

**We call our work
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It calls for those
who "make no little plans."**

If we sound a little bit flowery above it's just that we may be carried away by our own enthusiasm.

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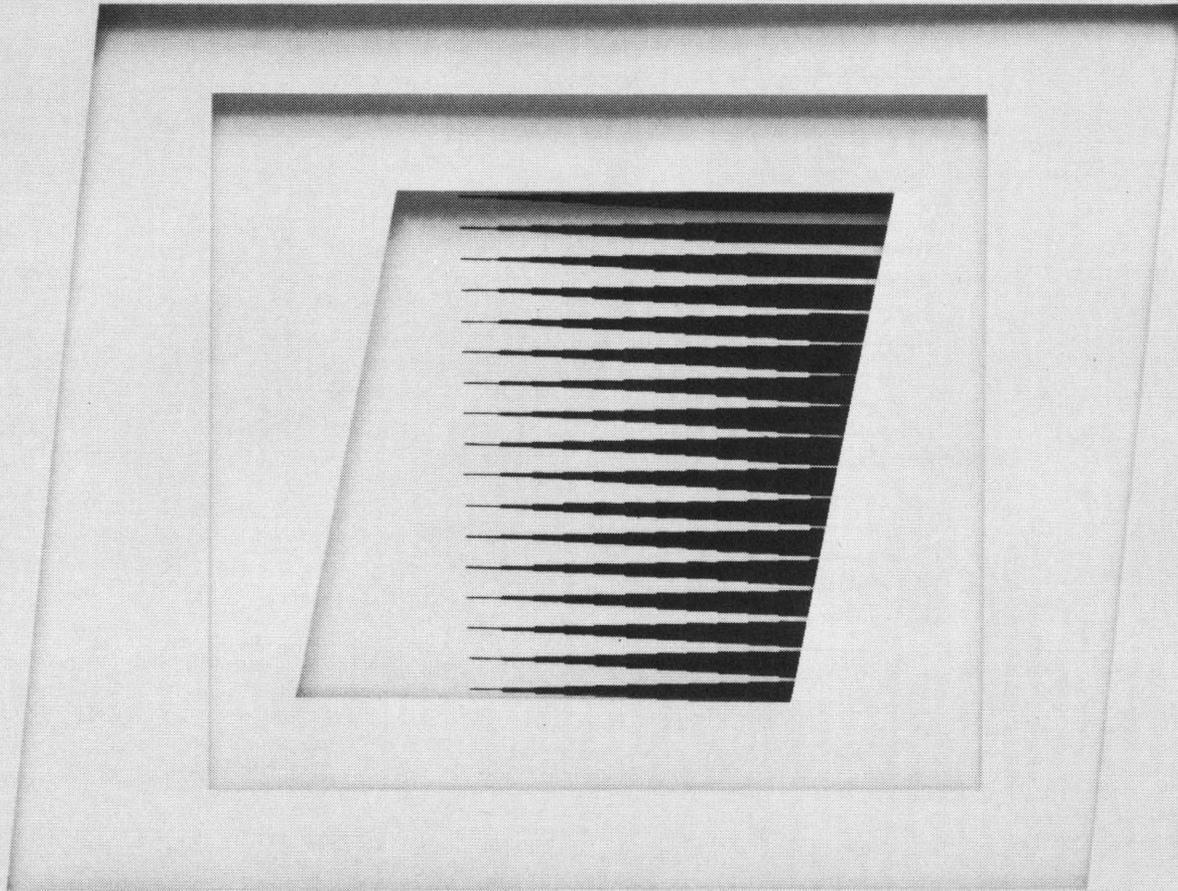
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If your plans for the future are big ones, why not tell us more about yourself. Your experience should be

in any of the following: programming; language processing; control systems; operating systems; utility systems; communications systems; micro-programming; field sales and system support; education or product planning.

*Write to: Mr. Thomas Beckett, Dept. 21,
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RCA
COMPUTERS

software age

JUNE, 1970

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COVER

Courtesy of the Urban Detroit Area Research Project,
representing high-speed (250-mph) transportation axes
to relieve population pressure and traffic congestion.

EDITORIAL

COMPUTER TOOLS & URBAN CRISIS

We're all aware—if we've followed recent media, or looked for ourselves—that in a matter of a few years many parts of America will be engulfed in an urban catastrophe of congestion and pollution. The few random causes readily identified include:

- ... an inability to think and plan in three or four dimensions, to relate spacial concepts of ground, air, and underground to human space relationships ... wide bands of haphazard urban-suburban sprawl, growth unplanned and uncontrolled, along pre-existing transportation corridors which merge in core cities originally sited for access to water and rail transportation ... industry concentrated at shipping ports or rail centers instead of near natural resources.
- ... a concern for material requirements; an unconcern for human needs ... energy systems in transportation and utilities that have been relatively unchanged for a half-century or more ... a multitude of legislative and regulatory bodies whose consent and coordination is mandatory for comprehensive urban planning, crossing state lines as well as cities and counties.
- ... urban planners have for many years created promises of the "city of tomorrow," but no product. Instead at best, we've had "progress through demolition," i.e., more unsightly downtown parking lots, or high-rise public housing.

Obviously, the planning tools, politics, economics, and social attitudes applied in the past will not handle the challenge of the congested megopolis. Of these factors, we predict that new planning tools, **utilizing computer technology**, will present hard, real alternatives that will force change by obvious choice in the socio-economic-political spectrum.

In this issue of SOFTWARE AGE, we're highlighting sample EDP approaches to urban problems, including "Systems Analysis for Urban Planning" beginning on Page 10, and EDP applications for water and air pollution control on Pages 13-14. In reviewing EDP industry background material on urban problems, we were encouraged by the number of EDP firms engaged in urban problem solving, including one which "rents a city" with a simulated urban model.

The technological resources to avoid catastrophe are already with us; our ability to match creative human resources with this technology is an open question that will be favorably answered only if we face the hard alternatives—in time of respond.

Wally Schaw

**TROUBLE-TRAN
PRESENTS
XTRAN'S
ADVENTURES
IN
FORTRAN**



By GEORGE N. VASSILAKIS

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

TROUBLE-TRAN EDITOR

software age

P. O. Box 2076
2211 Fordem Ave., Madison, Wis. 53701

You can also profit by submitting PROBLEMS for this feature. If your problem in FORTRAN programming is selected for use in this feature, you will receive \$50.00

TROUBLE-TRAN'S Objectives:

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

PROBLEM OF THE MONTH

Problem 26: THE INCOMPLETE PROGRAM

What is the value of X printed by this program? Would you believe 10? There are, of course, some missing statements which you must supply. But, you MUST NOT disturb the last five statements.

INTEGER X

.

10 X=5/2

WRITE(6,99)X

99 FØRMAT(I10)

STØP

END

If your answer is correct you will be eligible for one of two \$25.00 prizes.

Answer to Problem 24:

The key to this problem was the statement: $10 Y(1) = X(1)$ in subroutine XTRAN. At compile time, the FORTRAN compiler would have to assume that X is a function subprogram which will be supplied at load time. Therefore, the compiler generates a call to subprogram X. The main program compiles with a warning message that the DATA statement should not be used to initialize COMMON storage.

Since X is a missing subprogram at LOAD time, one would expect that the loader would kill the job and not go into execution. However, the name X happens to be the name of a labeled COMMON block in the main program; and many loaders cannot tell the difference between the name of a subprogram and the name of a common block.

The data item "8BEANS" generates a valid instruction on the IBM 7094 computer. Therefore, when the statement $10 Y(1) = X(1)$ is executed, subprogram X is called and control is transferred to location X(1) which is a TXI instruction. This transfers to some other location which is not full of "beans" and the program finally terminates.

Answer to Problem 23:

Last month I reported that I was concerned about the fact I had not received any solutions as of April 8, 1970. However, when the strike was over I received more than 250 correct solutions. As I started reading the mail I realized that the subject of "Automorphic Numbers," held a few surprises for me.

First, I found out that some of my readers were offended by the fact that I had asked them to solve this problem without spending a million dollars. They made it a point to let me know that \$3.96, or \$5.61, or \$7.35, or \$16.21 is less than a million. The highest I saw was \$168.00.

The second surprise was a letter from Terry Moore and Jerry Feinberg (two CalTech students) demanding the \$50.00 prize, since they had broken the record of 100 digit automorphic numbers in February 1968. In fact their solution was a 22,300 digit automorph with the message, "square me if you can". Terry and Jerry had responded to an article in Scientific American's Mathematical Games (January, 1968).

A letter from J. S. Madachy, editor of the *Journal of Recreational Mathematics* informed me that 1000-digit automorphic pairs to the base 10, base 12, and base 6 had been published in the July 1968 issue of his magazine. The article: "Automorphic Numbers," by Vernon deGuerre and R. A. Fairbairn.

The most pleasant surprise came from Derek A. Zave, UNIVAC Systems, Roseville, Minnesota, who computed a pair of automorphic numbers with 100,000 digits. His program was written in assembly language and took about 16 minutes to run on the UNIVAC 1108.

Most solutions had used rather complex algorithms in going from an n-digit to an (n+1)-digit automorphic number. However, a complex algorithm is still better than a trial and error method of searching and testing every possible combination of digits.

Most algorithms could not be explained in less than a page of space, but Professor Kirby A. Baker of UCLA came up with an algorithm which is believed to be the most efficient and can be explained in one sentence.

"If X is an n-digit automorphic number and $Y = (X-1)^2(2X+1)$, then the last 2n digits of Y form an automorphic number twice as long as X."

Professor Baker did not include a program but his algorithm can be verified by a 10-year old who can multiply large numbers.

Anyone interested in breaking Mr. Zave's record of 100,000 digits?

WINNER: The prize of \$50.00 was awarded to Murray F. Freeman, Philco-Ford Corp., 3900 Welsh Rd., Willow Grove, Pa. His entry was postdated April 2, 1970.

P.S.: Reinventing the "wheel" is excused when you come up with a better wheel.

XTRAN

NEW APPLICATIONS

Computer Helps Teachers Design Math Lessons

A new computer-assisted arithmetic teaching program for educationally disadvantaged students has just gone to work in 42 of the city's elementary school classrooms, according to William Webster, assistant superintendent of the Oakland Unified School District. The new Honeywell-developed system, called ATG for Arithmetic Test Generation, is designed to provide the teacher with precise identification of an individual student's strengths and weaknesses in arithmetic.

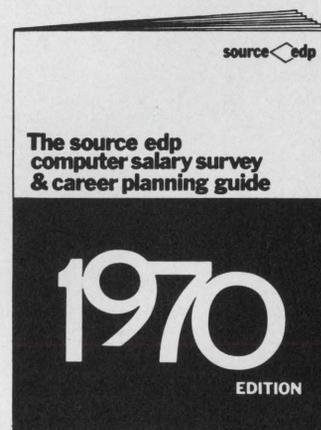
Webster explained that ATG is being used at the seven elementary schools in the city's integration model group. ATG is helping 100 students from low-income families to overcome educational handicaps brought about by their environment, Webster said.

Deliver First OCR For Supermarket Checkout

Transducer Systems, Inc., Willow Grove, Pa., delivered initial units of its recently developed hand portable OCR to Inventory Management Systems, Inc., of Los Angeles. The OCR designated by IMS as the 20/20V resembles a Buck Rogers-type gun. No heavier than an average flashlight, 20/20V stands for 20/20 vision.

Teamed with a computer, the 20/20V will provide several major advantages for store management as well as shoppers. It will practically eliminate the manual ringing up of merchandise, thus speed up the process at the checkout counter. It will provide maximum accuracy in cash transactions, and instantly calculate the price and tax for each item of merchandise the instant the checker aims and triggers it.

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Most Powerful

McDonnell Automation Company's Model 85, valued at nearly \$12-million, is comprised of 92 units of hardware and occupies nearly a quarter of McDonnell Automation's 24,000 square-foot main computer room in St. Louis. Having a 4-million character memory and a storage capacity of 1.7-billion characters, the computer system is the world's most powerful commercial installation.



Computer Changes Library

A computer is quietly changing tradition at the Columbus, Ohio Public Library. Use of an IBM System/360 to control circulation of 2.8 million books per year helps provide same-day return to the selves of reading materials turned in by patrons. Previous methods took two or three days.

Minicomputer Makes Oil Pipeline Safer, More Economical

Almost hidden in the massive and extensive array of equipment in what may be the world's largest and longest heated crude oil pipeline in the world, a tiny minicomputer is making significant contributions to both safety and economy of the entire operation. The Varian 620/i minicomputer is part of a solid state supervisory control system, at the point of origin of a 174-mile 20-inch pipeline moving heavy crude oil from the San Joaquin Valley to refineries in the San Francisco Bay Area. The line is leased and operated by Getty Oil Co., one of the largest producers of crude oil in the valley.

The new line moves approximately 112,000 barrels per day to the Phillips Petroleum Co. refinery in Avon, Calif. and to the Shell Oil Co. refinery in nearby Martinez. The pipeline was designed for a capacity volume movement of 145,000 bpd, or 165,000 bpd for less viscous crude oil. Booster stations along the system are located near Panoche, Gustine and Tracy, Calif.

"Talking" Computers Highlight New Banking Advances at Automation Conference

An RCA "talking" computer at Cherry Hill, N. J., is telling bankers here in a poised, almost human voice details on simulated checking and savings accounts. At the same time, other executives press a typewriter-like keyboard and watch banking data flash on a TV-like screen from an RCA Spectra 70/46 time sharing computer in Los Angeles.

The RCA demonstrations were given recently at the American Banking Association Automation Conference. The purpose is to show how computer-communications speed data from president's office or teller's cage for improved customer service and operational efficiency.

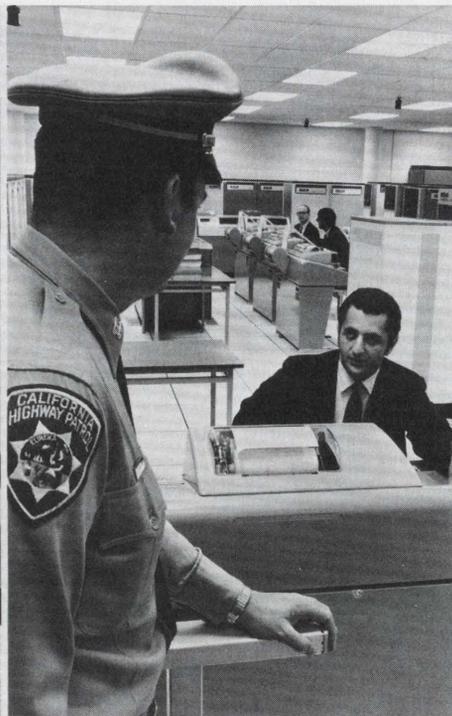
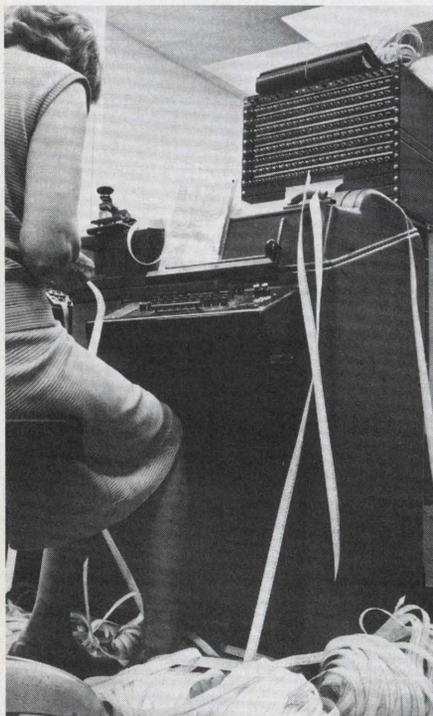
Popular Puzzler Fails to Frustrate Computer

A computer has overcome the frustrations of "Instant Insanity," a popular puzzle that requires the player to arrange four cubes in a particular order. To determine there are 256 ways of arriving at one or more unique solutions to the puzzle, a UNIVAC 1108 computer performed 1,207,959,552 calculations—and printed them on paper—in six minutes and 17 seconds.

Computer Helps Scientist Study Inner Ear

A mathematician at IBM's Los Angeles Scientific Center has programmed a computer to simulate the intricate workings of a portion of the human ear. Dr. Alfred Inselberg, who has spent 11 years on the project, has created a mathematical model of the inner ear that could help specialists learn more about how it works and might suggest remedies for certain types of hearing loss.

The model, already valuable in testing theories about inner ear physiology, is one of eight such research projects selected for demonstration in the IBM pavilion at Tokyo's Expo 70. The simulation involved hundreds of thousands of mathematical calculations on the IBM System/360 Model 75.



Speeding the Word

Yesterday's criminal could lose himself in the paper tape snarl (left) of law enforcement message transmission. But not any longer. Using four RCA Spectra 70/46 computers, CLETS—the California Law Enforcement Telecommunications System (right)—now allows more than 450 urban and rural law enforcement agencies throughout the state to transmit messages in seconds to retrieve criminal records stored in computer files in Sacramento and Washington, D. C.

Computer Helping Improve Care for Mentally Ill

A computer is helping trained professionals provide faster and better treatment for the mentally ill and retarded of Texas. Psychiatrists now receive rapid patient information from the computer that helps them diagnose illnesses and prescribe and maintain programs of treatment. Psychologists get far greater information than ever before about the number, types and needs of mental retardates in the state's far-flung network of special schools.

Soon, the IBM system will follow each patient from admission until discharge, recording every step in his treatment program and through the recovery process. The Texas Department of Mental Health and Mental Retardation's computer system is less than two years old and is built around an IBM System/360 Model 50. Terminals link the central computer with the department's nine mental hospitals, 10 schools for the retarded and mental science research institute.



Surveillance radar shelter mock up for Air Force Electronic Systems Division tactical air control system AN/TPN-19 shows position of display console and control equipment. New system being developed by Raytheon Company's Equipment Division, Wayland, Mass., will be used by the Air Force to meet requirements of all weather landings at tactical military airfields.

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FINANCIAL CURRENTS

Xerox Data Systems has formed a new department to provide specialized consulting services for its commercial data processing customers. The new unit, called Contract Services, is concerned exclusively with commercial applications of XDS computers and offers such services as business systems design and analysis, application programming, and conversion of a customer's existing programs to XDS languages. According to XDS Contract Services Manager Gerald Kaminsky, fees for these services are determined by their nature, scope and duration.

Scott Paper Co. recently reported it has purchased an approximate one-third interest in *Industry Computing Systems, Inc.*, a newly-organized company which will provide computer facilities management to other companies. No purchase price was revealed.

Harrison F. Dunning, *Scott* chairman and chief executive, said the investment in Los Angeles-based I.C.S. was the first in *Scott's* new venture capital program which is intended to help speed the company's diversification and participation in new high potential growth fields.

The nucleus of the EXEC-8 management and design team has left *Univac* and formed *United Software Corp.*, with offices in greater Philadelphia, Minneapolis and New York areas. Headed by Ira A. Clark and John M. Macgowan Jr., *United Software's* professional staff has 43 man-years experience with EXEC-8 software. This includes participation in both the design and implementation of the EXEC-8 multiprocessing, multiprogramming, and time-sharing systems. The firm currently is providing services for three manufacturers, a consulting firm and a common carrier.

Com-Share, Inc., has reached agreement with *Com-Share (Canada) Ltd.*, Toronto, and *Polymer Corporation Ltd.*, Ontario, to expand the Com-Share time-sharing system into European markets. *Com-Share (Canada)* will be the vehicle for this expansion under terms of a contract which gives the Canadian company an exclusive license to use Com-Share software and communications technology in Canada, Britain, Japan, and several Scandinavian, Eastern and Western European countries, for an undisclosed amount of cash and equity.

Recognition Equipment Inc., Dallas, and *Datacraft Corp.*, Fort Lauderdale, Florida, have held the second closing under their agreement of December 22, 1969. This completes the transactions whereby *Recognition Equipment* exchanged 142,415 shares of its common stock for 890,096 shares of *Datacraft* common stock. With the exchange of these shares, *Recognition Equipment's* ownership of *Datacraft* will be about 40 percent on a fully diluted basis. If *Recognition Equipment* exercises certain warrants, its ownership of *Datacraft* could increase to about 51 percent. *Datacraft* now holds 142,415 shares of *Recognition Equipment* common.

Computer Dimensions, Inc., Dallas-based data processing firm, announced at its recent annual shareholders meeting that earnings for the first quarter of 1970 marked a new record and that negotiations have been completed for the acquisition of *Investment Controls, Inc.* in a transaction involving up to \$4.5 million. Joseph T. Verdesca, Sr., president of CDI, said that earnings for the three months ended March 31, 1970, totaled \$85,482, or 7¢ per share, compared with a loss of \$155,501, or minus 17¢ per share for the like period a year ago.

Domestic shipments of *RCA* computers nearly doubled in the first quarter of 1970, and, if the past industry pattern continues, the company's scheduled deliveries this year should move *RCA* from fifth place last year to the industry's Number Two position, Robert W. Sarnoff, Chairman and President, said recently.

Sarnoff said that *RCA's* schedule of domestic shipments this year will account for slightly more than 7 percent of the projected industry total, as against 3.7 percent in 1969. He added that no company other than *IBM* has achieved this high a share of the market during the past five years. As a further indication of growth, he cited a threefold increase in the number of new computer accounts obtained by *RCA* in the first quarter of 1970.

Cybernetics International Corp., (OTC) has signed non-exclusive agreements with the EDP Division of *Honeywell Inc.* and *SirVess, Inc.*, to provide nationwide field maintenance for its *Realtronics R1* data entry system, it was announced today by E. W. Housh, *Cybernetics* President. "As a result of these agreements, *Cybernetics* now has the most extensive maintenance network of any company in the data entry field," Housh said. "Using trained *Honeywell* and *SirVess* service personnel to augment our own experienced staff, we can now offer around-the-clock field engineering support to *R1* installations anywhere in the country."

John J. Graham, President, *Diebold Computer Leasing, Inc.*, told shareholders at the recent annual meeting that despite record high interest rates and the scarcity of credit during 1969, which brought the computer leasing business in the U. S. to a virtual standstill, the company's revenues increased from \$12,813,000 to \$30,947,000 and earnings from \$1,098,000 to \$1,441,000 compared to the previous year.

In addition, first quarter 1970 revenues of \$8,159,000 and net earnings of \$382,000 compared favorably on a per share basis to revenues of \$7,244,000 and net earnings of \$427,000 for the first quarter of 1969 as the weighted average number of shares outstanding at March 31, 1970 and 1969 were 3,935,000 and 4,685,000 respectively.

Transamerica Corp. has taken a twenty-five per cent common stock equity position in *Western Operations, Inc.*, it was announced today by Alan Hochschild, president of Western Operations. Hochschild said that this completes the major financing planned for 1970 expansion. Other major investors, in addition to employees, are Boothe Computer Investment Corp., Bowne & Company, Inc., and Continental Capital Corp.

Western Operations, located in San Francisco, is one of the largest privately-owned computer planning and management companies in the United States. Among the systems planned and developed by the company is a comprehensive back-office system for the mutual fund industry, which has been installed in ten fund management companies throughout the United States.

Programming Methods, Inc. (OTC), a computer systems and proprietary software firm, recently reported record revenues and earnings for the three months ended March 31, 1970.

According to George Langnas, President, revenues for the first quarter reached \$1,281,538, a rise of 24.4 percent over the \$1,029,768 recorded for the same period in 1969. Net earnings climbed 29.7 percent to \$122,121, equal to \$.14 per share, from \$94,136, or \$.11 per share, last year. Langnas said the sharp rise in net earnings was due in part to increased sales of proprietary software packages which have high profit margins.

Computer Dimensions, Inc., of Dallas, Texas, one of the nation's leading data processing firms, recently announced it has signed a \$2,100,000 data processing contract with *Budget Industries, Inc.* of Los Angeles and also worked out an agreement to acquire a computer software company controlled by Budget. Under terms of the contract, CDI will take over the entire data processing operation currently maintained by Budget Industries, a \$35 million-a-year conglomerate listed on the New York Stock Exchange, and move its operations to CDI's Los Angeles data processing center where it will handle all of Budget's present processing requirements.

Computer Sciences Corp. has also extended its new computer time-sharing network, *Infonet*, to Chicago, according to Gerald G. Alexander, district manager for CSC's Information Network Division. CSC's Chicago computer center in suburban Oak Brook is the third *Infonet* center to open since the first of the year. Centers in Washington, D.C., and Los Angeles became operational in January. The company's plans call for a nationwide network of centers utilizing up to 20 Univac 1108 computers.

Gelman Instrument Co., of Ann Arbor, Mich., has completed further necessary steps for the acquisition of *Unico Environmental Instruments, Inc.*, Fall River, Mass., as a result of a favorable vote recently by Unico shareholders, according to an announcement made by Charles Gelman, president of Gelman Instrument, and Robert J. Kohn, president of Unico.

Under terms of the merger agreement, shareholders of Unico will receive one share of Gelman Instrument common stock for each five shares of Unico common stock held, resulting in the issuance of approximately 68,000 shares of Gelman Instrument common stock.

The Computer Exchange, Inc., a leading supplier of used computers and peripheral equipment, recently announced it has completed the acquisition of *Computer Synergy Inc.*, Oakland, Calif., for an undisclosed amount of stock. Computer Synergy provides facilities management to companies and institutions operating in-house electronic data processing systems.

Wellington Computer Systems Inc. has acquired 100 percent of the stock of *Aries Data Centers, Inc.*, a subsidiary of *Aries Corp.*, it was recently announced by William G. Lucas, president of Wellington. Aries Data Centers, which is headquartered in Fairfield, N.J., provides programming services and also does processing, mostly in a real-time environment. Currently the company is involved in facility management for Atlantic Container Lines, operating an inventory system for Atlantic's nation-wide container operations, and is doing processing work for the U.S. Government and industry.



CAREER MEMO

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Introduction

Urban planning as a discipline has a fundamental economic and human goal which is achieved through a variety of technical tools. Its central concern is with man, and with the problems of agglomerations that he creates. Planning is assumed to consider all factors influencing urban growth and change: physical, social, economic and administrative. Resolution of urban problems requires a broadly based comprehensive attack on their causes, utilizing the best knowledge and understanding currently available of the planning and economic systems techniques.

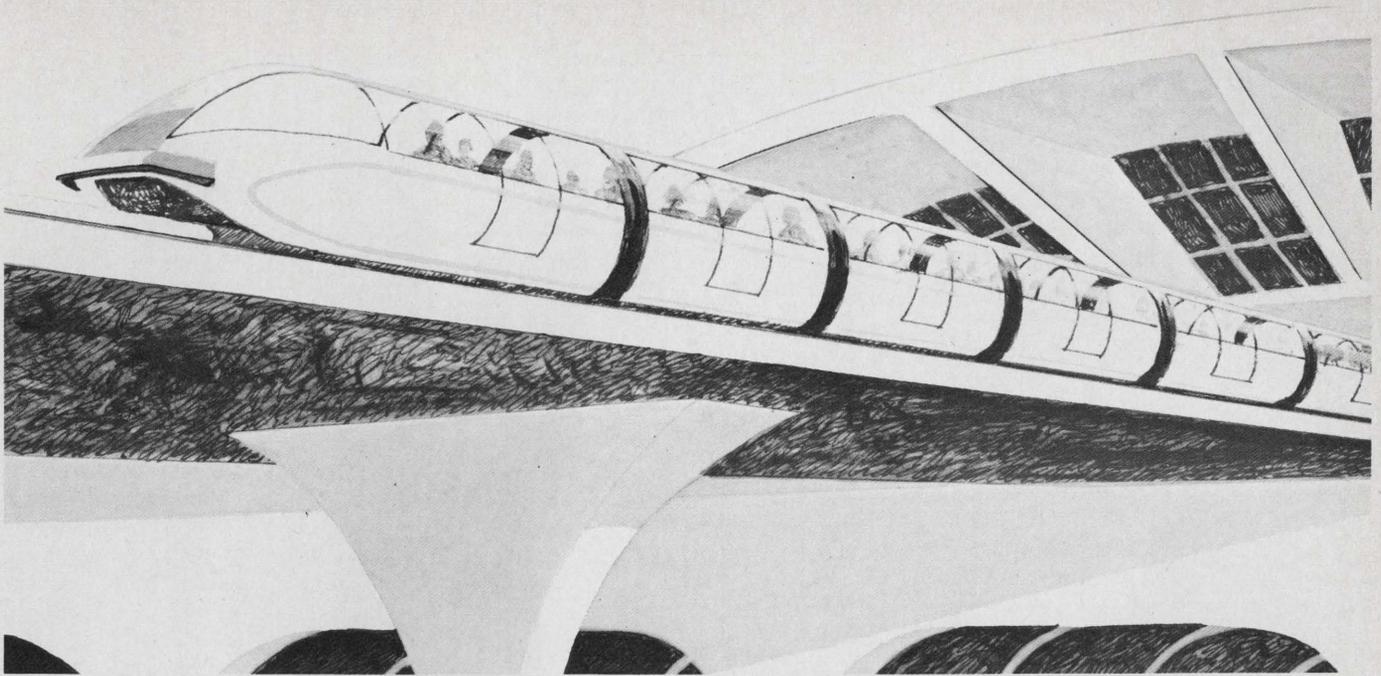
The first section of this paper is written from the viewpoint of an urban planner and architect. It outlines some of the critical areas in planning where some of the advanced methodologies of other disciplines may effectively be brought to bear in the solution of complex urban planning problems. The succeeding sections of this paper reflect the response of a systems analyst and engineer who is directly involved in the application of systems technologies to the problems that traditionally have fallen into the domain of the planner/architect. It is expected that a continuous, intensive interaction between these disciplines will lead to new and effective strategies in urban planning.

The creative process of planning is in a state of change in response to the social and economic forces acting upon it from without and the technology and the competitive forces from within. The planner functioning for society and within the framework of the creative process is affected by changes in both. These changes will demand a totally new and effective methodology which can be translated by the following outlines of systems analysis and possible planning approaches.

- A consistent and manageable set of data on existing conditions in the urban area and on its regional impingements must be developed. A multi-disciplinary evaluation of the data requirements will be necessary. It will also be necessary to develop a computerized data bank tailored to the needs and the use of local agencies.

- A problem definition methodology must be developed. The data should provide a capability for defining urban/regional development problems. Through analytical models and computer programs developed during the inquiry, the planner should be able to test the viability of alternate responses to the problems.

- A more scientific method of inquiry is needed to evaluate the effectiveness of available public programs in resolving identified problems and, where appropriate, to recommend other additional programs.



- An effective instrument must be established for comprehensive development program formulation by determining and anticipating opportunities.

- To permit ready evaluation and prompt corrective action, there should be a continuous and accurate monitoring of influence of policy changes through application of performance criteria.

- The breadth of inquiry should emphasize the identification and evaluation of interrelationships and influences of diverse aspects of regional problems and opportunities, of areas of public service and public responsibility and the public sector.

- A better method of resolution of analytical relationships is needed which will lead to a definition between the various elements of the urban area/region.

- Directions of population growth must be determined with greater predictive accuracy.

- A simulated metropolitan or area environment must be anticipated, each representing a group of internally coherent objectives.

- Planning objectives must be formulated in terms of quantifiable groups. These objectives represent a technical presentation of the needs which serve as guidelines for a specific development program.

- Conceptual programs must be synthesized to meet the planning objectives. These programs should be a simulation of private actions

as well as direct public actions and expenditures.

- Appropriate conceptual programs which are tested in an appropriate simulated environment will be needed. The outputs of the testing would permit an evaluation of the merits of the program.

- We must be able to predict the dynamic effects of planning and implementation as the environment changes.

- Environmental modification plans must be determined. This is a method of evaluating conceptual programs repeatedly until a desirable form of the concept is the predicted results and is presented along with other pertinent facts and details as the specification of the subsystem and elements.

- A basic management technique is needed for the implementation of plans, involving the use of program, planning, and budgeting systems.

- There is a need for monitoring the planning and implementation as a continuing dynamic process responsive to unanticipated as well as projected changes in the environment.

- Adequate measurement of the change in the urban system is needed as an essential element of the monitoring process. The significance of the observed changes may be related to the selected goals of the urban environment through performance criteria. Definition of these criteria at the outset of the

period considered by the plan will be provided by a measure of the progress toward the desired objectives as well as the guidance for possible modification of the plan.

Systems Analysis May Reshape Planners Methods

For the planner, the use of systems analysis may reshape the way he organizes thoughts and work. Through systems analysis he can fracture large problems into smaller ones. He could formally organize data in ways that permit alternative investigations leading to design solution, final development alternatives, and implementation methodologies. The process is not complete until the end results have been tested and the performance evaluated.

To forecast the future of the planning profession, one must examine the forces at work in all of these areas and plot their trends. This will be indicative of the task the profession must undertake: to accept new technology and to adapt new systems as required by its own concepts. In addition, there is a great need for adapting a systems approach as part of the planning process. It appears certain that a wider range of brain power and a new technology can be introduced to this creative process. Whether the urban planner will be capable of marshalling this kind of human resource is conjectural at this time.

URBAN PLANNING . . .

From the point of view of a systems analyst, the problems posed by urban planning and development require the extension of existing methodologies to the evaluation of acting and interacting urban system components. The efforts that have been given to resource management, transportation, education, and the many other urban system components lack a generalized approach to systematic planning and evaluation.

The urban system, complex with intangible factors, poses a unique problem to the systems analyst. The system, characterized by the diffusion of responsibility and authority, suffers ill-defined goals and objectives. Extraordinarily large sums of money and the necessity for long-range planning make the major variables of the urban system strenuously difficult to define. Simulation models tend to be so complex that few organizations have the trained personnel to effectively utilize such models and interpret the results to others.

In the following sections we will briefly present an overview of presently developed analytical tools which may be employed in urban system planning and evaluation.

The Systems Design Procedure

Figure 1 represents a highly aggregated schematic view of the

iterative process involved in the design or redesign of socio-economic systems. The design procedure is an outgrowth of well-established methodologies in the engineering design of complex physical systems. The starting point of the planning and/or evaluation design sequence may occur at any stage of the iterative loop. If the system must be designed in its entirety, then the starting point may be as shown in Figure 1. In the modification or redesign of an existing system, it is possible to start at any other point in the loop.

The descriptive model of the system consists of a series of generalized block and flow diagrams. The block diagrams will be used to delineate the control volumes (Step 6) that will be used in the analysis. Each control volume usually represents a subsystem of the entire system. In this case the system might be a city, and the subsystems might have included residential neighborhoods, shopping centers, industrial enterprises, schools, or any other operational entities within the city system.

The control volumes usually represent highly aggregated levels of the system. This implies that many of the activities are lumped together into a larger subsystem. Into each of these control volumes or subsystems there will be a mass flow (which could be people, materials, that is, any "mass"). These quanti-

ties are acted upon by the system function and are subject to the conservation laws of mass, momentum, and energy.

Determining Sufficient Systems Measurements

Once we reach a point in which we can see the total picture in terms of control volumes and we have an initial concept of all the interrelationships, then we ask whether we can measure the properties of the various flows in such a way that we can determine whether the system is achieving its objectives. At this high level of aggregation, the chances are that we will not be able to measure the quantities which are necessary for the kind of analysis outlined. Therefore, we switch to a Control Mass Analysis. We observe all of the interactions of a single citizen or fixed quantity of mass with the environment.

From a theoretical standpoint, the answers that we get from this Control Mass Analysis should be identical to those from a Control Volume Analysis. However, the difference in perspective gives us a great deal more information and ability to measure things. Ability, for instance, to measure income levels, or employment opportunities, average walking or riding distances, accessibility of recreation facilities.

After looking at the citizen from this perspective, we can again measure the various properties of the flow. If we find that the measurements which can be made are sufficient to enable us to set up standards for achieving the objective functions, we proceed to the next step of the analysis. If the measurements are still insufficient, we return to Control Mass Analysis and de-aggregate. The de-aggregation process will involve breaking down into more and more elemental components each of the subsystems that have been delineated. Having reached a level of aggregation at which the variables in question could not only be quantified but also measured, we are now in a position to develop a mathematical or computer-based model of the system.

Figure 2 represents one possible version of a general planning and evaluation model. It can be seen

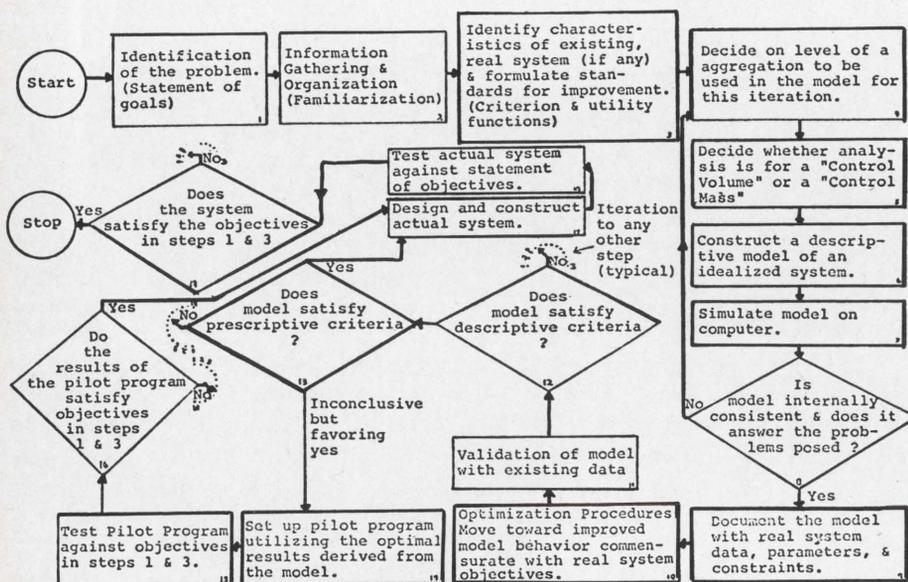


Figure 1

continued on page 16

AIR, WATER POLLUTION EVALUATED BY COMPUTERS

Model Simulates Pollution in Atmosphere

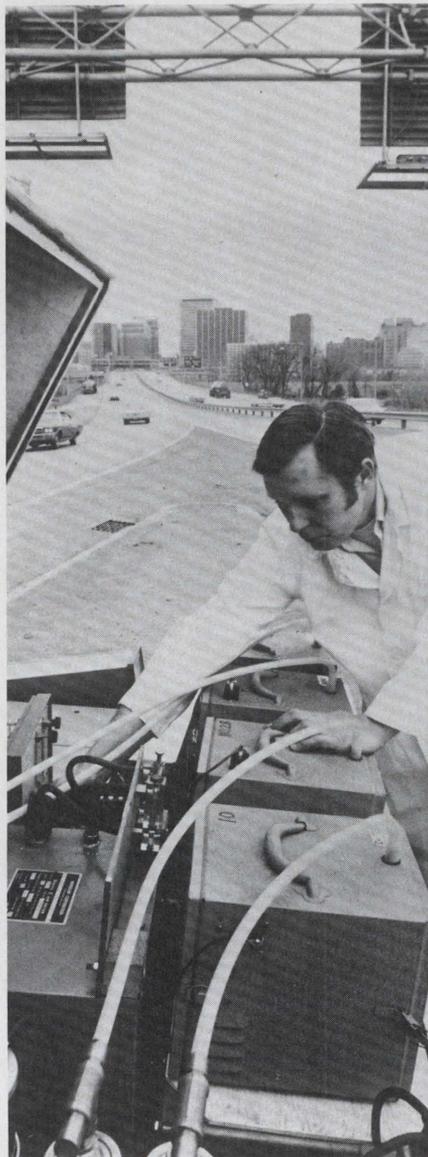
Scientists at a Hartford, Conn., research center are testing various methods of reducing air pollution by simulating atmospheric conditions in a computer. The research, aimed at producing specific recommendations for improving Connecticut's air quality, is based on a mathematical "model" developed by the Travelers Research Corporation. (The Corporation soon will be known as the Center for the Environment and Man.)

In addition to simulating pollution in the atmosphere, the computer, an IBM System/360 Model 40, also has analyzed thousands of actual air quality measurements. These calculations, according to TRC, show that pollution in some areas exceeds acceptable limits by 50 to 125 percent. Predictions of future pollution levels are also possible.

Glenn R. Hilst, TRC executive vice president, commented on the use of the computer model: "Only by knowing why, when and where we have polluted the air can we make sensible recommendations on controlling pollution. The computer is already giving us a great deal of this information, and is improving our ability to analyze it."

Dr. Hilst does not expect the computer to provide simple solutions, however. "The problem is too complex," he said. "For example, each type of pollutant, including sulfur dioxide and particulates—the airborne materials that cause smoke palls and grimy films of dust—presents three major problems.

"First, we must improve those areas where pollution already exceeds acceptable limits. Second, we must control pollution sources where concentrations are approaching unacceptable limits. Finally, we are



Analyze Air Pollution

Collecting data on exhaust emissions from motor vehicles, a Travelers Research Corporation technician sets up mobile air sampling equipment beside an expressway near downtown Hartford, Conn.

Pilot Method for Managing Water Quality

If the city waste treatment plant failed at Dayton, Ohio, how would the dissolved oxygen content of Miami River be affected three miles to the south? Would the pH of the water be influenced in Middletown if a new manufacturing plant was built six miles upstream in Franklin?

Finding answers to questions like these is one of the jobs of the engineers of the Miami Conservancy District, Dayton, Ohio, which is making one of the most detailed and exhaustive studies ever attempted on a river. By determining the factors that influence water quality on this heavily-used river, officials hope to develop practical means for improving and maintaining high quality levels.

To accomplish this, massive amounts of information are being collected from the river throughout the district. From this data, a mathematical model of the river is being created on the conservancy district's computer. By using the data given to the computer, the effect of varying conditions, either real or projected, can be simulated reliably.

Quality conditions on the Great Miami River are the result of a complex interaction of the discharge of treated municipal and industrial waste waters, run off from urban and agricultural areas, and the physical characteristics of the river itself. These factors are complicated by the great concentration of cities and industries for 130 miles along the banks of the river from Sidney on the north to the Ohio River on the south. The close proximity of these main sources of waste load make it difficult to develop a realistic and effective program for water quality protection unless their combined effects can be studied.

WATER QUALITY . . .

Water quality study is very different from other hydrology projects. Water conditions, highly affected by light and temperature, as well as the loads being introduced from factories, community treatment plants and similar sources, change from minute to minute, and from one part of the river to another. Use of a mathematical model calls for making literally millions of numeric representations available for processing on a random basis. Consequently, the volume of data, calculation and manipulation is such that a computer is a basic working essential for the study.

The system set up for regular monitoring of water quality in the Miami basin calls for a continuing flow of information into and from the district's computer. For example,

each of the 60 users of the river must make a regular monthly report on stream loading to the Ohio Water Pollution Board. Copies are sent to the Miami Conservancy District, where the data on the reports are key-punched and entered into the computer. This is no small task, since there is not a standard form used for these reports, because each user is discharging in the stream effluents of different character. One of the earliest jobs of the computer programmers at the conservancy district was to devise a program that could translate these varying reports into a format usable with the pollution report programs.

The cards that are punched from these forms give the quality of the influent to the plant and the effluent into the river. The combined reports from the computer show what

each plant is doing, and gives the total volume of loading for any given stretch of stream. All of this data goes onto an NCR Century's disc files, as does the detailed information from other reports.

Engineers Are Also Computer Operators

The ability of the District's engineers to interact closely with the computer, acting as his own computer operator, is important in making sure that the desired results are being delivered. By separating operation of the computer from the development of programs, a communications gap could have been created between needs and results. Under the districts plan of operation, the man who needs the information is standing right there when the computer prints it out. For the most part, these print outs are statistical reports on flow or pollution conditions. Should the engineer want to hypothesize—to test other influent or effluent rates, for example—he can enter cards which simulate the conditions he wants to observe. The computer delivers the needed data in seconds.

Further, results can be measured graphically on a dioramic scale model of the Miami River which has been constructed in the district's offices. This model has built in data displays to indicate flow and pollution factors over the whole length of the stream.

In developing a water-quality management program, one of the big problems is to know just what pollution really does to the river. Only the computer can provide the answers. The nature of the stream itself is very important, for a condition that may affect the Miami River adversely could have very little influence on some other river. For this reason the work of the ecologists is also very important; data provided by the computer helps them evaluate work that has already been done on the river, and project the influence of future projects. They are learning the effect of conditions on native aquatic life, the reactions to variations in water temperature, water levels, and similar factors. ■

POLLUTION IN ATMOSPHERE . . .

looking for potential problems where no pollution exists at present."

Further complicating the problem, he said, are the multitude of pollution sources, and constantly changing weather conditions. "There also are a number of social and economic questions—the cost and acceptability of proposed solutions, for example. Only with computers is it possible to carry out the millions of calculations needed to evaluate all these factors."

Team Developed Pollution Model

A research team headed by Arthur W. Bostick developed the pollution model over a two-year period. To formulate the complex mathematical equations that make up the model, exhaustive data on pollution caused by motor vehicles, power plants, factories, home heating units and other sources was fed into the computer.

The data was gathered from 25 strategically located measuring stations and from specially equipped trucks and aircraft operating along Connecticut's borders. These mobile measuring stations made it possible to measure pollution from sources outside the state.

For each station, it was determined how often and under what

conditions air quality failed to meet standards set by the Connecticut Clean Air Commission. By reducing this mass of data to meaningful form, the computer makes it possible to test many alternative methods of improving air quality. Among these might be rescheduling the operations of certain industrial plants at critical hours, or restricting the use of automobiles or oil burners. Even future technological advances, such as the widespread use of battery powered vehicles and nuclear power generation, can be evaluated.

The computer analysis shows that pollution exceeds acceptable limits in several regions of Connecticut, including parts of the coastal zone. In other areas, pollution is approaching permissible limits. Bostick's group is applying the computer model to air pollution control for metropolitan Toronto. As the model can be adapted to simulate any set of atmospheric conditions, he foresees the possibility of its use in many other urban areas.

Computer models should help to answer many questions about air pollution. Little is known, for example, about the effect of pollutants on drivers' reflexes, or the influence of over-the-road structures on the dispersion of pollutants. ■

THE TEST-PASSING METHOD OF RANDOM DIGIT SELECTION

by
FRED GRUENBERGER

Each new scheme for the generation of pseudo-random digits (or numbers) is validated by subjecting the output to eight standard statistical tests. A brief description of these tests is given in the Appendix.

Since the essence of randomness is unpredictability, the reasoning (admittedly specious) is as follows: If the output represented true randomness, it would exhibit certain characteristics, and the eight tests reflect these characteristics. If the output does have the stated characteristics, then it is considered sufficiently random to be useful, and an algorithm for the generation of such digits or number is labelled pseudo-random.

Thus, as Lehmer puts it [1], we have "a vague notion embodying the idea of a sequence in which each term is unpredictable to the uninitiated and whose digits pass a certain number of tests, traditional with statisticians and depending somewhat on the uses to which the sequence is to be put." For a thorough treatment of the history and philosophy of the subject, the reader is referred to "Random Number Generators" by Hull and Dobell [7].

While each new algorithm attempts to optimize some computer trait (e.g., minimum executions time, minimum storage use, minimum number of instructions, etc.), it is clear that the logical attack is precisely backwards. The actual goal, however carefully concealed, is to pass the eight tests. It follows, therefore, that the ultimate method is that which capitalizes directly on the true goal; namely, an algorithm which is based on the tests themselves. Hence the derivation of the test-passing method.

The new algorithm is simply that if the tests are applied in that order, tests 2, 6, and 7 may never be used to dictate the choice of digit.

A delicate problem arises when two or more of the test criteria are at identically critical points. Although they are being *monitored* in priority order, a choice must be made as to which test should be satisfied with the next selected digit. The obvious solution is to make the choice at random, using some handy digit recently selected.

The test-passing algorithm, written as a subroutine for the System/360, involves about 800 instructions, and (on a Model 50) takes an average of 3870 milliseconds to calculate each digit. Each of the eight tests requires some data storage. For example, the d^2 test calls for ten intervals, which means that ten totals must be carried, plus the ten known values. Total storage for the tests comes to 371 words, plus, of course, the critical values of the chi-squared table. Total data storage is thus 381 words. Subsequent implementations of the algorithm, particularly on other machines, are expected to operate at least 5 percent faster.

Suppose that the situation is as follows:

Test	Chi-squared	P
1. Frequency	5.380	.80
2. Serial	19.446	.76
3. Gap	35.608	.24
4. Poker	1.839	.72
5. Maximum	5.412	.02
6. d^2	12.247	.19
7. Correlation	31.410	.06
8. Coupon-collector's	22.685	.56

Clearly, at this point, the maximum test is out of bounds, so that the next digit selected should not form a local maximum (and probably the next half dozen points would be selected on that criterion alone). Eventually, the maximum test will be satisfied; that is, its probability will be raised to .05, at which time some other test will be the weakest, and so on. Tests 6 and 7 are the most awkward to manipulate, since they each require many digits to form one new test case. On the other hand, each attempt to bring them within bounds allows for the generation of many new digits, during which time the additional computation for the other tests may be suspended, thus saving compute time.

Experience in implementing the test-passing algorithm indicates that the poker test (number 4) is the one that most frequently wanders off scale or, looking at it another way, continuous monitoring of the poker test best insures that all the tests remain stable simultaneously. Thus, in practice, the priority order for the tests should be as follows: 4,3,5,8,1,2,6, and 7. There is some evidence stated: at any stage, select for the next digit that one which will tend to make the total collection pass all eight tests. This is the theoretical definition. As is customary, we need also an operational definition: select that digit which will tend to correct that test which is most out of control at that stage.

There are two difficulties. First, neither definition provides a way to get started. This can be resolved by utilizing any of a dozen known schemes (e.g. the Lehmer congruential method [1]; the mid-square method [2]; a method previously described by the author [3], etc.), used to generate, say, 400 digits each, and simply averaging their results. This is housekeeping for the method, and needs to be done only once.

The other difficulty is to provide a choice of digits that may be systematic. Thus, a subroutine can be written whose output is a decimal digit in fixed sequence: 0,1,2,3,4,5,6,7,8,9,0,1,2,3, . . . with a single digit to be selected according to the scheme of the algorithm.

At any given stage, all eight tests have been applied to the digits so

far created, with the probabilities given by their chi-squared analyses.

Appendix

1. *The frequency test.* A ten-way distribution is made of the frequency of appearance of the decimal digits. This distribution is compared to the theoretical; namely, ten percent of the total number of digits for each digit. The theoretical and observed values are compared for goodness-of-fit by chi-squared. The resulting probability must be between .05 and .95, thus reflecting that the distribution of the digits must be close to, but not too close to, the theoretical.

2. *The serial test.* Same as the frequency test, except for using the 100-way distribution of the digits taken two at a time.

3. *The gap test.* A distribution is formed of the lengths of the gaps between successive appearances of the same digit. These gaps can range from one up; the mean value should be ten, and any gaps of length greater than 40 should be aggregated. The gaps are taken for all ten digits. The observed and theoretical frequencies are compared by chi-squared analysis as before.

4. *The poker test.* Considering the digits four at a time, distribute them according to the poker combinations: four of a kind; three of a kind; two pairs; one pair; and none alike. Compare the distribution with the known theoretical distribution. The choice of four digits, rather than the five indicated by the name of the test, is solely due to tradition.

The first four tests were devised by Kendall and Babington-Smith and are described in [4].

5. *The maximum test.* Considering the digits three at a time, tally as a maximum those instances in which the middle digit is greater than the other two; this should occur 28.5 percent of the time. As usual, one wants to be close to 28.5 percent but not too close.

6. *The d^2 test.* This test is of random numbers, rather than digits. Random numbers are usually generated so as to be uniformly distributed in the range from zero to one, considered as fractions. Two random

numbers thus locate a point in the unit square. Two such points lie at a distance from each other of between zero and $\sqrt{2}$ units, or the square of the distance between them lies between zero and two. The theoretical distribution of such distances is calculable; see [5], and the theoretical can be compared to the observed by chi-squared.

7. *The correlation test.* Again, taking random numbers as coordinates of points, the distribution of all generated points in the unit square, divided into ten equal parts in both directions, can be determined. Each of the 100 cells should contain one percent of the points. Each of the theoretical frequencies is thus one percent of the pairs of random number under test.

8. *The coupon collector's test.* This is a digit test. Count the length of the string of digits that it takes to accrue a complete set of digits. This length will be at least ten and may be any length greater than ten; for statistical purposes, any string length greater than 40 can be aggregated. Form a distribution of these lengths; the theoretical frequencies in such a distribution are known to 35 digit precision. [6]

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continued from page 12

that the major steps of the anatomy of the problem solving process are enclosed in the dashed lines. Some of the major inputs are shown on the left side and some of the major outputs, on the right side of the diagram.

The solution of a given problem begins with a recognition of a need which must be satisfied. There may be a need for new policies, new procedures, replacement of roads or sewers, improved information, more money, and so forth. The "need statement" is usually a general statement in which the problem is recognized. The next step involves a more detailed definition of the problem which includes making the constraints and available resources explicit. Thus, the problem definition involves stating what the problem is, who will do it, when it must be completed, and the resources to be allocated to the solution of the problem. The next step involves establishing a value system.

The long-range goals represent the "directions" in which we want to go. By contrast, the short-range objectives represent specific steps that we must take in order to move in the direction of our goals. Usually it is possible to write the objectives in their relative order of importance with respect to achieving the goals. An objective is an activity, a task, or a project which must be completed within a given amount of time with a given set of resources such as manpower facilities, equipment, and information. Some objectives may be achieved sequentially through time while others may be achieved simultaneously or in parallel with each other. The objectives may be thought of as milestones against which we measure progress towards the goals.

It is important to develop a set of evaluation criteria for each of the short-range objectives. Criteria, such as cost, effectiveness, reliability, attractiveness, and so forth, make it possible to evaluate the relative merits or value of each of the potential solutions to the problem.

Since not all of the criteria are equally important in terms of the goals and objectives of the problem solver, they must be weighed relative to each other. Furthermore,

many different relationships may exist between the ratings to a specific candidate or alternative with respect to a given criteria and its corresponding utility or "value." For instance, the utility of a freeway may vary inversely as its costs but directly as its effectiveness. Furthermore, the relationships between utility and the criteria are usually nonlinear. It is essential to develop such utility relationships and to make them explicit.

Once the value system has been established, many different alternatives should be considered and the ones that are most obviously least compatible with the long-range goals, objectives, constraints, and available resources should be rejected. Thus it is possible to reduce a large number of alternatives to a smaller number of realistic ones. Each of these potential solutions may then be analyzed or tested to determine its properties. The important properties are those represented by the evaluation criteria. A rating for each criterion may be obtained by computation, empirical testing, or by utilizing the subjective judgments of one or more individuals.

The evaluation phase of this problem-solving model involves converting each of the ratings into a corresponding utility number and summing* all of the utility numbers for a given alternative solution to obtain its total utility to the problem solver. The relative overall utilities of the various solutions may then be compared and the alternative having the highest utility may be selected. In some problems, resources are allocated in direct proportion to the utility of the given project, program or activity.

In Figure 2 it can be seen that the decision-making process offers three major alternatives. First, it is possible that more information is needed before continuing on to another phase of the problem or to another problem. Thus we have an iteration to any of the preceding steps. On the other hand, we may decide that all of the work done so far has led to unacceptable alternatives and that the project should be ended. Hence, "stop."

* This procedure requires that the criteria selected be relatively independent of each other. To the extent that they are independent, the additivity concept holds; otherwise it must be considered as a good first approximation.

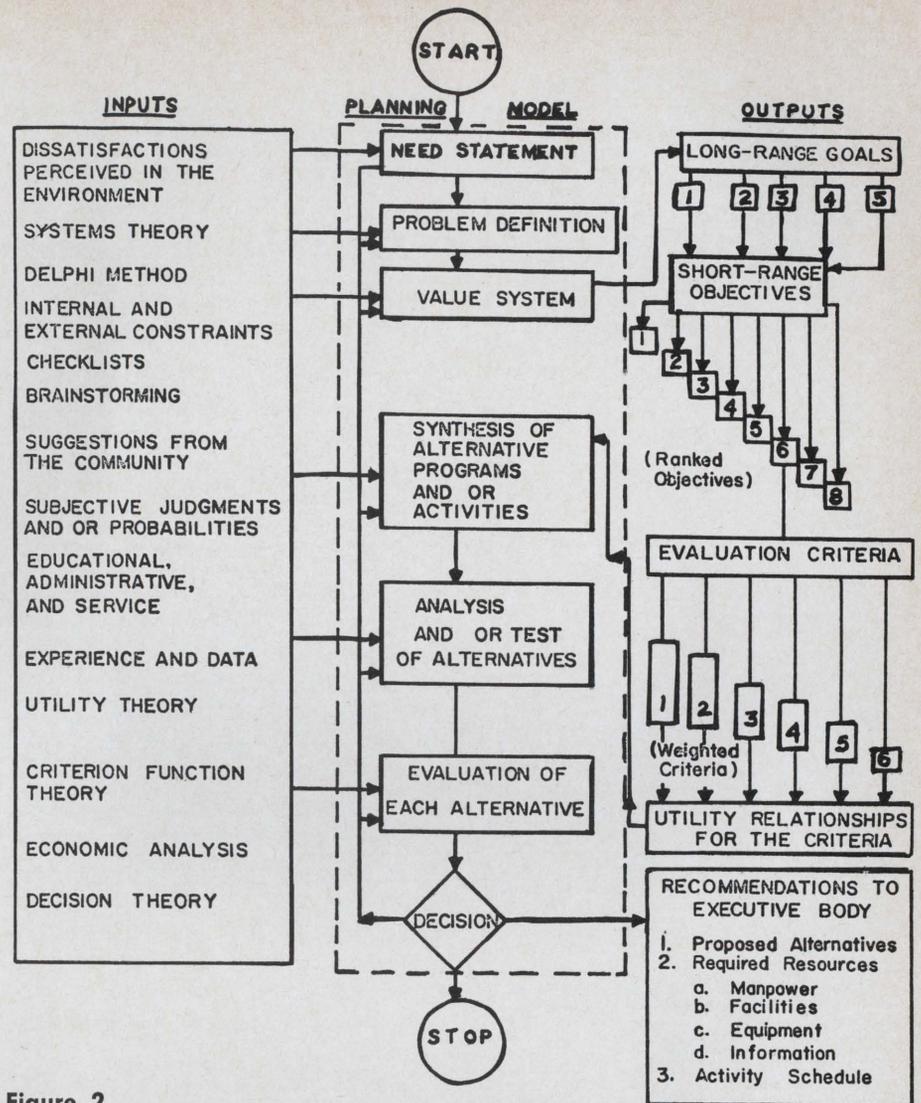


Figure 2

Finally, we may consider that the problem under consideration has been satisfactorily solved. We would submit a set of recommendations to some higher authority or make the required decision. This above set of recommendations typically includes a set of conclusions regarding the alternative solutions that were considered, a detailed projection of the resources required to implement the recommended solution, and a tentative schedule of forthcoming activities.

Conclusions

In the first part of this paper we have indicated some of the existing methods and problems of urban planning. In the second part, we have tried to show how some of the existing tools of system technology may be helpful in solving some of the problems that beset urban planners. In conclusion, we suggest the

following immediate objectives for current urban planning strategies:

- Increased application of systems analysis and operations research methods, to all phases of urban planning.
- Improved communications and cooperation between architects, planners, systems analysts, operations researchers, computer technologists, economists, sociologists, and politicians.
- Development of user-oriented computer programs, analytical techniques, and reporting techniques.
- Development of large-scale on-line information management systems which are economical to use and readily accessible to all interested users.
- Increased emphasis on psychosocial dynamics research and the incorporation of political factors as explicit variables in simulation models and in urban planning recommendations.



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EA301

'ISLOD' MACRO \$25

This macro will generate all the basic coding, tailored to the user's needs by his parameter specifications, to perform an ISAM file load function. Any additional user logic may be appended by coding and assembling it with the macro. In addition, provisions are made for optional user exit points from the macro expansion. All macro-generated code is self-relocating. The sequential input file may be tape, 2314, 2311. The output ISAM load file may be 2314 or 2311.

360/25 & up, R-20, DOS Assembler
William E. Howard
O. M. Scott & Sons
5832-D N. Meadows Boulevard
Columbus, Ohio 43229
EA302

OS COMRG MACRO \$10

Obtains the current data from the machine, converts it, and provides it to the problem program in MM/DD/YY format.

360/OS, MACRO
% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
EA303

OS PROGRAM INITIALIZATION MACRO CENTER \$15

Saves all registers, according to OS conventions, in a user provided area, sets up area pointers, and initializes up to five base registers.

360/OS, MACRO
% SOFTWARE AGE
P.O. Box 2076
2211 Fordem Avenue
Madison, Wis. 53701
EA304

SUB-ROUTINES

4K CONVERSATIONAL BASIC \$40,000

This compiler is Dartmouth extended BASIC with powerful systems commands for I/O and real time operational control. It is offered to computer manufacturers and large OEM producers. We provide interpretive program to adapt to particular mini-computers. Additional software tailored to the machine will be quoted separately (i.e., multi-terminal time sharing).

Mini-computers, 8K
Software Associates, Inc.
Edward R. Arnold, Marketing Manager
501 South First Avenue, Suite O
Arcadia, Calif. 91006
EB305

1130 NOWPOWER \$1,100

Nowpower is a method of interrupting an IBM 1130 at any time during the run of any program in order to run a different program without losing any of the time already invested in the original program. After the new job is finished, the original program is restored and resumed. During the interrupt, a disk pack can be changed and the system cold started for any job in the library. A special version of NOWPOWER will allow a CRT unit or any other desired device to cause an interrupt and assume control. Even process control becomes possible without loss to programs in progress.

1130 Disk, BAL
Michael Kulakofsky, President
Data for Management Decisions, Inc.
22335 Governors Highway
Richton Park, Ill. 60471
EB306

CHECK-PRO \$195

CHECK-PRO is a sub-routine used to convert a numeric dollar amount up to a billion to its alphabetic equivalent. There is no requirement for special stocks of blank checks. CHECK-PRO is written in COBOL and requires 1.5K to 2K bytes of memory. Installation and maintenance can be provided by existing programming staff. Average installation time has been less than four hours.

360, Spectra 70, CDC 3300, H-200, COBOL
Fred W. Vaughn, President
Concise Systems
926 J Street, Suite 1008
Sacramento, Cal. 95814
EB308

COMPUTER AIDED LOGIC DESIGN \$5,000

RACAD is a software program developed for the IBM 360 Computer to enable the logic designer to bridge the gap between logic drawings and finished hardware. Consisting of four subroutines, the program: 1) analyzes the user's logic design; 2) details the chassis design under the user's constraints; 3) generates a wiring machine drive tape; and 4) presents a set of the user's debugging changes and corrections. The program will accommodate virtually any type of logic elements and packaging techniques. For close designer-software interaction, each subroutine produces a report with appropriate listings. An Application Bulletin is available on request.

360/30 & up, COBOL

Marketing Manager
Raytheon Co.
4347 Raytheon Drive
Oxnard, Cal. 93030

EB309

CORESORT—INTERNAL SORT SUBROUTINE

\$25

This is a 140-byte subroutine capable of being "called" via standard DOS linkage conventions by any source language program. Based on parameter values passed, it will internally sort the data required (E.G.—table entries built from control cards). It is not re-

entrant, but may be called as many times as required by one main program. It requires no "hold" area for sorting purposes, and presently only handles one control field in ascending sequence. In addition, one internal data entry to be sorted may not exceed 256 bytes.

360/25, DOS Assembler

William E. Howard
O. M. Scott & Sons
125 E. Sixth Street
Marysville, Ohio 43040

EB310

CRT CHARACTER GENERATOR \$2,000

CRT Character Generator subroutine for output to a Tektronix Model 611 Storage Display Unit. This subroutine will assemble and output the full set of Alpha-Numeric characters from software character segment tables for storage on the CRT. User defines position of character on the screen and the character index code. The subroutine and all associated tables require 600 eight-bit memory locations. Addition of user special characters possible.

General Automation SPC-12, BAL

T. R. Conklin, Director of Sales
Datap Systems Limited
7070B Farrell Road, S.E.
Calgary 27, Alberta, Canada

EB311

CSORT

N/A

This subroutine was written to give COBOL programs the ability to use two of the user exits offered by the IBM Sort/Merge program (Program Number 360N-SM-483). Through these exits the address of an input/output record can be passed directly between the COBOL program and Sort/Merge program. This eliminates the need for intermediate storage areas between job steps by allowing each program access to records that have been processed by the other. There are three basic purposes CSORT can be used for. They are: (1) To receive records passed from the Sort/Merge program. These can be records read in by the Sort program before or after they are sorted; or output records from the Merge program. At this time you can print, edit or delete the record from the input or output stream. (2) To pass records to the Sort program. These can be records coming from a file that is on a device other than tape or DASD; or a DASD file with organization other than sequential. You can also insert records into the output stream of a Sort or Merge program. (3) A combination of both (1) and (2).

360/30 & up, DOS, BAL

Wm. R. McDaniel, Programmer
United States Marine Corps
Supply Center
Programming Section, Plans and
Systems Branch
Barstow, Cal. 92311

EB312

**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

360 DOS SUBROUTINES/MACROS \$8.50 ea.

Series of BAL subroutines and macros for usage with both BAL and higher level language requirements for programming efficiency. Each program is available in "ready to be cataloged" object format. Simply put each in either the source statement or relocatable libraries, and then use them. Each program costs a standard 18.50.

Program Description—Use With Language

1. Retrieving dates (calendar and/or converted Julian) from Communications region—CoBOL and RPG
2. Write to and retrieve data from 1052 console—RPG
3. Edit numeric fields as signed vs. unsigned, packed vs. unpacked—BAL (macro)
4. Macro to move one field to another if sending field is not blank. High order * in sending field will clear receiving field. Receiving data can be numeric (packed vs. unpacked) or alpha—BAL
5. Retrieving UPSI byte from communication region—CoBOL and RPG
6. Resetting UPSI Byte in communication region—CoBOL and RPG
7. Accessing interval timer to either retrieve time or establish time—CoBOL and RPG
8. Moving Byte Zones for CoBOL—CoBOL

360 DOS, BAL

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

EB307**DIGIFIL****\$2,000**

This package consists of copies of the DIGIFIL program and subroutine, both of which may be used to generate the parameters necessary to implement recursive digital filtering. The compiled program also may be used to study the digital filters and will give the user information about filter transfer functions, phase angle and unit impulse response functions. The subroutine, which may be used with the buyer's own program, generates the filter parameters required for low-pass, high-pass, band-pass, and band-reject filters.

FORTRAN IV

Robert K. Otnes, Vice President
University Software Systems
P. O. Box 24117
Los Angeles, Cal. 90024

EB313**EXTENSIONS OF IBM 1130****BASIC FORTRAN****N/A**

Assembler subroutines callable in IBM 1130 Basic Fortran to simulate features of Full Fortran IV not available in Basic Fortran. Included are COMMON initialization, Bit Manipulation, Logical IF, MAX-MIN with variable number of arguments, Logical Variables, Internal Subroutine, Subroutine Entry Points, Fortran Overlay, Rapid Core Dump, Keyboard Interrupt, execution time Format, Date Routines, PAUSE with address argument.

1130, BAL

Samuel Raymond, Assistant Professor
University of Pennsylvania
36th & Spruce Streets
Philadelphia, Pa. 19104

EB314**MATHSTAT****From \$7.50**

Various subroutines for mathematical and statistical use. Included are such routines as Matrix manipulations, solution of N linear equations with N unknowns, K-Bessel function, I-Bessel function, computation of Eigenvalues and Eigenvectors of a real Symmetric Matrix, Spearman Rank Correlation test,

Y-Bessel function, two-way analysis of variance, Mann-Whitney test, J-Bessel function, Compute Chi-Square from a contingency table, time series analysis, multivariate statistical analysis, Discriminant analysis, Two-way classification for two variables, total-mean—standard deviations, Canonical correlation computation between two sets of variables, etc. . . .

FORTRAN

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

EB315**MODULUS TEN CHECK DIGIT GENERATOR****\$10**

A very short routine for calculating a MOD-10 check digit as the seventh digit of an account number. (Can be supplied for other lengths.) Will accept a packed or zoned decimal number, and put out zoned or packed, as desired. Uses no translate routines, and no tables, and takes up approx. 200 bytes.

360/25 & up, ALC

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

EB316**MOHAWK DATA SCIENCES SUPPORT PACKAGE****\$1,000**

Package includes subroutine for inclusion in programs generating report tapes in M.D.S. 1320 format. Subroutine will pack data and generate necessary line advance orders. Also included is a program to simulate the function of the 1320 printer. It will take a magnetic tape in 1320 packed, edited format and generate printed reports. The simulator program can be used to test the program that generated the tape. It is also a valuable backup if the 1320 printer is down. Can be used as an off-line print program.

NCR-315 RMC OR CENTURY 200, COBOL

R. H. Morgan,
Supervisor Software & Training
ESB Inc.
No. 2 Penn Center Plaza
Philadelphia, Pa. 19102

EB317**MOVEVARB****\$100**

This subroutine allows the COBOL programmer to know the length of variable length records. By passing the Record-Length Field, which is not available to him under COBOL, to an address in his WORKING-STORAGE SECTION. It can be added to any existing program by just one CALL statement in the PROCEDURE DIVISION and a 2 position field in the WORKING-STORAGE SECTION.

360/25 & up, BAL

Richard A. Matthews, President
Program Logic, Inc.
1161 N. Tustin Avenue
Orange, Cal. 92667

EB319**SUBROUTINE BIGINV****Free**

Subroutine inverts very large matrices which have been stored on magnetic tape or disc in groups of rows. Inversion is accomplished by a partitioning scheme and Gaussian elimination upon the partitions.

7094, FORTRAN IV

John Hopkins, ACDEG, Mathematician
Aeronautical Chart and Info. Center
2nd & Arsenal Streets
St. Louis, Mo. 63118

EB320**RESTATE****\$250**

This program will re-sequence the statement numbers and identification numbers of a FORTRAN IV Source program. Input to this program is: 1) Starting statement number and amount this number is to increment by. 2) The program I.D. alpha name. 3) The program starting I.D. number and increment amount. 4) Fortran I/O unit numbers. Output is a new source deck or tape, plus a printed Source Deck Listing.

11K, FORTRAN IV

John Muellner, Bus. Consultant
6775 N. Oxford Avenue
Chicago, Ill. 60631

EB318**SYSTEMATIC METHOD OF COBOL CODING—SMOCC****N/A**

SMOCC is a complete software package made up of subroutines and subprograms to be cataloged in a user's SS and RL libraries. With SMOCC, any programmer having a knowledge of only the fundamentals of COBOL may be able to program the most complex of user applications. By completely standardizing COBOL—Program—Logic coding, and by automatically accessing, checking, and processing of up to 4 input files, each file with up to 4 control-level words, SMOCC provides, along with appropriate messages and alternatives, the complete set-up and processing of control-words for the sequence-checking of all input records, for all control-level breaks, and for the EOJ routine. The programmer merely follows a simple coding outline, and codes only his specifications for processing a record, processing control breaks, and processing the EOJ routine; SMOCC automatically handles the logic flow between each. Virtually all repetition in coding, as well as the impediments of the mechanics of coding, are eliminated, thereby providing more efficient programs, greater and more understandable automatically-generated program documentation, and more efficient use of actual machine time.

360 DOS, COBOL

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

EB321**SOFTWARE SYSTEMS****IBM 650 SIMULATOR****N/A**

SPOT (Six-Fifty Program On Three-Sixty) allows 650 programs to be run unchanged on a 360. The 650 simulated has a 2000 word drum, 2 x 533 card reader/punches, and a sterling conversion device. SPOT runs under the disk operating system (DOS) and provides automatic job-to-job transition, automatic handling of most programmed halts, drum dump facility to printer or punch, and the ability to catalog 650 programs into the core image library and retrieve them for execution. An assembler module must be coded for each 533 control panel. (Modules for a standard 80/80 panel, and a soap 2L panel are provided with SPOT).

SOUP (Spot Operations Utility Program) reads a card file, processes it through a control panel module (to detect storage seln. errors) and writes it on disk, so that a 650 program which reads two card input files can read one from disk.

360, 64K, BAL

A. R. Brennan
MLC Assurance Co. Ltd.
Victoria Cross
North Sydney, Australia

EC322

360 CONTROL SYSTEM \$5,000

Designed to provide all JCL requirements and eliminate run books by providing automatic operator documentation for each SYSIN file. This system polices programming standards. Any changes to system specifications need only be made at one point. Provides library control instructions and operator instructions forcing all documentation to be current.

360 OS, BAL

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

EC323

360 MASTER CONTROL SYSTEM \$5,000

Provides multi-tasking of seven subfunctional programs under operator control under DOS. Normally used to control peripheral functions card to tape, tape to printer, disk to tape, tape to disk, disk to printer, etc. An example of its power would be the ability to handle seven printers concurrently from a single processor while running other programs.

360 DOS, BAL

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

EC324

BASIC COMPILER \$5,000

A BASIC compiler has been developed for the RBM system on a Sigma 5/7 computer. The compiler requires about 8K of memory for a single user and 10K of memory for multiple users. The system can handle up to 64 users. The single user system does not require a disc unit while the multiple user system requires about 2K words of disc storage per user plus any permanent storage required by the users. The system has been tested for a period of two years. Both teletype and IBM 2741 terminals are acceptable I/O devices. The BASIC system has most of the standard functions as well as the matrix functions. The multiple user system has some additional editing functions.

XDS Sigma 5/7, XDS SYMBOL

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

EC325

COBOL BILL OF MATERIAL PROCESSOR \$25,000

Creates and maintains an item master file and chain structure file. Package provides conceptual guidance into use of routing file and work center master file. Retrieval programs include indented explosion, single-level bill of material, where-used bill of material, and summarized bill of material. All programs are designed to operate within 24K memory. There are no program overlays employed. Programs have been tested and utilized on an IBM S/360-30 with 32K memory under DOS release 21.

360/30, 24K, COBOL

Michael Hudgens
Datax, Inc.
6001 N. Brookline—1211
Oklahoma City, Okla. 73112

EC326

CONVRTR \$500

A conversion aid, CONVRTR makes possible effective batch processing of multiple COBOL-D to USAS COBOL conversions by utilizing tape as an output medium for the LCP program. CONVRTR places the SYSPCH output of from 1 to 99 LCP runs in catalogable format, and generates all job control to catalog each converted program to the source statement library and do an initial compile of the converted program using the BASIS function of the IBM USAS COBOL compiler.

360/30, BAL

Richard J. McLaughlin,
Technical Programmer
New Britain Machine Co.
South Street
New Britain, Conn.

EC328

CORESIZE 360 OS/MVT \$50

SCHEDULING AID: Systems task called from console, returns to console three largest areas of unassigned free core (core not assigned to any region). By minimizing scheduling problems program can be greatly increased throughout by maximizing utilization of systems most precious pre-source: core storage.

360, BAL

Richard Lavacot
2540 E. College Place #12B
Fullerton, Cal. 92631

EC329

DATA COMPRESSION \$3,000

The data processing manager utilizing Data Compression has implemented one of CRT's advanced Data Management Concepts. "Data Compression" routines will increase his installation's mass storage capability up to 50%. Further, increased computer time may be realized. Input/Output Standards may be specified for each Storage Device within the installation. These major considerations provide not only increased data management capability but also facility management.

All 360, BAL

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

EC330

DIALOG II \$28,000

DIALOG II is a terminal (CRT) oriented on-line Data Management System which operates as a problem program to OS/360. The DIALOG II system functions with DOS, OSMFT and OSMVT. It provides the software support for IBM 2260 (local and/or remote), IBM 2250 (graphic), and Sanders 720 display terminals. Design concept is aimed at facilitating and accelerating on-line implementation. No restrictions are placed upon the system as to the number or types of applications. The application software is terminal independent and may be written in ALC, FORTRAN, COBOL and JOVIAL. DIALOG II is capable of handling any number of (CRT) terminals (local and/or remote) within a re-entrant multi-programming environment and does not require re-design of user programs currently in use.

360/40 & up, ALC, JOVIAL, FORTRAN, COBOL

Leon Marcus,
Director/Special Programs
Proprietary Software Products, Inc.
1501 Wilson Boulevard
Arlington, Va. 22209

EC331

COBOL SHORTHAND \$130

Through the use of this program the coding task of the COBOL programmer and the amount of time required for keypunching of COBOL source code will be tremendously reduced. Over 120 of the most frequently used reserved-words and phrases have been reduced to three or fewer characters each (i.e. LO = Label Records are Omitted; C3 = Computational-3; NGT = Not Greater Than). In addition to expanding the mnemonics on tape, the program a) resequences COBOL source decks, and b) will build an executable job stream on tape. The program uses an extremely fast table-look-up routine, and will run in any 4K partition. The module is completely self-relocating.

Any 360 DOS/ALC

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

EC327

(HOSPITAL ACCOUNTING SYSTEM PROGRAMS) N/A

A real-time on-line hospital information system. Consisting of some two-hundred programs and modules designed around 2260, 1050 input-output terminals that provide all necessary information to process a patient from admitting to dismissal. Applications covered in this system are: admission-dismissal, accounts receivable, accounts payable, general ledger, budgetary comparisons, pharmacy and laboratory charging, census, laboratory result reporting, billing, insurance proration, asset accounting, and dietary menu planning and control. System is flexible enough that with minor alterations could be adapted to any hospital's data processing system or could be teleprocessed at our location.

360/140, 128K, PL/I, ALC & QTAM

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

EC332

LIBRARY CIRCULATION CONTROL AND ANALYSIS SYSTEM \$825

This system provides for the control of books and other media that are placed in circulation by libraries. In addition to a Books in Circulation Report, the system also can provide an Overdue Books Report, mailable Overdue Notices, and Volume Analysis Reports. The Volume Analysis Report can be taken both on the books currently in circulation and the total books checked out during any given time period, and shows sub-totals for each book class and borrower class. Features of the system to be used at the user's option include fine calculation and a variable length circulation period. The circulation period may be constant or can vary dependent on either the book type, the borrower type, or both. The system will accommodate Dewey Decimal, Library of Congress, or any other classification method, provided the book identifications are unique.

360, PL/I

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

EC333

LIBRARY INFORMATION SYSTEM \$6,500

LIS is a software system that automates the production of library catalog cards. Source documents are typed on a typewriter equipped with an OCR font or a remote 2741 terminal. The data is then processed and multiple catalog cards are produced. In ad-

dition, daily and monthly acquisition listings are produced. The data can also be used for retrieval based upon key words assigned to each document (optional). This feature requires a time-sharing computer and 2741 terminals.

360/130, PL/I

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

EC334

PROJECT PLANNING

SYSTEM—PPS IV

\$12,000

PPS IV is designed to aid in planning and managing a variety of projects. It is an extension to network oriented techniques such as CPM and PERT. PPS IV performs five major functions:

1. Critical Path Method (CPM) calculations
2. Resource Allocation
3. Report Writing
4. Bar Charting
5. Data input and updating

The program is written in a highly modularized, easily modifiable form in FORTRAN IV. PPS IV is being used to plan projects such as: construction, plant maintenance, computer programming, and many others.

360/256K, SIGMA 7, CDC 6000, FORTRAN IV

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

EC335

SUBSCRIBER ACCOUNTING PROGRAM \$5,000

This program is a complete membership accounting program for engineering societies or magazine publishers having memberships/subscribers numbering in excess of 5000. The program provides membership listings, mailing labels, invoicing and selective printing of any of the above listings. Updates to files are made simultaneously with printing and thus do not require additional time for merge, delete and updating. Input is optional from cards or tape; output is to tape if desired. All options of use are available and printed output always occurs during updating of master tape. The program will be tailored to existing file formats. The program has been in use for more than one year.

360/30 & up, 32K, COBOL—DOS

Rose Crews,
Manager Data Processing
Koenig Associates
3372 Washtenaw Avenue
Ann Arbor, Mich. 48104

EC336

ULTRA SIMPLE INFORMATION SYSTEM

\$8,000

This program is designed to handle communications lines and an information data base without regard for the application or the record contents. Features of the program are: Multiple applications can be handled concurrently; Cross-reference, indexing, and file directing capabilities are provided; TP application is independent of existing files and system logic; Diverse terminal devices are supported; Applications can include inquiry, data collection, and message switching; User exits are available to edit data and perform file update functions; File access by alphabetic and numeric keys.

360, BTAM, AL

Dan Grundl,
Director, System Development
Systematics, Inc.
411 Victory
Little Rock, Ark.

EC338

SYSFILE—FILE MANAGEMENT \$5,900

SYSFILE is an easy to use general purpose information management system that provides non-programmers as well as programmers with a proven system to manage complex data bases. After an introductory session, a non-programmer can create, maintain, retrieve, and analyze data in formats of his own design. Programmers can easily modify the thirteen open-ended modular programs to satisfy unique requirements. The user is provided with three levels of file searching capabilities and retrieved output may be analyzed in two dimensional tabular form. In use since 1967, SYSFILE is written in USASI FORTRAN with dialects provided for S/360, CDC 3000 and CDC 6000.

Core, 360, CDC 3000, CDC 6000, 100K, USASI FORTRAN

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

EC337

SOFTWARE GENERAL

APTLFT 1 FOR IBM 360 APT \$3,000—\$4,000

Accepts types 2, 5 & 6 data as input. Handles standard and barrel shaped cutters. Provides for matrix manipulation. Programmer selection of start, end and clearance points. MDI files written in APT I/O. Provides capabilities for three point/vector definitions, four additional point definitions, and three loft definitions.

360/50 & up, FORTRAN

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

EC339

AUTO-SOURCE

N/A

Auto-Source maintains and safeguards all 360 source programs. Auto-Source stores programs on disk; it randomly scrambles the contents of the programs to thwart theft. It also requires use of the password to modify a program. Some of the key features include: automatic creation of compile job streams, full documenting and audit trail on all changes, facility to compile any version of a program, one library for all source programs, one simple control card, eliminates card handling, increases the throughput and control of program development.

360/30 & up, DOS or OS, BAL

Bernard Kaplan
Rapid Response Systems, Inc.
1040 Avenue of the Americas
New York, N. Y. 10018

ED340

BICOMP/360—BINARY SYNCHRONOUS COMMUNICATIONS PACKAGE

N/A

BICOMP/360 runs as a regular job under DOS/360, and allows communication with IBM 1130's, 2780's, other 360's with BICOMP, and other 360's with OS/HASP. Card, tape, disk, and print data may be transmitted. BICOMP/360 allows a 360 to act as a remote job station to OS/HASP, OS/RJE, or any software supporting a 2780. The user chooses those modules from the BICOMP/360 package that perform the functions he desires. BICOMP/360 enables the development of an IBM/360, 2780, and 1130 on a switched telephone network. No modifications.

360 W/DOS, BAL

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

ED341

CALCTRAN \$6,000

CALCTRAN is a complete conversational language designed to meet the need for rapid calculations without resorting to cumbersome languages intended primarily for writing production programs. Although the core requirements are very low (a complete 10-line system can be run in a 12K byte portion), the facilities provided are extensive and include: Iteration, assignment, arrays, full set of 25 trigonometric functions, 35 other operators, formatting and graphing capability, programming capability, all operators defined for complex numbers. CALCTRAN has established itself as a preferable alternative to stand alone electronic desk calculators.

360 W/Terminals, BAL

Four Pl, Inc.
415 N. Scoville Avenue
Oak Park, Ill. 60302

ED342

COMPUTERIZED SCOUTING SYSTEM N/A

Computerized Scouting System used to analyze football scouting reports for high schools and colleges. Data preparation performed by the scout. Output report provides coaches with opposition tendencies. We are looking for service bureaus to process reports on weekends for our franchise holders.

360/30, COBOL

John M. Frease,
Director, Sports Programs
Inter-Active Computing, Inc.
900 S. Washington Street
Falls Church, Va. 22046

ED343

COSH—COBOL SHORTHAND \$1,200

Coding program in COSH is identical to coding COBOL. All the rules of the COBOL language must be followed except that the coder may choose to use an abbreviation for a COBOL reserved work or phrase, and to assign the same type of abbreviations to his own data-names. COSH then expands the abbreviated sentences into easily readable statements, inserting spaces and indenting lines where needed. This translation takes place just before COBOL compilation. For example 05 F P X V S. in the Data Division will be expanded to 05 Filler Picture X Value Spaces. Hundreds of COSH system users are realizing 20% to 40% reduction in coding and keypunching cost. Demo on request.

Any system supporting COBOL

Keystone Computer Assoc., Inc.
James W. Gifford
1276 West Third Street
Cleveland, Ohio 44113

ED344

DIRSORT \$100

DOS alphanumeric sorted core-sorts 2314 sysres and private library directories under UPSI control. HEX cylinder and head address constants must be initialized by user—one each for private source and private relocatable library starting disk address. Run time is approximately two minutes. Core required is 24K. A dserv of the sorted directories permits faster and more accurate identification of program and module names present in the system.

BAL

R. D. Jakary
14337 Bramell
Detroit, Mich. 48223

ED345

EDUCATIONAL ASSEMBLER N/A

Assembler which allows use of symbolic tags, mnemonic op-codes and address adjustment. Punches machine language deck for use by

"Educational Computer." Further information on request.

Any COBOL

Neal L. Rogers,
Vice President, Systems
AIMS, Inc.
2202 Wynnton Road
Columbus, Ga. 31906

ED346

EDUCATIONAL COMPUTER

N/A

Simulated computer used for teaching basic programming. Will handle card-reader, card punch, printer and magnetic tape using simple but complete instruction set. Dynamic trace and dump also included. Further information on request.

Any COBOL

Neal L. Rogers,
Vice President, Systems
AIMS, Inc.
2202 Wynnton Road
Columbus, Ga. 31906

ED347

EVAL

\$1,290

Used to evaluate the performance of a program for optimization or comparison purposes. Provides output report which is a complete breakdown of the program, performance; all I/O is timed, all subroutines calls are timed, individual I/O and sub-routine calls are monitored and averaged. Percentages of total, number of executions, average execution time, total and sub-totals of execution times, and locations of I/O and subprograms are provided in a comprehensive report. The program must be used on a system which provides access to a real-time clock and which has 32K or more of core and a standard FORTRAN IV compiler. We can give assistance in conversion to other systems on a cost basis.

H-1648 Timeshare System, FORTRAN IV

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

ED348

NUDE CALENDAR MAKER

\$5.50

Prints picture of nude girl on line printer together with a calendar. Can also print on any teletype which uses line printer size paper. User controls number of copies made during each run. User also designates the year for the calendar for each run. Data deck for nude included together with program listing.

FORTRAN or PL/I

Chris Lanier
Walker Hall
Pomona College
Claremont, Cal. 91711

ED349

OFFSET REPRODUCE AND GANGPUNCH \$20

This program will offset reproduce and/or gangpunch. Requires 1 lead card to offset reproduce and an additional lead card if gangpunching is done.

Honeywell 120, H-200, 360/20, 8K or BAL

James M. Beirbach
Failsafe Systems
2130 Winchester Drive, Suite 1
Indianapolis, Ind. 46227

ED350

RUN OUT COSTING (ROC)

\$10,000

Run Out Costing is a scientific method for utilizing historical and current information to obtain projections of total project cost

for a scheduled completion time. The methods and techniques of ROC have been incorporated into an advanced software package which can be used to supplement management expertise in making decisions regarding on-going or current projects. ROC considers, but goes beyond the point of assuming that a current project will continue to function in the future as it has in the past. Use is made of the fact that independent projects are often similar to each other in terms of resource utilization over time. Thus, historical information from similar projects as well as up-to-date information from the current project are used concurrently in projecting total completion cost of the current project.

FORTRAN IV

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

ED351

SEP (SCHOOL ENROLLMENT PROGRAM)

N/A

National marketing desired for highly efficient school enrollment proprietary program. Students are notified by mail of assignments. School receives various administrative reports.

360/40, COBOL

J. E. Buhler
Systems Research & Development
19834 Pacific Coast Highway
Malibu, Cal. 90265

ED352

SPC-12 ASSEMBLER

N/A

Time sharing assembler for the SPC-12 mini-computer. User keeps his SPC-12 programs on disk, where they can be edited in seconds and then immediately assembled. Accepts CAS-II assembly language statements as input and produces a listing and an object paper tape which is ready for loading into the SPC-12. The listing is compatible input for CAS-II.

Com-Share Time Sharing, CAS-II

Otis Myers, President
Computer Aidid Technology, Inc.
6905 Baylor Drive
Alexandria, Va. 22307

ED353

STANDARD-BRED (TROTting) HORSE-RACING PREDICTOR PACKAGE

\$19,000

Probably the most sophisticated digital computer program in existence for evaluating the probable order of finish of any trotting or pacing race. Three years of development and refinement yielded the final program, which can be run on any small machine with Fortran capability, e.g. IBM 1130.

Also available with the above, are several larger, more complex Fortran programs, comprising the system which was instrumental in formulating, analyzing, and optimizing the former (final) package. These latter exist in Fortran II for 7094 usage, but could easily be converted, upon request, to 360 Fortran IV. Utilizing several hundred random samplings of previous races, stored on magnetic tape, a linear-programming approach was applied to: (a) ascertain which available information was actually meaningful to a valid prediction technique, (b) determine the best mathematical expressions of these input data, and (c) evaluate and establish the proper relationships of the various independent and interdependent factors. The final result was a 43% win prediction capability; also significant is that in almost 70% of the cases, the program's top four rated entries contained the actual 1st and 2nd place

finishers (win and place was often picked precisely). Preparing data for the "final" program is a simple and mechanical task, and is obtained in the regular trotting program form, normally available one day prior to the race. One punch card is required for each horse.

1130 or equivalent, FORTRAN

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

ED354

STUDENT GRADING SYSTEM

\$325

This system is of use to high schools, junior colleges, and other educational institutions. It provides the scoring of tests during a term and the calculation of final grades at the end of a term. Central tendency statistics for each test and for the term are given. In addition, interrelation and grade adjustment features can be used for courses in which the students are taught in more than one section or by more than one instructor.

During the scoring of each test, the user may weight the questions to give more value to some than others. Alphabetic and numeric responses may be interspersed. At term end, the user may provide test grades in addition to those already calculated by the system. Alphabetic and numeric test grades may be interspersed, provided the relationship is specified. Each test may be weighted. Although the system is written in PL/I, requests for a Fortran version will be considered.

360, PL/I

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

ED355

TEXT STRING PROCESSOR

\$75

TEXTSCAN simplifies the processing of free form text strings by assembler and COBOL programs. Successive calls to the subroutine break the string into logical "words," delivering each word, along with its length count and location in the string, to the calling program. The calling sequence permits declaration of a set of special characters to act as logical word delimiters.

360, BAL

James Crawford
U.S.N. Bureau of Naval Personnel,
PERS N135
Naval Annex
Arlington, Va.

ED356

THREE-UP LABEL PRINT

\$60

First program reads cards punched with standard name-address-zip and writes blocked tape records. If name of city and state is constant for all or most addresses, then a constant name can be inserted in the program, relieving the keypuncher of the task of punching the city, state field for the bulk of the cards. Second program prints 3-up, 4" x 1-7/16" (standard) labels from the tape. This system is superior in that multiple runs do not require reading the cards each time, and is more useful to a firm requiring multiple lists of mailing labels.

360, ALC

Peter Smith
4113 Fairbanks Court North
Irving, Texas 75060

ED357

VECTOR III TAB SIMULATOR \$600

Simulates a 407 accounting machine with a 519 summary punch attachment using any COBOL supported computer having 20KB available exclusive of supervision. Simple control cards are required to prepare reports and file edits on a "load and go" basis. Can process card input or card image records on tape or disk.

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

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

ED358

FILE MAINTENANCE**MASTER ADDRESS SYSTEM 1 \$1,200**

MAS1 is an integrated two-program application oriented system for building, maintaining and selectively printing the contents of an address file. And, if the files are unblocked, the system will operate in a 16K environment. 1-4 up printing of addresses is possible and because vertical spacing is controlled by the Printer Carriage Tape, stock ranging from labels to continuous form filecards, envelopes, letterheads, etc. can be printed. The file can include a mix of three and four-line addresses. For file maintenance two types of card formats can be used; the first, a single card for the typical 3-line address and, the other, a two-card combination for inclusion of a second name-line. The addressee's name can be stored on the file in last-name-first order for sort and other purposes and can optionally be restored to first-name-first order during printing. All normal file maintenance functions are available; build file, copy file, add or delete record(s), and changes to an entire record or selected fields within a record.

360/30, 32K, TOS/DOS, COBOL—
LEVEL D

Jerome Breault,
Manager of Marketing
Systek, Inc.
621 Lenox Road
Pittsfield, Mass.

EE359

NAME FILE MAINTENANCE & SELECTIVE MAILING LABEL AND LIST PRODUCTION \$8,800

Additions, changes and deletions made to name lists, with sophisticated duplicate elimination as by-product of the maintenance program. Mailing labels and/or listings of the file or selected portions of the file along with totals by sectional center or zip code produced by label program. Title lines may be inserted in mailing labels; may replace the names (i.e. replace name with "resident" when list is to be sold), and many other options available in label program. 1-6 line address labels possible (may be increased to 8 lines). Cheshire, pressure sensitive, or other labels may be used. 1-up to 5-up formats acceptable (1-5 across 14 1/2" width of computer forms). System includes conversion of raw data (handwritten, typed, punched-cards or magnetic tapes) through label program. Many options available.

360/40, BAL

E. L. Doherty,
Systems Sales Representative
C. N. L. Corp.
5563 N. 41 Street
Milwaukee, Wis. 53209

EE360

UPAID—(UNIVERSAL PRINT AID) \$250

UPAID eliminates the writing of the Working-Storage print line definitions in COBOL programs. Aside from the savings of the programmers coding time UPAID also saves valuable core storage. Once cataloged on the systems source-library, UPAID can be copied into any print definition at the 01 level of the COBOL program. Any data required to be printed can be moved directly to the desired print position and blanks will be propagated to the right of the data. UPAID if used properly, can save up to 25% of coding and keypunching time.

360/25 & up, COBOL

Thomas J. Moran, Jr.,
Executive Vice President
AIDS Associates, Inc.
30 Huntington Street
Huntington, Conn. 06484

EE361

UTILITY**6K COBOL CROSS-REFERENCE \$200**

COBXREF provides a cross-reference listing of all Cobol data-names and literals. Entire program (5 phases) requires only 6K of core storages, including foreground save area if needed. This DOS utility needs only 25 cylinders of a 2311 or 2314 to handle up to 9,375 data-name or literal entries. Execution time is extremely fast. Supports standard IBM DOS Cobol.

360/25 & up, DOS, BAL

William C. Bricking
American Computer Leasing Corp.
One E. Fourth Street
Cincinnati, Ohio 45202

EG362

ALPHABETIC LIST OF 1130 LET N/A

This program lists, in alphabetical order, all entries in the IBM 1130 location equivalence table. The format of storage (DSF, DDF, or DCI), disk block length, and disk block address are printed for each entry. A subroutine for use by the mainline program is included in the package.

1130/1800 DM2, BAL

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

EG363

BAK-UP—4K DISK/TAPE DUMP/RESTORE \$200

BAK-UP is a set of two programs designed to provide DUMP/RESTORE functions for any standard IBM 2311 disk. This is not a file copy, but a complete volume copy, similar to IBM's utility DUMP/RESTORE. Both programs are completely relocatable (can run in any partition from one cataloged program). Both programs require only 4K core storage including foreground save area. Ideal for core limited machines with disk to tape back-ups. Really unique.

360/25 & up, DOS Assembler

William C. Bricking
American Computer Leasing Corp.
One E. Fourth Street
Cincinnati, Ohio 45202

EG364

BASIC/FORTRAN TRANSLATOR \$3,200

We can provide various translators to translate Honeywell H-1648 basic to FORTRAN IV up to and including 100% automatic translation, including subroutine calls and mode conversion if necessary. We are willing to discuss modification of the translators

for other forms of basic. Full source listings and documentation are provided. Delivery is within 30 days ARO. We will provide six months free support, although the programs will be thoroughly tested before delivery.

FORTRAN IV

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

EG365

BINARY CARD DUPLICATION \$20

Utility program to reproduce binary card decks up to 1000 cards. Capable of reproducing multi-punched cards, object decks or any binary card required. Program requires approximately 700 words of core storage, complete documentation including tested sample.

1130, BAL

Michael Adams, Programmer—Analyst
Business Computer Services
136 Louisiana N.E.
Albuquerque, N.M. 87107

EG366

EDIT \$200

The EDIT program is designed to greatly simplify the process of creating an error free source program, tape or listing for the 620/i computer. It is written to run on the basic 4K system with teletype with another version at the same price for a high speed paper tape reader. Instead of operating on only one line at a time, EDIT fills core with blocks of source data; with a 4K configuration this is about 4000 characters. EDIT enables the user to delete, insert, change and add lines; and further permits searches for text matches. Successive punching, writing and clearing of the text buffer enables the user to produce an edited tape or text of any length.

Varian 620/i, DAS

George C. Graff,
Manager, Mathematical Sci. Div., R&D
Systems Research Laboratories, Inc.
7001 Indian Ripple Road
Dayton, Ohio 45440

EG367

CARD TO CARD UTILITY PROGRAM \$40

At operator discretion or choice, input card decks of any type may be: 1) listed as read, 2) fields moved, 3) field exchanged, 4) data entered (HEX or CHAR), 5) sequenced (30 digits max each field), 6) printed as punched. Three fields for each option (2-5) possible.

360/30, 32K, ALC

David M. House
3314 Norfolk #D
Houston, Texas 77006

EG368

COBOL SEQUENCER/IDENTIFIER/LISTER \$45

Program can insert a new identification in columns 73-80, resequence cols 1-6 in any sequence number, or both. Also, if desired, a listing of the new deck is printed, and multiple decks can be sequenced in one run without having to reload the object deck. A single parameter card before the deck contains the information for paging/line count, identification, and print option.

360 DOS, BAL

Peter G. Smith
4113 Fairbanks Court North
Irving, Texas 75060

EG370

NEW PRODUCTS

Announce New Source Data Collection Device

Madatron Corp., a wholly owned subsidiary of Faradyne Electronics, has developed a new flexible, accurate and low-cost device satisfying requirements for a wide range and variety of applications for collection and origination of source data. Utilizing Madatron's legible alpha-numeric display, the device allows for the entry of data at the source where it is generated by employees unskilled in operating terminal or data processing equipment. Data is collected in real time or "as it happens" by personnel most knowledgeable of the data, and the responsibility for the correctness of entered data can be assigned specifically to such personnel. Additionally, the data is collected and entered in human language, and extensive coding formats are not required.

For more information, circle No. 4 on the Reader Service Card

Increases Hardware Operating Efficiency

A new software package which allows a user, for the first time, to easily evaluate the performance of his peripheral equipment and thus increase operating efficiency of his computer system up to 25 per cent, has been developed by Computer Efficiency Corp., Miami Shores, Fla. Called Peripheral Monitor, the package will be marketed by National Software Exchange, Inc., Great Neck, N. Y.

The Peripheral Monitor system enables the computer to use its own accuracy and speed to monitor, measure, compare, and document the actual performance of IBM/360 peripherals against the manufacturer's rated (sales information) speed.

For more information, circle No. 5 on the Reader Service Card



Printer Has Many Uses

The new General Electric TermiNet* 300 data communication printer can be utilized in time-sharing systems, for solving scientific and business problems; management information systems; point-to-point business data exchange; for editing and formatting text using computers; repetitive printing of business documents, such as shipping papers, billing invoices, etc.; and for information retrieved from computers.

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

Unit Evaluates Digital Data Links

Data-Control Systems, Inc. has developed a unit which can measure and display the bit error rate caused by Digital transmission, detection, or storage devices. Designated the Model 4660, "LINK-BERC," it can also measure and display clock advances and retards (bit slippages) within modems and bit synchronizers.

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

Data-Verter Tape Terminal Announced

A new Data-Verter central Magnetic Tape Terminal for gathering information sent over the telephone network from source recorders has been announced by Digatronics. The Model 5237 communicates with acoustical or unattended transmitters and records information on IBM compatible 9-channel magnetic tape in ASCII or EBCDIC code.

The Digatronics' Data-Verter System is being used by leading retail chain stores, accounting firms, and financial institutions to acquire data at the source for direct computer entry. It eliminates keypunch and key-to-tape operations, reducing data handling costs and errors. The Data-Verter System provides a printed copy record while simultaneously recording information on magnetic tape at the source—in the store, office, plant, or warehouse. Recorded information is transmitted via acoustic coupled or unattended transmitters to a paper or magnetic tape terminal at the computer center.

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

Varian Introduces Fastest Mini-Computer

Varian Data Machines, Irvine, Calif., claims the fastest mini-computer on the market. The new Varian 620/f is the latest addition to the company's long-established line of Varian 620 computers. It is also, by a factor of over two, the fastest. Cycle time is only 750 nanoseconds.

"But speed is only half the story," commented George J. Vosatka, Varian Data Machines, President, in announcing the new computer. "The Varian 620/f represents a complete restructuring of the Varian 620 line, reflecting the latest advances in state-of-the-art planar memories, MSI circuitry, and high-speed I/O transfers. "The new computer, for example, is not only fast, but also features an extended set of instructions. These combine with the speed to effectively triple the computer's data-processing capabilities."

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



Offer New Computer for Time-Sharing Systems

A low-cost computer for a wide range of communications uses has been announced by Devonshire Computer Corp., Newton, Mass. The new computer, made up of a communications processor and a programmable input-output controller, will be used in time-sharing systems to channel data between a central computer and as many as 253 remote terminals.

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

On-Line Demonstration by Scan-Data at SJCC

An on-line demonstration of multi-font OCR page reading system highlighted Scan-Data's exhibit at the SJCC. The Model 200 system is said to be the lowest cost page reader in its performance range. In its basic configuration, the system reads OCR-A. But it can be field upgraded to read as many as four additional fonts, including upper and lower case OCR-B, handprint, pica, 1403 edit symbols and mark sense.

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

Offer Small Computer Disk Pack System

A low cost, random access disk pack mass storage system with software monitor for its PDP-8 and PDP-12 lines of small computers was introduced recently by Digital Equipment Corp. The new system, the RKO8, can provide PDP-8 or PDP-12 users with up to 3,325,952 words of storage, each 12 bits in length and should prove attractive to anyone requiring large, fast access data storage. Each removable file provides 831,488 words of storage. Up to four can be handled by the system controller.

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

Singer Announces a People-Oriented System

System Ten, a people-oriented concept in electronic data processing, was announced recently by the Singer Company's Friden Division. Friden, a pioneer in billing/accounting data processing systems, called the introduction the most significant new product announcement in its history.

Key features of this new, low-price computer system are "the ability to process simultaneously up to 20 programs through the use of hardware, and the flexibility of putting computer power where the job needs to be done, not in an isolated computing center," emphasized Robert J. Campbell, president of the Friden Division.

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

Corning Introduces Time Sharing Terminal

The Corning 904, a time sharing interactive graphic computer terminal system that combines graphic and alphanumeric display, a built-in electrostatic hard copy device and a system for superimposing slide data over computer generated information, has been introduced by Corning Data Systems, a newly formed organization within Corning Glass Works.

Designed to be linked to time sharing computers through ordinary voice grade telephone lines, the Corning 904 brings the broad problem-solving capabilities of interactive graphics to scientists, engineers and business and financial analysts.

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

Telemetry System Transmits Over Telephone Lines

New Random Data Telecom is a complete telemetry system designed to transform any test facility into a complete data processing center. Transmitting acoustically over ordinary "voice grade" telephone lanes, the RDT can be operated anywhere without additional wiring and at normal, inexpensive phone rates. The RDT is housed in two compact, portable cabinets.

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

Announce New Printout Unit

Computer and Programming Analysis, Inc., Cherry Hill, N. J., announces the addition of a printout unit to augment its existing line of Model 7700 computer performance analyzers. Identified as the Model 7721 Output Printer, the unit can be used with all analyzer models in CPA's 7700 series. Printing of analysis data is performed in either of two print modes—tabular digital, or graphical output—and eliminates the need for attended operation of the analyzer.

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

Punched Tape Perforator on View

Remex Electronics, a division of Ex-Cell-O Corporation, will introduce a punched tape perforator at the SJCC. The Remex model RP-30 punched tape perforator operates bidirectionally at 30 characters per second. Use of advanced solenoid techniques allows for its compact size and eliminates the necessity for motor and standby power. The electronic design makes interfacing with systems requirements an easy task.

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

Pro/Test Generator Capabilities Expanded

Synergetics Corp. announces a major expansion to PRO/TEST, its proprietary test data generator—conditional field generation. With this feature, the PRO/TEST user is able to generate fields whose values depend on the contents of other fields or accumulators. This feature allows the non-programmer to rapidly generate data for program and system testing, makes PRO/TEST even more program-programmer independent and enhances its value as a testing aid.

PRO/TEST can create a file on disk, tape, or cards in ascending or descending sequence with up to nine levels of control breaks. Records can be fixed or variable length, blocked or unblocked. An unlimited number of records can be created. Fields within records can be defined as random, sequential, constant or user-specified values.

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

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COMPUTER PRO? BUSINESS CARD? \$6.50 per 1000 embossed. Send for Design Kit. Specialized service, P.O. Box 283, Butler, New Jersey 07405.

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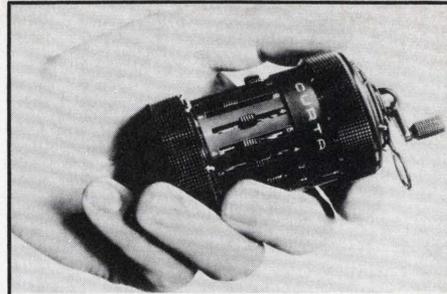
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Systems analysis experience (card design, flow charting, operation analysis, etc.): _____

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