the FORTRAN source, console I/O unit numbers default to those set at assembly time for FIOCS.

360 OS, BAL

John B. Rose  
284 Jacob Street  
Seekonk, Mass. 02771

CC118

**GEPOL-COMMAND-ORIENTED  
LANGUAGE PROCESSOR**

\$3,000

GEPOL is a set of integrated subroutines which may be used to provide any user-supplied applications program with a free-format, command oriented input language. GEPOL provides a complete capability for processing the input language. This capability may be utilized by the user in the applications program by calls to GEPOL subroutines. User inputs in a command-oriented language consist of a command, composed

of one or more words and followed, possibly, by data items. GEPOL may be used to interpret the command and to branch to a user supplied subroutine for command execution. Calls to GEPOL routines may then be utilized to input the command data items if required. Further information upon request.

#### **FORTRAN IV**

Manager, Software and Special Services  
Electronic Associates, Inc.  
P.O. Box 582  
Princeton, N.J. 08540

**CC119**

#### **HAL AS—PROCEDURE RUN SUPERVISOR**

\$195+/mo

HAL AS combines the functions of HAL A and HAL S. HAL AS will store up to 20 procedures for multi program module systems plus 10 installation standard procedures. HAL AS is "filled" ie initiated with the desired procedures. Thereafter any one or previously defined combinations of these procedures may be executed with the use of one HAL command.

**360/25 and up, 32K, DOS or OS, HAL Command**

Henry Oswald, President  
Exact Systems and Programming Corp.  
P.O. Box 115  
Thornwood, N.Y. 10594

**CC120**

#### **HAL EXECUTIVE CONTROL SUPERVISOR**

\$300/mo

An Executive Control Supervisor that assumes full control of an S/360 and supplies functions normally performed by a human operator. HAL stores and automatically executes procedures (JCL decks) and combinations of procedures.

HAL function: To substantially reduce operator intervention and human error and increase efficiency in operation of multi-job step programming systems as well as compilations and executions.

**360/32K DOS or OS, HAL Command**

Henry Oswald, President  
Exact Systems and Programming Corp.  
P.O. Box 115  
Thornwood, N.Y. 10594

**CC121**

#### **HAL A-MULTI PROGRAM MODULE EXECUTION SUPERVISOR**

\$100+/mo

A control program that stores and executes all the JCL procedures for one multi-module program system (up to 20 procedure). HAL A is "filled" ie initiated with the JCL decks thereafter, when HAL A is called, it controls machine IBM S/360 and runs the component procedures automatically without operator intervention.

**360/32K DOS or OS**

Henry Oswald, President  
Exact Systems and Programming Corp.  
P.O. Box 115  
Thornwood, N.Y. 10594

**CC122**

#### **HAL S STANDARD PROCEDURE SUPERVISOR**

\$125+/mo

A control program that stores and automatically executes up to 10 Installation standard JCL Procedures. HAL S is "filled" ie initiated with the Standard JCL decks. Thereafter any of these procedures may be executed with a single HAL command. Such functions as Compile can be handled so that the applications programmer need use no JCL.

**360/25 and up, 32K, DOS or OS, HAL Command**

Henry Oswald, President  
Exact Systems and Programming Corp.

P.O. Box 115  
Thornwood, N.Y. 10594

**CC123**

#### **HELP/A GP INDEPENDENT MACRO-PROCESSOR**

\$15,000

HELP is a general-purpose macro-generator which is target language independent and can be quickly prepared to run under any operating system on any machine. Macro-calls in the HELP language can be written with variable syntax and punctuation, or in "natural language" form. The generated output, which might be a program in any language or might be data, depends on the definitions of the macros called. The principal applications of HELP are to provide a macro facility for any language, to build shorthand versions of existing languages, to write machine-independent applications or software programs, to create special-purpose application languages, (etc.)

**360/30 and up, 32K**

Ralph L. Stout, Vice President  
Advanced Computer Techniques Corp.  
437 Madison Avenue  
New York, N.Y. 10022

**CC124**

#### **LEAP—Lambda Efficiency Analysis**

LEAP is an easy-to-use diagnostic tool for identifying those portions of a program that use time inefficiently. The package monitors a normal production run of a program, accurately analyzes the distribution of time, and presents a set of reports useful in deciding where to modify the program. LEAP automatically "zooms in" to the sections of code that are significant in terms of time consumption. Without the guidance of an aid like LEAP, even expert programmers cannot be sure to locate those few instructions that usually account for the great bulk of running time. With this guidance, a programmer can reduce running time by 30%, 50%, and sometimes more. The package operates simply and automatically. Users are provided with *A Guide to Program Involvement*.

**OS/360, ALL**

J. N. Killalea, Assistant to the President  
Lambda Corporation  
1501 Wilson Boulevard  
Arlington, Va. 22209

**CC125**

#### **LINK RELO**

N/A

Makes a 360 DOS program fully self-relocating with no special programming technique required. Programs link edited with this module are cataloged at +0 and may be run in any partition without separate catalog runs being required. It adds a small module to the program to do the relocating. This may be overlaid by an I/O area if desired since it is used at program entry only.

**360/254 and up, BAL**

James S. Tanner  
Credit Bureaus, Inc.  
240 Cottage Street, SE  
Salem, Ore. 97301

**CC126**

#### **MANAGE—SOURCE FILE MAINTENANCE SYSTEM**

\$2,485

MANAGE maintains COBOL, FORTRAN, ALC, Autocoder and RPG Source programs on a common file on tape or disk. Card files are thus eliminated. Changes, deletions, or additions to portions of programs or entire programs can be made by card input. Program logs and program modification logs are produced to serve as an audit trail. MANAGE automatically produces input to the compilers.

#### **360, 32K, COBOL**

Stuart L. Bunday, Marketing Manager  
Management Systems Corp.  
7007 Preston Road  
Dallas, Texas 75205

**CC127**

#### **MODIFIED CSMP (CONTINUOUS SYSTEMS MODIFYING PROGRAM)**

N/A

This CSMP program is a greatly modified 1130 CSMP Program. It allows up to 999 Blocks, the user may specify the mix of block types, all blocks can be saved and later printed. The program was written so that the unit numbers can be changed easily as well as the cards showing the mix and total number of blocks desired. All input is assumed to be from cards and the 1816 is used only for corrections.

**32K Memory, FORTRAN IV**

Michael Rourke  
Mead Hybrid Computer Laboratory  
Corner 8th & Hickory Street  
Chillicothe, Ohio 45601

**CC128**

#### **NORTHWEST COMPUTING TIMESHARING SYSTEM**

\$2,875/mo

Northwest Computing Timesharing System on IBM System 360's supporting full USASI FORTRAN IV, BASIC ASSEMBLER and extended DARTMOUTH BASIC languages. This system supports up to 120 lines simultaneously along with background batch processing. Further information upon request.

**360/30 and up, USASI FORTRAN IV, Basic Assembler, Extended Dartmouth Basic**

Richard I. Norman, Owner  
Northwest Computing  
1250 Mercer Street  
Seattle, Wash. 98109

**CC129**

#### **OS 360 MFT/MVT 2260 MONITOR**

\$35

The 2260 Monitor runs as a system task, similar to a reader or writer, in an 8K region/partition. It displays the status of the system on a 2260 located preferably near the CPU. The information displayed is: Status of partitions/tasks (job/stepname; system tasks, unit, classes; initiator, classes; for MVT also displays free core and system queue space) Status of job queues—no. of jobs on Q, whether in Hold, and % free. Also displays outstanding reply ids, addresses of off-line units, addresses of units requiring operator intervention, units waiting for mounts, and units available for AVR mounts. The screen is updated every 5 seconds; this time and the location of displays on the screen may be modified by the operator. The Monitor is OS Release dependent, and a few lines of code are installation dependent.

**OS MFT/MVT w/2260 Local Model + 8K, 360 OS Assembly**

G. Postpischil, Systems Analyst  
Applied Data Research, Inc.  
2425 Wilson Boulevard  
Arlington, Va. 22201

**CC130**

#### **POOR MAN'S TIMESHARED 8**

\$100

This package will convert a small PDP-8 installation into a time-sharing system which can handle 2-6 simultaneous users (depending upon the amount of disc storage and the number of teletypes connected). EDIT-8 and a loader are included in the user's library, with PAL and FOCAL optionally available. The system is most useful for small scale focal problems and software generation. All monitor functions are handled in the last three pages of core, with I/O buffers below that. The monitor consists of

a rather flexible teletype handler, a scheduler, and a disc handler. Further information upon request.

**PDP-8 series (4K), DF-32, PT-08, PAL**

Philip Miller, Senior Programmer  
Logic, Inc.  
7338 Woodward Avenue  
Detroit, Mich. 48202

CC131

**PRIVATE CORE IMAGE LIBRARY  
EXTENSION TO DOS**

\$5,000

This extension to IBM DOS allows users the ability to transfer programs from a disk resident core image library (SYSRES) to a private core image library on magnetic tape. This extension consists of two programs, one of which performs the maintenance to the private core image library and the other which loads problem programs from the private core image library (the load program does not require any additional storage beyond the problem program's requirements). During loading, the private core image library can be overlapped with problem program assignments. This extension to DOS will support programs written in any language (Assembler, COBOL, FORTRAN, PL-1, etc.) for any partition as well as self-relocating programs. This extension to DOS will not support programs loading or fetching phases during execution unless they are cataloged on SYSRES. Further information upon request.

**360/25 or larger, DOS Assembler**

Vincent H. Scott, CDP  
Credit Bureaus, Inc.  
P.O. Box 109  
Salem, Ore. 97308

CC132

**RCA 301 to BAL TRANSLATOR**

\$12,000

This system Translates RCA 301 Assembly Source Statements to BAL Source Statements. The program is a 2 phase system composed of a Translation phase and a Generation phase. Additions, deletions and corrections can be made at any level, i.e. the 301 Source to the Translation output or to the Generation output which is the BAL Statement.

**Spectra 70/35 up, 360/30 up, 65K min.  
BAL**

J. Cohen, President  
Computer Translators, Inc.  
2 Penn Plaza  
New York, N.Y. 10001

CC133

**RCA 301 RPG TO COBOL**

\$12,500

This system Translates RCA 301 RPG Source Statements to COBOL Source Statements. The program is a 2 pass system that converts all RPG statements to their corresponding COBOL Statement. Those Statements that are questionable under Translation are flagged. Automatic conversion in excess of 98%.

**Spectra 70/35 up, 360/30 up, 65K, BAL**

J. Cohen, President  
Computer Translators, Inc.  
2 Penn Plaza  
New York, N.Y. 10001

CC134

**REPO/360 LOAD-AND-GO REPORT  
WRITER**

\$150/mo

REPO/360 is a load-and-go report writer. It handles up to 4 heading lines, up to 5 levels of control break, and I/O automatically. In addition, a wide range of instructions, including I/O, and file types provide extensive flexibility as a report writer and a utility program. REPO/360 is suitable for use by both experienced programmers and non-programmers.

**360/20 or MOD 25 up, Assembly**

D. J. Tittle, President  
Data and Information Products, Inc.  
10 West Main Street  
Park Ridge, Ill. 60068

CC135

**SCORE**

\$12,500

COBOL program generator/File management system.

**IBM 360 DOS/OS, COBOL**

Robert P. Wolk  
Atlantic Software, Inc.  
5th & Chestnut Street  
Philadelphia, Pa. 19106

CC136

**SELEMBLER/1130**

\$2,995

SELEMBLER/1130 is a SEL 810A/810B assembler that will run on the IBM 1130. SELEMBLER 1130 consists of an assembler, a relocating loader and a cross-reference generator. SELEMBLER/1130 accepts all SEL mnemonic instructions and pseudo-ops as described in the SEL 810A/810B General Purpose Computer Reference Manual plus five additional specifications which describe and format SELEMBLER/1130 output. Further information upon request.

**1130/1800, 1130 Assembly**

Jerome Lisovich  
Dataneitics  
3512 Fifth Avenue  
Pittsburgh, Pa. 15213

CC137

**SHORTHAND/A COBOL**

**PRE-COMPILER**

\$500/\$100

Allows the use of abbreviations for selected reserved words. Insures correct margin alignment of all entries; variable length programmer supplied abbreviations; expand, compile, catalog and execute programs that contain abbreviations in one pass without an intermediate punched source deck. Use of either tape or disk for a work drive if direct input to the compiler is requested. All options are standard. There is no extra charge for any program features.

**360, DOS COBOL**

General Electronics  
3815 South Lombard Avenue  
Cicero, Ill. 60650

CC138

**SHORTHAND/COBOL PRE-COMPILER**

**FOR IBM DOS**

\$500/\$150

A program operating under DOS that will: automatically align all entries; ability to use either tape or disk for a work drive; for direct input to the compiler; ability to compile, catalog, and execute programs that contain abbreviations in one pass without an intermediate punched source deck; variable length programmer supplied abbreviations that can be used anywhere in the program.

**360, DOS COBOL/USA COBOL**

General Electronics  
3815 South Lombard Avenue  
Cicero, Ill. 60650

CC139

**1401 SIMULATOR FOR OS**

\$500-\$1,000

This software system executes IBM 1401 object programs loaded from cards or tape. No modification of 1401 program is required. The system simulates all 1401 card or tape programs including the advanced programming features plus multiply and divide. Debugging features include non-destructive 1401 core dump, snapshot of 1401 core and modifications to 1401 core memory at any 1401 halt. An operator command allows for spooling of printer output to disk or tape with proper forms overflow and chan-

nel skipping for offline printing. Simulator is available for 4 K to 16 K core 1401 programs and will operate in 32 K to 65 K region or partition of OS.

**360/40 & up under OS, BAL**

Alan P. Haesche  
14 Carafa Terrace  
North Haven, Conn. 06473

CC140

**SSTPAC II**

\$7,500

Systems Support Test Package (SSTPAC) is a stand alone diagnostic monitor designed to verify input/output operations on an IBM S/360. Modular tests are included for diagnosing operations of any device that can be interfaced to the S/360. Each test is designed to verify the initial selection, data transfer and ending procedure sequences required for local device interfaces to the S/360 channels.

Remote terminal tests are included for verification of asynchronous (Start-Stop) and synchronous (Binary Synchronous) terminal operations. Specific terminal tests verify the required polling, addressing, I.D. Verification, dialing, answering, and response sequences for multipoint and point to point switch and leased lines. An On-line channel program generator is provided to allow the user to build data banks and I/O commands for testing troublesome sequences. Further information upon request.

**360/25 with 32K, BAL**

Wm. R. Servais,  
Regional Director Technical Operations  
Programming Sciences Corporation  
1000 Connecticut Avenue  
Washington, D.C. 20036

CC141

**SYSMAC—SYSTEM MANAGEMENT FOR  
SYSTEM/360**

\$4,900 and up

SYSMAC provides an effective set of tools for managing System/360 in a multiprogrammed environment. It monitors, accounts, and controls the major activities under OS/MVT. A 600 to 4,000 byte region contains OS/MVT interface programs which record the computer resources actually used by each job. This includes CPU time, accountable core time, core size, number of job steps, terminal connect time, number of tape and disk I/O events, number of tape and disk setups, number of cards read and punched, and number of lines printed. This data is used to develop the logical billing for each job and the charge is printed at the end of the job. This data is logged by time of day and may be used by the installation to develop computer utilization analyses. Further information upon request.

**360 OS/MVT, BAL, FORTRAN**

William F. Gray, President  
Hygain Technologies, Inc.  
65 Whitney Street  
Westport, Conn. 06880

CC142

**SYSTEL—INTERACTIVE TIME  
SHARING FOR OS/360**

\$6,800 and up

SYSTEL is a totally interactive time sharing software system which operates on a System/360 using OS/MVT. Minimum core requirements start at 64K. SYSTEL includes an easily learned interpretive language and a command processor which provides terminal I/O and interactive file handling capabilities. The language may be used with most time sharing monitors available for byte oriented computers. The SYSTEL language is a dialect of PL/I and has been successfully used for both business and engineering applications. The direct mode option reports errors in syntax or logic after entering each statement. Thus the user can make corrections

and continue without making a new start. Further information upon request.

### 360 OS/MVT, Various

William F. Gray, President  
Hygain Technologies, Inc.  
65 Whitney Street  
Westport, Conn. 06880  
CC143

### SYSTEMS NETWORK ANALYSIS PROGRAM (SNAP)

N/A

SNAP is a system designed to solve system network problems. Any system which can be described by a network of directed nodes and arcs and multiple inputs and outputs can be analyzed by SNAP. The objective is to evaluate the total network cost/profit and to aid in analyzing the effects of network changes by comparing alternate system configurations to a baseline system. SNAP considers time variable loads (inputs). SNAP performs total systems analysis, i.e., the interaction of any change to the systems will be analyzed in terms of its affect on the total system. SNAP performs cost benefit analysis, i.e., a continuous approach to present worth. This method considers continuous compounding, which is a modern way of accounting for the fact that most operations generate savings continuously.

### Basic Fortran IV

Carl Rossow  
International Computer Graphics, Inc.  
Suite 402, Bryan Building & Loan Bldg.  
Bryan, Texas 77801  
CC144

### TACOS-IBM 7070 AUTOCODER TO COBOL TRANSLATOR

\$18,000

TACOS produces COBOL programs from IBM 7070 Autocoder source language programs. The system user receives a COBOL program in cards and a listing showing both the Autocoder and the resulting COBOL. Conversion efficiency is generally from 80 to 98%. TACOS may be purchased, leased, or individual programs may be translated as a service.

### 360, 256K, COBOL

Stuart L. Bunday, Marketing Manager  
Management Systems Corporation  
7007 Preston Road  
Dallas, Texas 75205  
CC145

### TELEPROCESSING MONITOR SYSTEM

\$800 Lease

Teleprocessing monitor system for use under IBM OS/MVT. This monitor system receives inquiries, priority queues the inquiries (as required), passes the inquiries to an asynchronously processing, user-written subtask, handles the response from the subtask, and returns the response to the remote inquirer.

The monitor uses less than 4k for control, peripheral, and error recovery modules and does all code conversion and pass word protection. All I/O is EXCP-channel programmed. All error recovery is self-contained, ensuring minimum system change and complete release dependence. This monitor system is currently being used in industry for IBM 2740's (model 2) through a 2701 (type 1 adapter). Other peripheral modules can be arranged for through contract. This is completely documented, including user and system manuals.

### 360 and 2701, BAL

Kent Schwaber, System Programmer  
University of Chicago Computation Center  
5640 South Ellis CB22  
Chicago, Ill. 60637  
CC146

### TIME SHARED (DATA GENERAL) NOVA ASSEMBLER

\$1,000

This program assembles symbolic code for the data general nova/supernova computers. The assembler is run from a remote terminal (ASR 33), allows a variable number of symbol tables, source files, and optionally places listings and binary output on files for subsequent offline processing at reduced rates. The assembler is conversational and utilizes a national computer utility. The program may be leased—charges are a function of connect time, etc., and averages 2-4¢ per instruction assembled.

### SUPERBASIC

J. E. Politi, Technical Staff  
Miller-Ellis Computer Systems  
1070 East Meadow Circle  
Palo Alto, Calif. 94303  
CC147

### TOTAL TRAN SYSTEM

\$100-\$400

An efficient system for translating 1401-1440-1460 source or object code to IBM S/360 or RCA Spectra 70 ASSEMBLER LANGUAGE. 2 separate services. Disassembler—process patched object code and recreates clean SPS or Autocoder source code. Also a Disassembler service available for processing 7074 patched object code into 7074 clean Autocoder source code. Translator—process SPS or Autocoder source code to IBM S/360 or RCA Spectra 70 Assembler Language. Optional services available. Further information upon request. At the present time the system is only available for service in New York, but other sales representatives are welcome.

Peter D. Colgan,  
Executive Vice President  
CPC Management Advisory Corp.  
853 Broadway  
New York, N.Y. 10003  
CC148

### TRANSLMBER

\$750

A cross assembler for performing off-line assemblies of machine language programs for the Varian 620i computer. It accepts the Varian DAS assembly language as input and generates object programs in DAS paper tape format.

### 360/40G, FORTRAN IV

Bill Clayton  
CODE, Inc.  
8939 Sepulveda Boulevard  
Los Angeles, Calif. 90045  
CC149

## SOFTWARE GENERAL

### MASTER/PATCH

\$75

MASTER/PATCH was designed to aid the programmer in patching the object program module. It is also a very useful tool for program testing and debugging, in that it eliminates continuous reassemblies. The object program module can be patched through MASTER/PATCH control cards which produce all necessary object program cards. The patching technique is similar to methods used for patching SPS and AUTOHOLDER object modules. Further information upon request.

### 360/20 CARD—Modified for TPS/DPS, BAL

William R. Lassiter  
Institute of Computer Management  
1935 Euclid Avenue  
Cleveland, Ohio 44115  
CD150

### MULTI-PROGRAMMING DUMP

\$300

A background dump that is in program state rather than in supervisor state, therefore is no foreground hang-up. Especially useful for on-line (multiprogramming) application. The dump prints out core in matching character and hex format with necessary information about program status.

### 360/DOS, COBOL, BAL

SNI  
Room 1612  
366 Madison Avenue  
New York, N.Y. 10017  
CD151

### OPERATOR ATTENTION MODULES

\$175/\$300

This module is to be used by the programmer to ring the 360/ I/O bell whenever a computer console response to a program is required. A definite computer time saver. Especially for computer centers, long jobs requiring little operator intervention. Available under two options: Option A—ring bell whenever requested by the program \$175. Option B—ring bell at fixed intervals in

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conjunction with the interval timer until program resets timer \$300.

### 360/DOS

SNI  
Room 1612  
366 Madison Avenue  
New York, N.Y. 10017  
CD152

## FILE MAINTENANCE

### GENERAL MAINTENANCE SYSTEM (GMS)

\$5,000

The General Maintenance System (GMS) is a general purpose software product designed to relieve programmers from the repetitive and time-consuming chores of program coding and testing which are inherent in the development of any unique file creation or file maintenance system. GMS automatically generates programs which are specifically tailored to the files upon which they operate. The system performs the full range of edit and update programs—including file creation, transaction editing, file maintenance and optional audit-trial and/or error routines.

### 360/30 32K or equiv. COBOL

John V. MacGuffie  
Information Science, Inc.  
18 New Hempstead Road  
New York, N.Y. 10956  
CE153

### PLATTER

N/A

PL/I Source Library Maintenance Program which allows for the altering of the Source Deck Image Library it has built onto Source Program Library. Options to: Alter Source Statement, Source Statements and to then Compile or Compile and linkedit with an Object Module the result placed on the Object Library.

### 360/40 and up, PL/1

Robert Bruce, Marketing  
Quantrasand Automated, Inc.  
Box 107  
East Orange, N.J. 07019  
CE154

## MISCELLANEOUS

### AUTODATE

\$1,200

Autodate allows the user to operate a fully automated computer dating service, the package contains two programs, both written in PL(2) level (F); one for file maintenance and another for matching candidates with the three most compatible persons in the file. The program checks race, religion, sex, and height before entering the routine to perform the matching procedure. A bi-directional check is made for each of the above characteristics. The program prepares a curve reflecting the profile of the individual and matches this curve to the data for other candidates.

### 360, PL/1, Level (F)

Jerald Goldring  
1441 South Shenandoah Street  
Los Angeles, Calif. 90035  
CF155

### AUTOMATIC ICDA DIAGNOSIS ENCODING

N/A

An operational system which accepts patient identification and medical data and processes these into multipurpose, expanded disease, operative and physicians index reports. Processing is based upon a standard input form manually prepared by hospital personnel at the time of discharge. Data entered on the form identifies the patient and the physician, and lists in free form in English language all diagnoses and operative procedures pertinent in the admis-

sion. Monthly processing converts English language into ICDA (8th Edition), and produces a morbidity report and a physicians index, both with passing statistics on mean and median stay, age, etc. Information is maintained discretely by hospital on tape as a base for potential special reports.

### 360/30 and up, DOS, BAL

M. Murphy, Vice President  
Medical Dynamics, Inc.  
404 Beacon Street  
Boston, Mass. 02115  
CF156

### CONVERSATIONAL TAPE LIBRARIAN \$9,000

A real time, conversational tape library inventory system serviced by a ASR or KSR teletype device(s). Updates a tape library master file and furnishes to the user on request various master listings. These listings can be in Reel number or job number sequences and are generated on a high speed line printer. The updating portion of the system permits assignment of scratch tapes, alteration of assigned tapes individual scratching of tapes and automatic scratching by retention date. The system operates with two programs: LIBRIAN—Updating module invoked by the user. GENERAT—Reporting module invoked by LIBRIAN.

### B5500, B3500, COBOL

J. R. Jagententf  
READO Systems, Inc.  
265 Sunrise Highway  
Rockville Centre, N.Y. 11570  
CF157

### CORONARY CARE UNIT SIMULATOR \$75

The program simulates any coronary care unit. The main objective is to find the necessary number of beds in such a unit without preempting. The model will work for any unit size. All the user has to do is to specify: 1) arrival rate, 2) distribution of time a patient stays in the unit, 3) discharge function. These distributions are stated independent of the main program. Extensive documentation, including detailed description of the model and assumptions will be provided.

### 360, GPSS

K. Christian Knudsen  
Univ. of Minn. MISRC  
1825 South 5th Street, #106  
Minneapolis, Minn. 55404  
CF158

### GIFT REPORTING & INFO. PROCESSING

(GRIPS)

\$15,000

The proprietary software system is designed to support fund-raising campaigns of colleges and universities and to maintain alumni and prospect records. The system maintains a set of data files related to donors, accounts, and statistics for gift processing and selective mailing. In addition, it will produce acknowledgments and pledge reminders as well as management reports. GRIPS features effective, easy to use system controls and powerful data selection capabilities. Flexibility in report format as well as input control and code structures assures adaptability of the system to user's specific requirements. GRIPS can be effectively shared by more than one institution.

### 360/25 & up, COBOL

Thomas Malone,  
Manager of System Development  
International Data Applications, Inc.  
100 Main Street  
Reading, Mass.  
CF159

### INTERNAL JOB COST SYSTEM

\$6,000

Distributes total cost of EDP Dept. operation to each job being performed. Reporting structure is designed to show total costs by operation, by job and by customer. Cost elements are made up and reported as machine costs, labor costs, forms costs and overhead. Many flexibilities are inherent in the system to allow for a variety of cost accounting concepts to be utilized as desired.

### 360/30, Disk, BAL and COBOL-DOS

Don L. Bates,  
Assistant Manager, Systems  
Old National Bank  
P.O. Box 718  
Evansville Ind. 47701  
CF160

### USDA FOOD STAMPS

\$2,500

A set of programs to do "food stamp" issuance and reporting for county departments of social welfare participating in this U. S. Dept. of Agriculture Program. May be used by banks or service bureaus for processing multiple counties.

### 360, 32K, COBOL

C. D. Harakas  
National Lumberman's Bank & Trust  
First Street at Webster  
Muskegon, Mich. 49443  
CF161

## UTILITY PROGRAMS

### AUTO-GEN

\$3,200

AUTO-GEN is a third generation COBOL program generator, for file creation and maintenance. Parameter cards supply basic file descriptions of either sequential or indexed-sequential files. Output generated includes card formats for update transactions and a COBOL source program, ready to compile.

### 360/32K and up, COBOL

David I. Leamon, Marketing Director  
Computer Guidance Associates  
8221 Third Street  
Downey, Calif. 90421  
CG162

### BVC-SMR

\$380

This program provides a means of storing punched card data on magnetic tape, modifying it and retrieving it in the form of printed listings or punched cards. Data stored on the library tape is separated into books. Records within books may be sequentially numbered in positions 1 through 6 or may be un-numbered. Books may be added, deleted or replaced. If the records within a book are sequentially numbered then individual records and/or blocks of records may be added, deleted or replaced. Sequential numbering can be redone in increments of 10 or 100. Punched cards can be retrieved sequentially re-numbered and/or with columns 73-80 altered. Can be used to store complete program source language, standard data descriptions, operator instructions, documentation or data banks (only minor modification is required to increase the size of the sequence field). Source deck, user instructions, forms and documentation are provided.

### 360/30 and up, COBOL or PL/1

Charles R. Kent, Owner  
BVC Systems Service  
260 Kearny  
San Francisco, Calif. 94108  
CG163

**COBOL MSPLT UTILITY \$450**

The COBOL MSPLT UTILITY extends the Honeywell COBOL D and H system to include management of source program tape files. The system has the ability to create selected MSPLT files from a Master MSPLT, merge MSPLT files together and to arrange source programs on a single MSPLT to allow for easier file updating. Also available is a COBOL DATA-DIVISION/PROCEDURE-DIVISION cross reference analyzer which processes source programs from an MSPLT.

**Honeywell H-120, 32K and up, COBOL**

Robert W. Coffin  
Span Systems, Inc.  
65 Southwest 93rd Avenue  
Portland, Ore. 97225  
CG164

**CPU (COBOL PRINT UTILITY) \$50**

CPU is a general purpose utility print program that will afford the user, who does not possess manufacturer supplied software, the capability to generate report print tapes for subsequent printing rather than producing the listing(s) during the actual execution of a report program. Detail lines for multiple reports produced by a single program may be written in any sequence to one print tape. When CPU reads this tape, the various lines associated with each report are extracted and a listing is printed for each report segment. CPU may be modified to meet the standard COBOL requirements imposed by most manufacturers. Complete documentation and a copy of the program listing are available.

**UNIVAC 9300, 32K, COBOL**

Fritz M. Maier  
800 Devon Place  
Alexandria, Va. 22314  
CG165

**EDITOR \$350**

Reads a file, checking each record for valid punching. Each record filed can be defined in any number of alternative ways. Also, any number of different formats can be handled, as long as records contain format identifiers, and are sorted in proper sequence. Bad fields are clearly marked.

**Any FORTRAN Configuration, FORTRAN IV**

Peter Moskovites, Vice President  
Systems Research Associates  
14 Newbury Street  
Boston, Mass. 02116  
CG166

**FORTRAN CROSS REFERENCE EXTENDED DIAGNOSTICS SYSTEM (XREF) \$226**

Used in conjunction with the existing 1130 FORTRAN compiler this system provides valuable assistance in 1) debugging, 2) documentation, and 3) program modification. Output gives a complete sorted cross reference of (A) all statement numbers and their usage e.g. FORMAT, READ, DO . . . (B) all variables, their attributes (COMMON INTEGER/REAL, EQUIV . . .) and usage (Occurrences and definitions), (C) all constants and special notation of I/O constants, and (D) all subprograms and type (function, subroutine, main pgm . . .). XREF generates ENGLISH diagnostics not given by IBM under the statement in error, and in error section. Further information upon request.

**1130, FORTRAN & BAL**

Jay Rosenberg  
Computer Resources & Tech.  
Suite 5044, 1629 K Street  
Washington, D.C. 20006  
CG167

**1130 FORTRAN EXTENSION PACKAGE \$11.30**

1130 FORTRAN EXTENSION PACKAGE expands the power of 1130 FORTRAN to approach that of FORTRAN IV, and then some. This package provides the user with 1) logical arithmetic operators (EQ, NE, GT, LT, LE, GE), 2) "If-Then-Else" arithmetic capability, 3) conditional, bi-directional, MOVE operators, and 4) integer MIN & MAX functions. Package complete with documentation, instructions, examples and programming hints. Written in ASM for fast execution. CRT found use of the package (A) increased programmer power, and (B) reduced program core requirements, flowchart complexity and compile times. All IBM 1130's.

**1130/Disk, BAL**

Jay Rosenberg  
Resources and Tech. Corporation  
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CG168

**'GINNY' DATA TRANSFER MULTIPLE UTILITY \$75**

"GINNY" data transfer multiple utility program operates under IBM DOS Version 3. It is a self relocating utility which supports card, printer and tape devices with block/deblock function Mnemonic command codes, Dynamic job control to allow device acquisition across partitions and character or character and hex output.

**360, 28K, BAL**

Mrs. V. Cranwell  
70 Tamaques Way  
Westfield, N.J. 07090

CG169

**INFOMACS—REPORT WRITER & FILE STRIPPER \$2,800**

INFOMACS is a powerful programming tool designed to produce completely customized reports through the use of easy-to-use control cards. INFOMACS also selects records from a file based upon criteria submitted by the user. Once selected, the records can be displayed on the printer in either record image or report format and/or written on a file. Other features of INFOMACS allow report titles and column headings, accumulations of up to ten fields with four levels and a final total, record counts by each selection criteria, padded input record elimination and a summary printing capability when totals or record counts only are desired. Further information upon request.

**360/DOS, Control Cards**

Robert Germscheid,  
Manager, Proprietary Software  
Management and Computer Services, Inc.  
104 Park Towne Place East  
Philadelphia, Pa. 19130

CG170

**MNEMONIC DUMP UTILITY PROGRAM \$65**

This relocatable program translates selected core locations and produces an Assembler Listing formatted dump with Hexadecimal representation of location counter; Assembly Language mnemonic instruction and machine language representation of the instruction. Facilitates comparison of modified instruction to the original Assembler listing. Save valuable time deciphering dumps and inspect program logic when listing is unavailable.

**360/20-40, ALL SPECTRA, UNIV 9000, BAL**

Proprietary Software, Attn: Robert Bruce  
Quantrasand Automated, Inc.  
Box 107  
East Orange, N.J. 07019  
CG171

**Q-SORT/900 N/A**

Provides the 12K UNIVAC Tape Sort for 9200/9300 Tape Users To Be Executed from Tape Using Only A Few Simple Parameter CARDS. Quick rewind from console allows speedy second job or resort. Cuts Sort Program Loading Time by up to 80%. Ends Card Handling—Cardjams.

**9200-9300 II, BAL**

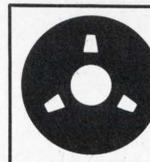
Robert Bruce, Marketing  
Quantrasand Automated, Inc.  
Box 107  
East Orange, N.J. 07019  
CG172

**SEARCH \$1,500**

Selection of records from a file now made simple. This program passes a file once, checking each record against a list of conditions. When a record satisfies a condition, it is copied onto the output file together with the identifier of the condition it satisfies. Conditions are expressed in terms of: descriptors, constants, and, or, not, and parentheses. The program is now written in FORTRAN IV, with two 360 BAL byte-manipulating subroutines. Number of descriptors, and number and length of conditions, depend only on available storage. Selling price includes rewriting to fit buyer's needs.

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**TIME-SHARING . . .**

continued from page 27

Similarly, the effect of different scheduling priority levels which are automatically assigned as a function of the degree of interactiveness (output to a terminal device) was investigated.

Benchmark norms for the real world environment were established and compared to the benchmark environment results. The two sets of figures compared very well.

The bias in the operational scheduling algorithm could be measured. Interactive users are favored two to one over compute and I/O-bound users. That is, the interactive time-sharing users suffer a 50-percent performance reduction while the other type suffer a 75-percent performance reduction as compared to the service each user type would receive in a stand-alone environment.

The major measurement difficulties centered on the measurement technique and the unsettled condition of the system. The programmed measurement techniques must be tightened up to reduce the observed random variation. Since the ADEPT system was in a checkout stage, many measurement runs were invalidated due to system problems.

19. Joslin, E. O. Application Benchmarks: The Key to Meaningful Computer Evaluations, *Proceedings ACM 20th National Convention, 1965*, pp. 27-37.
20. Buckley, F. J. Estimating the Timing of Workload on ADP Systems: An Evaluation of Methods Used, *Computers and Automation*, February 1969, pp. 40-42.
21. Totaro, J. Burt. Real-Time Processing Power: A Standardized Evaluation, *Computers and Automation*, April 1967, pp. 16-19.
22. Hillegass, John R. Standardized Benchmark Problems Measure Computer Performance, *Computers and Automation*, January 1966, pp. 16-19.
23. Arbuckle, R. A. Computer Analysis and Throughput Evaluation, *Computers and Automation*, January 1966, pp. 12-15.
24. Joslin, E. O., and John J. Aiken. The Validity of Basing Computer Selections on Benchmark Results, *Computers and Automation*, January 1966, pp. 22-23.
25. Oppenheimer, G., and N. Weizer. Resource Management for a Medium Scale Time-Sharing Operating System, *Communications of the ACM*, Vol. 11, No. 5, May 1968, pp. 313-322.
29. Karush, A. D. Benchmark Analysis of the ADEPT-50 Time-Sharing System, TM-4324, System Development Corporation, Santa Monica, California, June 1969.

(To be concluded in the May issue of S/A)

# NEW PRODUCTS

continued from page 29

## New Entry For Mini-Computer Applications

Xebec Systems, Inc. has increased the capability of the mini-computer. A reliable, low-cost magnetic tape operating system, the Xebec ICU, has been introduced by the Mountain View, Calif. firm, it was announced by Edward Onstead, vice president for marketing.

The Xebec system uses a compact triple drive tape cassette unit as the basis for this new on-line operating system. One cassette carries the standard software system; a second cassette handles the user's source information; and a third cassette carries the object program. The total operation is fully automatic, increasing speed and efficiency and eliminating operator error.

For more information, circle No. 22 on the Reader Service Card



Mini-Mis Plot is part of a family of programs designed to make the time-sharing computer more useful to a businessman. The package is part of the nationwide CALL/360 time-sharing service supplied by the Service Bureau Corp. Two businessmen, above, discuss a graph produced on their typewriter-terminal by the new program.

For more information, circle No. 23 on the Reader Service Card

## Announce New Digital Panel Meters

Series 2000 Digital Panel Meters from Newport Laboratories are the first line of  $4\frac{1}{2}$  digit instruments incorporating as standard features: 30 readings per second,  $\pm 19,999$  counts full scale, automatic bipolarity, high accuracy of  $\pm .01\%R \pm .01\%FS$ , double shielding by box-within-box construction, and BCD outputs isolated from analog inputs at up to 500 volts common-mode. Simply interfaced with other system components, the guarded, isolated input circuits obtain noise-free readings by preventing system ground-loops. Active filtering up to four poles also is available.

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## Programming Language For Simulations

Simulation Assoc. announces the availability of Simscript II Plus, a powerful general purpose programming language designed for simulating industrial, military, business and other systems. Its English-like structure, error-correcting compiler, and excellent debugging features enhance the user-orientation of this new language. Simscript II Plus is capable of modeling systems with a degree of complexity not practical with other simulation languages. Documentation includes textbook and reference manual and a manual describing the IBM System/360 implementation.

For more information, circle No. 25 on the Reader Service Card

## Announce New Mass Memory System

A new mass memory system capable of storing up to 44 million bits of information was announced recently by IOMEC, INC. The new disc drive, IODISC 2012, is the successor to IODISC 1012, currently one of the most widely used disc drives for mini and midi computers.

The 2012 has twice the capacity and transfer rate of the 1012. It uses two discs operating from a single drive; each disc holds up to 22 million bits of data, packed at 2200 bpi. One of the two discs is removable, and comes in a standard cartridge housing, permitting unlimited, low-cost off-line storage. The other disc is fixed.

For more information, circle No. 26 on the Reader Service Card

## Electro-Mechanical Device

Instant, economical high-level identity verification is made possible by the new Identimat-700, an electro-mechanical device assuring high accuracy through the use of hand geometry coding. The Identimat-700 makes easy virtual instantaneous verification of identity for social service benefits, employee benefits, meetings and conventions access, vault and computer access, gun and vehicle licenses, check cashing, and all areas where privilege is limited to approved persons only.

The Identimat-700 can be used with existing identification systems (e.g. those using photographs and memorized codes) to establish a higher level of security. The new device from Identimation Corp., a Sibany Company, provides a mechanical interface, utilizing a unique hand-geometry measurement to verify the identity of an individual under monitored applications.

For more information, circle No. 27 on the Reader Service Card

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## Tape Rack Provides Safe Storage, Accessibility

A new device for storing carriage tapes has been introduced by Virginia Panel Corp. Tapes are easily slipped over a fixed top peg and held firmly by a sliding, gravity-held bottom peg in an aluminum track. Tapes are suspended in perfect loops and are always visible and accessible. A label holder above each peg ends the problem of finding a particular tape in a hurry.

The VPC tape rack comes in eight models, the largest of which holds 80 short tapes. It has a revolving base and takes up less than one square foot of counter space. Smaller units, holding 10 long tapes or 20 short tapes, can be mounted on a wall or the side of a cabinet.

For more information, circle No. 28  
on the Reader Service Card

## Computer Tax Return While Client Waits

A new Federal Income Tax computation program, FEDTAX, designed for computer time-sharing use, is currently being marketed selectively in Eastern metropolitan centers through the AL/COM Computer Time-Sharing Network, a service of Applied Logic Corporation.

FEDTAX was devised to save time and to increase the profit potential of accountants who offer individual income tax return preparation service. It eliminates virtually all of the time-consuming computation normally required in Form 1040 preparation, and delivers return results immediately, without the delay necessitated by "batch" type processing.

For more information, circle No. 29  
on the Reader Service Card

## Data Computing Offers Low Cost Output Printer For Remote Terminal Use

Typeliner, a low cost, 100 line per minute multiple copy printout unit was announced by Donald E. Oglesby, president, Data Computing, Inc. Designed with the remote terminal user in mind, the Typeliner is available with 80 or 132 column capacity. The standard ASCII 64 character set is offered with lower case alphabet as an option. The design provides automatic multiple copy compensation.

The Typeliner may be used as an output device for CRT Terminals as well as for standalone remote printer applications. It is plug-to-plug compatible with these and any modem. It uses the standard EIA RS-232-B interface.

For more information, circle No. 30  
on the Reader Service Card

## Transmit Data Files

Com-Share, Inc., has released a new capability which permits customers to transmit data files between computer systems located in the company's three centers in Norwood, N.J., Ann Arbor, Mich., and Los Angeles. The new service, named COM-LINK, eliminates the need to store duplicate files when customers utilize various Com-Share systems.

By typing a one word command, a time-sharing customer may now transfer a file to or from his local system and proceed to read, write or update the file. Prior to COM-LINK, computer files could be distributed over long distances only by mailing magnetic tape duplicates between computer centers.

For more information, circle No. 31  
on the Reader Service Card

## Introduce Job Cost System

A method to reduce accounting costs, increase accuracy, and shorten the closing cycle for companies manually distributing costs, is available from ANCOM Systems in the form of a Job Cost System. This system provides cost information for multiple levels of project management and in addition automatically generates accounting information for the General Ledger.

This proprietary system eliminates the time consuming task of manually coding accounting distribution for purchases, labor distribution or materials issues. By acting as an interface with the other administrative systems, the Job Cost System automatically produces the accounting distribution codes based upon the job number, work order, or purchase order number. In addition, the system can calculate and apply overhead, and generate all entries for the clearing accounts. The costs of products and services are isolated to enable management to scrutinize them and set standards for efficient use of all materials, labor, and facilities involved. Costs are maintained and reported at four levels of project management in a Job Cost Reporting System.

For more information, circle No. 32  
on the Reader Service Card

## New Photo-Electric Tape System From Syner-Data

Model 300, a high speed, compact and reasonably priced photo-electric tape system, is now available from Syner-Data, Inc. The new system was engineered and developed for volume production techniques and continuous, reliable operation with small computers, telecommunicators and numerical control devices. It provides complete interface to 1/0 channels and operates at 30 times the speed of most teleprinter readers. It is also compatible with Syner-Data terminals. Model 300's photo-electrical optical system reads the tape at 300 characters per second, synchronously, 500 characters per second, free run, and 150 characters per second, asynchronously. The tape drive also has the ability to stop on any character, in all modes except free run.

For more information, circle No. 33  
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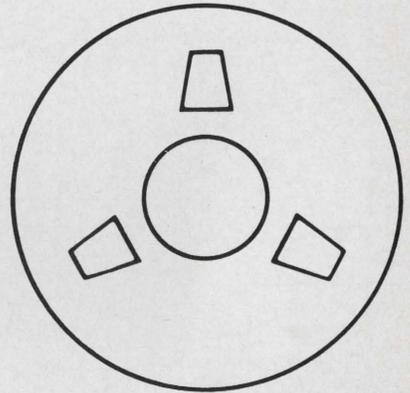
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