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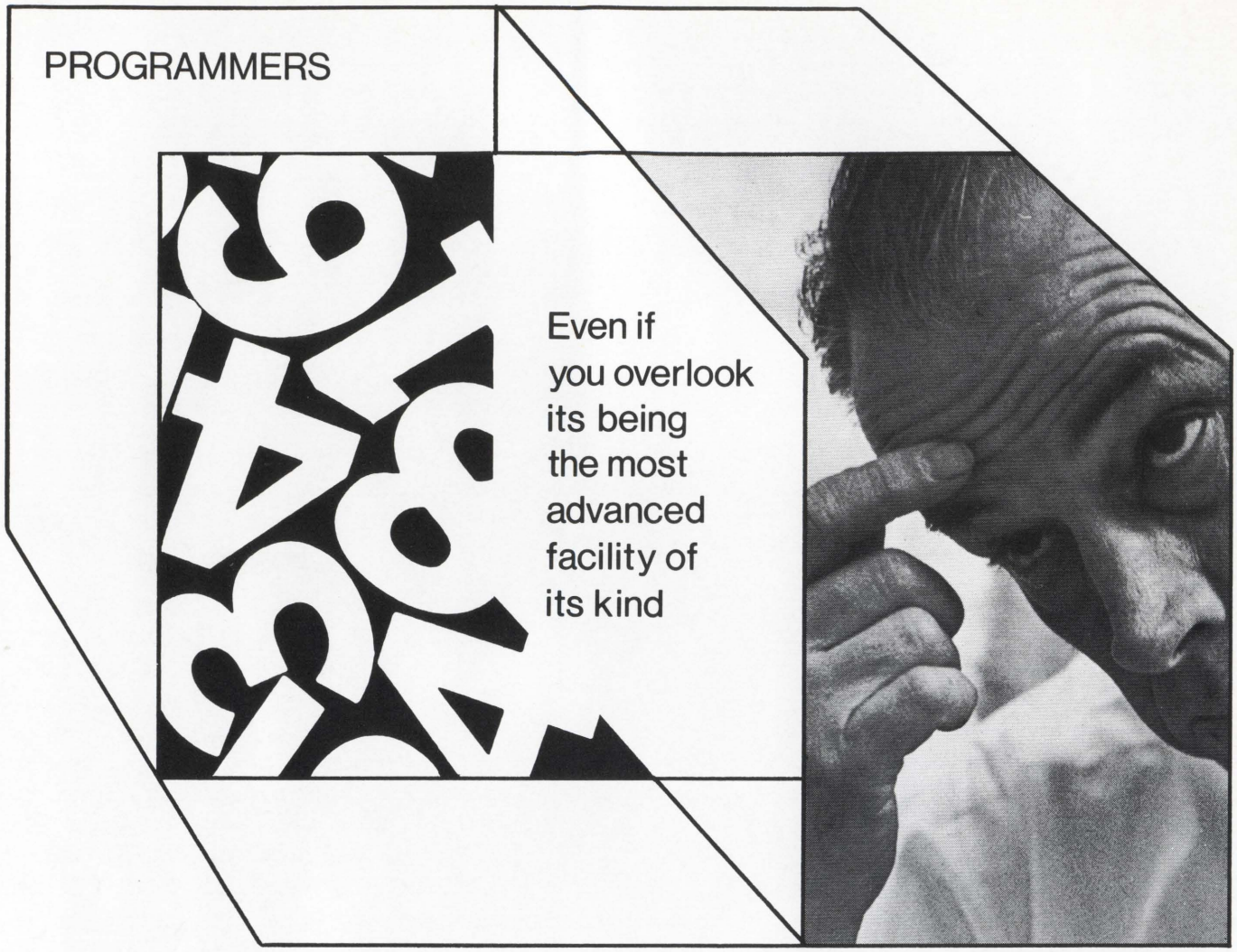

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COMPUTERS

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EDITORIAL

TIME-SHARING FACES THE EXPANSION YEARS

Emerging from a minor position two years ago to become the EDP industry's fastest growing segment, **time-sharing** receives the focus of Software Age's feature editorial in this issue. Its expansion years are expected to follow 1970 sales of about $250 million (double 1969 volume) to a projected $2 billion-plus by 1975.

Where and why will this growth occur? Author T. F. Droege provides an overview in "Interactive Computer Power for Decision Making and Problem Solving," beginning on page eight. His suggested applications, as a physician using a terminal for a qualitative diagnosis from a central data bank may **not be so far distant** . . . with the development of programmed "packages" and conversational time-sharing modes to directly involve the non-professional EDP user.

Two special interest areas of time-sharing are also editorially featured in this issue: **time-sharing performance measurement** and **software security.** Author A. D. Karush concluding his three-part series has emphasized that the goal of measuring and evaluating time-sharing systems must be as important to the EDP professional as creating newer, larger, and more powerful systems. Author H. K. Mintz tackles the problems and solutions of Software Security, complicated by the growing use of remote terminals (and points out its importance with one case of "lost" information valued at $5,000,000)!

As time-sharing enters its greatest expansion years, there remains the challenges of adequate time-shared software and a closer definition of user objectives with time-share capabilities. However, we believe time-sharing in the 70's will underscore IBM Chairman Watson's recent description of the EDP industry as ". . . still in its formative years and has almost **limitless potential.**"

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

If you are looking for an excuse to learn the hexadecimal system this is it!

Problem 25: HEXADECIMAL DIVERSIONS

A favorite problem in mathematics is to use the digits 1 through 9 in different combinations that equal 100. The problem is simple if all the mathematical symbols are allowed. However, the solution becomes much more complicated if only the plus and minus operators are used, and the digits have to appear in ascending or descending order. The following two sets of solutions illustrate this problem. Only five solutions are shown in each set, but the total number is 12 solutions in the first set and 18 in the second.

For this problem, you are asked to use the hexadecimal digits 123456789ABCDEF, inascending or descending order using only the plus and minus operators to generate equations that equal hexadecimal 100.

The prize of $50.00 will be awarded to the person with the best program for solving this problem. All entries must be postmarked prior to June 15, 1970.

Note: The hexadecimal digits A, B, C, D, E, F correspond to the decimal numbers 10, 11, 12, 13, 14, 15. If you have never used the hexadecimal system before, here is a $50.00 excuse.

Set 1	Set 2
123 − 45 − 67 + 89 = 100	98 − 76 + 54 + 3 + 21 = 100
123 + 4 − 5 + 67 − 89 = 100	9 − 8 + 76 + 54 − 32 + 1 = 100
123 + 45 − 67 + 8 − 9 = 100	9 − 8 + 7 + 65 − 4 + 32 − 1 = 100
1 + 2 + 34 − 5 + 67 − 8 + 9 = 100	9 − 8 + 76 − 5 + 4 + 3 + 21 = 100
1 + 23 − 4 + 5 + 6 + 78 − 9 = 100	98 − 7 − 6 − 5 − 4 + 3 + 21 = 100

Answer to Problem 23

The problem of "Automorphic Numbers" was not an easy one, and no solutions have been received as of April 8, 1970. However, there are three more weeks left before the deadline, and I'm keeping my fingers crossed.

P.S.: Have you heard what Dr. Richard W. Hamming of Bell Telephone Laboratories said about programmers at a recent symposium at UCLA?

According to *Computerworld* (page 2 of the April 8, 1970 issue), Dr. Hamming said that the programmers are myopic, they have megalomania, they act as though they were artists, they are illiterate, they are totally unable to read the other guy's programs, . . .

On university graduates with Computer Science degrees, he said, "All they want to do is play games. They don't know how to put anything real on the machine like a payroll." He also said "the industry will get rid of programmers in 10 years, because they aren't worth it."

Would the real programmers please stand up . . . and answer Dr. Hamming.

XTRAN

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new applications

Programming Facility Permits On-Line Debugging

An advanced programming facility which permits the user to enter and read out programs and data, manually debug programs, and monitor computer operations on line has been developed by the Bailey Meter Company, Wickliffe, Ohio. The facility simplifies initial program debugging and on-site program installation, debugging, and maintenance. Programmer training is also greatly simplified.

Designed for Bailey's large scale 855/25 process control computer, the new programming facility, Model B, consists of a high speed tape reader and tape punch, a typewriter, and a programmer's console composed of selector switches, push-buttons, bit lights, and digit lights.

Plant Maintenance System Offers Flexibility, Savings

A computerized facilities management and maintenance cost system which keeps track of more than 23,000 separate items of work was described to the Plant Engineering and Maintenance Conference of the American Society of Mechanical Engineers meeting in Fort Worth.

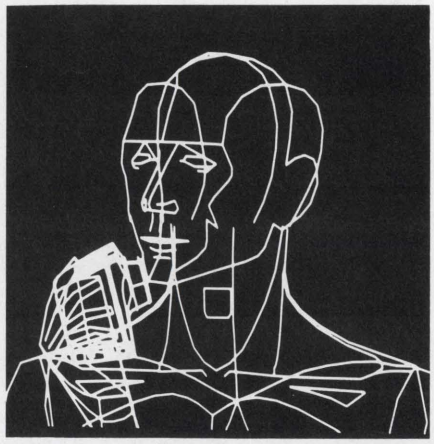
In a meeting at the Hotel Texas, Charles V. Engle, Director of Facilities for the Systems Group of TRW Inc., at Redondo Beach, Calif., said such a computerized system not only can accommodate increasingly larger volumes of data on maintenance scheduling and reporting, but it can reduce the manpower required when such scheduling is done manually.

Verifies Credit

Datatrol Inc., Hudson, Mass., specialists in Computer Voice Response Systems, has introduced the CS-1400 Credit Verification System to provide immediate verification of customer credit. A unique feature is "tailoring" each Credit Verification System to the department store's present requirements with modular expandability for future needs.

Credit verification is performed in a few seconds, and may include computer response such as: lost, stolen, marginal credit, clearance for purchases over $50, or even specification of the family members who may use the card. The Datatrol Credit Verification System can instruct the clerk on how to proceed with a particular transaction. The result is a saving of time, money, and possible embarrassment for both the store and customer.

3-D 'Computer Man' Sells Norelco Shavers



The first 3-dimensional commercial completely programmed by a computer will be used in the television advertising campaign for the new Norelco Rechargeable Tripleheader 45CT cordless shaver. The 30-second commercial shows a 3-dimensional man using and explaining the features of the Norelco shaver. All of the figure's movements are calculated by the computer.

Design Model for Medicare

An automated system expected to save the nation's taxpayers thousands of dollars annually toward the costs of the Medicare Program is being developed by Aetna Life & Casualty. The Social Security Administration has authorized Aetna to design and develop such a "model" system for the Part A, or hospital insurance portion of Medicare.

Under the terms of Aetna's arrangement with SSA, the system will then be made available to other fiscal "intermediaries" participating in the Medicare Program. Aetna expects to have the system operational in late 1970 or early 1971.

The new system will replace the current manual and decentralized methods for paying Medicare claims. Plans for the model include a centralized computer processing system which will receive claims directly from special communication terminals located in Aetna field offices around the country.

Explore Possibilities of Computer Intelligence

Ampex Corp., Culver City, Calif., has begun deliveries of large-capacity core memories to Stanford Research Institute for computer-aided research into the possibilities of giving machines artificial (man-made) intelligence. The Model RG memories are being delivered under a $340,000 contract from SRI, according to Eugene E. Prince, Ampex vice president–general manager, computer products division, SRI is conducting research to determine if man can feasibly develop advanced electro-mechanical devices to perform "human" functions requiring manual skill, comprehension and judgment.

Possible uses of artificial intelligence in the future were cited by Dr. Charles A. Rosen, manager of SRI's artificial intelligence group, Menlo Park, Calif. They might include a device that would "live" on the moon long enough to collect rocks and perform scientific experiments, in response to earth commands or to patterns pre-programmed into the device. In industry, devices with artificial intelligence might be used for jobs in difficult or dangerous environments, Rosen said, thus freeing personnel for more desirable positions.

Weathermen Predict Floods by Data Analysis

Weathermen can now sound evacuation alerts in potential flooding areas even before the streams and rivers begin to rise. Using an IBM data analysis system and radar information on storms, hydrologists at the U. S. Weather Bureau's River Forecast Center in Fort Worth can predict—almost as soon as rain starts—if water will spill over banks and threaten populated areas.

The experimental technique helps reduce the errors and guesswork inherent in conventional methods of flood forecasting and could help save lives and prevent property damage. In conventional forecasting, the Weather Bureau relies on sporadic rainfall reports furnished by volunteer observers in low density areas.

Hospital Computer Service

A radiologist prepares an analysis of x-rays on a television-like terminal located in a hospital laboratory. The device is connected to McDonnell Automation Company's computers in Peoria, Ill. The hospital data processing system provides administrative and patient care information.

Combat Troops Put "On File"

A significant milestone in the U. S. Army's multi-million dollar effort to computerize its combat service support functions has been achieved in the Second Armored Division at Fort Hood. After more than a year of system development, combat troops of the division are being put "on file" in an IBM 360/40 computer. Every element of information concerning each man will be rapidly retrievable to combat commanders. This first "on line" success is a part of the Army determination to build a multi-functional data processing system for the field Army corps and division commands.

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To help you understand the 360 System, the authors have set down two important guidelines as the basis for their book:

(a) You are shown immediately why a particular facility is needed, and

(b) You are introduced to the programming techniques needed by coding a representative sample of the system

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- How to generate multiprocessing algorithms
- Which Data Packing codes are best for each problem

All of this and much more is presented in clear language—complemented by scores of worked-out examples—so that it actually is possible for you to sit down and learn the 360 Operating System in your own home without a teacher!

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INTERACTIVE COMPUTER POWER FOR DECISION MAKING AND PROBLEM SOLVING

THOMAS F. DROEGE
Manager, Systems Engineering
Applied Logic Corporation

The applications of computer time sharing are multiplying—as are its markets and sales revenue. In 1969, time sharing sales climbed to about $125 million from approximately $70 million in 1968. This year time sharing sales are expected to double—and by 1975 they may reach $2 billion. Computer time sharing is the fastest growing segment of the computer industry.

Time sharing enables many people at different, remote locations to simultaneously use a centrally located computer. By giving people who think for a living "conversational" (interactive) access to an ultra-powerful computer specially designed to solve current problems, time sharing will vastly amplify the capabilities of business, industry, engineering, science. How well and quickly this happens depends on the resourcefulness of time sharing users and suppliers in implementing new applications for the remote computer.

Although it is but the start, much has already been accomplished in time sharing. In the past several years, time sharing has solved hundreds of thousands of problems to prove itself in general purpose computation. As users gain more experience with time sharing, they progress into more difficult problems. Time sharing computation will range from the simple to the immensely complex.

Time sharing is now entering lush new fields. Among these are data banks, or bases, which can be tapped with time sharing terminals for information retrieval pure and simple or for data plus varying degrees of computation.

Development of many more programs in the Question/Response mode will heighten the interaction of man and computer, simplify computer programming, and minimize the need to learn complicated computer languages. The time sharing computer will merely request the user to input specific data which it will use to compute the desired solution. In this way, programs written in powerful but complex computer languages can be accessed rapidly and directly. Also, an intimate association of time sharing with remote batch operation of computers is about to begin. This is a field that has far to go.

Large or highly specialized companies, and even entire industries and cities, will find it advantageous to operate in-house time sharing systems—in which case they may wish to rely on time sharing suppliers for equipment and expertise. Often, such

Special Question/Response programs written into time sharing computer instruct the user on how to input data to obtain desired results, minimizing the need for complicated programming and difficult computer languages.

in-house systems will work hand-in-glove with remote batch.

Compute-Heavy Time Sharing

The computational applications of time sharing are numerous and varied. With time sharing today, managers, businessmen, scientists, engineers are calculating; making projections and forecasts; monitoring and interpreting experiments and tests; designing mechanical parts, electrical circuits, even bridges; creating mathematical models of markets, companies, the entire economy, and research projects to predict performances and test variable factors; analyzing investments.

A market analysis by Applied Logic Corporation, which operates the AL/COM time sharing network, outlines some of the jobs that were being accomplished by time sharing in the following fields:

Management—Sales forecasting; market evaluation; analysis of product pricing and costs; project budgeting; capital investment evaluation; production scheduling; procurement analysts and scheduling; make or buy decisions; distribution and warehouse planning; analysis of new facility feasibility and/or location; etc.

Engineering—Design engineering; industrial engineering; operations research; machine loading; linear programming and Critical Path Method; plant engineering and maintenance; determining product lead times and prices; analysis of expenditures for capital goods and plant facilities; etc.

Science—Perform experiments and simulate or create models of atomic, molecular, chemical structures; monitor and interpret experiments; modify parameters or variables to obtain new test results; mathematically simulate physical phenomena to test performance of variable data; etc.

Banking—Bond swap and investment analysis; savings and demand deposit forecasting; evaluation of alternate savings interest plans; credit ranking; cash flow projections; installment loan monitoring; rate of return calculations; pro forma income statements; pro forma balance sheets; cost and financial analysis; effective yield to maturity calculations; pension fund performance evaluation; etc.

Civil Engineering—Lay out geometric configuration of bridges or superhighways; conduct land, right-of-way and other surveys; evaluate stability of earth slopes; design a complete hydraulic network; analyze plane frames; design steel beam framing and conduct analyses of concrete flat slabs; etc.

Other fields are also using time sharing computer power imaginatively and well.

Where Time Sharing Is Going

With its present applications as a base, time sharing is reaching higher into applications that involve huge masses of data, many alternatives and variables, and may well prove indispensable to management. Executives will predict the consequences of an action before they implement it. They will construct corporate models within which to test alternative courses and select the most desirable. Capital investment analysis will become a science, minimizing risks and enabling companies to more fully exploit their markets. Budgeting will be performed quickly and precisely. In many ways, executives will be able to use the time sharing computer to solve current problems.

Product design engineering will get even more substantial help from the remote computer. For instance, problems of designing gears and other components that ordinarily take days to solve with the calculator will be computed in seconds or minutes with time sharing. Such computations will cost a fraction of what they are costing now. Designs will be prepared far more quickly, and many manhours spent in tedious calculation will be freed for creative engineering.

Unfortunately, some engineers (and people in other disciplines, too) are reluctant to use time sharing because of the need to learn a programming language. To minimize the need for programming in product and systems design, specialized data bases and mathematical formulae are being pre-programmed into time sharing computers. With these design "packages," engineers need only input required data to obtain finished computations.

Although relatively few design programs are now available, many will, in the next few years, be developed by time sharing suppliers, as well as by companies themselves. Some manufacturing companies are already well into this field with programs that design and/or compute the structural and performance characteristics of products. One plastic firm's design program supplies manufacturing information as well.

Graphic displays, such as the cathode ray tube, and electronic light pens will become increasingly useful in design engineering. Integrated circuits, for example, are being designed in incredibly short times with this equipment. At one company, engineers conduct a graphical conversation with a computer, typing instructions, and pointing to objects with the light pen to indicate operations to be performed. The computer interacts with the designers by displaying on the CRT symbols and drawings of design elements. Of course, such design programs can be programmed into conventional in-house computers, as well as time sharing. But the time sharing model is specifically designed for interaction. Scientists, too, will be able to display and then manipulate axioms and theorems with a CRT and light pen.

Other Profitable Applications

Engineers in processing industries will be able to use time sharing to simulate processes, and by modifying operating variables immediately determine the effects on capacity, throughput, and quality. And they can make countless other computations that will optimize the efficiency and profitability of processes.

Matching of inks, colors, and pigments for printing and plastics industries may be automated by time sharing. To mach inks, for example, the manufacturer may need an abridged spectrophotometer to make a spectral curve of the dry print to be matched. When this data is supplied to a pre-programmed time sharing computer, it will print out how much and what kind of base ink concentration, pigment or dye should be used for the match. The computer can also supply a series of matches with different combinations of colorants that range from the least expensive to the costliest.

Time sharing will have an expanding role in marketing. Besides pricing products and forecasting markets, time sharing will help salesmen

win orders in the field. One manufacturer has developed a program which enables his salesmen to quote quickly on superconductive magnets.

Time Sharing in Science

It's estimated that only a small percentage of scientists are now using time sharing. Yet, they have compute-heavy problems ideal for the interactive computer. In studying plasma instability, one group of researchers had to contend with such variables as voltages, temperatures, magnetic fields. The conventional batch processing computer they employed to solve their equations took much too long because of turnaround time on their work. When they switched to computer time sharing, their equations were solved almost immediately after data was supplied to the remote computer.

Mathematical simulation of physical phenomena is a technique well suited to time sharing. Let's assume a laboratory wants to test the performance of various mixtures of rocket fuels without physically burning them in an actual test rocket. The lab can with time sharing develop a mathematical model of the rocket system, program this data into the computer, and then interact with the computer on a trial and error basis supplying thermal and other data on different fuels until a thorough understanding of the factors which determine optimum performance is achieved.

Soon, time sharing will bring unprecedented computer power into the laboratory. An instrument/computer interface system has been developed by Princeton Applied Research that processes either or both analog or digital data from up to 90 similar or different laboratory instruments. The data is sent over the telephone to a time sharing computer while the experiment is running (real time) or can be transcribed on punched paper tape for later transmittal. The computer reduces, correlates, or interprets the data in accordance with programs and data bases previously stored in its memory.

With this instrument/interface system, the time sharing computer can operate in the Question/Response mode, requesting the scientist to input alternative parameters for the experiment and calculating new test results from the same set of data.

Scientists, engineers, and businessmen with in-house batch-processing computers can solve their data problems internally. But doing so may prove costlier and more inconvenient than is generally realized. Well suited to processing one program at a time, the conventional computer is not geared for relatively small and unpredictably intermittent problems—no matter how important.

In-house computer centers are usually fully scheduled with routine computations and reports. The "small" problems have to wait their turn. By the time they are processed, the information may not be very useful. And if there has been an error in programming the problem, it must be completely re-run.

Data Banks and Bases

Perhaps the swiftest growing area of time sharing will be centrally-stored computer data banks or data bases which can be simultaneously accessed by remote terminals. Computerized information retrieval is destined to become an important industry affiliated with time sharing. In many fields, human knowledge is mushrooming. Its documentation is consuming countless tons of paper and miles of film. There is today so much documentation that the documents cannot be accessed quickly and conveniently. Clearly, the computer is needed to store information and dispense it on request, either in printed or visual form.

Scientific information alone doubles every 8½ years. In hours wasted searching and in lost opportunities, billions of dollars are lost each year because scientists, engineers, executives cannot locate information when they need it. Any information crucial to the conduct of science, engineering, industry, or commerce may be adaptable to computer storage and retrieval.

How many valuable manhours will be saved if scientists and engineers could input a few key words of a project into a teletypewriter and have a data bank reply with the titles of all pertinent scientific and engineering abstracts vital to their work?

How beneficial will it be to society if someday all the physical ills afflicting mankind are catalogued in a time sharing computer? When a physician anywhere inputs the symptoms of a patient through a time sharing terminal in his office, the central computer will return a diagnosis on the ailment and its severity.

Data Plus Computation

Data banks that combine information retrieval and computation have established a beachhead in time sharing technology and will greatly enlarge it. Many of these data bases are now available to executives, businessmen, scientists, engineers, statisticians. Many more will be developed, some of which will include Question/Response programs.

Companies are now beginning to develop exclusive data bases. These, too, will proliferate. When accessed by remote terminals, time sharing computers will retrieve data and instructions from memory and perform whatever computations, reductions, correlations are required. Exclusive data bases may be developed for various company functions, including marketing, management, procurement, engineering, production, distribution, etc.

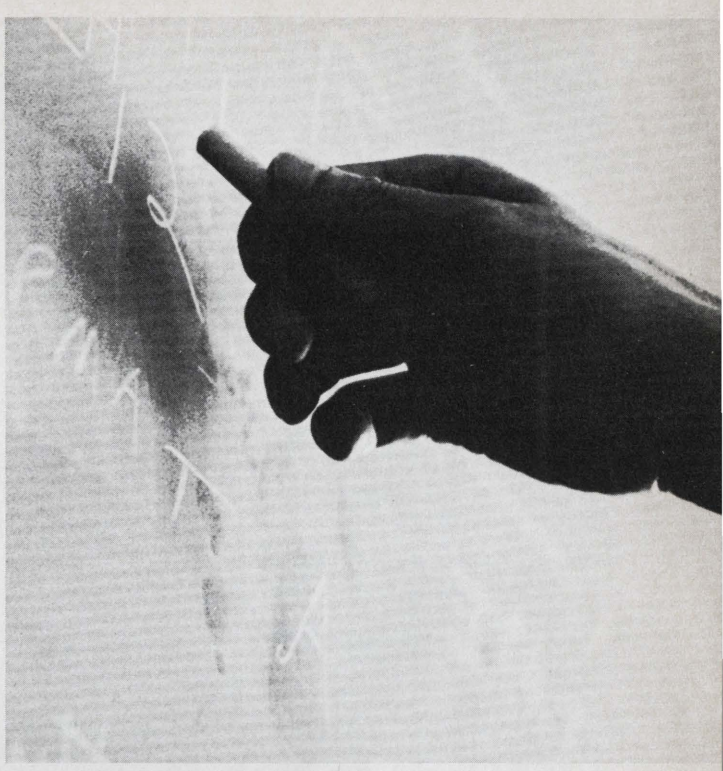
To keep their computers busy round-the-clock, time sharing computers will offer additional associated data processing services. Some of these services will involve batch processing. Data entered into a computer for processing can be accessed through remote time sharing terminals on a current basis. Retrieval of such data from batch files can be combined with computation to yield dynamic statistics that will enhance decision-making in management, marketing, production.

Using time sharing terminals, salesmen in the field, for instance, will be able to access several batch data bases in the central computer to enable them to bid firmly and realistically on orders. They may be able to obtain from the computer the price of an order, its delivery time, the cost of modifying standard components, and even the profit to be made. The same terminals used for time sharing can be employed to funnel data from field offices to a central computer to update such batch files as inventory, sales, shipments.

The expansion years of time sharing are here. And as time sharing grows, it will fulfill the evolving needs of industry, science, and commerce to influence these fields profoundly.

CONCLUSION

TWO APPROACHES FOR MEASURING THE PERFORMANCES OF TIME-SHARING SYSTEMS



ARNOLD D. KARUSH
System Development Corporation

a comparison of analytic and stimulus approach to time-sharing system measurement

Development Costs. The development cost of a stimulus measurement capability is much lower than the analytic capability. This is due to several causes. The amount of system sophistication required by the implementer is less. To design an analytic software instrumentation, a thorough knowledge of the construction and idiosyncrasies of the system is required, whereas the design of benchmark programs requires only an understanding of the major environmental conditions with which the system is built to cope. The programming of benchmark programs is also less costly than the programming of instrumentation, measurement and recording routines.

The analytic approach requires modifications to the executive programs. These programs are often complex, their behavioral relationships are intricate, and thus modifications to them can only be entrusted to senior personnel. The benchmark programs, on the other hand, are very simple to design and code once their functions have been determined. Furthermore, the checkout process for the benchmark programs is simplified, as it constitutes the testing of object programs that run in a time-sharing environment. The checkout for the analytic measurement code necessitates stand-alone computer time as the executive subsystem itself is being tested. Errors which are not detected during the stand-alone time can have disastrous effects upon the users; errors in the benchmark programs have no effect upon the users.

Operating Costs. There is a tradeoff between the operating costs of both measurement approaches that can only be evaluated at each installation. The stimulus approach requires some stand-alone computer time for calibrating the system without real users. It also necessitates a terminal and associated system resources when running under time-sharing to obtain a real world system calibration. The analytic approach increases the system overhead and thus affects all the users. The cost of this overhead must be measured and then weighed against the stimulus costs to determine which approach is least expensive for obtaining the required information.

Measurement Capability. The two measurement approaches produce significantly different kinds of information. The analytic technique provides data on the most subtle behavior and the complex interactions in a time-sharing system. The measurement categories include sampling, accounting, tracing or playback—each providing a different viewpoint of the system's behavior. With suitable reduction and analysis procedures, the recorded data can provide measures of performance on any portion of the system. The stimulus approach produces gross data on the behavior of the system in terms of throughput and response time. It assumes the existence of a set of important functional variables (thus obscuring the possible existence of other significant functional variables), and determines the effect of these variables in terms of the controlled stimuli upon the system load and the total hardware/software environment. It essentially measures the cost of operating the time-sharing system in different configurations and environments.

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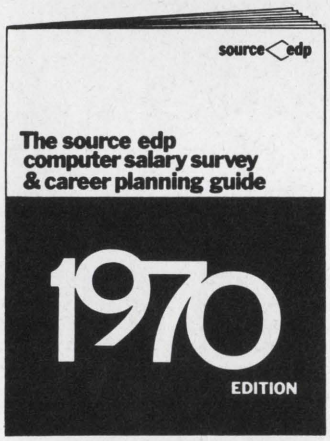

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Factor	Analytic Measurement	Stimulus Measurement
Developmental Cost	High. Requires personnel with sophisticated and detailed knowledge of executive. Testing requires stand-alone computer time. Errors may affect all users.	Low. Personnel with little experience can produce the benchmark programs. Testing can be done under time-sharing. Errors affect no one else.
Operating Cost	Increase in system overhead.	Requires some stand-alone time. Usurps a terminal and increases system load under time-sharing.
Measurement Capability	Detailed data on the system behavior and interactions. Measurements include sampling, accounting, tracing and playback.	All behavior is measured in terms of response time and throughput.
Knowledge of Results	Usually requires extensive offline analysis. Considerable statistical and analytic skill required.	Results are online, simple and immediate. Extended analysis usually not required.

Figure 2. Comparison of the Analytic and Stimulus Approaches to Time-Sharing System Measurement

Knowledge of Results. The analytic measurements usually require extensive offline reduction and analysis before the data is meaningful. This is expensive and time-consuming in that complex reduction programs must be produced, additional computer time is required, the interpretation of statistical results often requires talent that is not readily available, and there is a delay between obtaining the measurements and determining what they mean. In contrast, the measurements produced by the stimulus approach are simple and are immediately obtainable; little or no analysis is required. Refer to Figure 2 for a summary of these comparisons.

Areas for Further Development

Knowledge of the construction and efficacy of these measurement methods is just beginning to develop. There is still much research and development work to be done before "cookbook" approaches for time-sharing system measurement will exist.

Stimulus Approach:

(1) The conditions under which this approach is cost-effective must be defined. Although the analytic approach provides much more information, benchmark programs can still fill an important role due to their lower cost and the immediate utility of the information.

(2) Standardized measures for describing and ranking the performance of time-sharing systems should be developed. If these measures could be expressed in terms of throughput and response time, perhaps standardized benchmark programs could be specified for inter-system comparison.

(3) There may be other measures that a stimulus method could provide. There also may be additional insights into time-sharing system behavior that could be gained from the stimulus results.

(4) The design of the benchmark programs should be refined so that a minimum system load and terminal time need be required to extract a maximum amount of information.

Analytic Approach:

(1) A major problem is how to effectively construct a software instrumentation that will provide flexibility, power and economy. Ideas for this will be partially derived from developments in the knowledge of program structure (26–28).

(2) A cost formula for providing various measurement techniques and recording methods should be developed. Correspondingly, an information formula should be derived so that the cost-effectiveness of analytic measurement implementations can be evaluated.

(3) The problem of reduction and analysis for the mass of raw data generated by a recording function requires much inquiry. Certain approaches appear to be fairly common, such as time-ordered event histories and trace listings. But little seems to have been done with the development of sophisticated data reduction schemes (as exist in the military air defense system) and their application to time-sharing system data.

26. Freibergs, I. F. The Dynamic Behavior of Programs, Proceedings, *1968 Fall Joint Computer Conference*, Thompson Book Company, Washington, D.C., pp. 1163–1167.
27. Van Horn, E. C. Three Criteria for Designing Computing Systems to Facilities Debugging, *Communications of the ACM*, Vol. 11, No. 5, May 1968, pp. 360–365.
28. Lowe, T. C. Analysis of Boolean Program Models for Time-Shared, Paged Environments, *Communications of the ACM*, Vol. 12, No. 4, April 1969, pp. 199–205.

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360/30 and up, others, COBOL

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UNIVAC 1108/Exec 8, FORTRAN V

A. Eugene Andrdas
SCI–TEK Computer Center, Inc.
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1130/or 1800, BAL

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Scranton, Pa. 18510

CI182

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FORTRAN ASSEMBLY

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A generalized software system for Data Editing, i.e. Data checking and validation, Data correction, file restructuring Batch Balancing, Utilizing multiple file input (ISAM AND SEQUENTIAL) and multiple file output. The data editing and restructuring facilities of Data Check are built around a powerful user oriented set of commands. To use Data Check the user writes a procedure which consists of a series of statements written with these commands. Each statement consists of a command and an operand. DATA CHECK requires a fractional part of a programmers time compared to accomplishing the same task with COBOL and executes from 2–3 times faster than its COBOL counterpart. Ease of coding, job execution and standardization of editing procedures are the major enhancements of Data Check.

IBM, DOS & OS, RCA TDOS, BAL

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360/DOS or OS, COBOL

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104 Park Towne Place East
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CI185

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360/25, BAL

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CI186

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IBM S/360

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CI187

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360/50 and others, FORTRAN-IV(G)

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360, FORTRAN IV

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Fairfax, Va. 22030

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360/25 & up, Spectra 70/35 & up, BAL

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CI194

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360/30, 64K, COBOL

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Systems Consultants, Inc.
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360, Assembly

M. L. O'Connell, Manager, CSS
Sanders Associates, Inc.
D. W. Highway, South
Nashua, N.H. 03060

CI196

SCARP (System for Coding and Retrieving Parameters) $20,000

DLOAD—Converts paper tape (or Magnetic tape) input into machine language, prepares interim data file on magnetic tape, checks data against the input dictionary and control standards, and generates an error list and total list of data accepted.
DSTAT—Summarizes and lists input statistics for management control purposes.
DCORR—Updates file, merges in new data, and corrects previous entries. Generates listing of terms not in the input dictionary.
DEDIT—Extensive edit routines leading to a clean master tape of verified correct data.
DMERG—Merges correct data concerning a common event (an oil well, for example) on different tapes into a single file on one tape.
DLIST—Generates complete event descriptions using output dictionary and format.
DCALL—General retrieval system using any combination of "and", "or", "but not" conditions specified.
DDICT—Basic routine for constructing and loading dictionary of terms onto magnetic tape for use with the above programs, and for describing different abbrieviations.

XDS, IBM, CDC, or Univac w/32K, FORTRAN

E. L. Dillon, President
Dillon Associates
6940 Mossvine Drive
Dallas, Texas 75240

CI197

SELECTIVE INFORMATION RETRIEVAL SYSTEMS (SIRS) $15,000

A full text modified Boolean Key Word in or out of context batch oriented search system. Allows up to 175 search words, 15 questioning statements and/or/but not/else conditions and 4 types of output per search, unlimited number of searches per run. Uncontrolled vocabulary, average search time 1–4 minutes on data bases up to 5 million words.

360/30 & up, DOS/OS, RCA 70/45 TDOS, BAL

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

CI198

STREET ADDRESS MATCHING SYSTEM (SAMS) $8,000

A system for matching and merging any two files whose common element is street address. SAMS is a two-part system, consisting of a Preprocessor and a Matcher. The Preprocessor generates a match key in standard form for each input record by syntactic analysis of the address fields specified by the user. The Matcher performs the actual match/merge operation, checking for spelling variations and near-matches if a perfect match is not obtained. Most applications for SAMS are for geographic coding, where one file is a geographic reference file such as the Post Office National Zipcode Directory, or the Census Bureau Address Coding Guide or ACG/DIME File. In operation, the Matcher selects the apropriate geographic codes (Zipcode or Census Tract, for example), from the reference file and appends them to the data input record. Further information upon request.

360 DOS/OS, 64K min., BAL

John L. Sweeney, President
Urban Data Processing, Inc.
552 Massachusetts Avenue
Cambridge, Mass. 02139

CI199

TAPE RUN LINKAGE $5,000

Provides interface between a tape master file that is in compressed record format and COBOL processing modules. Makes application programming easier and allows for modular approach to any file maintenance run.

360/40, BAL

J. Owen Brant
110 North Illinois Street
Indianapolis, Ind.

CI200

THRESHER $495

Thresher performs any 80/80 function desired. In addition, functions as a range-finder between 2 input parameters, thereby allowing selective reproducing and/or listing. Supports tape, disk, card, data-cell as input and/or output. Up to 9 user options in any combination, including selected audit listing and hash total. Selective field is 1 to 9 digits, but may be located anywhere in record. Limitations: 80 character unblocked records on any device combination; Control is from console, but easily modified to control card, if necessary. JCL supplied is DOS, but easily modified to user configuration. COBOL statements in configuration section will be modified to user requirements upon request.

360/30 and up, 32K, COBOL, Level E

William W. Dungereaux,
Management Consultant
Coast & Southern Federal S & L
855 South Hill Street
Los Angeles, Calif. 90014

CI201

DOCUMENTATION

"CROSSREF" $100

A "COBOL Cross Reference Listing" program which provides separate listings of all data names and procedure names, with procedure name references coded as to whether they are used in a perform, go-to, or alter statement.

360–32K, COBOL

C. D. Harakas
613 East Sunset Drive
N. Muskegon, Mich. 49445

CJ202

DOCUMATIC $1,600

Automatic documentation of 360 RPG programs including English language descriptions of input, processing and output. Also, record layouts of input and output and system flow chart.

360, BAL

Data Usage Corporation
2460 Lemoine Avenue
Fort Lee, N.J. 07024

CJ203

DSI COBOL 20 CROSS REFERENCE PROGRAM N/A

This system gives a complete cross reference listing of all Data Names, Paragraph Names and verbs appearing in a program written in DSI COBOL 20. An option is available to inhibit cross referencing any of the above items. The listing shows where the items are defined and referenced. The system uses the scratch tape, generated during a compilation, as input.

360/20, DIS COBOL 20

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

CJ204

GRIM (GENERATED RUN INSTRUCTION MANUAL) $400

A series of programs designed to produce four types of documentation most often needed by S/360 users: (1) Operating Instructions; (2) Adhesive Tape Labels; (3) I/O Summary for a particular jobstream; (4) System Flowcharts. The GRIM conventions permit uniform documentation to be used by those responsible for scheduling and running complex series of computer programs. Input to the system is easily handled by clerical personnel, thus removing a great documentation burden from programming.

360/30 or above, COBOL

Maurice E. Shcerer, Jr.,
Director of Applied Research
Macro Services Corporation
131 Tremont Street
Boston, Mass. 02111

CJ205

NSIFlow $1,000

NSIFlow (nice-flow) is a complete COBOL documentation package. It includes a cross-reference and flowchart for each COBOL program to be documented and has capabilities to document multiple programs at one pass. It can save programming time, standardize documentation appearance, and ease the problem of program reassignment. NSIFlow is being extended to handle FOR-

TRAN, BAL, and RPG as well. The software requires at least one disk drive or four tape drives and 32K of main storage.

Any COBOL Supported Configuration COBOL/Object Decks

J. T. McMillen
Norvell Systems, Inc. (NSI)
Suite 2428, 100 N. Main Building
Memphis, Tenn.

CJ206

XREF, GENERALIZED CROSS-REFERENCE LISTER $200

XREF produces cross-reference listings. It relates each name in a body of text to the places in the text where it was referenced. The text may be in any programming language, or in natural language. Thus, it may be used for indexing documents as well as cross-referencing programs.

360, 05 or DO5, FORTRAN

Robert L. Glass
26414 124th Avenue, S.E.
Kent, Wash. 98031

CJ207

ENGINEERING

AIRLINE FLIGHT CREW SCHEDULING SYSTEM N/A

This system creates economic flight crew trip assignments for scheduled commercial airlines, beginning with the timetable and stated operational conditions. It will prepare daily assignments for domestic schedules, weekly assignments for international schedules, and special weekend frequencies.

FORTRAN

Murray Spitzer
6115 Greentree Road
Bethesda, Md. 20034

CK208

CAVIT $7,500

General Hybrid, Cylindrical Bearings, Incompressible, Cavitation Program No. 32–10 to determine steady-state performance characteristics of hybrid bearings operating with cavitated regions in the laminar incompressible flow regime.

CDC 6600, Univac 1108, FORTRAN IV

Wilbur Shapiro,
Chief, Center for Computer-Aided Analysis
The Franklin Institute Research Labs.
20th & Race Streets
Philadelphia, Pa. 19103

CK209

CSSL—CONTINUOUS SYSTEMS SIMULATION LANGUAGE $15,000

CSSL/6000 is the continuous system simulation language installed on the CDC 6400/6500/6000. It is a third generation super set of the languages: MIDAS, MIMIC, DSL/90, CSMP, DES, etc. The program is used to easily and economically simulate, analyze, or synthesize any mathematical system of equations that can be expressed as differential equations (linear or non-linear) or in S-plane notation ("block" notation). Further information on request.

CDC 6400, 6500, 6600/SIGMA 5/7/and others, FORTRAN

Don Snow,
Director of Applications
CODE Research Corporation
2141 West La Palma
Anaheim, Calif. 92801

CK210

CURVE $1,000

CURVE is a horizontal curve calculation program. The program uses plan or design data to develop tables of angular deflections, arc and chord lengths, for up to four radial offsets, based on 10, 25, 50, or 100 foot arc lengths (stations), for any given curve. The program is especially useful for highway and development survey work, as it provides all the field data necessary.

UNIVAC 1108/Exec 8, FORTRAN V

H. Eugene Andreas
SCI–TEK Computer Center
1707 Gilpin Avenue
Wilmington, Del. 19806

CK211

DESIGN OF CONCRETE BEAMS FOR SHEAR AND TORSION AND NORMAL FORCES $275

The program does the design of the reinforced concrete member subjected to shear, torsional moment and axial load, both tension or compression. The reinforcement both longitudinal and stirrups are designed according to the Tentative Recommendations for the Design of Reinforced concrete members to resist Torsion—Report of ACI Committee 438, and Building Code Requirements for Reinforced Concrete ACI 318–63. The program input consists of the member dimentions, concrete and steel strengths, any cover requirements if different from ACI Code, shear, Torsional moments and Axial load etc. etc.

1130 and 360/30, FORTRAN

Pal
3736 Bolling Road
Richmond, Va. 23223

CK212

ECONOMIC CONDUCTOR SELECTION $500

The selection of the conductor size for new transmission circuits is based on a set of calculations to determine the most economical size for the expected loading on the circuit over a period of years. The calculations include I2R losses, corona losses for both fair and fowl weather, present worth of money and several methods of depreciation.

1130–8K, FORTRAN IV

R. Shifman
290 Winchester Street
Newton, Mass. 02161

CK213

HEAT EXCHANGER TUBE LAYOUTS $1,250

Solves the multi-pass tube layout problem for process Shell and Tube exchangers. Unlimited variation of design scale eliminates extensive tube count tables from thermal and hydraulic design programs. English or metric system versions available. Systematically tabulates sets of layout standards for general use.

Any 4K machine w/FORTRAN IV

C. R. Holcomb, Owner
Industrial Computing Co.
1560 East 21st Street
Tulsa, Okla.

CK214

HEATRAN—GENERAL PURPOSE THERMAL ANALYZER $2,000–$4,000

HEATRAN is a digital computer package designed to solve multi-dimensional transient and steady state problems in heat conduction, convection and radiation. Continuous systems having up to three dimensions are modelled by conventional lumped parameter representations. Large, irregularly shaped systems are modelled by an asymmetric mesh network of up to 500 nodes and 999 connectors. Generality is achieved by allowing system parameters such as conductivity, heat capacity, heat generation, fluxes and temperatures to be arbitrary functions of system variables. The entire problem is defined and controlled by means of data cards specifically designed for ease of use by the analyst. Further information upon request.

Any 32K, FORTRAN IV

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

CK215

HEURISTIC INTEGER PROGRAMMING SYSTEM N/A

This program solves the zero-one integer programming model of large-scale combinatorial systems developed in vehicle scheduling, airline flight crew schedules, and other applications. It is capable of finding economic solutions to models of several thousand zero-one variables.

FORTRAN

Murray Spitzer
6115 Greentree Road
Bethesda, Md. 20034

CK216

ICSSE $5,000

Cylindrical Bearing, General Steady State Incompressible, Program No. 32–1—determines steady-state performance characteristics of hydrodynamic, hydrostatic or hybrid cylindrical bearings with incompressible lubricant in laminar regime.

CDC 6600, Univac 1108, FORTRAN IV

Wilbur Shapiro,
Chief, Center for Computer-Aided Analysis
The Franklin Institute Research Lab.
20th and Race Streets
Philadelphia, Pa. 19103

CK217

KCAL N/A

This program package provides D.C., A.C. or transient analyses of linear or non-linear electrical networks containing up to 40 nodes and 120 branches. (Choice of branch, nodes, . . . etc. numbers is arbitrary). Worst case, sensitivity and standard deviation calculations may be made in the D.C. analysis. Circuit parameter modification capability is also provided. Input may be by card reader or keyboard; any or all of the circuit variables (Node voltages, branch currents, branch voltages, element voltages, element currents, element power losses) may be outputted on typewriter, line printer and/or card punch. The user may choose to have each variable output for all nodes or branches) or he may select those specific nodes (branches in which he is interested. Plots of up to 16 circuit variables may be made as a function of varied parameters. (D.C., A.C. modify) or as a function of time (Transient). Program is also available without plot option and (with decreased capacities) for a 16K machine. Program can be further customized for use on machines other than above at the request of the client.

1130/32K, FORTRAN IV

R. Pasetto, and M. J. Mulryan
Kollsman Instrument Corporation,
Scientific Computer Center
575 Underhill Boulevard
Syosset, N.Y. 11791

CK218

KDA-CHEMICAL KINETIC DATA ANALYSIS $10,000

The KDA package is an integrated set of digital computer programs designed to solve chemical kinetic data analysis problems. This package operates in conjunction with either an algebraic or differential equation mathematical model of proposed kinetic rate processes supplied by the user. The user's model and chemical kinetic experimental data combine with a parameter optimization algorithm and command execu-

tive which are part of the KDA package. The algorithm in the optimization program is used to vary unknown model parameters (e.g., reaction rate constants) to minimize the error between computed and experimental results based on user options defined via the KDA executive program. Further information on request.

Any 32K, FORTRAN IV

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

CK219

OPTRAN—NON-LINEAR PARAMETER OPTIMIZATION $13,000

OPTRAN is a command structured free-format language which allows a user to obtain solutions to a wide range of non-linear parameter optimization problems; over 170 commands are provided. The package is composed of two separate programs, a data input processor and an optimization processor, each of which contains the OPTRAN language processor. The data input processor provides data input decoding and automatic generation of output reports. A quasi-dynamic memory allocation scheme is used for data storage to reduce the restrictions on problem size by efficient data

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

CK220

PARTAN—PARALLEL TANGENTS OPTIMIZATION $1,000

PARTAN is an integrated set of subroutines that implements a parallel tangents (or PARTAN) optimization algorithm in conjunction with an objective or error function obtained from a user generated subroutine. This package contains all necessary input/output programs for the optimization parameters and objective function prior to, during, and after optimization. The program logic makes it possible for the user to maximize or minimize the objective function or make individual objective function evaluations. The individual optimization parameters may be held constant, constrained to a specified range, or subjected to a maximum or minimum limit. Both the mode of the algorithm and the form of limiting applied to the individual parameters are specified by the user via card input or console typewriter.

FORTRAN IV

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

CK221

SCOGO (SCI—TEK COGO) $500

SCOGO is an expanded version of MIT's COGO-90. It is a problem-oriented computer language and programming system for solving geometric problems in civil engineering by using a digital computer. Complicated problems in surveying and highway design are easily solved using this method because all computer commands are constructed from terms familiar to the civil engineer. With less than two hours of study, an engineer who had no previous computer experience, can use this system to solve problems of any complexity. SCOGO excels in ease of usage and flexibility as to command structure, program interfaces, and formatting.

UNIVAC 1108/Exec 8, FORTRAN V

H. Eugene Andreas
SCI—TEK Computer Center
1707 Gilpin Avenue
Wilmington, Del. 19806

CK222

SHIP CROSS CURVES OF STABILITY (A0181) $60 per hull

This program produces all data necessary to plot a complete set of cross curves of stability. Displacement, righting lever and center of buoyancy is calculated for 0, 15, 30, 45, 60, 75, and 90 degree transverse inclinations. Input data are stations and transverse radii.

1130/8K, FORTRAN IV

N. Harper, Naval Architect
Colin Harper Model Basin
4001 Memorial Boulevard
Port Arthur, Texas 77640

CK223

SHIP HYDROSTATIC CURVES (A0184) $60 per hull

This program produces all data necessary to plot a complete set of hydrostatic curves. Displacement, centers of buoyancy and flotation, tons per inch immersion, transverse and longitudinal metacentric radii, Bonjean areas, block, prismatic, midship, and waterplane coefficients are calculated for each waterline. Input data are stations, waterlines, and half breadths or half areas.

1130/8K, FORTRAN IV

N. Harper, Naval Architect
Colin Harper Model Basin
4001 Memorial Boulevard
Port Arthur, Texas 77640

CK224

STRESS $1,000

STRESS is a problem-oriented programming language used to solve 2 or 3 dimensional structural engineering problems on a digital computer. The language uses commands already familiar to the structural designer. This feature enables the non-computer expert to handle a wide variety of structural analysis problems with only a few hours of study and a minimum of programming effort. Another important aspect of the system is the ability to easily and quickly obtain additional solutions from modifications of the original system. This enables the engineer to approximate an optimum structure with a minimum of effort.

UNIVAC 1108/Exec 8, FORTRAN V & SLEUTH II

H. Eugene Andreas
SCI—TEK Computer Center
1707 Gilpin Avenue
Wilmington, Del. 19806

CK225

STRUCTURAL DESIGN PACKAGE N/A

Time sharing programs which perform 1) rigid plane frame analysis, 2) design of floor system framing using standard rolled steel beams, 3) design of single and multi-story steel columns and 4) design of reinforced concrete footings.

G.E. Mark II, FORTRAN

W. P. Palmer
Peter F. Loftus Corporation
900 Chamber of Commerce Building
Pittsburgh, Pa. 15219

CK226

TAKE-OFF $3,000

Computation of accelerated take-off distance of an aircraft over an obstacle of specific height. Take-off distance consists of: ground distance to rotation velocity, ground distance to rotation velocity, ground distance from rotation to lift-off, and distance to obstacle. Flap and landing-gear retractions and ground effects are considered.

PDP-10, GE-635, GE-265, H—P 2000, etc., BASIC or FORTRAN IV

F. A. Klappenberger,
Manager of Computer Sciences
CADCOM, Inc.
111 Forbes Street
Annapolis, Md. 21401

CK227

THERMODYNAMICS AND PHYSICAL PROPERTIES (TAP) N/A

TAP is a versatile thermo-physical properties package for chemical and petroleum applications. Many of the latest methods for the calculation of properties such as viscosity, diffusivity, thermal conductivity, vapor pressure, heat of vaporization, density, fugacity, heat capacity, enthalpy, and entropy are incorporated in the package. Its executive routine is designed to choose the best method for calculating a property depending on the input continuation of TAP: information. Provisions have been made to minimize the effort required to modify or expand the program.

FORTRAN

Dr. Michael L. McGuire
ChemShare Corporation
730 Asp, Box 2310
Norman, Okla. 73069

CK228

TECHNIQUE FOR OPTIMAL PLANNING AND SCHEDULING N/A

TOPS generates the optimum schedule for maximizing profit of a complex project with nonlinear constraints. Primary emphasis is placed on the schedule rewards. The program provides two results in a reasonable amount of computing time: 1. Optimum schedules for all activities, based on the conditions at the review date; 2. For changed conditions between review dates, a simple guide by which the manager of each activity can locally select an alternative strategy that maximizes total project profit. By use of a unique proprietary algorithm, TOPS establishes an optimum project schedule in about the same amount of computer time as the mere processing of an ordinary PERT network. TOPS is useful, not only for maximizing profit on an existing project, but also for negotiation of profitable incentives. TOPS was developed to handle very large projects of up to 20,000 activities. However, it is practical for any project or company large enough to require PERT or similar controls.

360, 7090/94, XDS SIGMA 7/65 or 32K, FORTRAN IV

R. V. Morse, Associate
Hollander Associates
P.O. Box 2276
Fullerton, Calif.

CK229

VAPOR—LIQUID EQUILIBRIUM PROGRAM (EQUIL) N/A

EQUIL is a multicomponent vapor liquid equilibrium package. It is used for the calculation of equilibrium K-values of chemical and petroleum mixtures. The program has been tested extensively against experimental data. The output of the program includes vapor density, liquid density, vapor and liquid composition and K-values.

FORTRAN

ChemShare Corporation
730 Asp, Box 2310
Norman, Okla. 73069

CK230

VEHICLE SIMULATION $1,250

Program 1 creates data files based on vehicle weight and basic motions applicable to the vehicle. Program 2 then simulates one

or two vehicles operating on the same path. Delay factors, interference, skill, fatigue and other factors are considered. The program will handle up to 15 critical locations where delay may occur. Output is a list of cycle times before and after simulation. 100 cycles may be simulated. This program is ideal for simulating forklift operation in an industrial plant.

1130, 8K, BASIC FORTRAN IV

Richard Shifman, Consultant
290 Winchester Street
Newton, Mass. 02161

CK231

VOLTAGE GRADIENT $250

Calculate the voltage gradients of each conductor for a given tower height, conductor spacing, radius of conductor and line to line voltage. The program calls ARRAY and MINV, subroutines from the IBM 1130 scientific subroutine package. The program is based on a paper published by AIEE Transactions, Vol. 74, April, 1955, by G. E. Adams.

1130–8K, FORTRAN IV

R. Shifman
290 Winchester Street
Newton, Mass. 02161

CK232

WATER DISTRIBUTION, WATDB $25,000

The Northwest Computing Water Distribution program is based on the Hardy Cross method for the analysis of flow distribution in a pipe network. Modifications to the basic equations are used to permit the analysis of pumps in the system and multiple fixed pressure points. Input to the program consists of a description of each line in the system, the elevation of each of the nodes in the system, the discharges and inputs, pump locations, the pressure at one or more known pressure points, and a list of the pipes in each of the loops in the system. Output from the program consists of the amount by which the input or discharge has changed (from the estimated value) at the known pressure points (when more than one pressure is specified), the corrected flow rate, the velocity head loss and rate of head loss in each pipe, and the elevation of the hydraulic grade, the available pressure and the final discharge at each node.

1130 with disk, 360/64K, BASIC FORTRAN IV

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

CK233

WING-STRESS $2,800

Applications program for light aircraft design. Shear and bending stresses in a two-spar tapered wing under combined torsion, bending, and shear. Interactive program intended to save number of iterations required in wing design by permitting real-time parametric study.

Any time-shared system (PDP-10, GE-635, GE-265, H-P2000, etc., BASIC or FORTRAN IV

F. A. Klappenberger,
Manager of Computer Sciences
111 Forbes Street
Annapolis, Md. 21401

CK234

FINANCIAL

INVESTMENT AND BORROWING

ACUAS (AUTOMATED CREDIT UNION ACCOUNTING SYS.) $2,000

Credit union accounting system for shares and loans. Resolves clerical chore of operating credit unions. Produces balance listing, trial balance, posted transactions report, exceptions report, loan payment report, delinquent loan report, statements, dividend report & 1099's.

360/25, COBOL

G. S. Morningstar
P.O. Box 4711
Jacksonville, Fla. 32201

CL235

BID–BOND–SWAP INVESTMENT DATA $15,000

BID is a program for time-shared computer systems which provides Bond Investment Data in an immediate analysis of the income and capital effects of a bond trade, including all tax effects. It is used to compare alternative fixed-income securities in the process of replacing presently held bonds with new possibilities for maximization of income. The total context of the particular personal or institutional tax environment is considered. Used by banks, the service can be offered for subscribers' use via telephone to any bank department with a terminal. It can also be installed for private institutional use. The program was developed by State Street Bank and Trust Company, Boston.

360/30

Cullinane Corporation
60 State Street
Boston, Mass. 02109

CL236

"FILS" INSTALLMENT LOAN SYSTEM $15,000

Fils is a comprehensive installment loan accounting system for banks and other loan institutions. Developed and used by The First National Bank of Boston, it Accommodates both branch and correspondent banks. It is extremely versatile and is readily adaptable to the varied methods and policies of many independent correspondent banks. For the loan officer, it features readily available up-to-date payoff amounts for each loan, up to 99 different loan type classifications, indirect loan reporting, management statistics, and automatic closure of small balances. For correspondent banks, it features several accrual methods, various check-digit calculation procedures, option codes for the selection of reports, and flexibility of scheduling late notices and late charge assessments. Further information upon request.

360/30

Cullinane Corporation
60 State Street
Boston, Mass. 02109

CL237

INSTALLMENT LOAN $6,000

This is a multi-bank system which is extremely comprehensive. 23 daily reports are provided; 14 periodics and monthlies are also provided. The system has full rebate and payoff capability, uses minimum of preprinted forms (coupons, chase cards and file cards) and is built to support the collection agent.

360, 32K, DOS, COBOL

Michael J. Henry,
Vice President, Marketing
Florida Software Services, Inc.
1010 Executive Center Drive, Suite 255
Orlando, Fla. 32803

CL238

INSTALLMENT LOAN ACCOUNTING SYSTEM $7,500

This package has the capability of handling interest bearing loans as well as discount loans. On interest bearing loans the interest is calculated daily and notices of interest due may be sent to the customer on a regular basis. After posting the day's transactions, the accounts are aged and checked for delinquency. Exception reports, late notices, and history cards are automatically prepared. Payoff figures given by the system are up to date and reliable. On simple interest loans, the payoff includes interest due one day in advance of the trial balance. On discount loans, the payoff is updated one day ahead of the anniversary so that the payoff figure is correct the following day. There is never a need to calculate any payoff or interest due by hand. More information upon request.

360/30, 2311, 1403, 2540, 1419, BAL

Leonard A. Waldorf,
Programming Manager
Brenco Automation Center, Inc.
2818 Ingersoll Avenue
Des Moines, Iowa 50312

CL239

INSTALLMENT LOAN SYSTEM $6,000

Designed for processing in a multi-bank environment with branch and other control breakdowns. Options are available for each bank in regard to delinquent notices, late charge calculations, etc. A complete trial balance may be printed as desired (daily, weekly or monthly) showing current data including net payoff balances. Earnings accrual, dealer analysis, management reports and year end interest paid reporting are all features of the package.

360/30, 64K, DOS Assembler

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

CL240

MORTGAGE LOAN ACCOUNTING SYSTEM—MARC II $40,000

A comprehensive mortgage accounting system for mortgage bankers, savings and loan associations, and commercial banks. Includes all daily, weekly, monthly reporting functions; tax and insurance procedures; complete investor reporting (including new FNMA/GNMA system; escrow/impound subsystem. Flexible reporting and processing options for multiple companies. Report generator and inquiry options available.

Honeywell 200, 32K; 360, 65K, COBOL

Mortgage Systems Company
University Computing Company
1949 North Stemmons Freeway
Dallas, Texas 75207

CL241

BANKING OPERATIONS

AUDIO RESPONSE ON-LINE TELEPROCESSING SYSTEM

The system utilizes BTAM to receive/send data by touch tone telephone or pad attached to standard dial telephone. Demand deposit, savings, and installment loan are supported by up to 8 lines and a 64 word vocabulary. Designed for multi-bank environment, a security technique is employed at bank and application levels. All transactions are logged and a report is printed to provide an audit trail of updating and inquiries. The on-line program consists of 25 phases and requires a 20K partition under DOS.

360/30, DOS Assembler

Marvin Russell,
Manager of Programming
Old National Bank
P.O. Box 718
Evansville, Ind. 47701

CL242

BANK DEMAND DEPOSIT ACCOUNTING $2,500

Complete demand package including update, statement run, exceptions, return charges, large items, etc. Unique alert listing for holds, stop payments and special instructions. Self balancing feature. Completely operative system now in use for several months. Will handle multiple banks with branches on a single master file. Input can be MICR, paper tape or card. System requires single pass of master file per processing cycle.

Burroughs B-3500, 25K, Advanced Assembler

Marc Barott, Manager of Marketing
Valley Bank of Nevada
1077 East Sahara
Las Vegas, Nev. 89105

CL243

BILLING SYSTEM—TENANT $2,800

This is a multi-user billing and collection system designed for a data center operation. The system was designed to handle apartment complexes, condominiums, office complexes, mobile home parks, or other leasing operations which are characterized by the requirement for a fixed, monthly billing and collection service. On-site support is available, but not required and is not included in the price.

360, 32K, under DOS

Michael J. Henry,
Vice President, Marketing
Florida Software Services, Inc.
1010 Executive Center Drive, Suite 255
Orlando, Fla. 32803

CL244

BILLING SYSTEM—UTILITY $3,000

This is a general purpose, multi-user utility billing package built to handle utility-like companies with up to three types of utilities. The system is built to provide callable rate schedules, etc., for individual utilities. Meter book type inputs are accepted by the system which provides all calculations, historical record keeping, computer-produced bills, summaries, etc.

IBM 360, 32K, DOS, COBOL

Michael J. Henry,
Vice President, Marketing
Florida Software Services, Inc.
1010 Executive Center Drive, Suite 255
Orlando, Fla. 32803

CL245

BOND PORTFOLIO ANALYSIS AND ACCOUNTING $9,000

This is a multi-bank automatic bond investment analysis and accounting system. It provides each user with information required for proper management of a portfolio. This is a very comprehensive complete system for portfolio management.

360, H-200, B-3500–65K, COBOL

Michael J. Henry,
Vice President, Marketing
Florida Software Services, Inc.
1010 Executive Center Drive, Suite 255
Orlando, Fla. 32803

CL246

BRITISH TO U.S. INVOICE CONVERSION $50

Converts any Bill or Invoice from British to U.S. currency. Any number of line items may be entered along with the gross total, discounts and/or additions (if any), and a set total. The program checks the accuracy of the bill and if desired distribute the discounts and additions among the line items, converts to U.S. values, then list the line items and totals in U.S. currency.

Any 360 with CPS, CPS subset of PL/1

Dan W. Shealy,
Head, Library D.P.
University of Georgia
Main Library
Athens, Ga. 30601

CL247

CAPITAL INVESTMENT MODEL N/A

Provide an analysis of a project's (or company's) expected financial position to be obtained as the result of input, revenue and cost data. Develop standard financial statements (P&L Balance Sheet, Cash Flow, etc.).

140K Core, FORTRAN

J. F. Wagner or P. J. Skinner
Mellonics System Development Division
1001 W. Maude Avenue
Sunnyvale, Calif. 94086

CL248

CERTIFICATES OF DEPOSIT $4,000

Multi-bank and multi-certificates of deposit type (six different types of certificates of deposit) package built to operate in data center environment. Designed to handle almost any type of known certificates of deposit.

360, 32K, DOS, COBOL

Michael J. Henry,
Vice President, Marketing
Florida Software Services, Inc.
1010 Executive Center Drive, Suite 255
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CL249

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Certificates of Deposit processing system includes 10 programs plus 6 file back-ups, sorts, etc. Running present form since 01–69. Runs on Mod 25 up—is now on 40 multiprogramming. Weekly posting. Checks and Notices, alpha and/or numeric Trial, 1099's by customer. Multi-bank processing with all options variable by bank. Can report cash or accruals. Handles 3, 6, 12 month maturities and any increment of 12 months. Single term or renewable. Interest paid at maturity on 3 and 6 months CD's, 6 months or annually on 12 months CD's. Compounds interest, reports Savings or Checking accounts to be credited.

360/25 and up, 1403, 2540, 32K, BAL

Keith L. Avise, Assistant Cashier
Merchants National Bank—Datacenter
222 Second Avenue, SE
Cedar Rapids, Iowa 52401

CL250

INVEST $2,700

The objective of the program is to assist an investor in evaluating the economic feasibility of large scale investments. Tabulation of cash flow over the life of the project enables liquidity criteria to be considered in the decision making process. Included, as part of the analysis, are the calculations of:—rates of return on investment and equity,—net present value,—payback,—and benefit cost/ratios. Input variables include: —fluctuations in sales levels,—cost parameters,—method of depreciation,—pay back period (long-term loan),—interest rates on loans,—rates for Federal, State, and Local taxes,—changing levels of output. A complete list of input variables and total program description provided upon request.

360/30 and up, FORTRAN IV

Christopher D. Iles,
Financial Marketing Coordinator
PST Enterprises, Inc.
370 Lexington Avenue
New York City, N.Y. 10017

CL251

MUTRAN (MUTUAL FUND ACCOUNTING PROGRAM) $7,500

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FORTRAN Compiler, 3 tape drives, FORTRAN

Dr. Ted Finkelstein
Trans Computer Associates
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Beverly Hills, Calif. 90213

CL252

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PAT is a proof and transit system developed by second National Bank of New Haven. The program presently handles 75,000–150,000 items per day in an hour or two of processing. The program features fast processing in one partition, use of a standard printer, and readily changeable tables of sort and float patterns. In addition to deposit and batch proof, the system captures cash letter data for all end points on the initial pass; rerun passes are needed only for physical transit separation and require only 15k of core. The Second National is currently using the system to proof and separate all teller input including deposits, loans and inclearings. ON-us transactions are captured on a disk file for entry into DDA, IL, and other systems. The program also accumulates float data and deposit items for detail lists for each sort pocket, and automatically writes cash letters. Further information upon request.

360/30, BAL

Cullinane Corporation
60 State Street
Boston, Mass. 02109

CL253

SAVINGS SYSTEM $4,000

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360, 32K, DOS, COBOL

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CL254

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360/50, Primarily ALC &PL/1

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

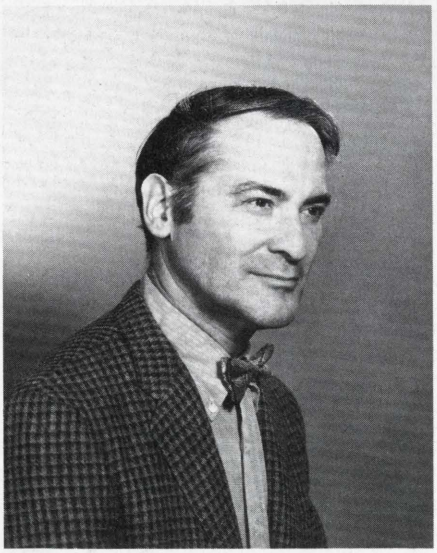
CL255

SAFEGUARDING COMPUTER INFORMATION

HAROLD K. MINTZ

Proprietary information in computer systems, in-plant or out, is highly vulnerable to industrial espionage. There are four categories of protection for such information. These categories are: cryptographic; contractual; managerial, administrative, and procedural; and electromagnetic, electronic, optical, and electrical. Each category includes a statement of protective measures that, if applied to computers, terminal stations, and communication lines, should minimize the opportunity for theft or loss of sensitive data.

Such a loss hurts. For example, early in 1969 British Overseas Airways Corporation "lost" information valued at nearly $5,000,000. The irony of it was that this information detailed "how the airline intended to operate its $96,000,000 computer system to make the company more competitive."[1]



Author Harold Mintz is a communications consultant headquartering in Burlington, Mass. Since 1962 he has taught a writing course to graduate engineers at Northeastern University, Boston.

Time-sharing systems that depend on public telephone and telegraph lines are especially vulnerable to espionage. In fact, without many precautions these systems are sitting ducks for sharpshooting spies. An article in the Harvard Business Review sums up the difficulties:

> Today, setting up a security program is complicated by the growing use of remote terminals. It is not uncommon for a company to have its computer in one center, data transmission points in several sembly of final reports in still ansembly of fiinal reports in still another location. When employees hundreds of miles away are in direct contact with the computer files, there must be controls to ensure that the files are not changed from remote locations without authorization, and that classified or sensitive data are available only to authorized personnel in those locations.[2]

Complicating the security picture is the astronomical growth in time-sharing since 1965. Each year more and more data is accumulated, processed, stored, and retrieved by: local, state, and federal agencies; universities; "think tanks"; corporations, trade associations; labor unions; hospitals; and credit bureaus.

Categories of Protection

Cryptographic protection employs scramblers (encryption devices) to encode information at the computer and terminals. These devices, which have been used successfully by the military for many years, also decode. Although costly, the scramblers are compatible with the telephone network and teletype equipment, and can operate at data rates up to 50,000 bits per second. Passwords and identification codes should be changed often. It may be wise to use a sequence of passwords and to require a different password with each use. Both the authorized user and the terminal require identification.

Program the computer to check the validity of passwords and identification codes before it receives or prints out information; the user should be able to key in his password without a printout of it appearing on the terminal or on the computer output. Preferably, the password should consist of numbers, letters, and symbols. Passwords, names, and identifications should *not* be given out over the telephone. Means for identifying computer users by fingerprints and voice prints are on the horizon, but are not yet operational.

Contractual protection is achieved by having computer personnel sign a non-disclosure employment contract. If programs are loaned to outsiders, have them first sign a non-disclosure contract.

All accesses to the computer should be recorded and audited for justification often as a part of managerial, administrative, and procedural protection, as well as limiting access to the library and computer room, which should not be a showplace for visitors and unauthorized employees. Access can be monitored by closed circuit TV. Another pos-

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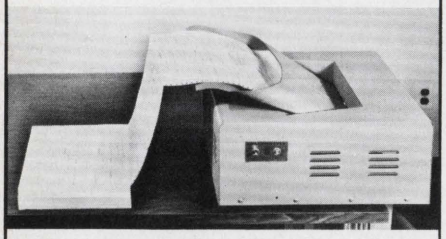

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sibility is ultrasonic alarms within the room.

The computer should be programmed to keep a log recording the files used, the users' identifications, and all inquiries. The log should be audited periodically to uncover questionable inquiries and penetrations. Lock the computer so that sensitive information can be obtained only if two or more supervisors request it together in writing. Break up coding tasks among a few programmers; because of the high turnover of computer personnel, avoid heavy reliance on any individual.

No matter how elaborate, ironclad, and costly your security system is, it will be no better than the integrity of your computer personnel. For that reason, subject programmers, operators, maintenance technicians, and systems analysts to stringent screening before hiring them, and have them bonded by a national insurance company. Review with them periodically their responsibility for preserving the privacy of confidential information.

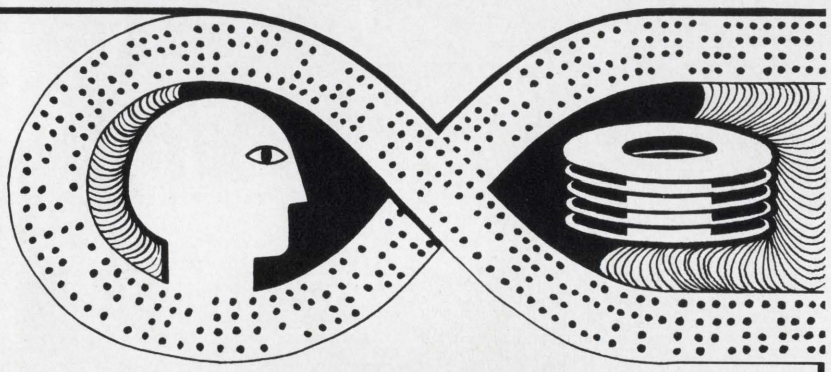
Data files, disks, and programs tapes should be stored in locked areas; keep a log of users and audit it periodically. Store up-to-date master back-up tapes in a remote (off-site) locked safe. Thus, if the original tapes are damaged or destroyed accidentally or deliberately, the loss will be negligible.

Assign a need-to-know status to qualified personnel, take out an insurance policy to cover losses of computer information, and delegate responsibility for overall protection of privacy to a member of top management. Avoid processing sensitive data on a regular fixed schedule. Destroy wastebasket contents and teletypewriter ribbons and carbon papers bearing sensitive information; even platens may be vulnerable. Write streams of random digits at least three times over drums, tapes, and disks so that their information cannot be retrieved.

Do not allow programmers to modify programs actually running on the computer; program changes should be approved and signed off by the cognizant manager. Use the "buddy system" in the computer room—no person should be allowed access alone (this rule applies especially to third shifts and Saturdays). Be wary of the "mop and pail platoon." Since they enjoy an unwarranted "open door" policy in many companies, they bear watching, at least on a random basis.

To prevent monitoring of RF signals conducted or radiated by computers, peripheral equipment, and communication apparatus, use RF shielding and noise generation for masking. One possibility is to enclose the computer within a screen room (Faraday cage). Another specific protective measure in the electromagnetic, electronic, optical, and electrical category of protection is to shield the cables that transmit data between components of the computer system.

I/O devices should be located as near as possible to the center of the computer room; in other words, far from the room walls. These devices are the most vulnerable points in an EDP system because their signals contain information. If possible, keep phones out of the computer room. If phones are necessary, equip them with plugs and jacks and unplug them when processing sensitive data. Remove all unused phone wiring and other unused wiring from the computer room; ground all conduc-



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tors (water pipes, heating and air-conditioning ducts, etc.) as near the computer room as possible.

Preferably, process sensitive information during mornings or afternoons as greater protection through masking from the higher level of environmental and man-made noise is offered than at night. This greater protection is particularly true of heavily urbanized or industrialized centers. Include random masking signals in transmissions to circumvent tapping of short-distance transmission lines.

A multi-conductor cable, with several circuits transmitting simultaneously, complicates penetration attempts as the spy has to pierce the cable to reach the wanted circuit —no easy task. Some cables are enclosed in jackets of dry air and have pressure sensors; any opening in the cable sheath causes loss of pressure setting off an alarm. Since these alarms are expensive, they are used mainly on short-distance lines. Watch for unauthorized connections to or signs of tampering with terminals, cables, or telephone apparatus.

Consider using an optical device that identifies people by hand geometry, specifically by the lengths of four fingers (index, middle, ring, and little) of the right hand. A Stanford Research Institute study proved that this device is 99.5 to 99.95 percent reliable for personal identification. It can be utilized with a terminal station connected on line with a central computer that has the individual's hand geometry stored in memory.

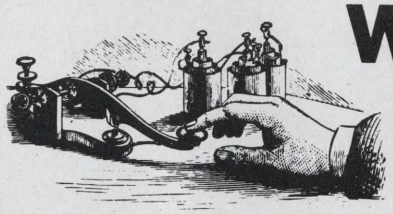
A Look at the Future

"Arthur D. Little Company and Stanford Research Institute have estimated that by 1975 more than 70% of all computer use would involve timesharing . . . ."[3] Fredrick R. Kappel, former AT&T president, predicted in 1967: ". . . in a few year's time data communications [over telephone lines] will actually exceed in sheer volume the communications of speech."[4] According to a recent special study by the Wall Street Journal, "The largest potential increase of EDP facilities or services is reported for terminal facilities with access to stored data."[5]

Figures on dollar volume bear out these predictions. In 1967 timesharing volume edged slightly over $30 million; in 1968 sales surpassed $100 million. As of September 1969 there were 150 timesharing companies in the USA, and their number is mushrooming, especially in Boston, New York, and Detroit.

Time-sharing systems using remote terminals will soon be linked by microwave relays, and in the foreseeable future, by communications satellites, and by television, laser, and infrared (for short distances) technologies. With all these interfaces forming regional, national, continental, and even global networks of computer systems, it is easy to understand why a new type of company was recently organized in Boston.[6] Its objective: to make computer information systems secure against infiltration.

1. "Computer Spy Worries", Electro-Technology, July 1969, p 16, col 3.
2. "Plugging the Leaks in Computer Security", Harvard Business Review, by Joseph J. Wasserman, September–October 1969, p 124, col 2.
3. "Dither over Data: Another Phone System Crisis?" Electronic Design 19, September 13, 1969, p 26, col 2.
4. Ibid, p 25, col 3.
5. "Management & the Computer", Wall Street Journal study, 1969, p 5, col 2.
6. "How safe is your computer?" Boston Globe, 16 November 1969, page B-33.



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financial currents

RCA Corp. recently announced major changes in its computer pricing structure, including the computer industry's first plan with options to bundle or "unbundle." The new unbundling plan gives computer users the option of leasing or purchasing RCA computers without systems support at a three per cent price reduction, or of acquiring the computer hardware with full systems support at present rates. RCA also announced the details of a new lease–purchase plan which offers its commercial customers up to a 15 per cent reduction in monthly charges for its computer systems over a six-year period, at the end of which they will own the computers.

Honeywell Inc. has entered the growing market for computer data-conversion services with the opening of a service center in Tampa in April. Richard R. Douglas, vice president and general manager of Honeywell's Information Services Division, said industry analysts expect service bureaus that use optical character reader devices to convert source data to computer-readable form will be doing business at a rate exceeding $110 million a year by 1974. This compares with a reported $28 million in 1969.

SYCOR Inc., Ann Arbor, Mich., recently announced an agreement with the *Midwest Stock Exchange Service Corp.*, under which SYCOR video terminals will be used for order entry by brokerage firms across the country. According to Samuel N. Irwin, president of SYCOR, this marks the first time in the securities industry, that video terminals will be employed in branch offices for order entry.

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

Datacraft Corporation, Fort Lauderdale, announced the receipt of a follow-on contract in excess of a million dollars from *North Electric Co.* of Galion, Ohio, for production quantities of its Model DC-37 core memory systems. The company received an initial order for DC-37 memories from North Electric for approximately $300,000 in August of 1969. The initial shipments have been made and accepted by North. The DC-37 memory is a key element in North Electric's NX-1E processor controlled commercial telephone switching system. Deliveries of all systems under these two contracts will be completed within the next 12 months. This contract brings the total of new contract awards to Datacraft for computers and memory systems over the past 6 weeks to 4.4 million dollars.

United Video, Inc. has applied to the Federal Communications Commission for a permit to build a data transmission microwave network to serve major cities in the midcontinent area, President Gene W. Schneider announced today. United Video, a miscellaneous common carrier, is the microwave operating division of *LVO Cable, Inc.*, the cable television division of Tulsa's *LVO Corporation.*

S. J. C. C.

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Interdata, Inc., Oceanport, N. J., has announced the signing of a marketing agreement with *Kyokuto Boeki Kaisha, Ltd.* of Tokyo, Japan. The agreement with KBK, one of the largest technical sales, service and programming operations in the Far East, will cover the marketing of Interdata's small computers and communications equipment.

The U. S. Department of Housing and Urban Development has awarded a $3.3 million contract to the *Univac Federal Systems Division, Sperry Rand Corporation*, for a UNIVAC 1106 computer systems to keep pace with HUD's expanding role in stimulating housing production and revitalizing the nation's cities. The UNIVAC 1106, with 131,000 words of memory, replaces older computer equipment presently being used.

Melvin B. Eagle, president of *REMAC International Corp.*, Gaithersburg, Md., announced the purchase of all assets of *Jonker Corp*, of Maryland. REMAC manufactures equipment designed specifically for use in information retrieval systems in operation throughout the United States, Canada, Japan, and Europe.

Direct digital control will be applied to the new Unit 4 at Conesville Station of *Columbus and Southern Ohio Electric Co.* to achieve one of the most advanced automation systems in existence. The project is a joint effort of *Cincinnati Gas & Electric, Dayton Power & Light* and Columbus and Southern Ohio Electric. Consulting engineers are *Black & Veatch*, Kansas City. The 800 megawatt unit is scheduled to go on line in early 1973. Contract for the Conesville DDC system has been awarded to *Bailey Meter Company*, which will supply a Bailey 855/25 Computer System.

Intranet Computing Corp. has acquired the *Data Systems Division of Datametrics Corp.*, Van Nuys, Calif., according to Arthur E. Speckhard, president of Intranet. The acquisition, which is subject to approval of the California Commissioner of Corporations and other regulatory agencies, involved an undisclosed amount of Intranet common stock. The acquired unit has some 30 employees and projected annual sales in excess of $1 million, Speckhard stated. The Data Systems Division of Datametrics develops and manufactures equipment which enables computer users to connect computing equipment from different manufacturers in a single data processing system.

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new products

Introduce Low Cost Disc Storage System

A disc storage system under $25,000 in unit quantities will be introduced at the SJCC by Peripherals General, Inc., Cherry Hill, N. J. The new system, the 816/716 Disc Storage System, is designed to provide a low cost, storage facility which can interface directly with the central processor of small to medium computers. It is also intended for use in special storage systems, and reductions in price are available with large quantity orders.

The 816/716 System uses removable disc packs as the storage medium and has a maximum capacity of 116 million bits. It consists of a controller (Model 816) and one or two disc drives (Models 716) which interface with the controller.

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

Introduce New Memory Products

Electronic Arrays, Inc., Systems Division, announced that MOSTAK I memory system which has a 1.0 microsecond full cycle time. The memory is a 512 word, 4 bit per word random access read/write memory with an 0.8 microsecond read access time. The Mostak I employs monolithic MOS random access memory devices manufactured by Electronic Arrays for the data storage and the majority of the address decoding. The system consists of a single board and is 6¾" x 4¼". The unit offers Non-Destructive readout, expandability to 16, 384 words, TTL input/output levels, small size utilization, low power consumption, wide temperature range and all address decoding and clock drivers.

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

New Video Terminal In SJCC Exhibit

A new video terminal, Model DW-33, from ALPHACOM, INC. (formerly Alphameric Data Corp.) will be displayed at the SJCC. The low-cost DW-33 is designed for time sharing and as an i/o unit for small computers. It offers features such as: 25 lines of 72 characters each (80 characters optional) and character insertion and deletion with capability to spread or close up a line of characters.

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

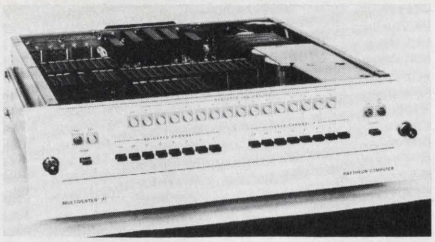
Datacraft Announces Second New Computer

Datacraft Corp. will be exhibiting the DC 6024/3 Digital Computer at the SJCC. This is the second high/speed computer to be introduced by the company in its 2½ year existence. The DC 6024/3 features a full cycle time of 1.0 microseconds and a fixed word length of 24 bits. The new machine was designed for use in applications requiring real-time control and complex calculations.

Datacraft's DC 6024/3 was designed for use in applications requiring real-time control and complex calculations.

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

New Converter by Raytheon



Raytheon Co. will introduce the Multiverter III® instrument, an addition to its line of multiplexed analog-to-digital converters, at the SJCC. Manufactured by the company's Computer Operation in Santa Ana, Calif., the new converter, designated Model MADC15, will operate at a throughput rate of 100 KH_z with 15-bit resolution.

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

Second Generation Line

Ford Industries, Portland, Ore., has announced that the second generation of their "ForData" product line of coupler/modem units will be shown at the SJCC. The new units are designated the Model 1210 for "originate only" operation and the Model 1610 for "originate," "answer" and/or "automatic answer" operation.

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

Home Study Course Describes Systems, Procedures

A new 12-page brochure describing its 50-lesson-home-study course in Systems and Procedures is now available from the North American Institute of Systems and Procedures of Newport Beach, Calif. The new course serves as a refresher in latest methods and techniques for the practicing systems men and particularly recommended to teach new systems people quickly and efficiently.

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

Terminal May Be Used in Line Printer Applications

The new Beta data communications terminal with switch-selectable baud rate by Syner–Data will be shown for the first time at SJCC. The Beta terminal system was specifically designed to meet exponentially increasing requirements for low cost hard copy terminal devices capable of performing multiple functions with maximum economy. Although Beta will be most frequently utilized as a competitively priced teleprinter communications terminal at speeds up to 30 characters per second, several unique features permit it to perform all functions of a business form line printer in applications not demanding high line printer speeds.

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

Daedalus Introduces Magnetic Tape Controller

An IBM-compatible Model 119 Magnetic Tape Controler has been introduced at SJCC by Daedalus Magnetic Tape Controller has been Computer Products, Inc., North Syracuse, N. Y.-based manufacturer of peripheral computer equipment according to Robert B. Ring, vice-president of marketing. The 119 is the first announced peripheral option to the Daedalus 711 Programmable Data Terminal, the recently introduced remote batch terminal which features a built-in modem, memory, universal I/O, and 30 cps printer. The magnetic tape controller has been designed to serve as a mass data storage device and to interchange data with the terminal on-line or off-line.

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

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

Data Collection Device To Be Exhibited

A new Source Data Collection Device designed to satisfy the growing need for an economical and easy-to-operate unit for collecting and originating computer input data will be exhibited at the SJCC by Madatron Corp., a subsidiary of Faradyne Electronics Corp.

The new Source Data Collection Device allows employees unskilled in operating data processing equipment to enter data directly at the source where it is generated, in real-time. Data is entered in human language through alpha-numeric display. Extensive coding formats are not required.

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

Multiple-Card Card Reader

A new card reader that feeds, reads, and stacks the new 96-column System/3 card as well as the standard 80-column card and its stub varieties has been designed and developed by Bridge Data Products, Inc. Identified as the Model 80/96 Multiple-Card Card Reader, it will be exhibited during the SJCC.

Made as a plug-in, add-on package, the 80/96 comes complete with electronics and enclosures. It is designed for reliable operation at speeds of 500, 96-column cards per minute or 300, 80-column cards per minute.

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

Data Card to Show New Embosser–Encoder

Data Card Corp. will demonstrate at the SJCC for the first time a new machine which simultaneously embosses self-writing characters and punches machine-sensible code holes into plastic credit cards at 1500 cards per hour.

The cards produced by this unique new machine can be read, automatically by data collection devices at the point of transaction—either off-line or online to computers.

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

Disk Storage Drive System To Be Shown at SJCC

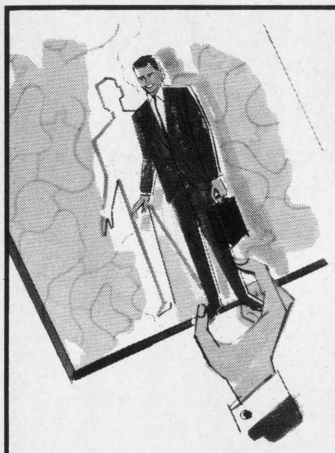
The Telex 5314 Disk Storage Drive System will be shown for the first time at the SJCC. The system on display will be made up of the Telex 5328 File Control Unit and three Telex 5312 Disk Storage Drives, according to Richard L. Martin, vice president of the Telex/Midwestern Instruments Group, and president of the Telex Computer Products Division.

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

New Printer for Displays and Minicomputers

A new, high-speed, low-cost electrostatic printer, with asynchronous speeds as high as 120 characters per second, has been introduced by REPCO Incorporated, Orlando, Fla. It is designed for use with video displays and minicomputers. The new printer will be shown for the first time at the SJCC.

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



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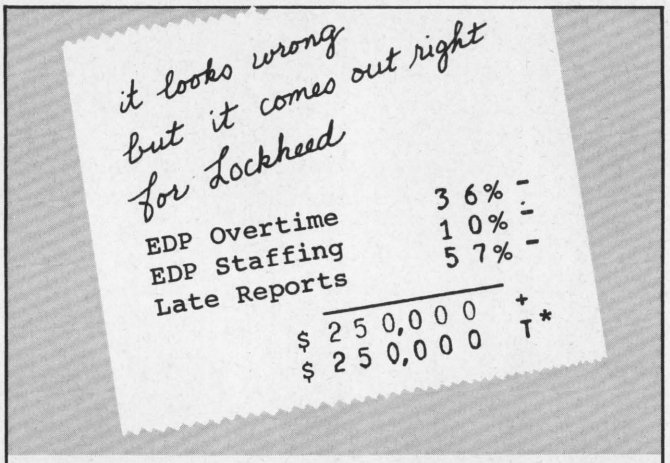

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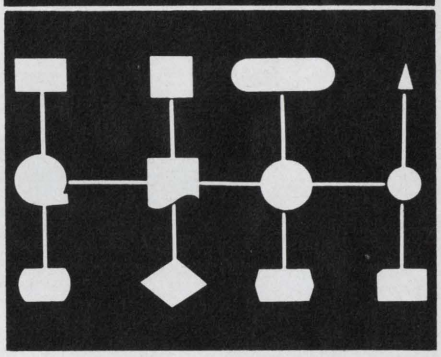

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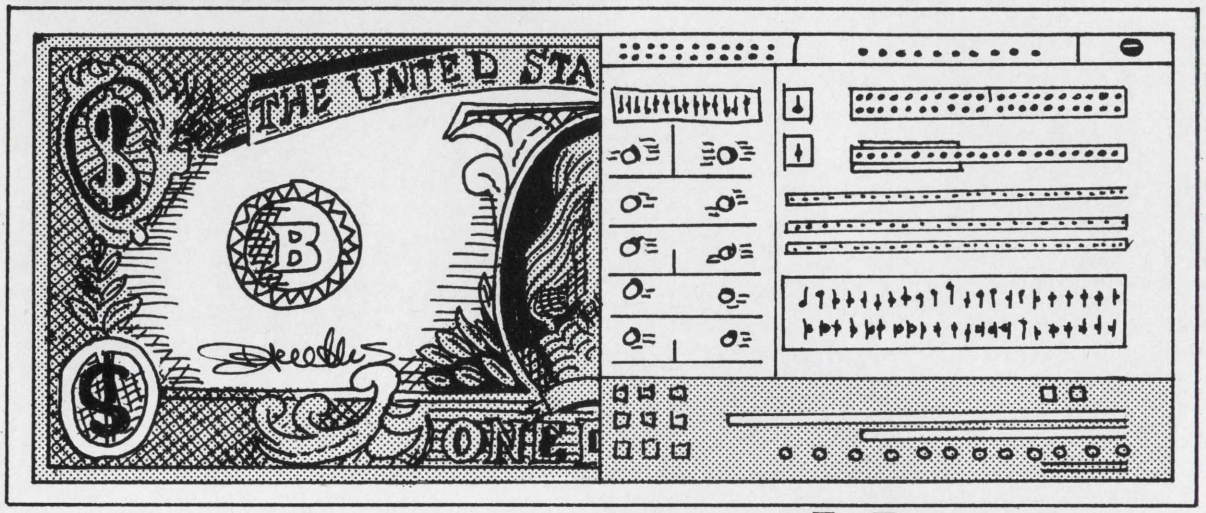

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