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software age

AUGUST-SEPTEMBER
1970

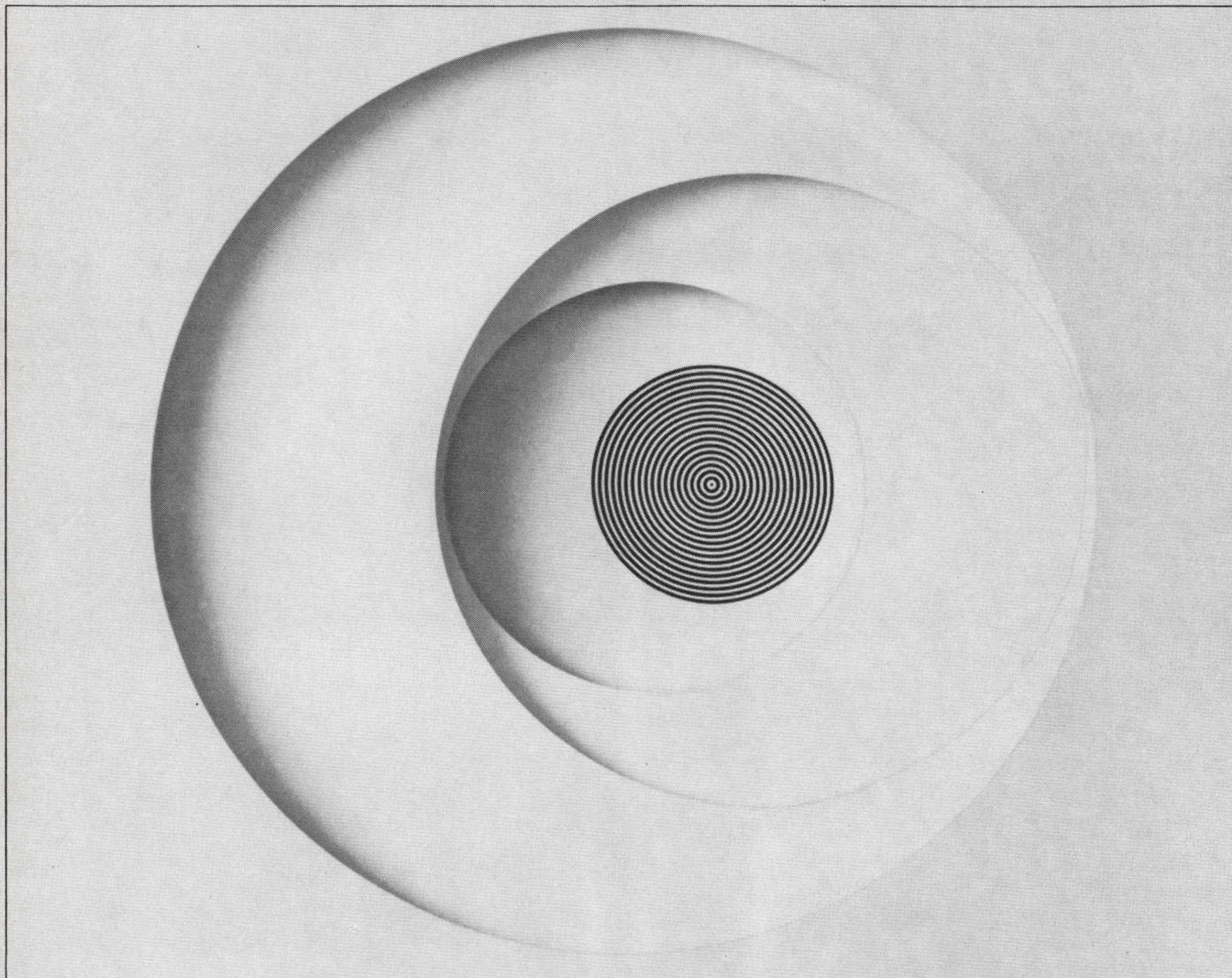
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AUGUST/SEPTEMBER, 1970

Vol. 4—No. 8/9

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SOFTWARE AGE

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SOFTWARE AGE, like the general economy and specifically the EDP industry, has experienced the need for cut-backs and belt tightening. Hereafter, SOFTWARE AGE will be published only six times during the calendar year. The staff and representatives of S/A regret the necessity of this action, but we will conscientiously put forth our best efforts to continue to bring our readers the best in software and program information.

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BPA Audit Applied For

COVER

Courtesy of National Cash Register Co. and Electronic Computer Programming Institute, Sing Sing Prison, and Leavenworth Penitentiary. Photos from files on EDP education courses being conducted in prisons. (See story on page 10.)

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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

Problem 28: THE BINARY SEARCH BUG, by M. Robinson and P. Stygar of TRW Systems, Redondo Beach, Calif.

Finding someone else's bug is often more rewarding than finding your own; especially, when a bug is found in a presumably bug-free program. Mike and Paul needed a good algorithm to perform binary search and were a little surprised to find just what they needed in a recently published book on Programming. However, they were more surprised when they found out that this algorithm was only 99.9% bug-free.

The binary search technique is used to speed up the search of a table. Data within the table must be arranged in ascending or descending order. The given argument is first compared against the mid point of the table, and the program decides which half of the table to search next. Half of the table is eliminated with each iteration, and the remaining half is divided by two.

The following algorithm assumes ascending order and searches table A looking for argument X. If X is found the program goes to statement 16. If X is not found the program goes to statement 15. The length of the table is represented by the variable N.

```

1 = N - N/2
INDEX = I - I/2
GO TO 121
10 I = I + INDEX
11 IF(INDEX-1)12,14,12
12 INDEX = INDEX - INDEX/2
13 I = I - INDEX
GO TO 11
14 IF(X - A(I))13,16,10
15 X is not found
16 X is found

```

Your job is to find all the possible hiding places within table A, and explain why the above algorithm does not always work. Do you have a better algorithm?

Answer to problem 26:

Since the problem stated not to disturb the last five statements, there are basically three types of solutions:

1. Insert new statements and do not execute the last five.
2. Change the value of the literal 5 to 20 before executing statement 10.
3. Set X equal to 10 and find a way to transfer around statement 10.

The trivial solution:

```

INTEGER X
X = 10
WRITE(6,99)X
STOP
10 X = 5/2
WRITE(6,99)X
99 FORMAT(110)
STOP
END
CALL A(5)
10 X = 5/2
WRITE(6,99)X
99 FORMAT(110)
STOP
END
SUBROUTINE A(J)
J = 20
RETURN
END

```

The expected solution:

```

INTEGER X

```

Since variable J in the subroutine corresponds to the literal 5 in the CALL statement 10 is executed. However, in some FORTRAN compilers the 5 in the CALL and the 5 in statement 10 are not the same. The former is a literal and will be changed to 20 by the subroutine. The latter is a constant sharing a storage location along with one of the instructions used in statement 10. This 5 is not changed by the call to the subroutine, but some sophisticated programmers have found the way.

The DO loop solutions:

The basic aim is to use X as the index parameter of a DO loop and statement 10 as the end-of-DO; then, drop through the DO loop when X equals 10. Notice that the rules of FORTRAN are violated but very few compilers give a warning message.

```

INTEGER X
DO 10 X=1,5,8
10 X = 5/2
.

INTEGER X
DO 10 X=10,9
10 X = 5/2
.

INTEGER X
EQUIVALENCE (I,X)
DO 10 I=1,1,8
10 X = 5/2
.

```

The CDC 3300 solution:

```

DIMENSION I(5)
I(13) = 14400012B
10 X = 5/2
.

```

The IBM 360 solution, by Leo McDermott:

```

INTEGER X, IA(2)
IA(20) = 20
10 X = 5/2
.

```

The GE-400 solution, by R. J. Gailer:

```

INTEGER X
X = 10
5 N = 7
GO TO (5,10),N
10 X = 5/2
.

```

The surprise solution, by Earl C. Abbe:

```

INTEGER X
X = 10
CALL SUB
10 X = 5/2
WRITE(6,99) X

```

99 FORMAT(110)

```

STOP
END
SUBROUTINE SUB(I,J,K,L,M)
RETURN
END

```

Notice that the CALL has no arguments, but the subroutine has as many arguments as needed to cause a return which bypasses the execution of statement 10.

XTRAN

NEW APPLICATIONS

Company Lives Up to Speedy Reputation

A computer is helping Trend Industries deliver on its promise of "48 or free freight"—picking up the customer's shipping expenses if an order for cut carpeting isn't filled within two days. J. W. Culpepper, systems manager for the Georgia-based tufted carpet manufacturer, says it would be difficult—if not impossible—to consistently meet this self-imposed deadline without the aid of the firm's IBM System/360 Model 30.

Before the computer, cutting floor workers filled orders as they came in, frequently having to handle the same roll of carpeting many times during the day. The order entry system now provides the cutting floor with a daily printout showing how many cuts are to be made from each roll during the day, so each roll is handled only once per day.

Automated Racetrack Betting in Australia

The Totalizator Agency Board (TAB), the official off-track betting organization for the state of Victoria, Australia, will complete automation of its dog and horse race betting services with computer systems from Control Data Corp., Minneapolis.

TAB will add five Control Data Corporation 1700 computer systems and 1,000 ticket selling machines to its present CDC dual 3300 computers to improve off-track betting services at its 220 agencies in Melbourne, and the large telephone betting auditorium that will serve nearly 64,000 account holders throughout Victoria. Together these locations can now handle as many as 100,000 telephone bets and several hundred thousand agency bets per hour with an annual volume expected to reach \$220 million this year.

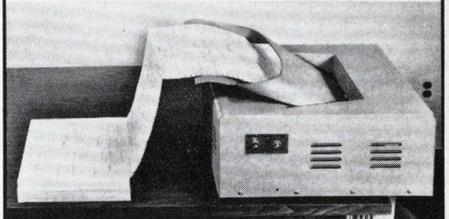


Computer Talk

Cecil H. Coker, at the computer console, demonstrates a new computerized system for converting printed text into synthetic speech. He is a member of Bell Laboratories Acoustics Research Department, where techniques for "text to talk" conversion are being devised. A simulated vocal tract on the oscilloscope screen changes its shape with each changing sound from the voice of the computer.

AUGUST/SEPTEMBER, 1970

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Billions of Bits

On the threshold of space at worldwide Apollo tracking stations, these UNIVAC 1230 computers processed hundreds of billions of bits of data to and from the spacecraft during the Apollo 13 lunar landing mission. The global stations are connected to NASA's Manned Spacecraft Center in Houston via the Goddard Space Flight Center in Greenbelt, Md. A group of 130 programmers from Sperry Rand Corporation's Univac Division writes the programs which guide the 1230's.



State Saves Time, Money

The Georgia State Revenue Department is using a machine that reads printed pages of information directly into a computer to simplify and speed up the massive task of updating motor vehicle registration files. William C. Rodes, programming manager, prepares to feed the machine—an IBM 1288 optical page reader—some of the 2.5 million registration forms that have poured into the department. The Revenue Department expects the device to shave the time required to record the 1970 registrations by several months, while saving some \$45,000 from the cost of previous years.

Computer Aids in Mosquito Control

A computer is providing a time-saving swat in the seasonal battle against mosquitoes in St. Paul, Minn. The computer, a Sperry Rand UNIVAC 9300, is providing a quick, easy access to a mass of information that assists from the Metropolitan Mosquito Control District (MMCD) in their work in and around Minneapolis and St. Paul. With 2,850 square miles, the MCCD is the largest mosquito control district in the nation. Mosquito breeding sites cover 244,000 acres or 14 per cent of the total land area in the district.) According to A. W. Buzicky, MMCD director, about 80 crews are involved in taking samples from some 56,000 mosquito breeding sites in the district.

Announce New Ethnic Identification Service

A new computer service that will determine ethnic affiliation by an individual's surname is being marketed by Spectrum Data Processing, Inc. of Bethesda, Maryland. The computerized system was established through extensive genealogical research into name characteristics. At present names are identified as belonging to Jewish, Italian, Irish, Spanish or other ethnic groups.

By subjecting the last name to numerous criteria which have been established for identification, the ethnic character of the name may be determined. If further identification is required, the first name can be subjected to the same criteria.

GE Flight Tests Digital Autoland System

The advantages of digital computing techniques have been successfully applied to aircraft automatic landing operations in a recently completed series of flight tests. The result of more than 12 years of research by General Electric's Aircraft Equipment Division here, the digital autoland system was developed for the Category III all-weather landing requirement.

Advantages of the digital computer system over analog systems now in use include greater precision and flexibility. The digital control program can be changed more easily than an analog program. A digital system also has the ability to more accurately perform self-test functions.

To demonstrate digital flight control, GE joined with the Boeing Company to conduct the advanced flight test program.

Inventory Control System Called First of Kind

One of the businessman's most difficult and costly problems—the control of inventory—is attacked by a new management information system developed by the National Cash Register Co. Designed for NCR Century Series computers, the system, called EMPHASIS, is the result of a three-year development effort. The letters stand for "Evaluation Management using Past History Analysis for Scientific Inventory Simulation."

The system is designed in two phases: phase 1 includes everything except automatic stock replenishment; phase 2, to be released later, will include the automatic preparation of purchase orders. When both phases are completed, EMPHASIS will be the first total inventory management system to be offered by the computer industry.

Urban Data Center Based on 1970 Census

The creation of the nation's first "urban data center," combining information from the 1970 census with sophisticated marketing and economic EDP programs, has been announced by Larry Smith & Company, Inc., New York, the world's largest real estate consulting firm. A new unit—the Computer Systems Division, an outgrowth of an in-house EDP service—has been formed to offer complete urban data packages to researchers in municipal, planning, retail, wholesale, and industrial fields.

Claim Foam Protects Tapes Against Arsonist's Fire

Attempts of vandalism, aimed at destroying the magnetically-memorized records of college, government and corporation computer tape libraries, demands a new generation of fire-fighting procedures to replace the old sprinkler and evacuation chart. Prompted by concern in the data processing industry after attacks on computer installations, Shell Oil Co. initiated tests to find a multi-purpose agent capable of extinguishing fire but harmless to computer tapes and computer room personnel.

Administered by R. T. Clark of the petroleum company's New York Service Center and Shell Chemical's Union Laboratories, preliminary investigations ruled out a number of fire-fighting agents and techniques. High expansion foam, when tested, proved effective in all fire classifications and demonstrated its ability to provide an insulating factor against radiant heat.

Clark reported, "High expansion foam is most efficient in extinguishing class A and B fires. Unlike a

carbon dioxide flooding system which completely expends itself when triggered, foam can be controlled either manually or thermostatically. This minimizes clean-up and insures continued protection in case of a recurrence of combustion within a short time."

Terminals Linked to Put Zip in Operations

At eight each morning a computer in Meadville, Pa. provides Talon executives with an inventory report on more than 10,000 kinds of zippers stored in the company's 26 plants, customer service units and warehouses. Information on the zippers is retrieved from the computer through IBM 2260 visual display terminals.

Talon, the world's largest manufacturer of zippers, stores inventory and production data in an IBM System/360 Model 30 to help assure the American housewife a wide selection of styles, sizes and colors. The computer also keeps track of "bulk" quantities of zippers supplied to the apparel industry.



Spot "Trends" from Telephone Repair

A computerized system implemented in Cleveland by Ohio Bell is helping spot potential equipment problems before they escalate into equipment failures. The system uses an IBM computer and an optical scanning device to monthly analyze 225,000 handprinted trouble repair tickets which record customer service complaints and corrective action taken to clear the trouble. Recurring problems or unusual trends throughout the 4-million-telephone Ohio network are noted in reports compiled by the computer for management review.

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FINANCIAL CURRENTS

Honeywell Inc. and General Electric Co. reported recently that they have signed a memorandum of understanding covering further details of the computer transaction between the two companies announced May 20. James H. Binger, chairman of Honeywell, and Fred J. Borch, chairman of General Electric, stated jointly that "detailed studies during the past month of the proposed transaction related to combining Honeywell computer operations and G.E.'s business computer interests have reaffirmed the interests of the parties in the merger."

Boole & Babbage, producers of computer measurement products and services, has announced a major price change in their System Measurement Software products, effective October 1, 1970. The changes affect both purchase and lease policies. The firm attributes a price increase principally to the increased capabilities incorporated into its products over the last two years. *Boole & Babbage* states that performance increases have not been accompanied by any previous price increases although the value of its products to the customer have increased considerably.

CCI Corp. recently reported that special write-offs, for the most part precipitated by sharp declines in aerospace business and in the overall economy, more than offset gains in its commercial operations, resulting in a net loss for the year ended April 30, 1970. According to Robert L. Zeligson, Chairman, operating losses, excluding special write-offs, were confined to one of the company's aerospace divisions. Commercial product sales, which currently account for more than half of CCI's volume, increased and were profitable.

Data capture devices for computers are expected to have an annual business growth of at least 30 per cent through 1973 and thus represent "one of the most dynamic and expanding markets" in the computer industry. That report was released by *International Data Corp.* during seminars in New York on July 27 and in Los Angeles on Aug. 3. IDC found 450,000 data capture devices worth \$2.7 billion installed in the United States today and predicts the market will grow to 733,000 devices installed valued at \$6 billion by the end of 1973.

REDCOR Corp., Woodland Hills, California, announced the sale of the assets of *Acme Electric Welder Co.* to *International Fastener Research Corp.* for cash in excess of one million dollars. Acme was acquired by REDCOR in August, 1968 and is a manufacturer of resistance welding equipment and accessories. Acme is operating profitably and has had total fiscal year sales exceeding 1.6 million dollars. Emil R. Borgers, REDCOR President, stated that the primary objective of the Acme sale was to increase working capital in REDCOR for use in the main product marketing areas, computer-controlled MOS testers and KeyLogic data entry systems.

W. Porter Stone, president of *U. S. Time-Sharing* (Traded O-T-C), metropolitan Washington, D. C. computer services firm, and A. Salam Querishi, president of *Optimum Systems, Inc.*, Palo Alto, Calif., jointly announced today that the merger of the two companies earlier approved by company stockholders has been formally terminated. Unsettled general market conditions were assigned as underlying reasons for the termination.

Com-Share, Inc., recently announced that effective August 1, 1970 it revised its standard volume utilization discount rates. The revision will extend the discount beyond the present rate of 5% on monthly charges in excess of \$1,000, and 10% on monthly charges in excess of \$3,000, to up to 30% and 40% on monthly charges in excess of \$15,000 and \$30,000, respectively.

Syner-Data, Inc., Beverly, Mass., terminal manufacturer, has announced the completion of an agreement with *Tymshare, Inc.*, Palo Alto, Calif., under the terms of which the latter company will distribute and market nationwide the *Syner-Data Beta* printing terminal to Tymshare customers. According to Byron D. Smith, President of Syner-Data, Inc., "we are pleased to be a key supplier of terminal equipment to Tymshare, Inc."

Levin-Townsend Computer Corp. and *Howard S. Levin* announced recently that they have reached agreement designed to resolve management problems of recent months at Levin-Townsend. It was also announced that *IBM* and Levin-Townsend have agreed to a plan setting forth a revised schedule of payments designed to retire the total debt of Levin-Townsend to *IBM* of approximately \$49 million. The agreement between Levin-Townsend and *IBM* provides *IBM* with additional financial assurances designed to secure full payment of the company's debt to *IBM*. Included are security interests in a significant quantity of Levin-Townsend data processing equipment and other unencumbered assets of value, including stock of two subsidiaries. As a result, substantially all Levin-Townsend's assets including almost all its computer equipment are presently encumbered to *IBM* and others.

Topas Computer Corp. (OTC) announced recently that its *Corporate Computers, Inc.* division has agreed to acquire *International Computer Equipment Corp.*, Washington, D. C. for an undisclosed amount of Topas stock. The announcement was made by Robert S. Topas, president of Topas Computer Corp., diversified multi-unit computer service company whose key divisions specialize in accounts receivable data processing and second user computer sales. Topas described *International Computer Equipment Corp.* as a four year old, privately owned company engaged in the sale of second user computers and peripheral equipment. "The acquisition," he added, "fits in compatibly with the operations of Topas' Corporate Computers division which is active in second user computer and peripheral equipment sales."

Walter B. Nelson, President of *Analysis and Programming Corp.*, recently announced that his firm has acquired the New York City operation of *Levin-Townsend Service Corp.* *Analysis and Programming Corporation* is a rapidly growing computer services firm with offices already established in Greenwich, Connecticut; New York City; Chicago, Illinois; and Rockville, Maryland. The New York City operation of *Levin-Townsend Service Corporation*, located at 260 West Broadway, was a subsidiary of the *Levin-Townsend Computer Corporation*, nationally known EDP equipment leasing organization.

Worldwide revenues of the *National Cash Register Co.*, through June 30 totaled \$649,122,000, an increase of 13% over the \$573,756,000 recorded for the comparable period of 1969. Six-month earnings were \$18,581,000, compared with \$17,361,000 for the first half of last year, or an increase of 7%. On a fully diluted basis, they amounted to 86 cents per share compared with 81 cents per share. For the second quarter, revenue totaled \$344,045,000, an increase of 11% over the \$308,995,000 recorded for the second quarter of 1969. Earnings for the period were \$10,432,000, compared with \$10,845,000 reported for the second quarter of last year. The second-quarter earnings on a fully diluted basis were 48 cents per share compared with 50 cents per share last year.

Systems Engineering Laboratories, Inc., announced recently it has been advised that *Computer Peripherals Corp.* shareholders have approved a formal agreement whereby *Systems* will acquire *Computer Peripherals*. *Computer Peripherals*, located in San Diego, is a manufacturer of head-per-track disc units. Over the past two-and-a-half years, *Computer Peripherals* has developed and recently began manufacture of these fixed head disc drives which are used as peripheral equipment in digital computer systems. *Systems* is a manufacturer of real-time digital computers, related data acquisitions and control equipment and keyboard data entry systems. *Systems* will integrate the discs into its product line and also market the products on an OEM basis to other computer companies.

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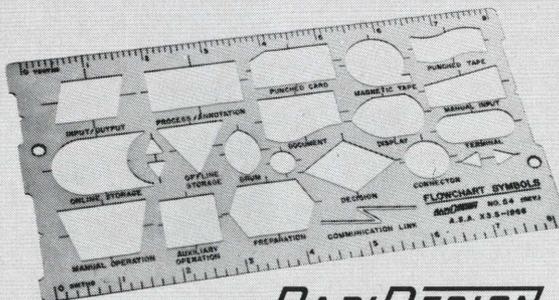
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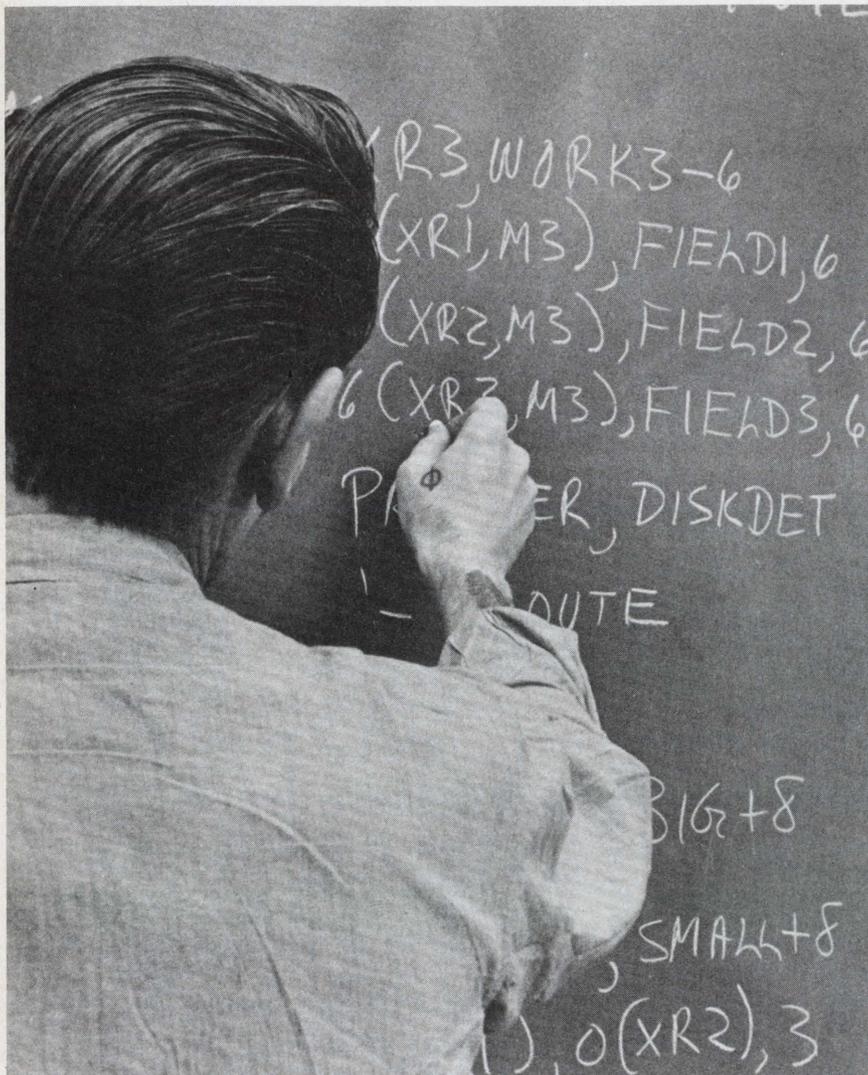
"For once in my life, I was in the wrong place at the right time."

This remark from a prison inmate reflects a common reaction from groups of men enrolled in computer programmer training courses being held in at least nine penal institutions in the United States. For many, their new computer skills mark the first realistic opportunity to break out of an endless pattern of failure, frustration, and social hostility that has dominated their lives.

The story of this program, its beginning and results to date, is an impressive example of what can be accomplished when private industry initiative is addressed to a major social problem: in this case, a chronic failure in the "correction" or rehabilitation of persons convicted of crimes. (Of all men now in prison, at least 40 percent will be back after their release.)

One of the pioneer EDP training programs was initiated at New York's Sing Sing Prison in late 1967 by the Electronic Computer Programming Institute, a national EDP school headquartered in New York City. Sidney Davis, ECPI President, presented the EDP training proposal to Paul D. McGinnis, New York State Commissioner of Corrections, and received his approval. Russell Oswald, Chairman of Parole, also promised full cooperation, and Sing Sing's pilot program was underway. "These officials were willing to take a chance on an entirely new concept in prison rehabilitation," reflected Ronald Siden, ECPI Vice President of Marketing, in a SOFTWARE AGE interview.

The prison's inmates responded to the idea and, of 33 applicants with a required high school or equivalent education, 14 passed a rigid programming aptitude test and were



Inmate Student

At Leavenworth Penitentiary, a graduate programmer explains a routine he has just written. One of several pioneer programs in prison education, the Leavenworth course goal is to offer the community a man well-trained in a much-needed skill.

enrolled. The first seven-month pilot program was rated a success by students, ECPI, and prison officials. By the time a second class had graduated in March, 1969, 21 former Sing Sing inmates had been released and were successfully employed in EDP departments by industry and government. National recognition followed and a number of other penal institutions picked up Sing Sing's example.

New York Times Endorses Program

Among the newspapers who endorsed the EDP program at Sing Sing as meaningful rehabilitation was *The New York Times*, noting in an editorial:

"Not all prison inmates can be trained as computer programmers, of course, but the initial success at Sing Sing illustrates that inmates can be trained for a far wider and more rewarding range of jobs than in the past. There is little market outside of prisons for license plate makers."

Siden reviewed ECPI's program as applied at Sing Sing for SOFTWARE AGE, explaining that the course of instruction for EDP programming is geared for individual achievement. Through a pattern of "sequential success and segmented learning," Siden stated, the usually failure-oriented inmate student gradually raises his confidence level and begins to apply his native ability. "We like to think," he said, "that we are helping restore these men to themselves, giving them an opportunity to gain a self-identity of human dignity."

He emphasized that prison instruction from private industry must be more personal than the usual "arm's length" student-teacher relationship in order to be effective. He also regarded as critically important the availability of the instructor and his company as advisors to the inmate graduate following parole and during his period of adjustment.

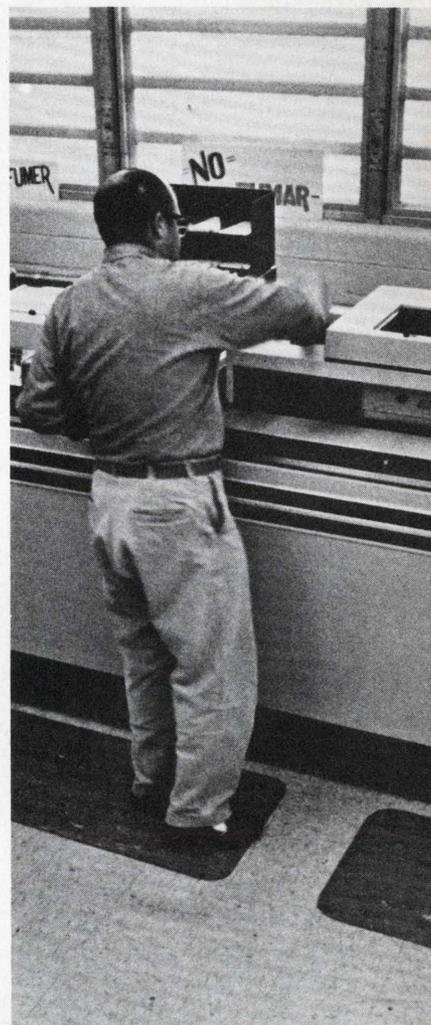
The importance of this personal involvement by instructors from private industry was underscored by an EDP student at Arizona State Prison who reported to SOFTWARE AGE; "Truth to tell, it is great to work with people on [from] the

'outside' who treat you like you are human and that you have something valuable to contribute. What I am trying to say is that we all [in the EDP course] feel needed and useful."

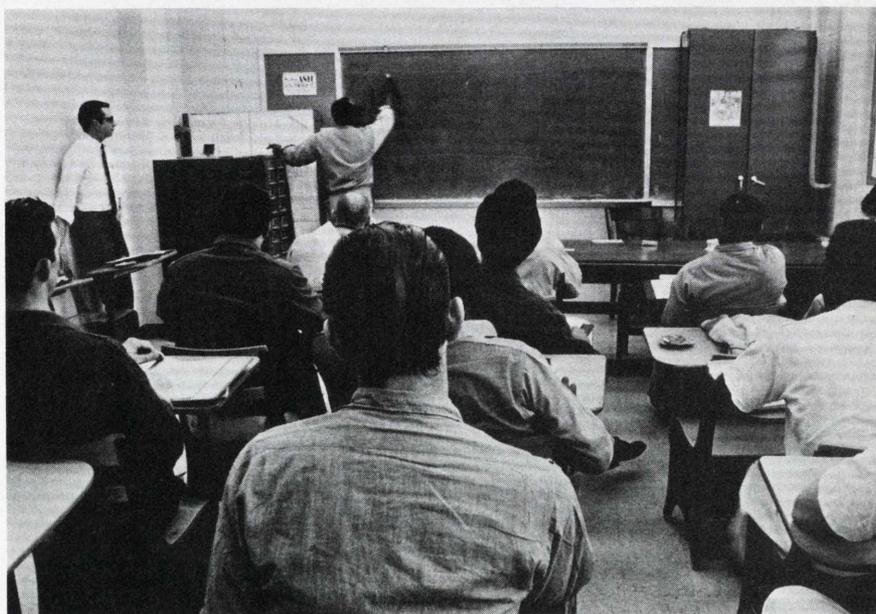
Other Prisons, EDP Firms Start Schools

Following the Sing Sing success, ECPI sponsored similar programs in penal institutions at Lucerne, Pennsylvania; Lebanon, Ohio; and Chino, California. At the same time, during the past two years, the base of EDP industry support for prison education has broadened with sponsorship and participation by Control Data, Honeywell, IBM, NCR, Univac and XDS, among others. With their help, new EDP schools were started in prisons at Florence, Arizona; Leavenworth, Kansas; Angola, Louisiana; Walpole, Massachusetts; and Salem, Oregon.

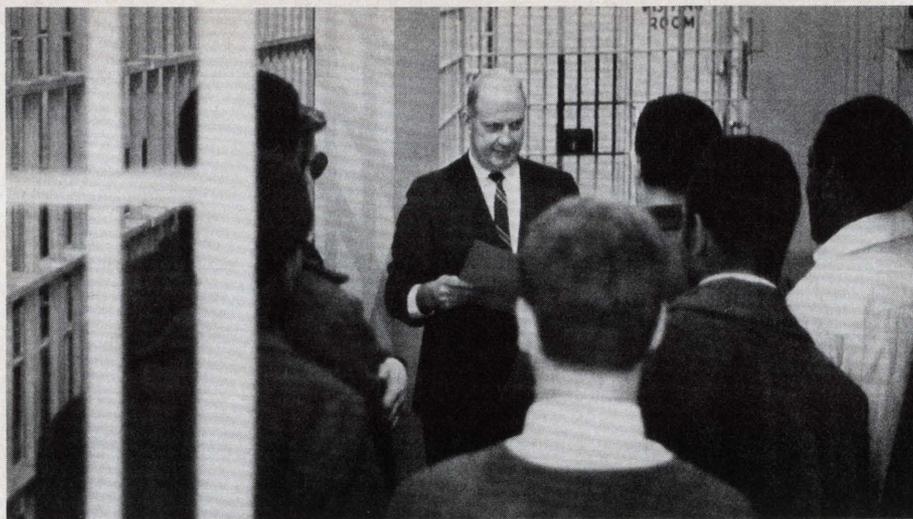
According to reports from both convict graduates and industry sponsors, the programs have been outstandingly successful in not only graduating skilled programmers, but in achieving a high rate of actual rehabilitation upon parole. According to Joe McKinley, a 23-year prison service veteran and supervisor of education at Leavenworth Penitentiary, "The men [parolees] in data processing are succeeding outside not only because the salaries are good, but also because they are working in a field which removes



Leavenworth trainee removes program cards from reader in prison installation.



Session in programming at Leavenworth taught by an inmate instructor. Looking on (left) is Harlan A. Hart, Computer Training Supervisor, at the institution.



Sing Sing's Warden John T. Deegan announces in a prison corridor the names of students who graduated from computer programming school.

them from past associates and former environment."

The enthusiasm of the students is reflected in McKinley's report: "They study during the days, when they could be making money working in prison factories; they do homework during their lunch hours, and they study from 10 P.M. to 2 or 3 P.M. and all day Saturday and Sunday." Siden told about two inmate students at Chino who refused parole in order to complete the course in programming.

Although the success of the programs to date has been remarkable throughout the United States, and can be expected to be applied in more institutions with greater EDP industry involvement, several problem areas are common to most institutions. One problem is gaining access to EDP equipment for the physical testing of programs, matching equipment with instruction. Another common problem is applying instruction to authentic programming problems.

At Florence, Arizona, inmate students found various state agencies willing to use their new skills as a qualified group of supplemental programmers. "Would you believe our first programming application was for the Arizona State Highway Patrol?", reported one student. Their final product, a matching program for traffic citations, is now routinely used by the highway patrol. At Leavenworth, inmates have programmed all applications for inmate educational records for the entire National Bureau of Prisons.

Wanted: A Chance to Earn a Job

The most critical problem, however, expressed again and again in letters to S/A by inmates about to be released, is a concern that in spite of their programming skills they will not be able to get jobs once they leave prison. One graduate at Leavenworth sent 29 letters of application and received 29 rejections. Another sent 14 letters. Most were not answered.

Without help or interest in employment by EDP firms prior to release, the high hopes of the EDP trained parolee may be subjected to further disillusionment when they pass the prison gates. A parolee reported to S/A, "For the most part, I have been limiting my EDP job search to [state omitted for anonymity.] The reason, that upon my release from prison, all I will have to begin with is the clothes I wear, \$25.00, and a bus ticket to the state line. Sounds like a class 'B' movie. I assure you this is the way it is in this state. . ."

Siden commented that an enlightened policy by state parole boards is one of the keys to effective rehabilitation through EDP and other advanced skill training of convicts. "You don't get a job by writing a letter," Siden stated, suggesting the inmates be given an opportunity for personal interviews by parole boards prior to their release.

Those companies in the EDP industry who have been willing to "take a chance" and employ prison graduates have acquired excellent employees, according to reports by

Siden and others. "The inmate graduate," said Siden, "is not asking for a break. He does ask for an equal chance to *earn* the job by what is expected from an entry level programmer."

The inmates themselves recognize that every man placed is proving not only himself, but the concept of the program. The president of the EDP Club as Chino reported ". . . we feel that more than logic and a high school diploma are needed to be a programmer, especially desire, and the willingness to work hard and long. . . . Our concern is to train men with the desire, aptitude, and ability to work in data processing. Every good man we place opens the door for others. Every poorly trained man shuts the door for others."

Another pioneer in EDP prison education, Malcolm D. Smith, of Honeywell, has stated, "The question is often raised today, what can we do to help the underprivileged? I would remind you that prisoners are less privileged than any other segment of our population. Even the poorest people in the deep ghettos at least have their freedom. Prisoners do not."

"What Can You Do to Help?"

One inmate-student letter asked the EDP industry "what can you do to help?", and answered by "(1) hire an inmate when he qualifies, (2) support him in his efforts to reform, (3) give him the chance and opportunity to prove he is worthy . . . and (4) don't turn him away when he appeals to you for help."

"Because EDP as a whole is probably America's most enlightened, progressive industry, we former convicts are pretty hopeful of at least getting a chance to prove ourselves. Some company is going to get a 'darn' dedicated as well as capable employee. I'm getting out in June, and I'm staking my future on this industry. A lot of other guys are watching to see how I make out, . . ." by an anonymous parolee. ■

A "clearing house" for prospective employers and graduate programmers from institutions has been established by ECPI. If you or your company are interested, please contact: Ronald Siden, Electronic Computer Programming Institute, 350 Fifth Avenue, New York, New York 10001.

OBJECTIVES OF PROGRAM DESIGN

By JEFF MAYNARD

Management Systems & Programming Ltd.,
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PROGRAMMING departments are notorious for their high rate of staff turnover and their low average age. It is possible that, because most people use programming departments purely as a stepping stone to systems or DP management, each generation of programmers has to relearn all the techniques of programming.

The senior programmer who has responsibility for training newcomers to programming, will probably only cover those details needed to actually put coding pen to paper. It is obviously necessary for any programmer to understand such things as the structure and syntax of a programming language and the relationships between the operating system and data sets.

He should, however, also be aware of the structure of programming and the factors which are needed to produce not just a working program, but one which the local management can say has been worthwhile.

Programming is the series of tasks between receiving and understanding a program specification and delivering a fully tested and documented program.

The tasks involved are: Program logic design, coding, assembly/compilation, test design, test data coding, test running, test output evaluation, amendment, documentation.

Throughout all these tasks the programmer must bear in mind certain objectives. These are: Cost effectiveness, simplicity, robustness, testability, generality, performance.

At every level in a project, it is necessary to balance the use (cost)

of resources against the anticipated rewards of the system. There are two main resources in programming—machine time and programming manpower. The benefits are usually calculable in terms of reduction in office overheads or increases in production efficiency.

Machine capacity will be used for compiling and testing programs and programming manpower will be used for all the programming tasks as well as certain other nonproductive items (waiting, communicating, "re-inventing the wheel," etc.).

Programming must be cost-effective in that the value of the systems produced must exceed the cost of the resources utilized in their production. It is not usually possible to account for all costs and benefits accurately. It is possible, however, to be aware of the major cost headings and to look critically at inflated claims for benefit. It is a common mistake to pursue apparent savings at a time/manpower cost, which exceeds the amount saved. For example, consider the case of a program designed for the fastest possible execution time.

This design will not be cost effective, unless the value of the machine time saved exceeds the costs of the following:

- Increased manpower for program design, writing and testing.
- Increased machine-time for testing.
- Increased maintenance costs due to greater complexity.
- Increased error possibility due to greater complexity.

Simplicity; Valid Program Objective

Simplicity is a valid programming objective because of the severe penalties of complexity. The complex program contains more coding linked in a more complex fashion than a simple program designed to perform the same task.

The initial program design and coding has taken a great deal longer (and therefore costs more) and although perhaps produced a program of a lesser number of instructions, it has at the same time produced one that requires a great deal of thought from a third party who wishes to understand how it works.

Too often one sees in programming departments the case of the "Lone Ranger" programmer, who retires to a corner and after three or four months' work, produces a working "black box" program. The program is of the "black box" type because, although it works quite well, i.e., a given input produces the expected output, nobody but the original author really knows how it works.

Sooner or later, the author leaves and, inevitably, an amendment to one of his black box routines arrives in the programming department a week later. Now comes the programmer's nightmare. The routine to be amended contains all manner of fancy, but superfluous, techniques which will have to be deciphered before corrections can be made.

If the original author of the program had forgotten his "clever" routines and had written his coding in a straightforward, logical and simple manner, then not only would the program have originally got off the ground sooner and at less cost, but the maintenance of the program would have been cheaper and less frustrating for the programmer making the amendments.

A robust program is quite simply one that will not break. How often has the DP manager heard the cry "I thought that was what was wanted" from the programmer whose program has just failed in production, at a point where he had made an assumption about the original systems specification?

It is quite common for systems departments to be accused of presenting vague or incomplete pro-

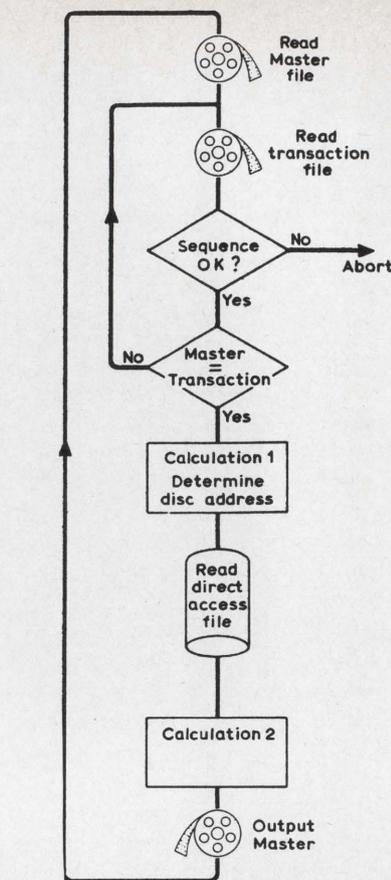


FIGURE 1

gram specifications (often as a result of being pressured for more output). No one can deny that supplying specifications with these types of errors or omissions is bad practice. However, a far more serious form of malpractice which is widely practiced, but seldom quoted as a source of production program failures, is the habit adopted by many programmers of making assumptions about missing details in program specifications.

When a programmer has doubts about any aspects of a specification, he must go to the systems department, and have the matter corrected by a person who fully understands the place of the program in a complete suite. By doing this, he ensures that the program is robust, i.e., that it caters for all possibilities and will not break when the unexpected happens.

It is surprising how many programmers plod along writing a program without giving thought to its testing until writing is complete. Usually when this happens, the programmer finds the program difficult to test, because of the number of input or output variables and because of its size.

The ultimate result of the difficulties is, of course, that the program is not completely tested, it is not robust, and sooner or later it will fail during a production run.

If a programming department is using some type of modular programming technique, the merits of which I do not propose to discuss here, then the problem of testability is considerably reduced, since one of the major aims of modular programming is to produce readily testable units. However, many installations do not use modular programming techniques, and some thought should be given, therefore, to the testability of a program before and during the period of writing.

If the program represented in the macro flowchart in Figure 1 were to be written entirely before being tested, it would prove difficult to be tested to complete reliability since, for example, all the possible outcomes of calculation 1 will not have been used as input to the direct access read sub-routine.

However, if these two parts are tested, and shown to be working independently, then they will perform the required functions when made into a whole. A useful sequence of writing and testing the sample program shown would be:

1. An outline skeleton to read master and transaction files, perform sequence checks and output the updated master (Figure 2).
2. Insert calculation 1 with a selective dump to allow the results to be checked.
3. Insert the Direct Access read routine and a selective dump (calculation 1 could be omitted for this if required).
4. Insert calculation 2.

While each stage is being tested, the next stage can be written and punched.

I wonder how many people reading this article have been involved in a payroll suite? Quite a considerable number no doubt. Would it not be a wondrous thing (some would say a miracle) if somebody could write a single good-for-everybody payroll program?

I do not suggest that every time a program is written, the programmer should endeavor to write it for use by the whole world. He should,

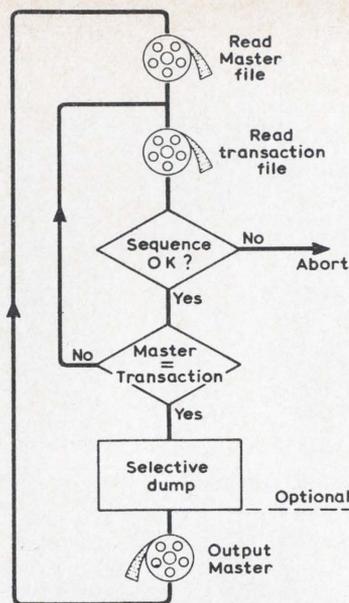


FIGURE 2

however, look for possible minor additions or amendments, which would make a routine useful to other members of the department.

For example, a programmer writing a program which involved calculating the square root of a number, could be of great service to others by writing the square root routine as a sub-routine or module (or even in some cases as a macro). Once a department starts a policy such as this, it soon snowballs and programmers soon find a lot of the daily monotony taken from their job by provision of such things as read/write modules for all the installations' main files.

Some people will probably think it strange that performance is bottom of the list of programming objectives. Double buffering and I/O processing overlap are of course vitally important, but are normally taken care of by manufacturers' software, so do not really count as performance characteristics in this discussion.

Why then is performance last on the list? A program containing 100 superfluous instructions, run five days a week, 52 weeks a year, would take less than one minute extra *per year* to run (360/30). The cost of rewriting or amending that routine to remove the unwanted instructions (which could take two programmer-days), would far exceed the cost of the extra machine time used during the life of the program.

There are, of course, instances where programs should be recoded to increase performance. Take as an example, a program that searches a table of 256 entries for every input record read. The average commercial programmer would write a sequential search routine requiring, on average, 128 passes through the search loop before achieving a hit. Written in a high-level language, this search loop could easily contain 50-100 machine instructions, giving an average table search time per input record exceeding 1/10 of a second. This does not seem very long, but multiply it 50 50,000 records on the file. . . .

The experienced senior programmer can be of great value to a company in an instance like that mentioned above, where he would amend the program to use a binary-search routine, requiring only eight passes through the loop for each input record.

Check Removes Odd Instructions

Performance checking to remove odd instructions scattered about a program is not cost-effective. Major savings can be made, however, by the application of experience to repetitive routines.

One reads a great deal in the technical press about methods designed to improve the output of data processing departments. Some of the systems suggested will no doubt be unworkable, or too academic to be of use in a commercial installation. However, it is a common occurrence for all systems to be disregarded by computer people vainly crying "we have schedules to meet."

However, is it sufficient merely to attempt to meet deadlines with no thought to quality or cost? The answer must be an emphatic no. The main aims of the programming manager should be not meeting schedule dates but producing the best quality at the minimum cost. When the department and its work is structured effectively around these aims, the capacity of the department becomes definable in more precise terms, enabling realistic completion dates to be tendered to project leaders.

Having accepted the basic programming objectives and the need to observe them, the next question to spring to mind is "how do we go

about it?" The first aim of any programming department should be the issuance of a standards manual. A great many words have been written about standards and their implementation. I do not propose to go into any detail, but merely to offer two points to be borne in mind when compiling a manual:

1. People, especially programmers, do not like being dictated to, or being told exactly how to do a job.
2. It is better to have a mediocre standard that is rigidly adhered to than to try and develop an omnipotent standard which is ignored.

The training of new programmers is perhaps the most important stage in the development of an efficient programming department, since these are the people on whose shoulders will fall the burden of writing the "total information system," promised hopefully for next year. Yet how often does training consist of four weeks of P. I. text and two weeks with another programmer? Self study texts are marvelous for introductory teaching, but to develop the seed sown by them one cannot better the lectures and following discussion sessions provided by computer manufacturers.

Some programmers regard the looking after of a trainee for a time as nothing short of punishment and consequently, tend to mumble all answers to questions, or merely pass on minimal and sometimes misleading information. A better system is to give trainees some definite responsibility by way of a small program, with instructions to seek advice from as many members of the department as possible. In this way, they tap a wider fund of knowledge and do not burden any one individual.

Programmers seem distrustful of standards manuals and programmers' guides, possibly because they hold a fear of regimentation or being turned into coders. A situation such as this, must obviously be avoided whilst maintaining a considerable degree of conformity.

The successful manager will probably do this by channeling his programmer's individuality away from "clever" coding techniques, and into useful areas, such as applying the above mentioned objectives to specifications received. ■

OPTIMIZATION OF TAPE OPERATIONS

By Selection of Mathematically Correct Blocking Factors

by
EWING S. WALKER
 Chas. Phizer & Co., Inc.

Recent technical articles on computer operating efficiency concern themselves primarily with languages, operating system configuration, disk accessing methods and memory size. Tape methodology is largely undiscussed although the largest amount of data is still retained and processed with tape systems. The fact that a \$30 reel of tape can retain as much data as five \$300 disk packs clearly establishes the use of tape storage for data that is accessed only on a monthly or weekly cycle.

Optimization of tape I/O time can be achieved via selection of blocking factors using the calculus of variations. This method involves the minimization of the number of interblock gaps on the input and output tapes of the program being optimized. This minimization of interblock gaps will reduce the time wasted to pass the read/write head across the interblock/gap. This is lost time to the channel and the tape drive.

As the following formula for I.B.M. 2401-V tape drives indicates, 7.38 milliseconds are required for the read/write head to cross this interblock gap while .0083 milliseconds is required to read a character of data.

Time per block = 7.38 + .0083N milliaseconds where N = characters/block

Time per file = (No. blocks) ((7.38) + .0083N)

To illustrate the importance of blocking factors, a file of 300,000 card images on tape can be read in 420 seconds if blocked 10, while if blocked 30 it can be read in 273 seconds.

Blocked 30

$$\begin{aligned} \text{Time in ms} &= 10,000 (7.38 + .0083 (2400)) \\ &= 273 \text{ seconds} \end{aligned}$$

Blocked 10

$$\begin{aligned} \text{Time in ms} &= 30,000 (7.38 + .0083 (800)) \\ &= 420 \text{ seconds} \end{aligned}$$

To fully optimize I/O time, this tape file should contain one block, theoretically. That is, the entire file should be one record. (Error recovery considerations would make this blocking factor unrealistic.) This would require a 24 million byte memory buffer. Therefore, the methodology is to minimize the number of

interblock gaps constrained only by the memory available which can easily be determined after program compilation. Therefore, mathematically:

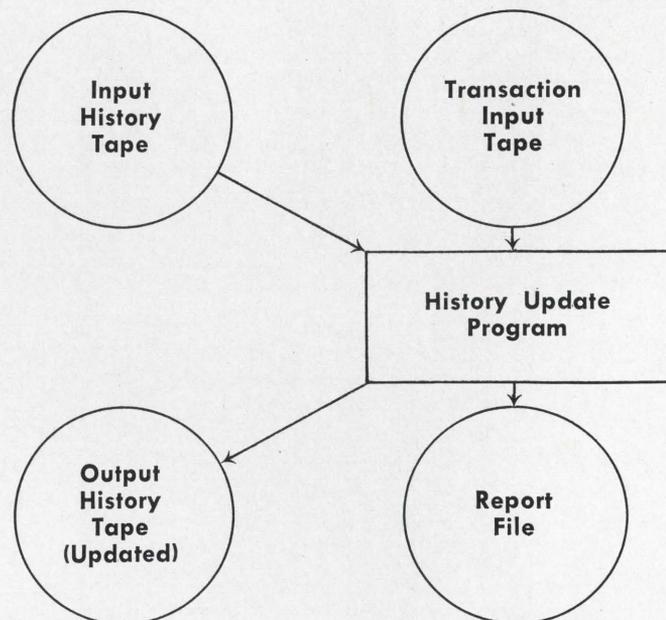
$$(\text{No. of blocks}) = \frac{\text{Records/File}}{\text{Records/Block}} = \text{Minimum}$$

Where Records/File is known and Records/Block is unknown and to be determined mathematically.

Memory Equation Constraint

$$\begin{aligned} (\text{Bytes Available}) &= \left(\frac{\text{Bytes}}{\text{Record}} \times \frac{\text{Records}}{\text{Block}} \right) + \\ &\quad \text{File 1} \\ &\quad \dots + \left(\frac{\text{Bytes}}{\text{Record}} \times \frac{\text{Records}}{\text{Block}} \right) \\ &\quad \text{File N} \end{aligned}$$

For a relatively standard history update program consisting of history input, transaction input, updated history output, and a report file, the method of optimization is as follows:



Assume for the sake of the example that the history input and output both contain approximately 500,000 150 byte records, the transaction input contains 100,000 80 byte records, output report tape 200,000 70 byte records.

For memory allocation, assume that 10,000 bytes are available for buffer areas with alternate areas reserved. Then, the memory equation:

Memory

$$10,000 = 2 \left(\frac{150 \text{ Bytes}}{\text{Record}} (X1) \right) + 150 (X2) +$$

$$\frac{\text{TRANS-IN}}{80} (X3) + \frac{\text{Report-Out}}{70} (X4)$$

Where X1, X2, X3 + X4 are Records/Block for files 1, 2, 3, 4.

Blocking Gap Minimum

$$\text{Minimum} = \frac{500,000}{X1} + \frac{500,000}{X2} + \frac{100,000}{X3} + \frac{200,000}{X4} \quad (I)$$

Memory Constraint

$$10,000 = 300 X1 + 300 X2 + 160 X3 + 140 X4 \quad (II)$$

Dividing equation (I) by 100, 000 leaves

$$\text{Minimum} = \frac{5}{X1} + \frac{5}{X2} + \frac{1}{X3} + \frac{2}{X4}$$

Solution

To minimize

$$F (Xi) = \frac{5}{X1} + \frac{5}{X2} + \frac{1}{X3} + \frac{2}{X4}$$

Under equality constraint

$$\Phi = 300X1 + 300X2 + 160X3 + 140X4 - 10,000$$

Using LaGrange Multiplier Technique

$$\frac{\partial F(Xi)}{\partial Xi} + \lambda \frac{\partial \Phi}{\partial Xi} = 0$$

The partial differentiation will result in the following equations:

$$\text{For } X1 = X1 \frac{-5}{X1^2} + 300\lambda = 0 \quad (A)$$

$$= X2 \frac{-5}{X2^2} + 300\lambda = 0 \quad (B)$$

$$= X3 \frac{-1}{X3^2} + 160\lambda = 0 \quad (C)$$

$$= X4 \frac{-2}{X4^2} + 140\lambda = 0 \quad (D)$$

The memory constraint equation is:

$$300X1 + 300X2 + 160X3 + 140X4 = 10,000 \quad (E)$$

Using elementary algebra, the five equations with five unknowns can be readily solved with λ being not physically significant.

The optimum blocking factors are:

$$X1 = 12.1 = 12$$

$$X2 = 12.1 = 12$$

$$X3 = 7.3 = 7$$

$$X4 = 11.2 = 11$$

Therefore File 1 will contain 12 records/block and 1800 bytes of storage plus another 1800 for alternate area.

File 2 will be identical to file 1.

File 3 will contain 7 records/block and 560 bytes of storage plus 580 bytes for alternate.

File 4 will contain 11 records/block and 770 bytes plus 770 for alternate.

The DOS FORTRAN program following will solve this problem for a program utilizing up to 6 tape files. Input to it are two data cards as follows:

Card 1

cc 1 Number of tape files.

Card 2

cc 1- 3 Memory available (in thousands of bytes)

cc 4- 7 Bytes per record File 1

cc 8-11 Records per file File 1 (in thousands)

cc 12-19 Same as 4-11 for File 2

cc 20-27 Same as 4-11 for File 3

cc 28-35 Same as 4-11 for File 4

cc 36-43 Same as 4-11 for File 5

cc 44-51 Same as 4-11 for File 6

DOS FORTRAN IV 360N-FO-479 3-0 MAINPGM
DATE 12/09/69 TIME

```

0001      DIMENSION BK(6),T(6),X(6), A(6),
           B(6)
0002      READ(1,101)N
0003      101 FORMAT(I1)
0004      READ(1,102)G,(A(I),B(I),I=1,N)
           C INPUT MEMORY F3.0,A(1) F6.0,B(1) F6.0,
           A(2) F6.0,B(2) F6.0, ETC
0005      102 FORMAT(F3.0,12F6.0)
           C CORE*1000 FOR INPUT SCALING DIVIDED
           BY TWO FOR ALTERNATE AREAS
0006      GK=500.*G
0007      DO 110 I=1,N
0008      BK(I)=B(I)*1000.
0009      110 CONTINUE
0010      DO 120 I=1,N
0011      T(I)=SQRT(A(I)*BK(I))
0012      120 CONTINUE
0013      S=0.
0014      DO 130 I=1,N
0015      S=T(I)+S
0016      130 CONTINUE
0017      W=S/GK
0018      WRITE(3,190)W,GK
0019      190 FORMAT(F6.2,F6.2)
0020      140 DO 150 I=1,N
0021      X(I)=SQRT(BK(I))/(SQBT(A(I))*W)
0022      WRITE(3,180)I,X(I)
0023      180 FORMAT(3X,'FILE NBR',I1,'BLOCKING
           ',F6.1,'RECORDS PER BLOCK')
0024      150 CONTINUE
0025      STOP
0026      END

```



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.

"N/A" DEFINED . . . where price is either not available or not readily reported at the top right of each list, "N/A" or "Not Available" is listed instead.

INVENTORY

INVENTORY CONTROL SYSTEM (ICS) \$2,500

ICS is available in either a time-sharing or batch processing mode. The basic purpose of this system is to provide an inventory position and inventory valuation of raw material, finished goods, or both. In addition, all of the additions to and deletions from inventory are shown. Each different part number has a unit price assigned and the program calculates a valuation for each part. The value of the individual part numbers are summed to produce a total valuation of the inventory. The reports can be produced on a weekly, monthly, or on demand basis.

360/30, PL/I

% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701

EQ451

INVENTORY MANAGEMENT PLANNER \$375

Provides a simple and inexpensive means of estimating the effects of changes in inventory policy. Management specifies the values of control parameters such as: inventory carrying charge rate, max stock-out or customer service level required, ordering cycle, fixed and variable order costs, etc. The Planner calculates and prints, for each individual inventory item, the following: "Classic" economic-order-quantity; reorder point; reorder quantity; safety stock required; yearly quantity used; service level; ordering cycle; ratio of EOQ to ROQ; yearly usage value; average finished stock quantity and value; stock-turn; average work in process stock quantity and value; set-up hours per year; order cost per year; inventory carrying charges; total costs per year,

etc. The Planner then calculates, for the total inventory, and lists: Total average finished stock value; total average work in process value; total stock-turn ratio; total set-up hours per year; total order cost per year; total inventory carrying charges, etc.

360/25 & up Disk, COBOL

Gerald Thomas, Consultant
Management Control Systems, Inc.
619 Penfield Road
Fairfield, Conn. 06430

EQ452

INSURANCE

FUND ADMINISTRATION—FAD \$30,000

The system is designed to support the administrative function of group insurance funds for organized labor. It will handle health & welfare, pension, vacation & apprenticeship contributions based on either a fixed rate or percentage method. The system also produces current and year to date balance sheets and operating statements by local. In addition, current and year to date claims information is shown by local and employee for the health & welfare funds. All operations are handled in a multi-local environment.

Any 20K, 5 Tapes, COBOL

Mrs. Jackie M. Johnson, Vice President
Computer Generation, Inc.
3781 N. E. Expressway
Atlanta, Ga. 30340

EP450

MANUFACTURING

EXAPT 1, EXAPT 2 \$3,100

Numerical control processors utilizing an APT like input language. EXAPT 1 is for programming machines which are primarily drilling machines. EXAPT 2 is for programming lathes. The EXAPT processors are unique among N/C processors in that they perform many technological functions normally performed by the programmer. For example: The EXAPT processors determine feeds and speeds, select the proper tool, determine the work sequence, and distribute the cutting operations for lathe work.

360/40, U-1107-08, CDC 6400-6600,
32K, FORTRAN

M. N. Lofton
Systems, Science & Software
P.O. Box 1620
La Jolla, Cal. 92037

ES457

INDUSTRIAL MAINTENANCE MANAGEMENT SYSTEM (IMMS) \$7,500 and up

This system includes the scheduling of all Preventive Maintenance Tasks in an industry, hospital, institution, or government agency, the development of those PM tasks, manhour accounting for all maintenance tasks, material usage, all costs, and automated reporting of slippages. It prints PM Job Tickets, reports PM not accomplished, reports, on demand, on a variety of costing elements in any selected category. It also accumulates and reports all Corrective Maintenance actions.

360/B5500, COBOL

George Tabin, Director, IMMS
Systematic Services of California
560—14th Street
Oakland, Cal. 94612

ES458

MANAGEMENT SCIENCE/ OPERATIONS RESEARCH

PROMPT \$15,000

PROMPT is a project planning and reporting system that is highly responsive to all levels of management. PROMPT is an innovative project control technique embodied in a system that operates in a multi-project environment. It monitors projects from the planning stage through execution. The system monitors and projects both man hours and costs. PROMPT also develops historical data, concerning all projects under its control, which can be analyzed via a highly flexible reporting module included in the system. The system combines the best of critical path and program evaluation techniques and couples them with a comprehensive employee data base reporting system.

360/30 & up, (DOS & OS), H200/2200, B5500, COBOL

Richard Olson, Division Manager
ARIES Corp.
4930 W. 77th Street
Minneapolis, Minn. 55435

ER454

TARGET

\$4,500 Lease

Target is designed as a tool for management, to provide optimum utilization of existing manpower. Six levels of reporting provide the capability to better control the activities of analysts and programmers in a Data Processing installation. This is accomplished through a comprehensive reporting system with a minimum of maintenance effort. Critical status indicators are applied, where necessary, to inform management of program, system or project status. Current and historical time and cost expended by task and analyst are reported. Computer usage and cost can be controlled, utilizing applicable rates. Standard cost rates are variable and determined by user requirements and are maintainable within the system. Comprehensive edits are performed on all input transactions. Analyst backlogs and history by project are maintained for reporting. An Analyst worksheet is generated weekly, documenting effort expended and remaining on a given project. This system is designed in such a way that other areas such as engineering, etc., may be controlled

using normal maintenance and at the same time as the Data Processing reporting.

360/30 w/65K, DOS-COBOL

Florian Smolarek, Software Repr.
Computer Business Consultants, Inc.
3550 West Peterson
Chicago, Ill. 60645

ER456

DATA PROCESSING COST CONTROL \$4,000

Accumulates elapsed time for all tasks in EDP department by application, employee and work stations. Prices task using standard rates to provide: monthly user statements; trend reporting for past 24 months to enable observation of improving or deteriorating trends. Very useful for budget planning and control purposes. Reports prepared in detail or summary form.

360/25 & up, RCA 5/35, U-9000, H-200, B-2500, COBOL

E. J. Solomon
National Systems Planning
3098 Piedmont Road
Atlanta, Ga.

ER453

SOFTWARE AGE FREE PROGRAM LISTING FORM

(PLEASE TYPE)

New Listing
Revised Listing
Program Wanted
Broker Wanted

This program is: Utility Systems Scientific Applications Engineering Management Other

Title: _____ Additional Listing Forms Required _____

This program is: For Sale Lease Franchise Price: _____

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

Name and Address of Program Owner _____
Individual Contact _____ Title _____
Firm _____ Industry _____
Street Address _____
City, State and Zip _____ Tel: (_____) _____

RETURN TO: PROGRAM LISTING EDITOR • SOFTWARE AGE • 2211 FORDEM AVE. • MADISON, WIS. 53701

**TRANSPORTATION OPTIMIZER—
TOPT****\$10,000**

TOPT solves the so-called Transportation Problem of minimizing the total costs involved in distributing a commodity from several sources to a number of destinations. TOPT is designed to solve large problems in a minimum of core. A typical configuration may solve a problem of 6000 sources and an unlimited number of destinations. TOPT is extremely fast. It may be used as a stand-alone system or as a subroutine imbedded in a larger system.

360/40 & up, FORTRAN IV

% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
ER455

PAYROLL AND BENEFITS**PAY-20****\$1,500**

PAY-20 is a card oriented Payroll system written for Model 20 I.B.M. S/360 computers with a minimum of 8K memory. This generalized multi-company system will process salaried and/or hourly earnings data from source to net and furnishes both labor distribution reports as well as pay registers. The system includes all state taxes, multiple pay period tax calculations, automatic file maintenance capabilities, complete input editing, and both quarterly (941a) and annual (W-2) processing programs. Pay-20 has been fully tested under actual production for 18 months.

Purchase price includes installation assistance, complete documentation, and one year's full tax update service. Source programs only are furnished.

360/20, 8K, RPG

% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
EU457

PAYROLL SYSTEM**\$1,000**

System is card oriented. Reports are provided for complete payroll information, including registers, employee status, deductions and standard government reporting. System can be used for any type of periodic payroll (weekly, bi-weekly, monthly), hourly or salaried.

360/20, R.P.G.

% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
EU458

SCIENTIFIC**BLACKBODY TABLE GENERATOR****\$400**

This program provides the user with the most useful Blackbody (Planck) functions. By simply specifying the limits of the function, the user will receive a table of photon flux (photons/sec-cm²-micron), a table of the cumulative integral of the photon flux (photons/sec-cm²), a table of power flux (watts/cm²-micron) and a table of the cumulative integral of the power flux. The results are as accurate as the input constants, which were entered in their highest known accuracy. Input constants permit calculations to be

made for black body temperatures ranging from 4°K to 100,000°K (or larger with slight modifications) for any wavelength. Output is in the form of printed tables in a format suitable for reproduction and/or punch cards for input to other programs (the data may also be written on tape or disk by modifying the data definition card for the punch data set). User instructions and a theoretical discussion accompany the program. Program will run with, at most, minor modifications, on any machine accepting FORTRAN IV.

360, FORTRAN IV

S. J. Bostwick
4208 W. Russell, #14
Los Angeles, Cal. 90027
EZ462

**GENERALIZED PROCESS FLOW
SIMULATOR (GPF5)****\$12,500**

Program is a library of computerized mathematical models of chemical reactions and engineering unit operations for analyzing physical and chemical operations of processing schemes. GPF5 sequentially steps through each unit operation of a process flow sheet and calculates heat and material balances at equilibrium conditions. Schemes with up to 25 recycle streams of unknown composition can be analyzed. Also available, an extension to the program to permit the plotting of a process flow sheet with stream characteristics.

65K, FORTRAN IV

Frank H. Lawton,
Project Mgr., Computer Program Sales
Sun Oil Co.
1608 Walnut Street
Philadelphia, Pa. 19103
EZ463

PRINTING**FORM LETTER PRINTING PROGRAM****\$175**

Uses teletype time-sharing terminal. The program creates an edited file which can be printed on-line or off-line. A "name and address" file can be merged to print a letter for each name on the file.

FORTRAN II

% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
EW461

1130 PRINTER SKIP SUBROUTINE**\$150**

The SKIP subroutine allows the 1130 FORTRAN user to perform carriage skip and space operations on the 1132 or 1403 printers. SKIP is compatible with normal FORTRAN I/O. The arguments passed to the subroutine allow the user to specify the channel to be selected or the number of carriage spaces (1 to 32,767) to be executed. Complete documentation and program listing available. Specify 1132 or 1403 printer.

1130/DM2, BAL

Jimmy I. Pruitt
612 Lareine Avenue
Bradley Beach, N. J. 07720
EG482

UTILITY**RPG AID****\$450**

Prepares expanded file descriptions and cross reference listings of data names, alphanumeric and numeric literals and indicators. Indicator references are shown where altered and where tested separately. A list of unused indicators is provided. Will process RCA and UNIVAC RPG programs as well as all IBM 360 RPGs.

360/24K & up, DOS, BAL

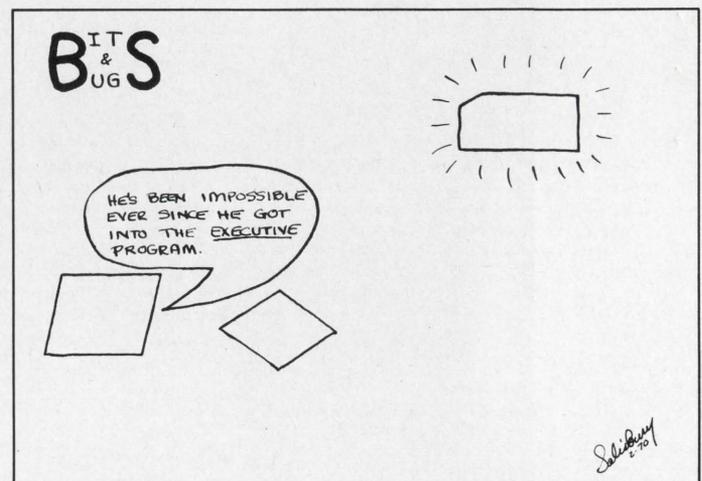
P. Wayne Canady, Vice President
DMC, Inc.
1211 W. 22nd Street
Oakbrook, Ill. 60521
EG484

TRACE**\$50**

This subroutine causes a listing to be printed which "traces" the execution of the program which calls TRACE. This is accomplished by printing (before execution) the location, instruction pair, the A and Q contents and six Index registers, for each instruction pair executed after TRACE is called and until it is terminated. Initiation and termination of TRACE is completely under program control. When the program is debugged, the calls to TRACE can be ignored by setting Monitor Flag 1 on.

CDC 1604, CODAP-1

Kermit N. Klingbail, Senior Analyst
Computer Symbolic, Inc.
310 E. Chestnut Street
Rome, N.Y. 13440
EG489



GETUPSI \$25

Allows access to the UPSI control byte from a COBOL program. All UPSI bits are converted to bytes and is an excellent method of controlling I/O devices or external program control.

360/25 and up, BAL

Ron Turner
North East Systems & Programming
Londonderry, N. H. 03053

EG383**GOSUP—GENERAL OS/360 UTILITY PACKAGE** \$300

GOSUP is a utility program for OS/360 which performs dataset manipulation through simple card command input. GOSUP prints, punches, dumps, lists, copies, logical OS/360 datasets, and also treats physical data (tape, disk, card). GOSUP performs the functions of DEBE and some of the regular OS utilities with one simple card command structure, without console operator intervention. Further information provided upon request.

360/OS, 44K, BAL

Joseph Iwanski
Allied Chemical Corp.
P.O. Box 70
Morristown, N.J. 07960

EG384**LIST DISK** Free

This program provides a tabularized listing of the data sets on a system 360 direct access device. The description includes all pertinent information from the VTOC. Options allow listing an entire device or individual data sets, only listing available space, listing the members of partitioned data sets, and listing the core size or SSI of load modules.

360/75, Model I-J, BAL

David Shick, Consultant
Room 169, Digital Computer Lab
University of Illinois
Urbana, Ill. 61801

EG385**PUNCH *DELETE CARDS FOR IBM 1130 FROM LET** N/A

This program punches *DELETE cards for an arbitrary number of consecutive entries in the location equivalence table (up to and including all entries). Cards are punched so that the most recent entries are deleted first.

1130/1800, BAL

Richard Poppen, Systems Programmer
Claremont Graduate School
Harper E-2
Claremont, Calif. 91711

EG386**SCIT—SHORTHAND COBOL INTERFACE TECHNIQUE** \$300

Allows user to write labels and reserved words in abbreviated form. The following outputs are produced: a listing of the user dictionary entries; a listing of COBOL shorthand source code; a listing of the generated COBOL source code; Allows 2,000 user abbreviations and also acts as a utility program for changing identity and sequence numbers on source deck.

Any computer with COBOL capability

Marvin Hill, President
Computer Research & Technology, Inc.
Suite 230, 550 Interstate North Office
Park
Atlanta, Ga. 30339

EG388**EXPENSE DISTRIBUTION and TIME REPORTING** \$2,500

Provides a series of reports for time reporting for employees and projects. Ideal for in-house use.

B3500, COBOL

Frank J. Buzolits, Marketing Repr.
Cobol Software Consultants
25245 W. Five Mile Road
Detroit, Mich. 48239

EG474**FUS (FORTRAN UTILITY SYSTEM)** \$15,000

FUS is a Fortran Utility System for symbolically debugging, timing and checking out Fortran programs on batch or time sharing computers.

The first part of FUS is the Fortran Automatic Debugging System (FADS). FADS is a comprehensive symbolic display system that offers programmers the ability to examine in detail the computational flow of Fortran source code at all desired points of interest. The second part of FUS is the Fortran Automatic Timing System (FATS). FATS automatically times all desired Fortran subroutines and displays a complete and accurate CPU timing report. The third part of FUS is the Fortran Automatic Check-out System (FACS). FACS automatically displays all source statements not used during a Fortran execution.

FUS is designed to IBM 360/OS, IBM/67 and UNIVAC 1108 users as a powerful and easy to use tool for developing Fortran programs.

360/50 & up, U-1108, FORTRAN

Jack Safran, Vice President
Digital Solutions, Inc.
100 Menlo Park
Edison, N. J. 08817

EG475**MATCH MERGE UTILITY** \$350

Program emulates the capabilities of a collator. Will compare two input files and put matched, unmatched or duplicate records onto the same or independent output files. Program has been written to be a record and device independent. Input may be on cards, tape or disk. The input and output files may have any desired physical record size. Designed for a maximum of operating efficiency with a minimum number of control cards or statements.

360-30, 32K, DOS, BAL

R. K. Ragni, Staff Assistant
Signode Corp.
2600 N. Western Avenue
Chicago, Ill. 60647

EG478**ASSEMBLY PROGRAM FOR MINI-COMPUTERS** from \$4,800

This program allows users or manufacturers of small computers or controllers to take advantage of the large memory, fast I/O devices and mass storage available at a central computer site or local service center while developing programs for their more basic 8, 12, 16 or 24 bit devices. The program is written in Fortran in modular fashion. The modules are customized for the computer/controller allowing a wide range of listing formats, source statement formats, data conversions, binary object output, etc. Listing includes alphabetized concordance, error summary, and full page control with page numbers and titles.

360/67, U-1108, R-70, FORTRAN IV

Lewis H. Halprin, Systems Consultant
2 Barrett Road
Lexington, Mass. 02173

EG480**MICR SOFTWARE** \$3,000

The software package that bank EDP installation have waited for since the S/360 was announced. Permits the user to write MICR routines in high-level languages—COBOL, PL/I, FORTRAN. Also provides immediate crisis recovery that eliminates costly reprocessing.

360, ALC

Frank J. Buzolits, Marketing Repr.
Cobol Software Consultants
25245 W. Five Mile Road
Detroit, Mich. 48239

EG479**REORG** \$100

REORG is an Isam Reorganization Macro which generates a complete program from a single set of parameters.

The program provides maximum I/O overlap and lists reorganization statistics. Options include: The handling of blocked and unblocked files, the ability to delete records, and a choice of default values for the parameters.

360/DOS, DOS Assembler

Phil Rice, Programmer
Browne & Sharpe Mfg. Co.
Precision Park
No. Kingstown, R.I. 02852

EG483**SORT 1400** \$1,495

This Utility Package consists of two interface routines designed to allow the 360 DOS SORT (483) program to read, sort and write 1400 series disk formatted files. Sort run times are reduced by factors of from 2 to 1 to 6 to 1, depending on volume and key size. The package at present does not process 1400 disk labels but will be modified if sufficient interest is shown.

360/30 & up, DOS, BAL

Dave Gortner, Programming Supervisor
Bourns Inc.
6135 Magnolia
Riverside, Calif. 92506

EG485**SUPERDEB** \$125

This program will go card to card, card to printer, or card to tape or any combination of these simultaneously. COBOL, FORTRAN, and JCL decks can be batch processed under a wide range of user defined sequencing, identifying, and printing options.

360 under DOS, COBOL D or F

B. Crane, Systems Programmer
Radio Ltd.
P.O. Box 23
Ann Arbor, Mich. 48107

EG486**TAPE LIBRARY MAINTENANCE & CONTROL SYSTEM—I** N/A

A comprehensive information and control system on the status of each file within the library. The system produces four reports. The reports indicate the condition of each tape in the library, its current allocation, the data it contains, its individual history, and its availability for re-use. By identifying available tapes, it reduces inventory; by controlling usage it indicates when a tape should be cleaned or re-certified.

360/25, 32K, 3 tapes or discs, COBOL

A. A. Calamari,
Manager, Software Products
Mnemotech Computer Systems, Inc.
55 Liberty Street
New York, N.Y. 10005

EG487

REFORM (JOVIAL SOURCE TEXT REFORMATTER) \$5,000

REFORM is a program which provides for reformatting source programs coded in the JOVIAL language. Installation parameterization of REFORM permits complete freedom of selecting the most desirable form in which reformatted JOVIAL source statement will appear.

U-1108, CDC 3800, 360, H-3118M, JOVIAL

% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
EG387

TABULATION ALL \$100

This program is designed to replace all card tabulation programs, and has the capability of tabulating any two numeric fields in a card. Controlled sub-totals are granted for any card field desired. The program has the feature of tabulating and listing each cards amount field and control field, or just printing sub-totals and final total, whichever your job requires.

360/25 and up, COBOL

Hollis C. Lamb
P.O. Box 135
Bomoseen, Vermont 05732
EG389

UJCCS UTILITY JOB CONTROL CARD STACKING \$600

UJCCS gives an installation the ability to build a Job Stream on disk using the Source Library as its origin. The Job Control Cards are stored in the source library where they can be maintained and retrieved as the operator desires. More than one set of Job cards can be built to a disk file thus having complete or partial applications stacked to the disk. Also, this frees a card reader from reading Job Control Cards to reading only input data. It eliminates the tedious work for the operator of having to setup the Job Control Cards along with the input data. Materials include: Source deck ready for compile, Standard disk labels, Description of options needed in the supervisor, Sample set of Job Control Cards & Documentation for setting up the systems.

Model 30 and above operating under DOS

John Jaska, System Programmer
St. Paul Federal Savings & Loan
6700 W. North Avenue
Chicago, Ill. 60635
EG390

XREF-1130 ASSEMBLER CROSS-REFERENCE GENERATOR \$250

XREF both generates the assembled object code for an Assembler program and generates a statement-numbered listing (containing object code, error flags, statement number, and source statement) and cross-reference table. The cross-reference table contains the number of the defining statement, the label, the value of the label, the relocation mode and all references to the label for each label used and a listing of all LIBF's, CALL's, DSA's and LINK's used in the program. The fact that XREF produces DSF output in working storage allows the user to assemble his programs with XREF rather than Assembler when he desires a cross-reference listing.

1130, 8K, BAL

Peter Langston, Director
Reed College Computer Center
Woodstock Boulevard
Portland, Ore. 97202
EB391

TESTING AND DEBUGGING

APSE—AUTOMATIC PROGRAMMING & SCALING OF EQUATIONS N/A

APSE is a digital computer program for producing the patching and other hardware information necessary to set-up and check-out an analogue computer. Work on the program was originally begun by a British Computer Society working party, set up to develop procedures for a general purpose program which would avoid the limitations of earlier programs in this field. The National Computing Centre has been involved in the development work and was subsequently given sole marketing rights. Briefly, APSE II reduces, through a digital computer a set of system equations to scaled analogue machine equations, and allocates analogue hardware. The system equations are checked for validity and consistency and the static check values are computed. An enhanced version APSE III will, in addition, do a dynamic check which will integrate the equations over any required range of the independent variable, and calculate the steady state solution, if the system has a steady state.

360 (or other w/FORTRAN compiler)

J. A. T. Pritchard, Head of Optimisation Dept.
The National Computing Centre Ltd.
Quay House, Quay Street
Manchester M3 3HU, England
EH392

DEBUGGING TRACE \$430

Selectively prints values of arrays and variables of any mode. Portions of arrays may be select; program defined variable values may be used for selecting portions of arrays to output. Full output format control is provided; output is extremely legible. Program flow may be monitored and diagnostic comments inserted to indicate subroutine calls and returns, loops, branches, etc. The system is designed to allow very rapid input of diagnostic data; total time required is from 1/3 to 1/10 of that required for manual training. The system is currently operating on-line to a H-1648 time sharing configuration; however, it is programmed in standard FORTRAN IV and can be used on other systems with little or no I/O modification.

FORTAN IV

Mike Speer
Timeware
4720 N. Talman
Chicago, Ill. 60625
EH394

RPG-TRACE-1130 \$50

RPG-Trace consists of two assembler written subprograms used to trace resulting indicators and the contents of numeric data. Developed to aid in the programming and debugging of 1130 RPG programs in the same manner as do the 1130 FORTRAN arithmetic and transfer trace routines. Each is independent of the other and a trace of indicators and/or numeric variables may be performed. Complete documentation included. Specify type of printer in use.

1130, BAL

Michael B. Adams, Programmer-Analyst
P.O. Box 12332
Albuquerque, N.M. 87105
EH396

ASYST \$1,300
ASYST is a S/360 BAL program designed to operate under DOS control providing the programmer-operator a debugging tool with the ability to display or alter general registers, floating-point registers, main storage, and PSW via the 1052 printer-keyboard. Control is received via the external interrupt key on the S/360 mainframe or any of the 15 internal program interrupts. ASYST can be operated in any partition of storage and in the full multiprogramming environment. ASYST has the ability to do address calculation (in hex) and to simulate the SAR address stop feature of the S/360. ASYST also incorporates a high-speed interpretive dump which will dump selected core locations at I/O speed.

360/30 up, 32K, BAL

Ken E. Woertendyke, System Software Engineer
International Logic Corp.
404 Ignacio Boulevard
Novato, Calif. 94947
EH393

SAMPLE REPORT GENERATOR \$75

This program produces hard copy mock-ups of proposed reports. It allows management to see its reports before actual programming begins. Simply layout your proposed report on the specially designed forms, using representative data, headings and total lines. Spacing is controlled by preview. There is no need to insert blank cards. As many pages as needed to show the actual report can be produced in one pass. The layout form is sent directly to keypunch with no additional coding required.

360, 25K DOS/TOS, BAL

George K. Staropoli, Program Mgr.
System Implementation Corp.
18 East 48th Street
New York, N.Y. 10017
EH395

TAPE CERTIFICATION PROGRAM \$240

This program checks a reel of tape for its reliability and usefulness. Any read or write errors that occur on a reel are noted on the printer along with the serial number of the tape, and the approximate footage where they occurred. The program will also summarize the total number of read errors, and the total length of the tape. The program makes dynamic use of I/O channels, control units and available drives (maximum 4) to insure that the maximum number of reels will be certified in a given span of time. The program operates in a Background and Foreground.

360/25 & up, DOS, BAL

H. E. Prall
Data Systems Assistance Inc.
100 William Street
New York, N.Y. 10038
EH397

TESTPAK AUTOMATIC PROGRAM TESTING SYSTEM \$11,050

An application program testing system completely automatic with no operator intervention. This system provides a powerful tool for the programmer to control his testing environment, select, and generate test data. Vastly increases computer utilization and programmer efficiency. Consists of three programs: Dataset Generator, Dataset Printer, and Dataset Stripper, each can be used as a stand-alone utility.

IBM 360/65K, BAL

Vincent J. Arcovitch
Computer Methods Corp.
470 Mamaroneck Avenue
White Plains, N.Y. 10605
EH398

DATA HANDLING

DATA-CONTROL SYSTEM \$20,000

Generalized data edit control system to allow all data editing and record formatting to be controlled at one point through a single dictionary. Developed to handle data problems of both real-time and batch. Reduces data entry requirements and provides handling of free form or fixed form data entry. All input data is recorded to provide adequate protection in on-line systems.

360, BAL

Marvin Hill, President
Computer Research & Technology
Su. 230-550 Interstate North Office Park
Atlanta, Ga. 30339

E1399

FAST ACCESS DATA SYSTEM \$14,000

Replacement for IBM ISAM which improves speed, core usage, and error recovery. Fast Access Data is up to 29% faster than ISAM. Requires approximately 8K core for nucleus plus 1K+300 bytes per data set. Device utilization is improved through blocking. Random access is 135MS versus 190MS of ISAM. 80% of delete areas are reused. Shared buffers with only 1 or 2 write events required on addition of records.

IBM 360, BAL

Marvin Hill, President
Computer Research & Technology
Suite 230, 550 Interstate North Office Park
Atlanta, Ga. 30339

E1400

FILE HANDLING SYSTEM (FHS) \$5,000

Designed to provide the computer specialist with an efficient method for organizing a data base and processing mass storage files from an application program written in COBOL, FORTRAN or Assembly Language. The benefits of this File Handling System are: Mass storage files constructed easily; File indexing maintained dynamically; Provides automatic reorganization; Direct or sequential accessing on any file (User need not specify organization); Handles all I/O for user program (card, printer, tape and desk); 292 files available to user program no extra buffering required; Handles files now created by FHS; Ability to dump to or load magnetic tape.

360/30 & up, U-1108, SPECTRA 45, COBOL

J. H. St. Onge, President
American Computer Concepts, Inc.
835 E. Germantown Pike
Norristown, Pa. 19401

E1401

MAILING LIST CONTROL \$500

Generally, the mailing list programs provide for printing names and addresses on any type of continuous form envelopes, or on mailing labels, one up. The master file contains six-30 position fields for name and address, plus separate code fields for state and zip. In addition, parameter fields allow coding each individual with up to 10 variables. All printing programs allow selective call-out of individuals based on an and-or-not relationship between parameters. In addition, the master file contains customer (or control) number and an alphabetic sort code. Provisions are made for adding, deleting and changing an entire entry, or in the case of changes, selective changing of any field including parameters. Reports include a file maintenance run, showing additions, deletions and actual

changes processed, the envelopes or labels themselves, and three reports of the entire file or selective portions of the file, printed four up. The listings are in sort code (alpha) sequence, in zip code sequence and in control number sequence. The printing program will print in any sequence, requiring only a sort to change sequence.

360/30, 32K, COBOL

% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
E1402

DOCUMENTATION

FILELOG \$2,500 and up

Filelog is a documentation and planning tool designed to assist data processing personnel in documenting, maintaining and upgrading their computer systems. Filelog provides cross-referenced, indexed listings of all files, programs, and systems in the users installation, in addition to program and system I/O flow charts, directly from source program decks. Filelog is designed to process programs written in any programming language and has the ability to handle user designed languages.

360/30, 32K, DOS UP, COBOL

N. Gautreau
Information Associates, Inc.
12 Newell Road
Wakefield, Mass. 01880
EJ403

ENGINEERING

AUTOMATED DRAFTING SYSTEM (ADS) \$15,000

Automated Drafting System (ADS) is a computerized system for making isometric piping fabrication sheets. ADS has proved to be highly effective in saving time and in substantially reducing total drafting costs. ADS can be made an integral part of computerized functions (e.g., requisition and purchasing, inventory control, manpower scheduling, cost estimating, accounting, etc.) of the company.

Advantages made possible by ADS stem from an imaginative and skillful combination of man and machine. The creative skill of the draftsman is used to design the piping network and to translate its details into computer input. The ability of the computer to do repetitive tasks accurately at very high speeds is used to make the drawing and to label, title, specify, and tabulate parts on the fabrication sheet.

360/65K and plotter, FORTRAN IV

Frank H. Lawton,
Project Manager, Computer Program
Sun Oil Co.
1608 Walnut Street
Philadelphia, Pa. 19103
EK404

FINNED TUBE CONVECTION SECTION DESIGN \$3,000 Lease

This program optimizes the fin arrangement and tube metal selection used in convection sections based on process requirements, mechanical limitations, and cost data. The program contains the most reliable correlations for heat transfer, pressure drop, and various physical and thermodynamic properties.

GE Mark II, 1130/8K, FORTRAN IV

% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
EK409

AUTOMATIC TOOL DATA GENERATION SYSTEM (ATDG) N/A

This system is designed to substantially reduce the amount of time and the cost associated with generating paper tape data for Numerical Control (N/C) drill and punch presses. A minimum amount of engineering data is transcribed from prints and then keypunched into cards. The ATDG program thoroughly edits all input data and then performs all the mathematical computations required in determining coordinate values. In addition, this program contains a shortest path (time-wise) routine which is uniquely fast and accurate in determining the minimum N/C machine stroke sequence.

A piece part requiring 500 machine hits takes less than 2-minutes run time on a large scale computer, to complete all coordinate computations and optimum sequencing. Output from this program is then converted by the second (ATDG) program to paper tape machine format. A listing of all coordinate data is printed out along with any error messages.

10K, 1-Disk, 1-tape, FORTRAN IV

John Mueller, Business Consultant
6775 N. Oxford Avenue
Chicago, Ill. 60631
EK405

DAINET-1 (ELECTRONIC CIRCUIT ANALYSIS) \$2,300

For use by computer-aided electronic circuit designers and analysts, DAI NET-1 is an efficient, reliable program for nonlinear DC and nonlinear transient analysis with graph-plot output, better suited than its predecessors for rapid, trouble-free batch processing. Electronic circuits containing the following components can be analyzed: resistors, capacitors, inductors, mutual inductances, transistors, diodes, DC sources, signal sources, devices which can be modeled as combinations of the above. The new program is an improved, combined version of the NET-1 Network Analysis and SOP (Solution Output Processor) programs originally developed by Los Alamos Scientific Laboratory. The Program includes the Los Alamos Scientific Laboratory improved DC analysis routine using double-precision arithmetic.

IBM 7094, 360/65, FAP

N. Sokal
Design Automation, Inc.
809 Massachusetts Avenue
Lexington, Mass. 02173
EK406

ECAP (ELECTRONIC CIRCUIT ANALYSIS PROGRAM) N/A

Up to 30 Nodes (not including ground), 100 Branches, 100 T cards, 60 Switch (diode) cards (controlling up to 120 branches), 10 Time dependent sources (five voltage and five current), 20 M cards (AC analysis only), Selective Print option, Free field input (recognizes a blank or comma as a delimiter), Plot option in AC and Transient (permits multiple plots without recomputing problem), with either manual or autoscale option, Decibel (DC) output option for voltage and/or current in AC Analysis, Teletype or file input option, On-line modify capability via console command (AC and DC only), Automatic file dump when input problem is entered via keyboard, Plot option overhead is incurred only if the user's response indicates that he may desire to plot results prior to actual program execution; hence, significant savings in program execution cost is achieved.

GE 430, FORTRAN IV

Harry Wert, President
Read, Inc.
2068 Leanne Court
Winter Park, Fla. 32789
EK407

**ENGINEERING DRAWING TO N/C
TAPE, DIRECT CONVERSION** \$7,000

Using a two or three dimensional digitizer with paper tape recording facilities digital data points plus operator input information turns any machine tool operator into a N/C part programmer. Two programs are available: A program to convert unformatted paper tape input to a corrected formatted input listing plus an input card deck for making any necessary corrections to the input data; A second program converts the digital input data to N/C blocks for both circular and linear interpolation. Feedrates are determined offsets calculated and any necessary Z axis motion is integrated with X-Y motion. Current System outputs to Bendix Dynapath 1500 N/C controller but can be adapted to any other desired controller. Output is N/C controller format punched cards.

360/30 & up, 64K, COBOL/FORTRAN IV
N. Koenig/H. Quackenboss, Consultants
Koenig Associates
3372 Washtenaw Avenue
Ann Arbor, Mich. 48104
EK408

FLONET N/A

FLONET is a generalized hydraulic engineering program which analyzes water distribution network systems by the Hardy Cross relaxation method. The program is unique among such analysis programs in that it not only computes the balanced flows and head losses in a distribution system, but it accommodates booster pumps, storage tanks, pumping stations, and pressure reducing valves as well. FLONET'S outstanding feature is that it will automatically analyze both level and unlevel networks.

FLONET is entirely conversational and is designed such that the user can actually design a system by modifying and changing the system pressure at any point during a given run as many times as desired. The user also has complete control over all output through the use of a series of conversational commands built into the program. FLONET is written in standard FORTRAN IV and is adaptable to any computer system which has a standard FORTRAN IV compiler.

Burroughs 5500 and GE-425, FORTRAN IV
% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
EK410

GARD \$2,500

Gard—Guy-ring Analysis and Reduced Dimensions. Computes effects of statistically applied loads acting in arbitrary orthogonal directions. Applies to a framed tower with a vertical shaft having at least one axis symmetry, to a tubular tower, or to a "mixed" tower with up to 15 guy levels and 30 guys per level.

FORTRAN (USASI)
% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
EK411

**POSITIVE-REAL TESTER & CAUER
(LADDER) SYNTHESIZER** \$475

Given any rational polynomial quotient immittance function, routine performs complete positive-real testing and Cauer synthesis procedure for two-terminal, two-element-kind networks and identifies functions which represent RLC networks. The algorithm tests for common factors in rational polynomial $P(s)/Q(s)$, tests $P(s) + Q(s)$ to be Hurwitz, and tests $\operatorname{Re} Y(j\omega) \geq 0$ for all

omega. Functions passing all tests are synthesized into first and second Cauer canonical forms. Options allow bypassing positive-real and/or common-root testing for well-defined functions. Forced solutions (RL for RC and vice versa) for a given immittance function may also be obtained. Final output for each function consists of circuit configuration and element values in Ohms, Farads, and Henries.

FORTRAN II
Dr. Myron A. Calhoun,
Private Consultant
420 Laurel Avenue
Menlo Park, Cal. 94025
EK412

**PRESTRESSED CONCRETE ANALYSIS
SYSTEM (PREOO)** N/A

As the system name implies, PREOO is a complete prestressed concrete analysis system, as opposed to the more common "best design" approach. The system consists of 17 separate programs which reside on disk. However, it is started with a single calling card and operates as a single program with all external control done via data and console entry switches. Features of the system are:

1. Data error and consistency diagnostics with error messages.
2. Full cantilever capability, either end or both ends of member.
3. Maximum 10 each dead loads and live loads and each can be concentrated, uniform full length, uniform between limits, linear full length, or linear between limits and one live load can be HS15 or HS20 moving live load.
4. Full-formatted, switch-selected output options give section properties, moments, stresses, ultimate moment analysis, deflections, and prestress report for ends, supports, and tenth points of span.
5. Accepts maximum of 10 prestress vectors, each of which may consist of any number of prestressing elements and may be deflected, straight tensioned, or straight non-tensioned. Each deflected vector can have as many as 6 deflection points, down or up.
6. Provides section property, moment, stress, and deflection output for any beam, any material, composite or non-composite, prestressed or non-prestressed.
7. Correctly analyzes shored composite problems.
8. Running time less than one minute per problem.
9. Is designed for conversational use. User can run trial configuration, observe results, change parameters and re-run until satisfactory design is obtained.

1130/8K, FORTRAN IV
% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
EK413

**RAPID-RESOURCE ALLOCATION &
PIPING ISOMETRIC DRAWINGS** \$24,000

A complete System for the development of material take-off lists and production of piping isometric drawings for oil or chemical plant. Handles any combination of materials within ASA and DIN codes of practice.

**ICL 1900, 360/30, 64KB store plotter,
USASI FORTRAN**
J. R. Ellison,
Head of Interactive Computing
The National Computing Centre Ltd.
Quay House, Quay Street
Manchester, England M3 3HU
EK414

**TRANSCAP-TRANSIENT CIRCUIT
ANALYSIS PACKAGE** N/A

TRANSCAP (TRANSient Circuit Analysis Package) uses a new proprietary method to compute transfer functions for linear electronic circuits. The package can perform transfer function, AC, DC, and/or general transient analysis using any selected set of input and output node pairs. Because of the new method used, TRANSCAP offers as an advantage over other circuit packages, a reduction in running time of an order of magnitude for complex circuits. The program can accommodate with simple circuit coding, all popular transistor models. An on-line highly interactive version of TRANSCAP is currently available for time-sharing applications on COM-SHARE Time-Sharing. Batch versions of TRANSCAP can be custom installed on a client's machine. These batch versions can include multi-variable plot options. Circuit sizes (nodes, elements) are limited by available core.

4K & up, FORTRAN IV
S. Gardner, President
Binary Systems, Inc.
88 Sunnyside Boulevard
Plainville, N.Y. 11804
EK415

FINANCIAL

INVESTMENT AND BORROWING

**AMCK—MORTGAGE MONTHLY
PAYMENT CALCULATION** \$100

Calculates the optimum level payment for mortgages or other loans, optimized to the nearest penny, starting from an assumed figure. Will often yield a substantial improvement over calculated or published table figures. Runs on small scale eqpt.

360, UNIVAC 9200, 8K, BAL
Arthur Mark, President
Electronic Computer Programming
Institute of Central Pa., Inc.
49 N. Progress Avenue
Harrisburg, Pa. 17109
EL416

**BOND PORTFOLIO ACCOUNTING AND
VALUATION PACKAGE** N/A

This is a complete bond portfolio accounting and valuation package for use by banks, both in-house and as a correspondent bank service. It offers: Initial loading and input verification; Daily posting, including the addition, alteration, and deletion of assets; Interest accounting, both cash and accrual; Monthly amortization of bond premiums; Periodic computation of market value.

360/30, 32K, 2540, 3-2311, BAL
J. Donald Pate,
Data Processing Officer
The First National Bank
P.O. Box 511
Montgomery, Ala. 36101
EL418

INSTALLMENT LOAN SYSTEM \$6,000

Multi bank system; 24 daily reports; 14 periodics and monthlies; automatic rate charges; full rebate and payoff capabilities; coupon book, chase cards, and file cards are only pre-printed forms required. Price includes one man week of installation assistance.

360/30, 32K, DOS, COBOL
% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
EL419

AUTOMATIC BOND INVESTMENT & ANALYSIS SYSTEM \$9,000

Multi Bank System
Comprehensive edit and audit procedures for portfolio integrity
Complete accounting for: Buy, sell and change transactions, Income and expense accruals, Income and expense adjustments, Automatic generation of coupon dates, Automatic maintenance of book value, Automatic coupon generation, Generate yield at cost, Cash reconciliation, Short-term, long-term capital gain or loss calculations, Comprehensive trial balance, History printed in ledger format.

Built-in Billing System for bills and accounting for customers you service. Optional reporting for both complete reports and items within specific reports. Price includes two man weeks of installation assistance.

360/30, 65K, DOS and H-2200, 65K, COBOL

% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701

EL417

AMSKED—MORTGAGE AMORTIZATION SCHEDULE \$200

Calculates monthly payments to principle & interest on level-payment mortgages or other loans, to include as desired FHA mortgage insurance premiums and tax reserve. Prints amount of each category of payment and total payments and remaining balance for each month with twelve-month totals. Runs on small scale equipment.

U-9200, 360, 8K, BAL

Arthur Mark, President
Electronic Computer Programming
Institute of Central Pa., Inc.
49 N. Progress Avenue
Harrisburg, Pa. 17109

EL420

MORTGAGE PAYMENT REVERSAL \$75

Given the current balance, the interest rate and the monthly payment amount, this subroutine will compute the principal and interest spread on the last payment that was applied. In effect it eliminates the necessity of looking up the principal and interest spread of the last payment applied in order to process a reversal. Flow chart—program listing and sample program furnished.

360/30, COBOL—BAL—RPG

J. A. May, Jr.,
Sr. Vice President, Data Processing
United Mortgage Servicing Corp.
3200 Pacific Avenue
Virginia Beach, Va. 23451

EL421

BANKING OPERATIONS

BANKSERV—CARDHOLDER ACCOUNTING SYSTEM N/A

Accomplishes cardholder accounting, statementing, and reporting of activity for single or group bank credit card plan operations. Systems available with descriptive or country club billing and with two or three levels of monetary controls including provision for correspondent participation. Successfully operating for B of A and Interbank plans in both single bank and association installation.

360/30, 65K, COBOL

Harlow B. Ladd
Arthur S. Kranzley and Co., Inc.
1010 S. Kings Highway
Cherry Hill, N.J. 08034

EL424

AMORTIZATION SCHEDULE SYSTEM \$250

Prints amortization schedules and computer FHA insurance premiums in applicable for fixed payment simple interest loans with payments due monthly.

360/25 & up, COBOL

% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701

EL422

BANKSERV—AUTHORIZATION SYSTEM N/A

This on-line inquiry and information display system enables clerks to determine whether or not to approve credit or cash loans in seconds. The System eliminates manual posting and the delays of manual look-up. It produces an audit trail of all authorizations, continually updates credit status files, and makes management reports available on demand. When used in conjunction with BANKSERV Cardholder Accounting, it provides for recording and deleting authorized transactions from individual cardholder master files and posting name, address and status code changes. The system is successfully operating for B of A and Interbank plans in both single bank and association installations.

360/30, 65K (Programs use 18K), COBOL

Harlow B. Ladd
Arthur S. Kranzley and Co., Inc.
1010 S. Kings Highway
Cherry Hill, N.J. 08034

EL423

BANKSERV—CHECK CREDIT & OVERDRAFT ACCOUNTING SYSTEM N/A

This is a proprietary system for effective processing and tight financial control of overdraft banking and related revolving line of credit services. The system is generalized by design, in successful operation, and produces comprehensive and intelligible customer statements in full accord with Regulation Z. It creates and maintains comprehensive master file for separate and DDA related credit reserve accounts, creates and processes new loans initiated by checks or fund transfers, and prepares customer statements.

360 or Spectra 70/45, (65K), COBOL

William M. Washington
Arthur S. Kranzley and Co., Inc.
1010 S. Kings Highway
Cherry Hill, N.J. 08034

EL425

BANKSERV—FILE STREAMLINER SYSTEM \$3,600

The System combines input files and generates a sorted listing based on a highly effective sort key. Duplicates on the sorted listing are flagged for manual review. Add and delete transactions are applied using a record serial number as a key in order to produce the streamlined file. This file carries original input names and titles and reverse names in key order, two address fields, an input file designation, and, if desired, system generated sequential account numbers.

360/30, 2 tapes, BAL and COBOL

William M. Washington
Arthur S. Kranzley and Co., Inc.
1010 S. Kings Highway
Cherry Hill, N.J. 08034

EL426

BANKSERV—INSTALLMENT LOAN ACCOUNTING SYSTEM N/A

Modular comprehensive system provides for every major IL activity and features strong financial control, operating ease and flexibility, full multi-bank capability and action keyed reporting. Five modules are available, each on an integrated or stand alone basis: customer accounting, dealer accounting, charge-off accounting, on-line video inquiry, and floor planning. Variability is provided for payment schedule processing accrual and rebate calculation, check digit routines, and late notice interval selectors. The system accepts multiple input media and features single lock up for all inquiries.

360/30, 65K, COBOL

Edwin R. Ellis
Arthur S. Kranzley and Co., Inc.
1010 S. Kings Highway
Cherry Hill, N.J. 08034

EL427

BANKSERV—MERCHANT ACCOUNTING SYSTEM N/A

Accomplishes merchant accounting with gross net merchant deposit, billing and reporting of activity for single or group bank credit card plan operation. Features include ability to calculate discount on daily, weekly, or monthly basis, automatic preparation of descriptive monthly merchant statement, and provision for a variety of history and activity reports for marketing and financial analysis. The system is successfully operating for BofA and Interbank plans in both single bank and association installations.

360/30, 65K, COBOL

Harlow B. Ladd
Arthur S. Kranzley and Co., Inc.
1010 S. Kings Highway
Cherry Hill, N.J. 08034

EL428

CERTIFICATES OF DEPOSIT SYSTEM \$4,000

Package consists of 10 programs and two sorts. Up to six types of Certificates of Deposit with control totals by Certificate of Deposit type and bank. Continuously compounded interest or simple interest based on either a 360 or 365/366 day year; variable pay periods; variable interest rates. Disposition of payments include: Mail check, Hold check, Deposit to savings account, Capitalization of interest. Computer prints checks and 1099's; multi bank system; account history reports on request. Price includes installation assistance of one man week.

360/25 & up, 32K, COBOL

% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701

EL429

ONE STATEMENT BANKING N/A

One statement banking incorporates the combination of a checking account; a no-passbook, daily interest savings account; an automated Christmas club account; an automated cash reserve which includes protection against overdrawn checks; automatic bank payments service; and provision for a check guarantee card system automatically generates al DDA, savings, and Christmas club reports.

IBM 360/30, BAL and COBOL

Paul S. Field
LTI Computer
Suite 409, 30 East 42nd Street
New York, N.Y. 10017

EL431

NEW PRODUCTS

Proctor System In Three Modules

Proctor, a system of project control, is now available in three separate modules—time, cost, and scheduling. The system was developed to give realistic project control without over burdening the user with complicated input and output documents.

Proctor Module I, time, builds a data base for the cost and scheduling modules. The time module also produces comprehensive project control reports showing effort expended on the project; projected variances and expected completion dates; individual and team productivity; and summaries for all the projects being monitored.

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

Interface Unit Couples Document Reader to Key punch

A new direct interface for coupling a Motorola MDR document reader to a standard IBM-029 key-punch unit has been announced by Motorola Instrumentation and Control Inc., a Subsidiary of Motorola Inc., Phoenix, Ariz. The document reader senses pencil-marked, key-punched, and preprinted data, alone or in any combination, entered on tab cards, forms, or page-size documents. Leading edge, trailing edge, or column strobe control signals can be used.

The optically-read data is transferred, via a single inter-connecting cable, to the card punch. Output language from the reader is 12-bit parallel, character serial. Data transfer rate is 10 characters (columns) per second.

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

80-Column Photoelectric Card Reader Introduced

A new 80-column photoelectric card reader which also can be converted for use with IBM System/3 96-column cards has been developed by Bridge Data Products, Inc., Philadelphia. Identified as the Model 8000, the new card reader reads 80-column cards at more than 300 cpm, and stub varieties can be read at up to 400 cpm demand. The Model 8000 is also designed for multiple card capability—a simple field conversion kit can be installed in 15 minutes to give it the added capability of reading IBM System/3 96-column cards. Complete with electronics and skins, the Model 8000 is compactly packaged in an attractive desk top size—about 2 ft. x 2 ft. x 2 ft. and weighing less than 50 lbs.

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

Announce "Add-On" Graphics Terminal

Monitor Displays' new Model 8190 Graphics Terminal generates and displays graphics, alpha-numeric characters and symbols from digital input data. It contains a digital to analog interface as well as the analog circuits and function generators necessary to display data generated by a general purpose computer.

The basic terminal contains a CRT Graphic Monitor and Position, Vector, and Character Generators, packaged in a desk type console. Options such as display processor, memory, general purpose computer, light pen, etc. are available from Monitor Displays to expand the 8190 before or after delivery to a full interactive graphics terminal such as the Monitor 8100.

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

Switching Relays Feature Operate/Release Times of 1.0 Millisecond

The Computer Products' CR300 Series General Purpose Switching Relays offer an economical approach to many high-speed mechanical switching requirements. These miniature relays were designed primarily to provide electrical isolation for interfacing digital signals in digital computer systems, however, they also offer a solution to many other high-speed switching problems encountered in industrial control equipment design.

These long-life relays are compact and light weight, measuring only 0.44" x 0.5" x 1.25" overall and weighing less than 7 grams. The CR300 Series feature typical operate and release times of 1.0 millisecond, and are available in either dry-reed or mercury-wetted contact configuration. They are designed for printed circuit board mounting.

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

OCR Terminal Reads Handprinted Information

A low-cost optical character recognition (OCR) unit that reads handprinted numbers and symbols as well as machine-printed information was recently introduced. The new remote reader, called Input 3, was developed by Recognition Terminals Inc., a subsidiary of Recognition Equipment Inc. "It is designed for use in decentralized information processing environments where the volume of data is relatively small, but important, and must be transmitted on- or off-line to central or regional computers," according to Herman L. Philipson, Jr., president of Recognition Equipment Inc.

When used with IBM's System 3, the reader eliminates the small punched card that is incompatible with other punched card equipment. Input 3 can be connected directly to an IBM 360/20 and other computers, as well as to System 3. Standard software provides this capability without modifications to the computer's or the user's programs.

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

Silent Teletype Terminal Introduced

Development of an improved, silent Teletype-base time share terminal was announced by TTS division of Remote Data Terminals, Inc. Addition of a new "Sound Barrier" silencer to the firm's TTS-110AM and TTS-110-AC integrated acoustic data terminals eliminates most operational noise, according to test reports. High-frequency sound is reduced by a ratio of 3:1; that of lower frequencies by more than 2:1. Such effective silencing will offer new economy and convenience to time share users. Terminals no longer require isolation because of characteristic high levels of noise. They may be used in offices where other business is conducted, or several terminals may be used comfortably in a single room.

The Sound Barrier is the latest of TTS' improvements upon the basic ASR-33 Teletype terminal system. It is offered with the firm's TTS-110 series of mobile and portable terminals, which also include high-performance acoustic couplers and meters that measure carrier conditions. Formats with as many as 105 characters per line are optional.

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

Service Available for Detecting Digital Faults

The first commercially available software package that automatically detects MSI/LSI circuit functional design faults is now available from the Mellonics Division of Litton Industries. These new diagnostic computer programs provide logic designers with a fast, accurate and totally reliable method for detecting functional logic faults and for generating functional test procedures in complex digital circuits.

Available on a service basis from Mellonics, they substantially reduce design time and eliminate errors due to manual data manipulation. This enables circuit designers to automatically generate error-free tests or diagnose manually-prepared tests for functional faults in less than half the time required with manual methods.

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

XDS Announces Universal Time-Sharing

Fall delivery of a new Xerox Data Systems operating system that will permit one computer to concurrently perform the data processing tasks of three was announced recently by the Xerox Corporation computer subsidiary. The new operating system, Universal Time-Sharing System (UTS), is designed for use with XDS Sigma 7 computers and will be delivered without charge to customers after quality assurance testing of the program is completed.

Tape Saver

The computer data in this stack of 40 reels of magnetic tape can be recorded on one reel by a new data recording system developed by General Dynamics. Known as the UNIDAR system, it will be used initially for a data acquisition requirement of the U.S. Government but may eventually have commercial applications in accounting, inventory control, library reference and other information retrieval systems.

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

Card Punches Speed Remote Data Collection

Portable punches for punching Hollerith type holes into standard paper or Plastic tabulating cards and plastic I.D., badge and credit cards for use with contact or photo electric static card readers are available from Wright Line Division of Barry Wright Corporation. These light weight, inexpensive and rugged punches can handle a variety of punching requirements such as: time & attendance recording; job cost & production control reporting; machine & process control; blending & bulk plant control; and retail credit, vending & validation systems.

Operation of the punches is simple and requires little or no training. Punches are available in both manual and electric models for both tab card and plastic badge, I.D. or credit card punching. Five separate models are available as listed: Model 2600—designed primarily to punch any of the 960 possible locations in a standard size tab card under 15 mil thick; Models 2610 (manual) & 2611 (elec.)—designed specifically to punch any of the 240 possible locations in a standard 20-column plastic credit card; Models 2620 (manual) & 2621 (elec.)—designed primarily to punch any of the 264 possible locations in a standard 22-column plastic badge or I.D. card. Also punches

15 and 80-column cards or up to 5 regular tab cards at one time. For special applications involving quantities of punches, modifications can be made to the standard models.

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

Independent Processor Creates User Languages

A new machine independent processor for creating user languages—believed to be the only practical software ever developed for the purpose—is now available. Called DUAL (Dynamic Universal Assembly Language), it was developed by Proprietary Software Systems, Inc., Los Angeles, California, a subsidiary of Images Enterprises, Inc.

DUAL is a powerful computer independent Meta assembler, which together with a set of directives (commands to the processor), enables users to readily define languages for specific or general applications. With DUAL, it now becomes possible to communicate with a computer in a user's jargon, or in terms which are designed specifically for a particular application.

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

Free Sample Lesson Offered By Systems & Procedures Home-Study School

A free sample lesson, taken right from its home-study course in Systems & Procedures, is being offered by the North American Institute of Systems and Procedures so that prospective students may "preview" the course.

The lesson is one of fifty contained in the comprehensive course, which is sponsored by the Association for Systems Management. The new course is excellent as a refresher in latest methods and techniques for the practicing systems man and particularly recommended to teach new systems people quickly and efficiently, as well as for companies—who want to train their own personnel in Systems & Procedures.

For free sample lesson and tuition schedule without obligation, write North American Institute of Systems & Procedures, 4401 Birch Street, Newport Beach, California 92660.

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

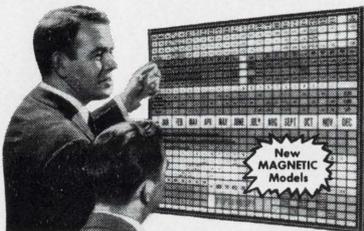
**Provide Terminal User
With Direct Link**

COMPAK/360 new from Computer Audit Corp., Silver Spring, Md., provides the terminal user a direct link, via CRT or hardcopy terminals, with a central computer to a data base. The terminal user is given the ability to query the data base as well as enter updates to it. COMPAK/360 resides within a partition of the 360 Operating System. Other partitions will remain available for batch or remote batch production jobs. COMPAK/360 does not place any restrictions upon the multi-programming capabilities of the operating system nor does it restrict the usage of systems running with HASP or Remote Job Entry.

COMPAK/360 monitors the execution of user written, conversational and update programs. The conversational programs communicate with the terminal operator through a series of query and response pairs. The update programs use data entered during the conversational phase to enter updates to the data base. COMPAK/360 is application independent and supports systems files that are sequential, indexed sequential or random. It provides interface for application programs written with COBOL, PL/1, FORTRAN, ALP or RPG.

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

GRAPHIC VISUAL CONTROL



You Get Things Done Better And Faster

The BOARDMASTER saves time, cuts costs and prevents errors. You see what is happening. Shows facts at eye level. For Production, Scheduling, Inventory, Sales, Traffic, Etc. Simple to operate. Write on cards, post on board. Fully flexible. Million in use. Price \$49.50 with cards.

FREE 24 Page BOOKLET No. B-86
Mailed Without Obligation

GRAPHIC SYSTEMS, Box 398, Yanceyville, N.C. 27379

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

**market
place**

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Display Classified—One inch by one column, \$75.00. Column width is 2 1/4". Help wanted and employment services ads will be accepted in the classified section. Ads of 1/8 page or more will be listed in the Advertisers' Index, and will qualify for the free resume service.

software age

Classified Department
P. O. Box 2076, Madison, Wisconsin 53701

PRODUCTS

"HOW TO SUCCESSFULLY SOLVE MONEY and Investment Problems through Game Theory." Treatise for layman. Took years to develop. Many examples and formulae. Send \$6.95. Mayhouse, Box 22-A, New York, N.Y. 10033. Two weeks money back guaranty.

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RESUME KIT. Unique Approach Opens Doors! Gets Interviews! Mail \$1 to: Dept. B, Box 2, Babson Park, Mass. 02157.

WRITE YOUR OWN RESUME: Comprehensive manual shows you how. Includes successful samples for EDP Personnel. Send \$4.25 to K & H Associates, Dept. S, 421 W. Clinton St., Elmira, N.Y. 14901.

BUSINESS CARD FILE with alphabetical guides. Black and gold anodized aluminum \$3. Telephone Index. Attaches to base of telephone, holds 324 numbers. Black bakelite construction \$1.25. LJ Shops, Box 90, Lake Hiawatha, New Jersey 07034.

COMPUTER TIME. Honeywell 200 & 120. 24K each. 4 Tapes. Card Reader/Punch. 1 Printer each system plus Data Products LP—1000 upper and lower available off line printer, OCR Page Reader. Available 3 shifts—7 days. Decollater—Burstur with interstacker, imprinter on site. Call Mr. Moss, (516) 433-8500.

OPTICAL SCANNING. Full EDP services available on site. Your typing or ours—100% throughput possible. Farrington 3050—eliminate retyping. Very fast turnaround at our 24 hr/7 day operation. Call Mr. Moss, (516) 433-8500.

PROFESSIONAL SERVICES

CONTRACT PROGRAMMING—COMPUTER CONSULTANT. Roy Hyde, P. O. Box 3461, Chula Vista, California 92011.

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