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TROUBLE-TRAN PRESENTS XTRAN'S ADVENTURES IN FORTRAN

By GEORGE N. VASSILAKIS

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

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

TROUBLE-TRAN'S Objectives:

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

PROBLEM OF THE MONTH

Here is a problem which you may use to entertain your friends at a party, but it would be no fun at all if you did not know the answer either. So, why not use a computer first before you try it on your friends. This problem was submitted by Dr. G. E. McCasland, Research Professor of Chemistry at the University of San Francisco. His solution used only 19 seconds of IBM 360/67 computer time at the Stanford University Computation Center. Your solution, if you are not careful, may use many minutes.

Problem 29: WHO OWNS THE PARROT?

Five computer programmers live in adjoining houses on the west side of Fortran Lane. Their street numbers are 101, 103, 105, 107, and 109, from left to right. Each man is of a different nationality and has a different make of automobile, kind of pet, and favorite beverage. Each house is of a different color.

The Irish programmer lives in the red house. The Greek owns the dog. Coffee is drunk in the green house. The Swiss drinks beer. The green house is just to the right of the white house. The Ford driver owns the cat. The Chevrolet driver lives in the yellow house. The man in the middle house drinks gin. The Dane lives in the first house on the left. The Dodge driver's house is next to the turtle owner's house. The rabbit lives next door to the Chevrolet driver. The Buick driver drinks wine. The Frenchman drives a Rolls-Royce. The blue house is next to the Danish man's house.

Write a computer program which will print out answers to the following questions: (1) Who owns the parrot? (2) Who drinks rum? (3) Which house color, nationality, automobile, pet, and beverage corresponds to each of the five street numbers?

Note: Dr. McCasland's solution includes only two arithmetic statements which are used to initialize two constants. It also includes a nest of DOs 23-levels deep, with 33 logical IFs inside the nest. This is the kind of application where the use of arithmetic instead of logical IFs may reduce execution time. In general, arithmetic IFs are more efficient than logical IFs, but the program is more difficult to follow.

Answer to Problem 27:

Where is it? It seems that no one has been able to add a fifth factorial to the "Simmons Factorial Conjecture". Perhaps, there is no solution.

Since I do not have anything else to say about Problem 27, I would like to make some comments about the mail I receive:

- Most problems require very little (under one minute) computer time, and only a few pages of output. I am not interested in hundreds of pages of intermediate results.

- If I ever get rich, I will hire a private secretary to answer all the letters from my readers that I have not answered in the past.

- Please don't send me decks of cards unless I ask for them.

- If you have ever taught programming to high school students or to gifted children, I would appreciate hearing from you.

XTRAN

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appeal to thinking adults and alert youngsters. Adults are fascinated by the vast amount of strategic skill and mental dexterity they may employ in playing the games. Children use the basic principles of play to enjoy the games at an easier strategy level. Bookshelf games, packaged in attractive leather-like slipcases, make a handsome set of volumes for any bookshelf.

OH-WAH-REE is a game with a 3500 year history and many nations, brought up to date for modern tastes. In the game players make captures by "sowing" pebbles into the pits. In some versions player with the most pebbles at game's end wins. In other versons player with the most pits wins. Adults play thoughtfully, strategically; children play it as a swift game of capture. Two to four players. **$8.95 postpaid.**

TWIXT is a stimulating board game with the fascinating chess-like strategy of move and countermove. Each player tries to connect his borders with an uninterrupted chain of linked pegs before his rival can do the same. Two versions permit either two players or two teams, children or adults, to play. **$8.95 postpaid.**

ACQUIRE is the exciting, new game of hotel investment. Its main object is to become the wealthiest player by forming hotel chains (to get free stock), shrewdly buying the right stock at the right time, merging chains (to get cash), and expanding the chains in which you have controlling interest (to increase their value). Two to six players, pre-teen to through adult. **$8.95 postpaid.**

TEACH KEY MATH . . . educational play for ages five to eight. The fascination of numbers unfolds as mini-mathematicians solve simple addition and subtraction problems with their Teach Key. The Teach Key tells them if their solution is correct! Youngsters will love playing by themselves, or with friends as they try to be the "grand winner". **$6.95 postpaid.**
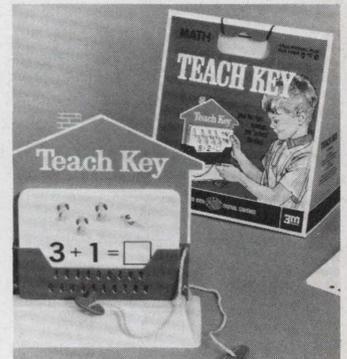
STOCKS & BONDS is the exciting, new stock game for investors and speculators of all ages and incomes. Each player buys and sells stock and bonds as he tries to grow thousands of dollars richer. The game's unique calculator will tell him if he's had a Happy Monday or a Black Friday. Two to eight players, teen through adult. **$8.95 postpaid.**

new applications

The computer program can be used to maximize profits by selecting that blend (from available blending stocks of butane, reformate, alkylate, cat cracked and lead) which meets octane and ASTM 90 ratings at lowest cost. It can also be used to minimize the lead content and still meet these ratings for both regular and premium grades of gasoline.

Instrument Tests Operators

Virginia Panel Corp., Waynesboro, Va., has introduced a portable electronic instrument to test the speed and accuracy of keyboard operators. The Challenger is basically a teaching machine that works with a verifier.

Utilizing a pre-printed instruction tape, the Challenger tells the operator what to punch onto special cards which are correlated with the tape. The operator's speed and accuracy are constantly measured by photoelectric sensors. As long as she verifies correctly, the speed of the tape is gradually increased. If she makes a mistake, the instruction tape drops to a slower speed and begins again to gradually increase. At the end of 15 minutes, the final speed and error count clearly indicates the operator's true capability.

The Challenger can be used to train new operators by providing meaningful, computer-analyzed work for trainees with tapes provided for every level of competence. It helps operators increase their speed by gradually increasing the speed of the instruction tape and by correcting errors immediately.

Computer Programs Proper Gas Blends

SCI–TEK, Inc., Wilmington, Del., has developed an optimization program for gasoline blending.

Study Aids Design for Largest Airport

The world's largest airport is scheduled to open in 1973 at Dallas–Fort Worth.

Under a contract with airport planners, IBM Corp. has developed a computer simulation study in which hypothetical passengers, baggage and cargo are being shuttled between terminals and parking lots. The simulation study will enable planners to design the most efficient high-speed airport transit system.

To be nine miles long, the facility will be able to handle 150,000 passengers daily and equal in size to Kennedy International and Chicago's O'Hare Airport combined.
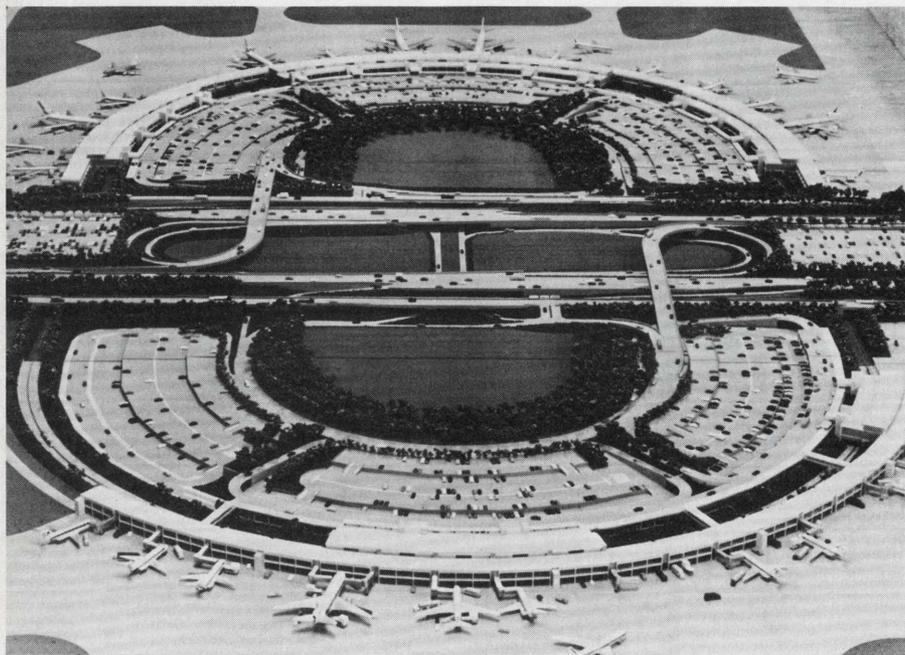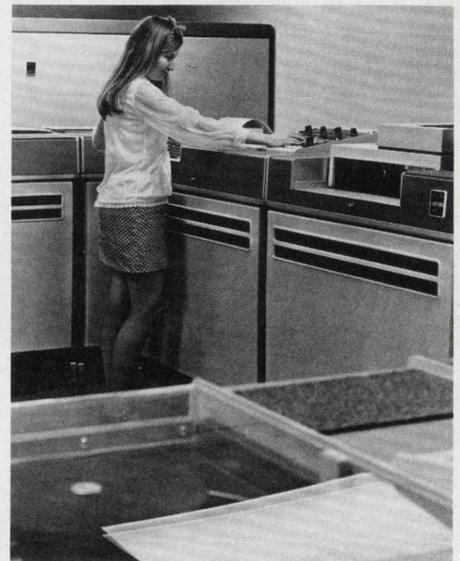
Computerized Zip Code Map Offers Marketing Services

Magnetic disc pack of NCR Century stores Zip Code map information and retail distributor data that Geodatic, Inc., Princeton, N. J., uses in putting potential customers in touch with local outlets.

Simulator Trains Engineers

A new kind of railroadman has begun piloting Southern Pacific locomotives. They are engineers who trained for their jobs in the classrooms of Southern Pacific's Engine Service Training Center at Downey, Calif., the only such center of its kind in the country.

The core of their training has been on a locomotive that goes nowhere. Built for SP by Conductron Corp., a subsidiary of McDonnell Douglas, the $1 million, computerized simulator gives the railroad the ability to confront its fledgling engineers with every operating problem in the book, without ever leaving the room in which the mock locomotive rests.

Sound, motion and visual effects are all controlled by the unit's computer, which can set up any operating problem that the teaching staff decides on.
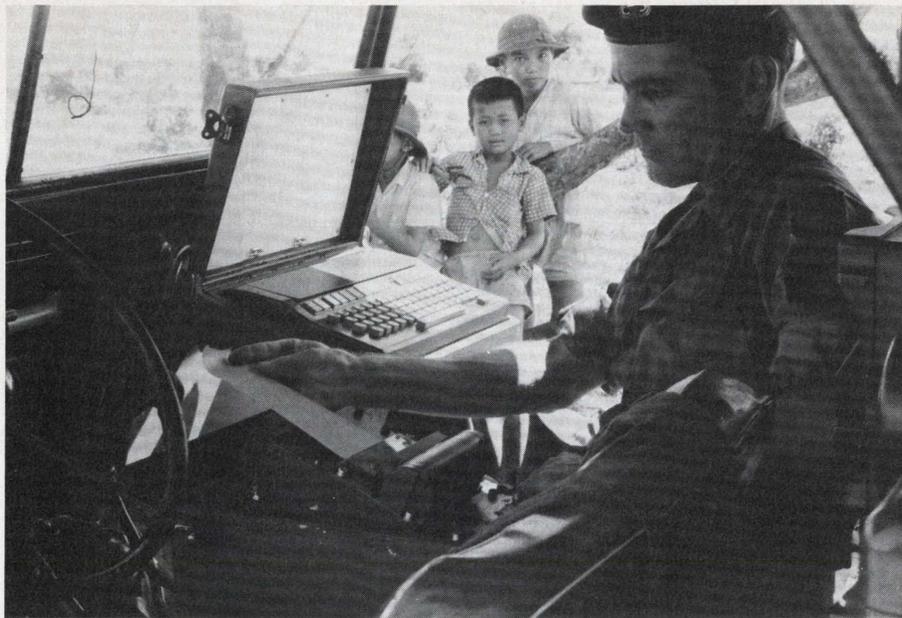
Computers Enter Into AF Airlift Business

Programmed computers are scheduled to take over the tremendous job of managing more than 800 airlift sorties a day in the Republic of Vietnam late this year. U. S. and Royal Australian Air Force crews make the drops.

Above, an Air Force combat controller, uses the jeep-mounted portable digital communications set to coordinate air drops at a zone eight miles west of Saigon. When this set is connected via secure communications circuits with a planned computer system, changes in cargo delivery schedules can be accomplished quickly.

Increase Understanding of Metal Processing

Scientists at Bell Laboratories have found a way to use a computer to simulate the behavior of metals during the manufacturing process.

As a result, metallurgists and metal producers are now one step closer to being able to predict and control physical and mechanical properties of metals without conducting extensive experiments. With their linear programming–computer work Bell scientists have found a way to solve equations, known for over three decades, but until now, seemingly too complex to calculate.

Computer Replaces Hay to 'Beef-Up' Cattle

A computer, recently installed in a hayloft at Mahogany Farms, Williamston, Mich., is being used for cattle-breeding research aimed at developing better beefsteak for America's dinner tables.

Data on the offspring of pure-bred beef sires is analyzed on the Honeywell Model 110 computer system. The objective is to develop cattle that eat less, grow faster and supply tastier steaks and roasts. When a sire with superior characteristics is identified through this research his blood line is passed on to several thousand cows through artificial insemination.

Stocks Transferred by Remote Display System

Southern California First National Bank has become one of the first banking institutions in the U. S. to use a remote, online-to-computer display system for stock transactions. The system, incorporating three unique display terminals, was installed recently in SCFNB's Corporate Trust Division to help service some 50 companies for which the bank acts as transfer agent.

The display system is an integral part of a 2½ year project, begun last March at the San Diego-based bank, called TRANSFER (The Remote Access Network for Stock Filing Exchange and Recording). The project is designed to streamline stock transfer operations of about 100,000 shareholders while better utilizing third-generation computer equipment used to handle customer records and bank information.

FJCC
IN SOUTHWEST
FOR
FIRST TIME

Texas style! with approximately 30,000 conference registrants and guests expected to tour over 275 exhibits covering about 300,000 square feet of space, this year's Fall Joint Computer Conference in Houston's Astrohall, November 17–19, can be called nothing less.

Houston's skyline is constantly changing as new skyscrapers are added. When finished the 52-story One Shell Plaza will be the tallest building west of the Mississippi (top). Although their number is dwindling, cowboys are not an uncommon sight in Houston. At right a cowboy watches loading of cattle at Port City stockyard. The "Spaghetti Bowl" (opposite page) is part of the city's $500 million freeway system.
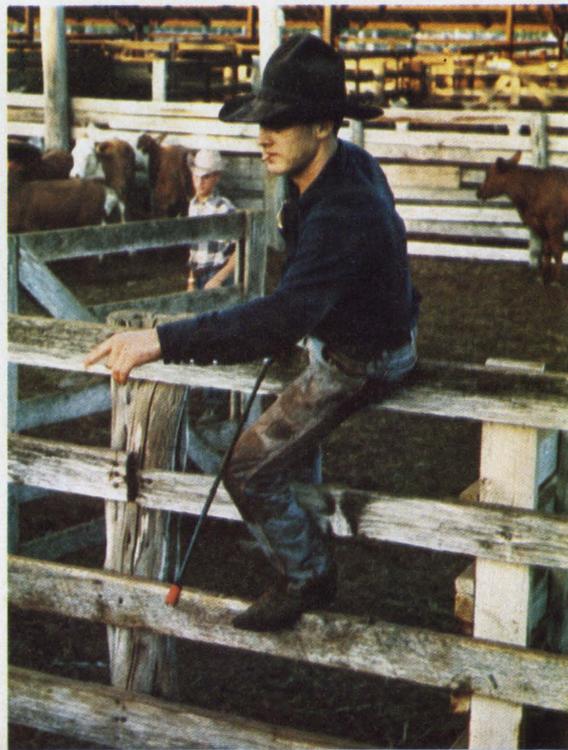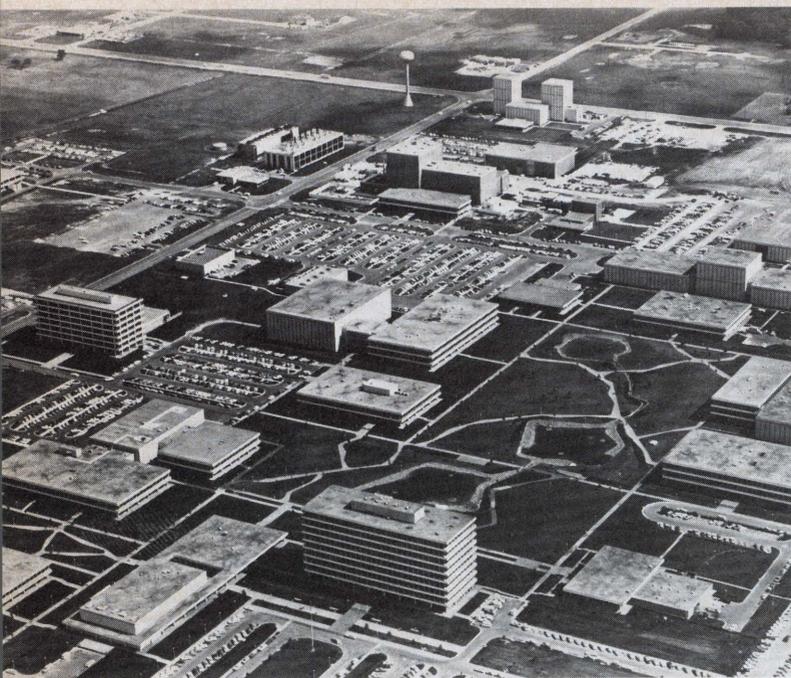
Special tours of NASA's Manned Space Craft Center will be offered for conference registrants and wives daily throughout the FJCC.

According to American Federation of Information Processing Societies (AFIPS) Director of Exhibits Donald Cruzen, most major firms in the computer field will be exhibiting the latest developments in computer hardware, software and related services. The display will feature approximately $200 million worth of equipment and services including computer main frames, input/output devices, peripheral equipment, time-sharing services, software services, related technical and trade publications, digital and analog computer systems, hybrid systems, special purpose systems, consulting services, data communications and conversion equipment, microfilm/microfiche equipment and services, test equipment, and source data collection services.

SOFTWARE AGE has heard from many of the exhibitors, including Tracor Data Systems, Austin, Texas-based computer and peripherals designer and manufacturer, and three affiliates—Remcom Manufacturing, Inc.; Peripherals General, Inc.; and Bright Industries, Inc.—who will exhibit specialized computer systems and a wide variety of peripheral equipment in a two-story display (booth 2003). Centronics Data Computor Corp., Hudson, N. H., will show operating versions of its Model 101 line printer and Model 301 CRT keyboard terminal (booth 1308–1310).

Miami's Datatype Corp. will be in booth 1634 with their 3800 System. The 3800 System features the DATAFLOW Optical Page Reader. Fabri-Tec Inc., Minneapolis, will feature the LCM+ Large Core Memory in booth 3021.

To complement their complete line of hard copy output peripheral devices, Versatec, Cupertino, Calif., will be the first firm to offer electrostatic printers with top-of-the-page formatting on fan-fold paper. This new capability will be shown in on-line operation at booths 3716 and 3718. Another product to be introduced is a new serial memory and strip printer devel-

oped by the Systems Division of Electronic Arrays, Inc., Woodland Hills, Calif. (booth 1427).

Computer Synectics, Santa Clara, Calif., will introduce a new Configuration Simulator along with their expanded SUM Data Analysis Program. The exhibit will be located at booths 3724 and 3726. The Computer Products Department of BASF Systems, Inc., Bedford, Mass., will display the BASF Model 214 Disk Drive, a direct access mass data storage device.

Booth 3014 is the site of CalComp's new high-speed drum plotting system, the 900/1136, the 900/1670 COM system and its new IBM compatible disk memory systems. CalComp is based in Anaheim, Calif. Two new minicomputers will be shown by Computer Automation, Inc., Newport Beach, Calif. The new machines, Models 108 and 116, along with CAI's new computerized logic tester, CAPABLE, will be in booths 3614, 3616 and 3618.

The Technical Program for the 1970 FJCC will include 26 sessions designed to provide a view of the latest developments and expected trends in computer hardware, software and applications. A total of 74 technical papers will be highlighted by speakers at the conference. In addition, nine panel discussions are planned on a number of major topics of importance to the computing field.

Art, Vice and Games is the intriguing subject of just one of the sessions. Among the subjects to be covered in this session are the use of computer techniques in electronic music, an analysis of computer-related crime, the development of a highly skillful bridge-bidding program, and the use of computer programming to generate original sculpture.

A special, in-depth Survey Session will be presented as part of the FJCC on November 17 and 18. The session will feature six leading computer professionals who will explore current industry trends and expected new developments. And officials of the United States Department of Commerce have prepared a special presentation on Global Marketing in the EDP hardware and software fields (see page 16 for more on Global Marketing).

Native Texan and internationally-known businessman and philanthropist Ross Perot will address the keynote session. Mr. Perot, President and Chairman of the Board of Electronic Data Systems, a Dallas-based data processing service organization, will discuss the impact of current computer technology on society and how future technological developments may affect sociological progress.

This impact should be well illustrated with the red carpet tours of NASA's Manned Space Flight Center. The tours will be offered continuously each day of the conference. Additional tours include the famed Texas Medical Center, the IBM Scientific Center, the Houston Lighting and Power Control Center and the Texas Transportation Institute.

The nation's sixth largest city, Houston offers ample opportunity for the conventioneers to go from dawn to dawn. From Broadway-quality theatre, to honest-to-goodness real-live cowboys, from the third largest seaport in the country to some of the best shopping anywhere, participants in the 1970 Fall Joint Computer Conference should find Houston a great place to visit.

FORTRAN PROGRAMMING AIDS

GERALD L. PERRY

and

JUDE T. SOMMERFELD

Jude T. Sommerfeld

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Gerald L. Perry

Gerald L. Perry is manager of computer applications for Wyandotte Chemicals Corp. He is responsible for computer utility, operations research and applied mathematics projects. Mr. Perry received a B.S.Ch.E. from the University of Michigan. He is a member of ACM, TIMS and AACE.

A recent article[1] presented a series of tips on how to improve the readability and self-documentation aspects of PL/1 programs. A similar presentation for Fortran programmers would also be in order. Most articles in this area in the past have been concerned only with improving the efficiency of Fortran programs.[2] This present article was thus developed from the authors' years of experience with Fortran programming.

A number of suggestions for improved programming resulting from this experience are detailed below. Implementation of these suggestions does not lead to any increase in programming time, once they become habit. Actual program size, in terms of card deck size, is probably increased by 10–20%.

Definition of Data Names: Before any data name is declared, referenced, or generated in a Fortran source program, *all* data names should be defined as to their meaning through the usage of comments at the beginning of the program. This is admittedly a rather laborious task, especially for larger programs; nonetheless, it is one which is inevitably necessary, in some form, for effective documentation of any Fortran program. As with the subjects discussed below, these definitions should be presented in alphabetical fashion.

Alphabetization of Data Names: In any declarative statement, e.g., DIMENSION, COMMON, EQUIVALENCE, DATA, NAMELIST, REAL, INTEGER, DOUBLE PRECISION, etc., all data names therein should appear in alphabetical order, insofar as possible. Labelled COMMON and NAMELIST areas should also appear in alphabetical order, just as the data names in each such area should be alphabetized.

Organization of Common Areas: Data names listed in COMMON and NAMELIST areas (labelled or unlabelled) should be organized in a neat fashion. That is, they should have the appearance of easily readable data tables. This is illustrated below:

COMMON/AREA1/APPLE, BEET, BERRY, CUKE, DATE, FIG, GRAPE, LEMON, LIME, 1MELON, ORANGE, PEACH, PEAR, PLUM, TOMATO

```
OCOMMON /AREA1/ APPLE , BEET  , BERRY  , CUKE  , DATE   , FIG   ,
1               GRAPE , LEMON , LIME   , MELON , ORANGE , PEACH ,
2               PEAR  , PLUM  , TOMATO ,
```

(Preferred)

In the above preferred format, data names start in columns 22, 30, 38, 46, 54, and 62. In the case of arrays whose dimensions are given in COMMON statements, some modification of this suggested format would natuarally be necessary.

Organization of Equivalence Areas. The Construction of EQUIVALENCE statements should likewise be done in a neat fashion to improve readability. The following contrasting examples make this point:

EQUIVALENCE (IN(1),BIRD), (IN(2),CAT), (IN(3),COW), (IN(4),DOG), (IN(5),1DOG), (IN(5),FOX), (IN(6),GOAT), (IN(7),HEN), (IN(8),LION), IN(9), MOUSE)2, (IN(10),RABBIT)

(Undesirable)

```
0EQUIVALENCE (IN( 1), BIRD   ), (IN( 2), CAT  ), (IN( 3), COW  ),
1             (IN( 4), DOG    ), (IN( 5), FOX  ), (IN( 6), GOAT ),
2             (IN( 7), HEN    ), (IN( 8), LION), (IN( 9), MOUSE),
3             (IN(10), RABBIT)
```

(Preferred)

The obvious requirement in achieving the above two preferred formats consists in *always* allowing enough room for the maximum number of characters, e.g., six positions for scalar names and two (or more if necessary) for subscripts. This principle also facilitates insertion or changes of data names.

Construction of Input Data Base: For medium to large Fortran programs with 20 or more input data items, the programmer may wish to construct an input data base. Using DATA statements, base values for all of the input data items can be stored. These items can also be equivalenced to an input data vector, hinted at in the above section, to facilitate individual changes to the data base at execution time. In this fashion, a user can retain a good deal of program flexibility and simultaneously minimize input data handling, especially when multiple runs are being executed.

Continuation Statements: The designation of continuation cards (in column 6) should be made in ascending numerical order. The first card of a statement to be continued should be flagged with a zero in column 6; this coding, which was also employed above, is legitimate with most Fortran compilers. Some compilers also allow more than nine continuation cards to a given state-

ment; in this case ascending alphabetic sequence should follow the numerical sequence. Thus, in the most general case, the sequence of continuation-designation characters in column 6 will be: 0, 1, 2, 3, ..., 8, 9, A, B, C, ...

Liberal Usage of Spaces: This

```
0PRINT 2020, AZURE  , BLACK   , BLUE   , BROWN  , GRAY  , GREEN
1            MAIZE  , ORANGE  , PURPLE , RED     , TAN   , VIOLET  ‘
2            WHITE  , YELLOW
```

(Preferred)

suggestion has also been demonstrated in the discussion of COMMON and EQUIVALENCE statements above. In addition to these cases, there are various other occasions whereupon the liberal usage of spaces adds significantly to the readability of a Fortran program. These include: between variable or data names in multiple-item lists or calling sequences, between such arithmetic characters as +, — and =, and between adjacent field designations in FORMAT statements.

Liberal Usage of Comments: Each significant area or division in a Fortran program, especially large ones, should be so delineated with the liberal use of comment cards. Such descriptions might include format areas, loop designations and preliminary calculations. Comments should also be used to denote the purposes of special functions or subroutines called by a program, as well as for denoting the significance of index variables used in ASSIGN and computed GO TO statements. A good practice is to indent all comments so that they all start in the same column, e.g., column 25. Such comments should also be set off, front and back, with blank comment cards, that is, cards with only a C in column 1 and nothing else on that line.

Organization of Input/Output Lists: Input/output lists in READ, PRINT, and WRITE statements should be organized in neat tables, much like those in COMMON lists.

The following two examples make this point:

PRINT 2020, AZURE,BLACK, BLUE,BROWN,GRAY,GREEN, MAIZE,ORANGE,PURPLE,1RED, TAN,VIOLET,WHITE,YELLOW

(Undesirable)

Again, some concessions or modifications to this rule have to be made when arrays or tables with subscripts are being handled.

Arithmetic Statments: One neat manner in which to organize arithmetic statements consists of the following conventions: 1) start all right-hand-side expressions in the same column, e.g., column 22; 2) place all equal signs in the same column, e.g., column 20; 3) start all scalar left-hand-side quantities in the same column, e.g., column 13; 4) back up as far as necessary (and insofar as possible) to accommodate subscripted quantities in place of rule 3) above.

Logical and Control Statements: The idea here is to facilitate distinguishment being logical (IF) and control (DO, GO TO, CONTINUE, etc.) statements, on the one hand, and arithmetic statements on the other. We have already set up conventions for arithmetic statements above. Thus, logical and control statements could start in the normal statement-beginning position—column 7—practicing, as always, the liberal usage of spaces. The application of the conventions described in the last two sections is seen in Figure 2 later on in this article.

Program Statement Numbers: It goes without saying that program statement numbers should always be assigned in ascending numerical sequence. One way to achieve this aim in the early stages of program writing is to increment statement numbers by a factor of 10 or 20; this generally allows enough room for insertion of additional statements in the later stages of program development or debugging. This is a practice which is generally recommended for programming in other languages also, such as in the assignment of sequence numbers in COBOL programs.

```
C   SUBROUTINE FOR CALCULATION OF FLASH TEMPERATURE
C
      SUBROUTINE ISOVFL (FLFEED,FLFEES,FLVAS,T,A,B,C,NCOMPS,K,BOFERR,
     1VAPY,QUIDX
      DIMENSION FLFEED(20),A(20,5),B(20,5),C(20,5),VAPY(20),QUIDX(20)
      EQUILKF(A,B,C,T)=EXPF(A/(T+460.0)+B+C*(T+460.0))
      FLLIS=FLEES-FLVAS
      KTIMES=1
    1 SUMY=0.0
      SUMX=0.0
      DO 2 I=1,NCOMPS
      VAPY(I)=FLFEED(I)/(FLLIS/FLVAS/EQUILKF(A(I,K),B(I,K),C(I,K),T)+1.0
     1)
      QUIDX(I)=(FLFEED(I)-VAPY(I))/FLLIS
      VAPY(I)=VAPY(I)/FLVAS
      SUMY=SUMY+VAPY(I)
    2 SUMX=SUMX+QUIDX(I)
      IF (ABSF(SUMY-1.0)-BOFERR) 3,3,J
    3 IF (ABSF(SUMX-1.0)-BOFERR) 7,7,4
    4 KTIMES=KTIMES-1
      IF (KTIMES) 6,5,5
    5 SUMYO=SUMY
      TO=T
      T=T+10.0
      GO TO 1
    6 SLOPE=(SUMY-SUMYO)/(T-TO)
      SUMYO=SUMY
      TO=T
      T=((1.0-SUMY)/SLOPE)+T
      GO TO 1
    7 RETURN
      END
```

Figure 1. Typical example of a Fortan subroutine (From **COMPUTATION OF MULTISTAGE SEPARATION PROCESSES** by Donald N. Hanson, John H. Duffin and Graham F. Somerville, Copyright (c) 1962 by Reinhold Publishing Corporation, by permission of Van Nostrand Reinhold Company).

```
C   PROGRAM 9              PROGRAM FOR INTERLINKED COLUMNS
C
C
C                       SUBROUTINE FOR CALCULATION OF FLASH TEMPERATURE
C
     0SUBROUTINE ISOVFL (FLFEED, FLFEES, FLVAS , T    , A    , B    ,
     1                   C    , NCOMPS, K    , BOFERR, VAPY , QUIDX )
     0DIMENSION         A(20, 5), B(20, 5), C(20, 5), FLFEED(20),
     1                  QUIDX(20), VAPY(20)
      EQUILKF (A, B, C, T) = EXPF (A/(T + 460.0) + B + C*(T + 460.0))
           FLLIS  = FLFEES - FLVAS
           KTIMES = 1
     10    SUMY   = 0.0
           SUMX   = 0.0
C
C                       COMPUTE VAPOR AND LIQUID COMPOSITIONS
C
      DO 20 I = 1, NCOMPS
     0     VAPY(I) = FLFEED(I)/(FLLIS/FLVAS/EQUILKF (A(I, K), B(I, K),
     1               C(I, K), T) + 1.0
           QUIDX(I) = (FLFEED(I) - VAPY(I))/FLLIS
           VAPY(I)  = VAPY(I)/FLVAS
           SUMY     = SUMY + VAPY(I)
     20    SUMX     = SUMX + QUIDX(I)
C
C                       CHECK CONVERGENCE ON COMPOSITIONS
C
      IF (ABSF (SUMY - 1.0) - BOFERR) 30, 30, 40
     30 IF (ABSF (SUMX - 1.0) - BOFERR) 70, 70, 40
     40      KTIMES = KTIMES + 1
      IF (KTIMES) 60, 50, 50
     50      SUMYO  = SUMY
            TO     = T
            T      = T + 10.0
      GO TO 10
C
C                       NEWTON-RAPHSON INTERPOLATION FOR T
C
     60      SLOPE  = (SUMY - SUMYO)/(T - TO)
            SUMYO  = SUMY
            TO     = T
            T      = ((1.0 - SUMY)/SLOPE) + T
      GO TO 10
     70 RETURN
      END
```

Figure 2. Same Fortran subroutine as in Figure 1, but organized according to the conventions described in this article.

Format Statement Numbers: A good practice here is to assign certain number ranges to format statements for both input and output lists. One suggestion is to reserve statement numbers 1000–1999 for input format statements, and 2000–2999 for output format statements. This mode of assignment also accomplishes (generally) another worthwhile objective, namely, the collection of all format statements (input and output)in a single area near the end of a program.

Summary: The habitual application of all of the rules presented in this article can do much to improve the readability and documentation of Fortran programs. An example of the manner in which Fortran programs are generally written is presented in Figure 1; this example was taken, as written, from a well-known text which presents a number of Fortran programs for the computation of multistage separation processes.[3] This same subroutine, written in line with the conventions described in this article, is shown in Figure 2. The reader is allowed to make his own preference.

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COMPUTER INTELLIGENCE AND GENERAL SOFTWARE DEVELOPMENT

by Herbert C. Kugel

One of the most interesting and logical fictional presentations of the problem of machine intelligence is contained in the Ambrose Bierce short story "Maxon's Master." Published in 1893, it deals with a chess-playing automaton which eventually kills its creator—adversary. Some 60 years later Arthur C. Clarke defined another non-human chess player, the HAL 9000 computer in the memorable film "2001: A Space Odyssey." It also became violent.

The concept of 'machine thinking' or 'machine intelligence' has long fascinated both researcher and lay-man. The question, "Can machines think?", has been posed by many investigators and the annals of fiction contain many examples of automaton involvement in human affairs.*

The purpose of this article is to attempt to place this general topic into a perspective that can be meaningful to the working digital computer applications programmer. This is because it is felt that the ideas to be discussed pertain to all areas of software development and not just to the highly specialized topic of artificial intelligence and its related areas.

The normal software sequence from the application point of view is usually quite straightforward: What does the program have to do? Display intelligence? How? By solving a problem? What problem?

Before these questions can have meaning, it is necessary to consider some basic working definitions. A 'machine' for this presentation is taken to be a digital computing system. 'Intelligence' will be defined arbitrarily as the ability to solve a specific problem while 'thinking' will be defined in an equally arbitrary manner as the actual mechanics of obtaining the solution to that problem. Thus, it is reasonable to infer that a specific digital computer program possesses intelligence in a certain area while the computing system as a whole 'thinks' while that specific program is executing.

Considerable efforts have been made toward the creation of programs that display a meaningful form of artificial intelligence (1). Meaningful in this sense indicates a program that obtains the solution to a type of problem that would require meaningful intelligence in a human being—winning at chess or bridge, for example. The creation of these programs, however, is in most instances simply an extension of many of the basic concepts of ordinary digital computer program design. This is true even of 'heuristic' programming; that is programming in which the software attempts to make plausible guesses about what action to take next in a particular situation.

Tables of incorrect solutions may be constantly created, expanded, and inspected, but in all programming, the issue finally reduces itself not to avoidance but to the positive process of generating a series of digital computer instructions and operations to solve the problem. Nothing else will do.

There is, however, usually one crucial difference between ordinary problem programs and artificial intelligence software packages. For the latter to display anything that resembles meaningful intelligence to an impartial observer, it is absolutely necessary for the artificial intelligence program to manipulate and respond to the statements of a particular language with a great deal of flexibility and versatility. Further, the operations abstracted by the language must not be trivial. A chess playing program, in theory, should be able to respond to any move on the board no matter how absurd. In this case the communication language can be chess notation; in other specific cases a subset of natural human language may be used for input and output.

This is quite reasonable. The various source statement compilers such as FORTRAN and COBOL have their own very limited languages and vocabularies, much in the same way a baby has his own small group of words and phrases. A normal adult, on the other hand, has a vastly superior facility to process and respond to the statements of a natural language—something which cannot even be slightly approximated by any contemporary computing system. This fact, in itself, is not significant. What is significant is that since a particular subset of a natural language may be processed by a computer program, it is possible to allow for the definition and the solution of certain types of unique problems.

The really critical question concerns the nature of the language subset. A compiler, for instance, reads its small input language and takes its output statements from another simple language—instructions and operations which can be executed by the computing system.

Therefore, expanding the above,

could computer programs be created that read a meaningful problem in normal day-to-day English, convert the English sentences into a successful series of digital computer instructions and operations that create a solution to the problem, and of most importance, convert the solution thus obtained into a language structure sophisticated enough to define other than a strictly numeric calculation?

If the answer is 'yes,' and if the input and output language subsets are flexible enough to expand and contract independently as needed for problem input and output, then the program may be considered as displaying meaningful intelligence. It is most probably not very smart in more than one area but it does possess intelligence in a certain specific situation.

Consider a program to solve high school level algebraic word problems (2) Here, in theory at least, the methods of solution as outlined in most elementary texts are quite straightforward:

1. Read the problem and find the statements which can be expressed as equations.
2. Represent the unknown value or values by means of numerals and letters.
3. Express the conditions of the problem as equations involving these symbols.
4. Solve the equation or equations.
5. Check by substituting the values thus obtained back into the original problem.

From a computer programming frame of reference, items 2, 3, and 4 are strictly determined by item 1. How good are the algorithms that extract the information contained in the input language statements? The initial success of the program depends strictly on item number 1. The type of algebraic word problems that will be solved is insignificant. The important thing is how much freedom of expression will be allowed in the definition of these problems.

From a software point of view, item number 5 can also be quite interesting. Obviously, the central processing unit need not check its calculations. Rather, the question is how can it substitute the solutions back into the original problem in a

way that would determine if these solutions fit the problem? Again, the success here would also be determined in part by item number 1.

Another aspect not usually faced by the high school algebra student involves the displaying of the solutions. From a programming frame of reference, this can be very important. Suppose, rather than merely print numeric solutions, it is desired to create a unique paragraph to define both the problem and its solution. How exactly will the output language be related to the input language? Here, item number 5 may be thought of as the inverse of item number 1 to a great extent. This, also, can be as trivial or as sophisticated as is desired.

In the case of both item 1 and item 5 it is fairly obvious that the simpler the input and output languages, the less the possibility of an error in the interpretation, and, also, the less sophisticated the class of problem that can be solved. There is no genuine excitement in the output from a source language compiler as opposed to a chess-playing program.

For a moment, imagine an entirely new situation. Suppose that a high school teacher of mathematics is sitting alone in a room and writing various types of algebraic word problems on blank cards. He then gives these cards to a messenger who takes them into another room where, unseen by the teacher, a student, also alone, is somehow solving these problems. The results are then written by the student on blank cards and returned by the messenger to the teacher. Obviously the student is showing meaningful intelligence.

Now, what if the student is replaced by a computing system and, over a period of time and with different types of problems, each worded differently, the teacher cannot ascertain any change in the quality, either good or bad, of the solutions. Is the software showing meaningful intelligence? By the definitions, yes, but the key here is *over a period of time.* One or two successes are completely meaningless. The software must be able to read and respond to quite a varied series of problems, each phrased differently from an almost similar problem, or possibly, each problem

radically different from the preceding problem but worded in almost the same manner. Again language is the key here, not arithmetic calculations.

Such arguments are not new. A. M. Turing, one of the pioneers in the logic theory of computers, proposed a similar type of rationale in 1950 (3). Here, too, the human analogy is striking. Do 'idiot calculators' display meaningful intelligence? That is, there are a few unfortunate feeble-minded individuals who can somehow perform highly complex arithmetic operations 'in their heads' yet can do very little else. Do they show meaningful intelligence? No. They are showing, by the above definitions, intelligence in much the same way a FORTRAN compiler shows intelligence, but it is not a meaningful or an interesting intelligence.

What Is the Point?

In summing up, what is the point of all this? Quite simply, 'no programmer is an island unto himself.' It can be seen that the problems involved in the so-called 'exotic' areas of heuristic programming and artificial intelligence are not unique to these specialties. They appear, rather, at the basic foundations of all software development, commercial as well as scientific. How sophisticated will the input data analysis scan be? Will the software try to 'out-guess' a particular set of data conditions? Should the software completely ignore any form of data which it cannot understand?

These mundane day-to-day questions are really the basic problems of heuristic programming with new labels. This article, hopefully, helps in the formalization of these questions, or at least indicates a perspective for obtaining a formalization for usage in day-to-day work.

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ELECTRONIC DATA PROCESSING EQUIPMENT, PERIPHERAL DEVICES AND SOFTWARE

GLOBAL MARKET SURVEY

The Global Marketing Program is a new service of the Department of Commerce's Bureau of International Commerce (BIC). Spearheaded by the Export Development Activities Program (EDAP) in BIC, the objective is to help increase U.S. exports to $50 billion a year by 1973.

For the first time joint company/government export actions are being initiated on a world-wide basis, covering two to five years for industries selected as having the highest potential for sustained export increases, and emphasizing pinponited product identification of each market.

Electronic Data Processing Equipment, Peripheral Devices and Software is one of six categories that have been selected thus far under the Global Marketing Program for 1970–1972.

Executive Summary

The market for electronic data processing, which is growing rapidly in the U. S., is expanding even faster abroad. The results of recent comprehensive market research studies completed by the Department of Commerce in 25 countries, confirm a steadily increasing demand globally that translates into significant opportunities for additional business for U. S. suppliers of EDP equipment, peripheral devices, software and supplies. Virtually every industry, government and service organization is a target for export sales.

Increasing international competition is forcing greater numbers of overseas firms and foreign governments to improve their efficiency. Conventional management concepts are being overhauled to take advantage of computer technology that will upgrade production performance at reduced cost, provide better service to the consumer and enable decision makers to solve problems more efficiently to keep pace with a rapidly changing overseas society and business environment.

Nearly $3 billion of EDP equipment was sold or leased to countries of the free world in 1969 and sales and leases are expected to increase in total value by over 20% yearly, reaching $6 billion in 1973. Even a very small percentage increase in the U. S. share of this substantial EDP market represents many millions of dollars in additional U. S. exports. This continuing upsurge in overseas demand for computers and computer-related equipment offers challenging, as well as rewarding, opportunities for U. S. suppliers to expand their marketing base and significantly increase their income.

Important EDP marketing data, including specific export sales opportunities uncovered as a result of an intensive Commerce Department study of 25 countries are summarized separately in Section II of this Survey. Included also, as a part of this Survey, is a calendar of world-wide promotional events scheduled for 1971–72.

Highlights of the Survey

Of the three major segments which comprise the billion dollar plus export potential (computers, periph-erals and software), computer installations represent an important measure of both the direction of future marketing trends abroad and the extent of the U. S. computer industry's involvement. The high proportion of U. S. designed computers abroad indicates very favorable prospects for an immediate and continuing external market for U. S. supporting peripherals and software.

Over 80% of the 34,000 computers installed or on order in 1969 in the 25 countries are products of American-owned firms; much of the remaining 20% was produced abroad under U. S. licenses.

Total U. S. hardware exports should reach $1 billion in 1970 (first four months actual, $300 million) and are projected to reach $2 billion by 1974, excluding shipments by U. S. subsidiaries and licensees abroad.

One of the largest and fastest growing export segments of the U. S. computer industry is peripherals which represents an estimated 60% of the present cost of a computer system. With the shift overseas to third generation computers, the need to speed the "in and out" flow of

Table I
EDP: MARKET SIZE FORECASTS, BY COUNTRY, 1970 AND 1974
(In Millions of Dollars)

1970 Country	Amount	1974 Country	Amount
Japan	$ 805	Japan	$2,213
Germany	568	Germany	1,150
France	418	United Kingdom	970
United Kingdom	405	France	896
Canada	175	Canada	360
Italy	112	Italy	231
Sweden	66	Sweden	134
Netherlands	45	Belgium	91
Australia	42	Australia	90
Belgium	38	Netherlands	79
Denmark	33	Spain	67
Spain	32	Denmark	66
Switzerland	28	Switzerland	57
Yugoslavia	20	Yugoslavia	46
Brazil	18	Brazil	38
Mexico	15	Israel	37
Israel	13	Norway	25
Norway	12	Mexico	24
Finland	11	Finland	21
Argentina	9	Argentina	17
Venezuela	6	Hong Kong	11
Austria	5	Venezuela	10
Hong Kong	5	Austria	9
Thailand	4	Thailand	6
Taiwan	2	Taiwan	6
Totals	**$2,887**	**Totals**	**$6,656**

Source: Estimates based upon data contained in World Markets for U. S. Exports reports.

Table II
COMPUTERS, INSTALLED AND ON ORDER, 1969

Country	Number
Germany	6,400
United Kingdom	5,000
France	4,803
Japan	4,600
Italy	2,300
Canada	1,928
Netherlands	1,378
Switzerland	1,330
Belgium	1,000
Australia	818
Spain	600
Sweden	540
Austria	440
Brazil	400
Argentina	356
Denmark	350
Mexico	300
Venezuela	236
Finland	220
Norway	207
Israel	127
Yugoslavia	116
Hong Kong	54
Taiwan	29
Thailand	28

Source: Estimates based upon data contained in World Markets for U. S. Exports reports.

data has increased the demand for printers, media converters, disc and tape drives, data terminals and other time-sharing input and output peripheral devices.

On the basis of computer numbers, those countries with the highest computer density should represent the most immediate outlet for software. However, overseas markets with low computer numbers should not be discounted since software technology in such instances is not always as readily available from local resources.

Factors Favoring U. S. Exports Growth

Foreign markets for EDP are growing at twice the rate of the U. S. The American computer industry enjoys a commanding lead in manufacturing technology and it is unlikely that foreign competition can bridge this "gap" in the foreseeable future.

U. S. industry has also pioneered and developed the widest range of EDP systems for every type of application from simple business programs to the most advanced programs for space exploration. This extensive U. S. expertise provides American firms with the unique capability of solving the increasingly complex problems of foreign EDP users.

With 80% of the free world's computers of American design, U. S. EDP exporters face few problems of equipment compatibility. The U. S. has the world's largest pool of trained and experienced computer personnel, a significant export marketing asset in a field in which the greatest single resource is knowledgeable people. Most importantly, American EDP products and American EDP experts enjoy an unparalleled reputation in the international marketplace for quality, know-how and service.

On the Negative Side

Foreign competition is on the rise. ICL of Great Britain, Germany's Siemens, Philips of the Netherlands and Japan's Hitachi are mounting major production efforts. The latter three are diversified giants, each with sales exceeding $2 billion a year. Smaller companies in other countries—Regnecentralen in Denmark, Olivetti in Italy and Sweden's Datasaab, for example—are also gaining entry in world EDP markets.

Telecommunications networks abroad generally are higher in costs and lower in quality, compared with U. S. systems. Both factors presently limit the expansion of the teleprocessing segment of the computer industry abroad. Some countries discourage imported U. S. EDP products in favor of their own domestic products. And, reluctance to change from time-honored and long outmoded procedures is still evident.

Conclusions

Essentially, the computer story abroad is a repetition of past U. S. experience, with the exception that foreign markets are being spared some of the expenditure of effort and time which accompanied U. S. EDP development. The U. S. still leads in research and development, and U. S. products still command prestige in the marketplace.

With the foreign growth rate of the computer industry exceeding that of the United States and the fast pace of technological change that is taking place worldwide, continued successful penetration of the overseas market presents a formidable challenge as well as opportunities to the U. S. EDP industry. It is essential that U. S. industry maintain an aggressive global sales policy in order to maximize penetration of overseas markets.

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MANAGEMENT SCIENCE

SYSTEM 70—COMPUTERIZED PROPERTY MANAGEMENT   N/A

If you manage apartments, condominiums, offices, or mobile homes, or provide services to people who do, then the XiOX System 70 Computerized Property Management System can provide a great tool for you. This package handles the complete billing and accounts receivable cycle including daily postings in up to 20 separate recurring charges and up to 2 different tax rates per charge. Charges can be set up to be billed once, fixed duration or over the term of the lease. Included is a module to customize the hierarchy of cash applications. The system produces all the information required for efficient management. Also, a facility is built into the system to accommodate "lock box" capability for you.

IBM System/360—65K, 2 tape, 2 disk or equivalent, IBM System/360 COBOL
KA100

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This system of programs generates an optimum low-cost crew schedule within given airline, union and FAA constraints. There are three major phases: crew trip generation, reduction, and selection. The generation phase will require some adaptation to individual airlines requirements. The reduction and selection phases utilize efficient ALC subroutines leading to cost/effective solutions in extremely short running times. Provision is made for handling multidomicile structures allowing for variational analysis of domicile location and crew manning.

360/40 and up, FORTRAN IV/ALC
KA101

ORDER—A STEPWISE REGRESSION MATRIX $100

ORDER is a FORTRAN IV subroutine which generates a stepwise regression analysis having the following flexibility: 1) Variable order is specified by the user at each step, so that non-statistical factors can be taken into account, 2) Data having occasional missing variable fields can be analyzed.

ORDER is based on the generation of the following matrix used to transform data into an orthogonal variable set:

1	0	0	.	0
X21	1	0	.	0
X31	X32	1	.	0
.	.	.	.	.
Xn1	Xn2	Xn3	.	1

Multiplication by this matrix is equivalent to partial linear regression on the variables already entered—the resulting simplification in logic leads to the increased flexibility of items 1) and 2). This routine is useful for both batch and time-share applications. Core requirements depend on matrix size.

IBM 360/30 & up, FORTRAN IV
KA102

PERSONNEL MANAGEMENT INFORMATION SYSTEM (PMI) $18,500

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IBM 360/30, 65K, 2 Disk, 3 Tape, COBOL
KA103

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The DCS Responsibility Accounting System is designed to assist management in preparing an annual financial plan and in the timely recognition of significant deviations throughout the planning period. The system provides for a five-year projection of income and expenses with a detailed monthly projection for the first year; the plan is then compared to actual performance monthly, reporting deviations at selected levels of organizational responsibility.

System/360 or Spectra 70, 65K, 5 sequential I/O files, COBOL
KA104

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The system is currently servicing contractors, certified public accountants, restaurants, repair, retail and service businesses.

Controller Checked Automated Accounting System provides print-outs of all source journals and the General Ledger, Trial Balance, Balance Sheet and the profit and Loss Statement. In addition, up to three subsidiary ledgers may be provided; accounts payable, work in process or job cost and accounts receivable from which you may also generate the customer itemized statements.

360/25 & up, COBOL

KA106

ENGINEERING

SYNCOMP MICRO/1—CIVIL ENGINEERING SYSTEM   N/A

SYNCOMP MICRO/1 is a computer-based civil engineering system which permits the performance of: (1) Surveying and subdivision design, (2) Profile/earthwork, (3) Plot check, (4) Traverse balancing, (5) Subdivision and map plotting through CalComp's SAMPS program, (6) FORTRAN IV, (7) 360/20 simulation, (8) Mathematical library routines, (9) Management/Accounting, including job costing, labor distribution, payroll, invoicing, accounts receivable, etc., (10) and Normal utility programs.

MICRO/1 is a proprietary civil engineering instruction set which insures maximum efficiencies from the INTERDATA basic central processor. The system is a stand-alone in-house totally integrated system, with extensive in-house time-sharing capabilities as well as the capability to act as a sophisticated terminal for commercial time-sharing networks.

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KB207

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$1,000 per year lease/$1,500 sale

SYSMOD is a versatile continuous modeling program that emulates an analog computer on a digital computer using a block oriented language that enables scientists and engineers, even those without extensive programming knowledge to develop an intuitive feel for the operation of the program. SYSMOD is set up for an interactive mode of operation; the user at his terminal has full control over the execution of, and modification to, the model that he is using. Special features include: basic print—plot output, which allows plotting of up to three variables on the teletype, tabular output that permits printing of up to forty outputs on the teletype, disk-file output that stores up to forty block outputs on an output disk for processing by other programs. SYSMOD includes all the block elements found in the batch-oriented language, CSMP, plus logarithm, exponential polynomial and sine.

Burroughs 5500, FORTRAN IV

KB208

MULTISPAN   N/A

MULTISPAN performs the bending analysis of multiple-span beams. The structure can

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have from one to 10 continuous spans having constant or variable cross sections. The interior supports are pinned, and the end supports can be fixed, pinned, or free. Data can be supplied interactively or from a data file. Input procedures have been optimized to eliminate all unnecessary inputs. Because the output is entirely interactive, the user can select output for the entire beam or for individual spans. The program can be recycled to specify new geometry or to apply new load cases.

Input limitations: 10 spans, 25 geometric segments, 25 concentrated loads, 25 distributed loads, 25 moments.

Output: Reactions, internal forces, stresses, displacements.

G. E. 635, FORTRAN IV
KB209

ELASTCOL   N/A

ELASTCOL determines the smallest buckling load for elastic end-loaded columns. The column can have a variable moment of inertia, and any stable combination of support conditions can be handled. A finite-difference technique is used to determine the buckling load and the associated mode shape. Input procedures have been optimized to eliminate all unnecessary inputs, and data can be supplied interactively or from a data file.

Input limitations: 40 linearly varying sections.

Output: Elastic buckling load, section properties, normalized mode shape.

G. E. 635, FORTRAN IV
KB210

INRING   N/A

INRING performs the structural analysis of thin, circular rings subject to loading in the plane of the ring. The external forces are reacted by a distributed in-plane shear flow, so that shell-supported rings can be analyzed, as well as rings loaded by self-equilibrating forces. The ring displacements are calculated with respect to the center of the ring which is assumed to be fixed. Data can be entered interactively or from a data file. A wide range of options is available to the user with respect to loading and output.

Input limitations: 50 radial loads, 50 tangential loads, 50 bending moments.

Output: Internal forces, stresses, displacements, weight.

G. E. 635, FORTRAN IV
KB211

OUTRING   N/A

OUTRING performs the structural analysis of thin, circular rings subjected to loading normal to the plane of the ring. External forces are reacted by distributed running loads, so that shell-supported rings can be analyzed, as well as rings loaded by self-equilibrating forces. Both open and closed sections can be examined. The ring displacements are calculated with respect to the center of the ring, which is assumed to be fixed. Data can be entered interactively or from a data file. A wide range of options is available to the user to facilitate output.

Input limitations: 50 out-of-plane concentrated loads, 50 twisting moments, 50 bending moments.

Output: Internal forces, stresses, displacements, weight.

G. E. 635, FORTRAN IV
KB212

2DTSAP   N/A

2DTSAP solves for the joint deflections and member forces of a pin-jointed, two-dimensional truss. Loading conditions can be external forces on the joints of the truss, member axial distortions, or member temperature

changes. The solution is based on small-deflection theory assuming linear stiffnesses for the truss. Matrix alterations can be used to add complex structural elements which cannot be represented by members. The flexibility matrix of the structure is obtained by inversion of the stiffness matrix using Choleski's method. The input/output is especially designed for two-dimensional truss problems to simplify the use of the program.

Input limitations: 75 unconstrained degrees of freedom, 100 members, 50 joints.

Output: Joint deflections, member loads, joint equilibrium check.

G. E. 635, FORTRAN IV
KB213

3DTSAP   N/A

3DTSAP solves for the joint deflections and member forces of a pin-jointed, three-dimensional truss. Loading conditions can be external forces on the joints of the truss, member axial distortions, or member temperature changes. The solution is based on small-deflection theory assuming linear stiffnesses for the truss. Matrix alterations can be used to add complex structural elements which cannot be represented by members. The flexibility matrix of the structure is obtained by inversion of the stiffness matrix using Choleski's method. The input/output is especially designed for three-dimensional truss problems to simplify the use of the program.

Input limitations: 75 unconstrained degrees of freedom, 100 members, 50 joints.

Output: Joint deflections, member loads, joint equilibrium check.

G. E. 635, FORTRAN IV
KB214

2DFSAP   N/A

2DFSAP solves for the joint deflections and member forces of a rigidly jointed, two-dimensional frame. Loading conditions can be external forces on the joints of the frame, member axial distortions, or member temperature changes. The solution is based on small-deflection theory assuming linear stiffnesses for the frame. Matrix alterations can be used to add complex structural elements which cannot be represented by members. The flexibility matrix of the structure is obtained by inversion of the stiffness matrix using Choleski's method. The input/output is especially designed for two-dimensional frame problems to simplify the use of the program.

Input limitations: 75 unconstrained degrees of freedom, 100 members, 50 joints.

Output: Joint deflections, member loads, joint equilibrium check.

G. E. 635, FORTRAN IV
KB215

3DFSAP   N/A

3DFSAP solves for the joint deflections and member forces of a rigidly jointed, three-dimensional frame. Loading conditions can be external forces on the joints of the frame, member distortions, or member temperature changes. The solution is based on small-deflection theory assuming linear stiffnesses for the frame. Matrix alterations can be used to add complex structural elements which cannot be represented by members. The flexibility matrix of the structure is obtained by inversion of the stiffness matrix using Choleski's method. The input/output is especially designed for three-dimensional frame problems to simplify the use of the program.

Input limitations: 75 unconstrained degrees of freedom, 100 members, 50 joints.

Output: Joint deflections, member loads, joint equilibrium check.

G. E. 635, FORTRAN IV
KB216

FINANCIAL

SAV-A-MATIC—BANK TIME DEPOSIT SYSTEM $9,000 to $15,000

SAV-A-MATIC is a computerized total time deposit accounting system for banks that handles the processing of any savings instrument from a certificate of deposit to regular passbook savings accounts. It offers such exclusive features as COMPUT-A-MATIC—variable input computational programs that handle 140 variations of five basic input formulas for specifying the rate, basis, compounding and payment method of interest. AUTO-CAL, another XiOX exclusive, offers an automatic internal program calendar that controls the generation of 57 reports and in-depth management analysis recaps. Reports are printed on stock forms and one pre-printed Ledger Form with no operator intervention except for form changes.

The system consists of 40 programs written in COBOL and is operational in more than 40 banks throughout the United States

IBM System/360—65K or Burroughs 3500, COBOL
KC300

SYSTEM 1099 $1,800

System 1099 provides the mechanism which insurance companies providing accident and health coverage can use to comply with IRS Ruling 69–595. This system allows the company to collect information regarding the claims payments it processes to the health care providers on a continuing basis throughout the year. Provides name and address information is also maintained. At the end of the year, the system prepares the IRS form 1099 in paper form or on magnetic tape, as required by the IRS ruling. System 1099 provides complete procedural documentation in "play-script" format, including sample forms.

360125 & up (DOS & OS), COBOL
KC301

CREDIT UNION ACCOUNTING SYSTEM   N/A

A series of programs to update and maintain a share/loan accounts, to produce a general ledger, and the financial and statistical report.

SYSTEM/3 mod 2 disk system, RPG II
KC302

CL/I—COMMERCIAL LOAN SYSTEM $30,000

Complete automated commercial loan accounting, servicing, and portfolio management and analysis. Includes conversion, daily, monthly, collateral, prime rate and customer history modules.

IBM 360/30, 65K, 2 Disk, 4 Tape, COBOL
KC303

INSTALLMENT LOAN SYSTEM $20,000

The DCS Installment Loan Package combines an efficient system for the computer with a completely functional system for the Loan Department. The multi-bank feature of the package allows many individual bank options and exceptions.

IBM/360, Model 40, 128K Memory or Larger (DOS), COBOL
KC304

BOND PORTFOLIO ANALYSIS $10,000

This system provides Monthly Portfolio Accounting Reports as well as Monthly Pricing and Management Reports. The Accounting Reports are designed primarily to be used as a bank's securities subsidiary ledger. They will also provide useful portfolio management information.

The pricing program lists monthly all issues held by category, calculating market values, market prices and net gains or losses. The Management Reports reflect totals by category, maturity, and Moody's Rating. Also provided is a listing of holdings by maturities. The Accounting Reports supplied are Accounting Report, Coupon Due Report and Gains—Losses Report. The Pricing and Management Reports provided are Maturity Summary, Category Summary, Quality Summary—Municipals, Pricing Report, General Maturity Listing and Securities Pledged Reports.

IBM/360, DOS, 54K Memory, 1 Tape, 1 Disk, Card Reader, COBOL/BAL

KC305

BANK CHARGE CARD DESCRIPTIVE BILLING $10,000

The Descriptive Billing System is an extension to a bank credit card accounting system to replace the "country club" bills with a "descriptive" bill. This system describes each transaction in detail on the face of the bill. The typical customer's bill will consist of a single printed page.

IBM/360, 65K Memory, 6 Sequential I/O Files, COBOL

KC306

SCIENTIFIC

PARCOR—PARTIAL CORRELATION COEFFICIENTS $500

From an array of zero-order correlation coefficients, PARCOR develops successively all higher order partial correlation coefficients up to order N-2 or to a user supplied value M subject to $M < N-1$, where N is the number of variables.

The program prints all zero-order correlation coefficients and all developed higher order partial correlation coefficients including headlines, identification of variables, undefined partial correlations, etc., and performs page and margin control. The user supplies the number of desired lines/page. PARCOR can be used as a stand-alone program or as a subprogram. The assignment of input and output devices is flexible.

IBM/360, B5500, CDC3000 and 6000 Series, etc., FORTRAN IV

KD400

TESTING AND DEBUGGING

PCRESET—DATA EXCEPTION RESET MODULE $75.00

This program is a time saver in the testing of new programs. PCRESET prevents your test from cancelling due to a data exception. Each program check caused by a data exception will print on syslst the position of the offending instruction and the position and contents of the field or fields involved, move zeroes to the offending field or fields, and return control to your program. Much machine time and debugging time will be saved by using this program. The purchase price could be saved during one day's use.

360 DOS Model 25 & up, ASSEMBLER

KE500

CONTROL/360 (DOS Procedures Library)
$2,500 for 1st computer
$500 for each additional

Program testing and production job control are handled more efficiently with CONTROL/360, a system for DOS users. The improved operating effectiveness is achieved with a disk-resident procedures library, used to store all types of card images, including DOS job control and source programs. Job streams are constructed for all three DOS partitions by entering procedure names through the console or the card reader. Eliminating the re-handling of punched card input not only increases computer throughput, but also helps to standardize operations. In a program testing environment, the source program is initially keypunched and then stored on the procedures library. Programmers use a convenient maintenance procedure to make changes, ranging from the simple addition or deletion of statements, to a complete re-organization of the logic. To compile and execute the program, job control procedures stored in the library are combined with the source program to form a job stream. When no more changes are anticipated, the program may be transferred to a magnetic tape annex to the library, thereby economizing on disk storage. Operators may readily switch between the CONTROL/360 job streaming monitor and the usual DOS mode of operation. Using the monitor, entire job control routines, identified by short procedure names, are called from the library and written on the DOS direct-access SYSIN for immediate execution. Changes, such as the insertion of I/O assignments, may be made at execution time. The monitor requires no core storage overhead because it is not resident during program execution.

360/DOS, 32K Min., PL/1

KE501

QWICK QWERY $19,000

QWICK QWERY is an information retrieval and report generation system created by C.A.C.I. to allow both programmers and non-programmers to selectively access and display information from existing data files. It eliminates the costs and delays associated with problem definition, system analysis, and the coding, testing, and debugging of special purpose programs. Thus, QWICK QWERY provides the means for timely dissemination of existing but frequently inaccessible information throughout an organization. Simultaneously, it allows a management information systems group to focus on the pressing problems of data management and systems implementation, free from requests for special reports.

User convenience for report generation is achieved through three simple forms. Form 1 provides for the selection of specific data items from a record and specific records from a file. Form 1 also provides for sorting and subtotal calculations. Form 2 is used when new data items are to be computed as a function of existing data items. For example, Price to Earnings Ratio when Price and Earnings are on the file. Form 2 also provides an indexing capability which permits sequences of related data fields to be referenced conveniently. Form 3 provides the user with the means to lay-out the generated report in any way he desires.

S/360, Univac 1108/494, CDC 6600/3000, GE 600/400, XDS Sigma 5, FORTRAN

KE502

ACCOUNTING

ON-LINE REAL-TIME MEDICAL BILLING SYSTEM   N/A

Complete real time system producing statements, trial balance reports, accounts receivable aging, cross reference cards, pressure sensitive history labels, charge and service analysis and multiple insurance reports. All information is entered via the on-line terminal. Format errors, invalid account numbers, invalid transactions are edited in a conversational mode. Each transaction updates all affected records immediately. New accounts entered generate automatic cross reference cards and history labels. On site batch processing is provided dependent on available core and volume.

360/30, DOS, 360/50, OS, COBOL, BAL

KF600

VENDOR LIST   N/A

A scientific system which provides for the development of a single-list of vendors for any size business. The list is simultaneously in alphabetical and numerical sequence with required flexibility for expansion. All details are given in copyright description accompanying the source deck.

360/40, PL/1

KF601

GENERAL LEDGER ACCOUNTING $7,500

The DCS General Ledger Accounting System produces: 1) a Transaction Register, 2) Posting and File Maintenance Activity Reports, 3) Trial Balances, and 4) Profit and Loss Statements. Other auxiliary reports are printed as well as those printed only on demand.

Honeywell 200 series (110, 120, 200, 2200), 4 tape drives, 12K, COBOL

KF602

BANK GENERAL LEDGER SYSTEM $10,000

The DCS Bank General Ledger System produces on a daily basis all of the reports normally found in a manual system as well as reports now made practical by automation—comprehensive audit checks, call report data, etc. One unique feature of the System is that data is processed in such a manner that monthly statements can be produced by responsibility center.

System/360, 50K, 6 sequential I/O files, (DOS or OS), COBOL

KF603

GENERAL LEDGER (GL/II) $20,000

A complete general ledger accounting system configured on an open-charge-of-accounts basis, permitting the accountant or accounting department to maintain any desired schedule of account designations. GL/II automatically posts repetitive information, such as accruals, deferrals, and depreciation, while it enables the aging of accounts receivable, where appropriate. Has the capability of producing 44 different reports incorporating all three levels of accounting—General Ledger, Subsidiary Ledger, and Voucher Invoice. The reports range from the automatically-produced transaction posting registers, to the standard balance sheet and income statement, to nine different analysis reports, to three departmental report classifications (each presented in four separate formats), to seven consolidated company reports, together with the 12 forms of departmental reports on a consolidated basis.

IBM 360/30, 64K, 2 tapes, 3 disks—Burroughs B2500/3500, 60K, 3 tapes, 1 disk, DOS/OS—COBOL (or any system using COBOL)—MCP COBOL

KF604

WHOLESALE DISTRIBUTORS COMPREHENSIVE ORDER ENTRY SYSTEM $9,985

This easy to use system will enable a wholesale distributor to automate all of his internal office procedures will regards to: Order Processing, Inventory Control, Accounts Receivable and Financial Accounting. The more than 16 programs which comprise this system, provide for complete flexibility in the areas of product pricing and discounting, thus enabling the user to obtain a multitude of benefits from the system regardless of product line.

360 Models 20, 25, System 3, IBM 1130 & Univac 9200, RPG

KF605

GENERAL LEDGER SYSTEM $10,000

Independent Chart of Accounts, 8 digit account number, 6 levels of financial statement consolidation, 15 reports, expense ledgers, comparative analysis, current outlook analysis, automatic budget calculation, automatic error suspense, recurring journal entries, automatic accrual reversal, and overhead distribution.

32K core and four files including one disk, ANCII COBOL

KF606

ACCOUNTS PAYABLE SYSTEM $10,000

Multiple division/company capability, General Ledger chart of account independence, D & B compatibility, inventory interface, 1099 accounting, due date, discount & payment amount computed, standard vendor terms, will handle multiple banks for same company, 19 different reports, automatic General Ledger Journal Voucher preparation and contract payments.

32K core and four files including one disk, ANCII COBOL

KF607

INVENTORY

EXPEDITE ENTRY—SHOE SIZES (EESS) $750

Provide a very quick method of keypunching shoe size runs, utilizing a unique code which will improve your entry of size runs into order entry and inventory systems. Up to 15 size runs for up to 3 widths can be recorded on 1 (one) IBM card in less than 50 cols. Punched cards are loaded onto disk file exploring the unique code into proper

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width sizes utilizing a quick table-lokup. Invalid codes (errors) can be stacker selected (if 360/20 with 2560 MFCM) or printed or a system halt may occur. Only valid records is loaded. This is a very definite time saver with up to 60% savings realized.

360/20 & up Disk, (DPS, DOS), RPG

KG700

PARTS EXPLOSION AND INVENTORY CONTROL (PACK) $3,825

PACK is available in either a batch processing or a time sharing mode, The system provides the user with an instantaneous position and automatically adjusts inventoried items such as raw materials, finished products, component parts, and/or subassemblies, by the entrance of a final product. A final product can be made up of any combination of items, any quantity of items, and has no limitation as to size of files. A bill of materials is produced and the inventory is adjusted. Many additional options are available.

TSS/8 or PDP8 with Disk or DECTape, PAL-D

KG701

INVENTORY RECORDS CONTROL (INVENT) $1,650

INVENT is an Inventory Records Control System available in either a batch processing or time sharing mode. The system accepts a variety of inventory transactions and provides current inventory status by item or total upon demand and accepts inquiries for order filling. The system also provides reports on purchases and sales by either product or location code and can be expanded to give totals on any indicator. Available options include inventory reports by exception; reorder points; minimum and maximum quantities, etc.

KG702

PAYROLL

PAYROLL $1,000

Burroughs TC 500/L 2000. Keyboard and paper tape oriented. Provides payroll ledger, paystubs, quarterly tax and year-to-date tax reports. Program will handle weekly, bi-weekly, semi-monthly and monthly hourly or salaried payrolls. Four users covering the past two years assure reliability and accuracy. Object programs only will be furnished.

TC 500/L 2000 W/Paper tape reader and punch, Assembly language

KH800

PAYROLL (17 PROGRAMS) $20,000

A flexible modular System which performs payroll processing only or payroll processing plus labor distribution and reporting functions. The system accepts multiple wage rates for each employee, as required. Performs multiple state tax calculations for an employee or employees working in more than one state. Performs supplemental calculations for reimbursement of expenses, such as tips, room rent, meals, and entertainment. Performs individual departmental, group or agency payroll calculation and reporting. Allows variable sequencing of all reports to accommodate individual departmental, group, or agency needs. Generates labor distribution information as a by-product of payroll input. Accumulates statistical information automatically during computer runs, facilitating sophisticated data analysis and reporting. Prints employee address on W-2 Forms automatically, reducing mail preparation costs. Permits the employer to define

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special payments and special employee deductions, in addition to routine types, characteristic of most payrolls.

IBM 360/30, 64K, 3 Tapes, 3 Disks, DOS/128 OS-COBOL

KH801

PAYROLL ACCOUNTING SYSTEM $5,000

The Delta Payroll System is a multi-division, multi-corporation package designed for the Honeywell 200 series computer. It features the following:
- File and report control for up to 4 organizational levels.
- Up to 10 deduction categories, 5 earning categories and fields for advances and adjustments.
- Weekly, bi-weekly, semi-monthly, and monthly pay periods provided.
- Earnings and deductions categories may be designated by file maintenance entries at the department level.
- Deductions may be constant amount, one time, or declining balance.
- Any earnings amount may be over-ridden on a one-time basis.
- Government approved formulas used for tax computations.
- State and local tax routines easily added or changed.
- Comprehensive input editing.
- Both salaried and hourly employees processed with a full range of overtime schedules.
- Individual employee vacation checks printed on request.
- Terminated employees retained on file through year-end for W-2 preparation.
- Personnel information and direct bank servicing provided.
- Reports generated: Input Edit Report, File Maintenance Report, Transfer Report, Payroll Register, Deductions Register, Year-to-date Payroll Register, Year-to-date Deduction Register, Deduction Arrears Report, Checks and Earnings Statements, Wage and Withholding Statements (W-2's), and Quarterly Wage Reports.

Honeywell 200 series (110, 120, 200, 2200), 4 tape drives, card reader, 20K core memory, line printer, COBOL

KH802

PAY-35 PAYROLL SYSTEM $950

American Data Control Systems now has a complete payroll system at the unbelievably low price of $1250.00—customized, installed, and guaranteed. Source decks and all documentation are included. (Pay-35 is available without installation and customization for $950.00).

Minimum Computer Equipment Configuration: Any computer with a Fortran compiler; 8K core including Supervisor; Disk or tape oriented; One tape is required (even paper tape will suffice).

Programmed in Fortran for compatibility and ease of maintenance.

Transaction Inputs: New employees; Changes to existing company and employee records; File updates; Adjustments; Time cards.

Time Reporting: Regular time; Overtime; Double time; Adjustments.

Labor Distribution: Two distributions per employee—each with regular, overtime, and double time; Two-digit labor distribution code.

Pay Periods: Weekly; Bi-weekly; Semi-monthly; Monthly; Period.

Payment Calculations: Hourly; Salary; Miscellaneous pay.

Tax Calculations: Federal income tax; F.I.C.A.; State tax; City tax.

Voluntary Deduction Calculations: Six company-defined deductions; Automatic expiration deduction (ex. United Appeal); Automatic accumulation deduction (ex. Bonds).

Quarter-to-Date Accumulations: City tax;

State tax; Federal taxable pay.
Year-to-Date Accumulations: City tax; State tax; Federal taxable pay.
Modular Design Provisions: Customized tax provision; Easily maintained and modified; Simplified systems' documentation.
Other Features: Payroll and labor distribution computation from the same input; Company specification of payments and deductions; Pre-calculation edit and file maintenance.
Reports: W-2's; Quarterly 941-A; Payroll tabulations; Checks and stubs.
Pay-35 is guaranteed for 90 days. Later maintenance is available by consulting contract. Additional state and city tax routines will be made available for $30.00 each.

Any Machine with FORTRAN, FORTRAN
KH803

PLOTTING

SPEEDPLOT II (Revised)   **$1,500**
This program automatically screens and plots data in 8½" x 11" format on a line printer. Up to six curves per plot with individual plotting symbols and curve titles may be printed. Each plot is identified separately. X and Y axis scale values, limits, and labels are all variable. Plot point values may be plotted directly from input data, or can be calculated using stored formulae. A data screening capability is provided since only significant values falling within the X and Y axis scale limits are plotted, whereas all data is separately tabulated.

IBM 360, OS, DOS, or equivalent
KI900

DETRAN (DECISION TABLE TRANSLATOR)
     $8,000 Lifetime Lease, or **$400 Mo.**
DETRAN converts limited entry decision tables to COBOL source. Eliminates flowcharting with three printed sets of documentation: (1) Tables as written, (2) Tables as sorted and optimized, (3) COBOL source. Each table is subjected to many logic checks; tables must be complete, not redundant, not contradictory. Source COBOL always contains minimal branching (one less branch than number of D.T. rules.) Action strings are optimized. Package comes with 2-day D.T. course. Course materials & user manuals supplied. For $500.00—two day course and two months free use of DETRAN. Any computer—any operating system. DETRAN fits into 30K; no overlays. More sold than any other D.T. translator.

COBOL is used with DETRAN, DETRAN is also written in COBOL
**KI901**

UTILITY

AT-16 ASSEMBLER   **N/A**
The ATI-16 Assembler available from Automation Technology, Incorporated of Champaign, Illinois is an expanded fully compatible version of the DAP-16 Assembler. The ATI-16 creates an environment, utilizing the 360, that is much more efficient for the programmer and economical than even the most complete set of peripherals that can be supplied with a DDP. The ATI-16 Assembler accepts DAP-16 source code written for any 16-BIT Honeywell computer and is source-deck-compatible with existing DAP-16 programs.
The ATI-16 Assembler increases capability and clarity and generates object code directly from any IBM system 360 Model 30 or higher that has 64K or larger core storage

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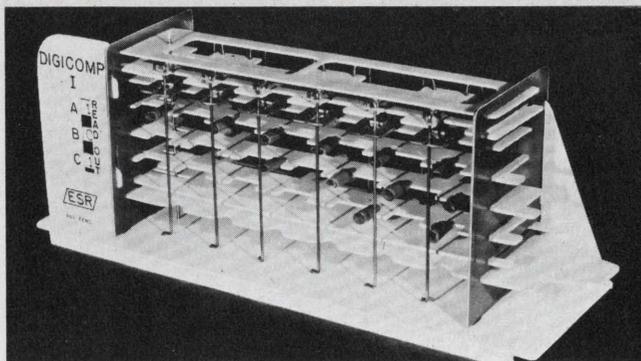
Ingenious mechanical equivalent of an electronic digital computer. Can be "programmed" to perform, individually, every operation of a digital computer. Best thing ever for teaching binary math, how a computer operates, how and why problems must be broken down for machine solution. In kit form—1 hr. to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

This year make Christmas educational as well as merry. DIGI-COMP-I and CONFIGUATIONS make enjoyable Christmas gifts for the whole family.

CONFIGURATIONS

Based on concepts from the geometry of incidence, CONFIGERATIONS is a series of intriguing mathematical and geometric puzzles that will challenge and delight those who enjoy careful reasoning. It is authored by Professor Harold L. Dorwart, Chairman of the Mathematics Department, Trinity College, Hartford.

$4.95 Postpaid

utilizing OS/360. A complete cross-reference is provided with the listing generated by each assembly.

Honeywell System/360 model 30 & up, 64K & up, requires OS/360, BAL

KJ1000

MODIFICATIONS FOR IBM 1130 PLOTTER ROUTINES $50

This package includes modifications for the IBM 1130 plotter routines that reduce execution time by about 30%. This is accomplished using advanced overlap techniques. The package takes 300 words less core than existing routines. This package requires no modifications to existing software, and is completely compatible with the old plotter routines. The calling sequences for these are completely identical.

IBM 1130 (4K), plotter, 1130 Assembler

KJ1001

PGENT $10

This macro provides the standard interface between an Assembly Language program and the Operating System. Provides the establishing of all the required linkage conventions. The programmer has an unlimited number of base registers that may be specified. Also provides for the standard save area chaining required under OS.

360/40 & up, OS

KJ1002

"TITLE" $50

This subroutine was designed to prepare title sheets for any computer run. By using various function codes, the user can prepare a title sheet which is at once esthetically pleasing, informative and sophisticated in format.

The functions are as follows: 1. Print a line of text, with self-centered feature; 2. Print a line of text, with left-justified feature; 3. Skip up to 6 lines; 4. Insert a line of all one preselected character.

"TITLE" is especially good in a scientific or technical environment where uniqueness of a run is complemented by additional descriptive documentation.

Any Hardware Configuration, BASIC FORTRAN

KJ1003

'FORTRAN' MACROS FOR ASSEMBLER $500

The full facilities of the FORTRAN formatted READ and WRITE statements (of any complexity) are provided in ASSEMBLER by macro statements almost identical to the FORTRAN ones. The macros are called FREAD and FWRITE. Any FORMAT specification can be employed. Furthermore, character or arithmetic strings to be input/outputted in A or Z format can be of any length up to line size, and arrays of such strings, or variable substrings of such strings can also be input/outputted. No special control cards are needed. Further details on request.

360, Assembler

KJ1004

JULIAN/CALENDAR DATE CONVERSION SUBROUTINES $75

Two subroutines easily added to any current IBM System/360 BAL MACRO library for inclusion in BAL programs. Each subroutine handles one-way date conversion (either Julian to calendar or calendar to Julian) and includes full error detection/validation of input entered into the routine. Maximum core storage utilized per routine is 150 bytes.

IBM System/360, Assembler Language

KJ1005

BUSINESS FORECASTING, PLANNING, & ANALYSIS SYSTEM
$5,000 1st Yr, Approx. $40 per hr.

A Time-Shared remotely accessible Business Planning System which allows a great flexibility of use. This is not strictly a financial planning tool (which is in fact its prime purpose) but is in reality a system which permits modeling of resources. Currently used in Financial Budgeting, Forecasting, Vessel Analysis, Mine Evaluation & Smelter Analysis, manpower resource allocation, and many other applications. The user interfaces with the system in an English sub-set of verbs and directives. No technical experience is required to effectively utilize the system.

Currently available only through the time-share network of TYMSHARE, INC.,
FORTRAN

KJ1006

SERCHR (RETRIEPE, SORT & REPORT PACKAGE) $15,000 or $500 Per Mo.

User (can be non-D.P.) specifies need for report, in two sentences, from existing file predefined with) COBOL FD-01. File is searched for selected records (or parts of records) and new file is built from extractions. New file is sorted and report printed complete with page headings. Math functions are sum, count, range, average, percent. No forms necessary. Any number of criteria for selection. Any number of total levels. Newly created files may be preserved. SERCHR can be learned in two hours or little more. 46 reserve words.

Burroughs 3500/IBM 360, COBOL

KJ1007

SHOBOL SHORTHAND COBOL EXPANDER $100

SHOBOL allows substitution of abbreviations for any reserve words or user labels not exceeding 30 positions. The source deck is then processed by this program and substitutions are made by the computer and new cards are punched whenever a match is found. Each user may set up his own abbreviations using table cards. Resulting source program is in the extended COBOL coding form and may be compiled in the usual manner. Much program writing time may be saved as well as keypunch time. The price of this program can be recovered in the first week of use.

360 DOS, Model 25 & up, COBOL

KJ1008

COPY COBOL SOURCE AND LIBRARY STATEMENTS TO TAPE N/A

This program will copy COBOL source programs from card and/or tape to tape. During the copy all INCLUDE and COPY statements (9 acceptable formats) are extracted from the source statement library expanded, processed and written on tape.

Appropriate DOS Job Control cards are also extracted from the DOS source statement library, and written in front of or behind each source deck.

Use of this program will: (1) Facilitate exchange of programs; (2) Increase interest and usage of source statement library; (3) Provide a method of reading source statement library in order to: (a) Flow chart the program with FLOBOL or other flow chart program; (b) Obtain crossreference via a crossreference program; (c) Analysis of program to determine adherence to standards.

DOS 360/30 & up, DOS, ALC

KJ1009

ANADISK $40

This program is designed to read a 2311 or 2314 disk pack and provide listing of the information contained in the VTOC. This

listing is in easy, readable form and provides status information about any entire disk pack. After the VTOC listing ANADISK provides a sequential listing of the areas already allocated for use. This will give the user a listing of what is on a pack and what is not free or available for use.

360/30 & up, DOS, BAL

KJ1010

DECISION TABLE TRANSLATOR $500

The Decision Table Translator accepts complex statements of problems, in decision table form. Those statements are converted by the translator into source COBOL language subroutines which are to be compiled as a part of the COBOL program. Object modules of the translator along with attendant JCL, deck set up, and operating instructions are provided. In addition, model statements (ready for punching) along with already punched cards to be input to the translator and output COLOL subroutines are included.

OS 360—200K, Assembler

KJ1011

COBFSE 12 (COBOL (F) SORT EXTENSION TWELVE) $25

COBFSE 12 allows use of CALL verb in the INPUT PROCEDURE and OUTPUT PROCEDURE of the COBOL (F) SORT.

360/30 & up, BAL

KJ1012

COMPRESS $295

The program will make efficient use of disk storage space on source language files and many types of data files. Savings can be as much as 80%—that is, 1,000 bytes can be compressed into 200. Source language program provided with full documentation. Can be used as "stand-alone", part of catalogued procedure, or as a module.

360/ & up, COBOL E

EG469

DMC TRAP $800

DMC TRAP enables a programmer to find all programming errors and data definition errors in one test, by trapping all program checks, displaying the offending instruction and its location, the reason for the interrupt, and the contents of the data fields and registers. Certain data errors are corrected and the offending instruction re-executed. Otherwise, the next seqential instruction is performed.

360/32K & up, DOS, BAL

EG470

360 EAM UTILITY $504

Through the use of control cards, which can be placed anywhere in the input deck, this program will perform any or all of the functions in one pass of the input deck. (1) 80/80 list, (2) 80/80 reproduce, (3) card to tape, (4) intersperse gang punch up to a maximum of five fields, (5) gang punch into any column or columns (up to five fields), (6) consecutive number into any column or columns (up to five fields), (7) single, double or triple space, (8) set the line count per page by spacing requested, (9) eject the listing at any point, (10) convert the deck from BCD to EBCDIC, and (11) accumulate field totals in up to five fields.

360/25 & up, BAL

EG471

new products

Introduce Compact Storage and Display Unit

REMKARD System by Remington Rand Office Systems Division, Sperry Rand Corp., Marietta, Ohio, will house up to 75,000 pages of random stored microfilm data with four-second, push-button image display.

The system will also interfere with any third generation computer or computer peripheral equipment since its internal language is binary. When the unit is used in a data processing system communications costs can be cut by as much as 70% according to a Systems Division official.

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

New Company Markets Transportation Equipment Identification Scanners

Recently formed ACI Systems Corp., Chicago, offers a new generation of automatic transportation equipment identification scanners and ACI label-decoding processors which feature new capabilities and lower costs.

ACI will also provide advanced computer-based operations and terminal control systems to domestic and international transportation companies. Remote multiple scanners linked to these systems contribute continuing on-line information inputs.

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

GE TermiNet™300 Is Quiet and Fast

General Electric's TermiNet™300 data communication printer operates quietly at high speed and can cut an hour's transmission time to 23 minutes, providing impressive savings in data costs.

Developed and manufactured by G.E.'s Communication and Control Devices Dept., Lynchburg, Va., it is designed with variable speed ranging from 10 to 30 characters per second. Large scale integrated circuitry provides quiet operation allowing the self-contained TermiNet 300 to be used in front office locations.

TermiNet 300 can be used in private and commercial time-sharing systems, for solving scientific and business problems, for management of information systems and for point-to-point business data exchange. It can also be used to edit and format text using computers, perform repetitive printing of business documents or process information gained from computers.

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

Video Display System Brochure Available

A six page brochure describing the total systems approach to computer communications on System/360 utilizing standard off-the-shelf hardware and software is now available from Computer Communications, Inc., Inglewood, Calif.

In addition, similar complete systems using only standard off-the-shelf CCI products can be installed on XDS Sigma series, CDC 3000/6000 series and IBM 1130 computers.

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

## Protecting Computer Records Detailed in New Literature

A comparison chart that distinguishes the important differences between protecting paper records and computer records is featured in a new brochure from the Safe Manufacturers National Association (SMNA).

Titled "Safeguarding EDP Media," the four page, illustrated brochure emphasizes that methods and equipment used to protect paper records from fire are no longer applicable to non-paper records.

For more information, circle No. 24 on the Reader Service Card

Laser Beam Carries a Billion Bits of Information Each Second

Recent advances in new types of high speed electronic circuits by a Bell Laboratories scientist have made it possible to transmit one billion bits of information (a gigabit) per second over a laser beam. This is four or five times the capability of previous methods and equivalent to transmitting 200 books per second or a library of 50,000 volumes in about eight minutes.

Developer Gerald White adjusts an optical modulator, part of the Bell Labs experimental laser system. Similar systems using laser light instead of microwave or cable may one day carry thousands of signals, including voice, television, data and other forms of information simultaneously.

For more information, circle No. 31 on the Reader Service Card
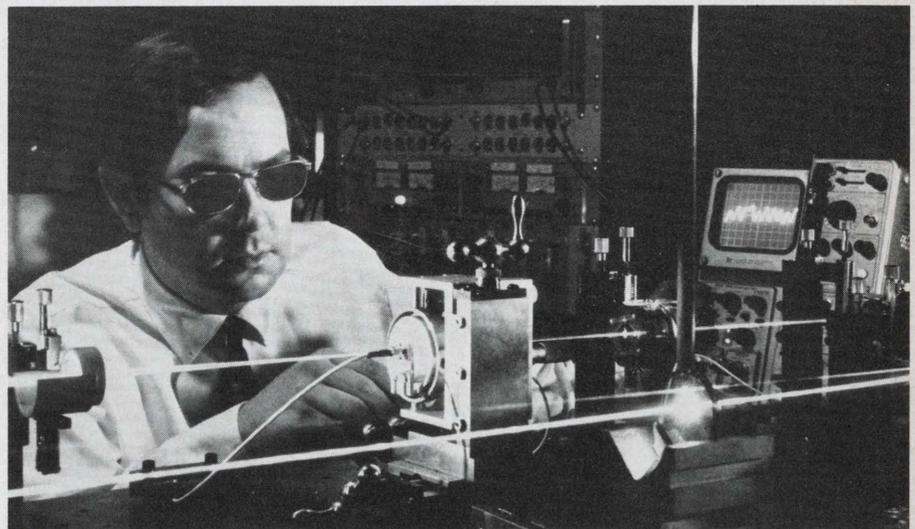
New On-Line Receivables Package

A new, powerful on-line open item accounts receivable software package has been introduced by Computing Corp. International, Inc., Englewood, Colo.

The package, OLAR, provides for automation of receivables, inventory, atomation of receivables, inventory, billing, and purchase orders to suppliers. Written in FORTRAN IV, the package provides capabilities and efficiencies not normally possible with COBAL programs. The package can be used with any batch or time-sharing DOS system supporting FORTRAN IV in the DOS environment.

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

Digital Equipment Corp. Develops ALGOL for PDP-10

ALGOL, a high-level computer language extensively used in Europe for mathematical, scientific, and system development work, is being developed by Digital Equipment Corp., Maynard, Mass., for it PDP-10 computer.

The PDP-10 ALGOL package is made up of three components (a sharable compiler, a sharable operating system, and a library of scientific subroutines) that give the user a powerful version of an extended ALGOL 60 capability.

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

Portable Electric Keypunch

Varifab, Inc., Old Greenwich, Conn., has announced the Model 402 Vari-Punch, a portable, electric keypunch that prints and punches original entry data on standard tab cards, at the source. Single cards, multiple-part card sets, aperture and plastic ID cards can be accommodated.

The fast, simplified electric operation enables any employee to prepare computer input data ready for processing. Average production exceeds three cards per minute; transcription errors, work backlogs, and peak loads associated with central keypunch operations are alleviated.

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

Introduces Debugging System

Applied Data Research, Inc., Princeton, N.J., has introduced IMP (Interactive Mini-computer Programming Environment), a proprietary on-line system for the preparation and debugging of programs for several widely used mini-computers.

IMP consists of an integrated set of software which includes editors, assemblers, and a new ADR mini-computer simulator called Mimic. These programs, together with the PDP-10 file handling ability, provide the mini-computer programmer with all the resources and facilities available only in the most sophisticated large computer environments.

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

NCR Retail System Designed to Optimize Asset Management

The National Cash Register Company's new NCR 280 makes possible higher profit yields through better asset management. The Dayton, Ohio, company's system provides unit level information at the same cost required for department level and class level information in the past.

To achieve this, the NCR 280 system "plugs-in" sophisticated hardware and technology at each of the action points in the retail operation to provide a total system for receiving-marking and point-of-sale data capture.

With a quick pass of the "wand" reader of the encoded price tag, the store captures the detailed information required for its merchandise replenishment system without laborious and time-consuming manual entry into a cash register keyboard, speeding customer service and virtually eliminating errors.

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

Scan-Data Develops Unique OCR Software Which Defines, Recognizes Any Font

Unique self-teaching OCR software which can automatically define virtually any typed or printed font and register it in memory in a little more than a minute, has been developed by Scan-Data Corp., Norristown, Pa.

Designated SWAMI, the program has been used successfully with Scan-Data page reading systems to define and recognize a variety of fonts including those in English, Russian, Japanese and Greek. According to Joseph Yacyk, vice president of engineering, "SWAMI represents a significant breakthrough in the OCR industry. It is the closest anyone has yet come in developing an omni-font capability for direct OCR application."

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

Offer Complete Data on Inktronic[R] Terminals

Detailed data on its Inktronic[R] line of high-speed electrostatic terminals is contained in a new product-information brochure now available from Teletype Corp., Skokie, Ill.

Operating at speeds up to 120 characters per second, the Inktronic terminal forms the upper and lower case characters of the ASCII code by electrostatically propelled ink droplets. A five level code is optional for the receive-only set, and the data terminals require no buffer characters before moving to the next line. Available in keyboard send-receive or receive-only modules, the Inktronic terminal and its features are fully described in the brochure and an explanation of electrostatic deflection printing provided.

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

System Provides Tape File Accounting

Fast, accurate accounting of a computer facility's magnetic tape files now is available through use of a computerized record-keeping system developed by GT&E Data Services Corp., Tampa, Fla., a subsidiary of General Telephone and Electronics Corp.

The Automated Tape Library Accounting System (ATLAS) is used in a serially-oriented magnetic tape environment to record the current status and location of each tape along with vital historical information. In addition, the system provides a complete and accurate record of every data set name within an installation, plus related retention data.

The automated system not only increases record-keeping accuracy, prevents "losing" tapes in the library and facilitates job set-up, but by eliminating most manual procedures also reduces the time spent by personnel in library maintenance.

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

Memory Reliability Up Costs Down

Lockheed Electronics Data Products Division, Los Angeles, has developed a 180-mil core (18MT05) for data storage memories that requires a drive current of only 420 milliamps yet features a switching time as fast as 270 nanoseconds. Without a significant sacrifice in switching speed, this improvement makes possible microsecond memory systems that have overall better performance and higher reliability because of the limited stress placed on the system.

The most significant advantages can be achieved in large-scale mass memories where power requirements are typically high and where dissipated heat can impair performance and reliability.

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

APL Manual Offered

Time Sharing Resources, Inc., New York City, has available "APL: An Introduction," a manual describing a condensed version of APL, IBM's general purpose computing language.

The Manual, useful as a reference for popular routines, answers questions and includes a summary of the system command keyboard operators and mixed and hybrid functions. The APL Introduction is in accordance with the standard IBM APL version.

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

Reduces Main Memory Costs

RCA, Camden, N. J., has successfully reduced main memory cost at the same time that it improved system performance, through the use of standardized memory modules.

Standardized memory modules means that every computer in the new RCA series—starting with the RCA 2, RCA 3, RCA 6 and RCA 7—is equipped with main memories that are identical in design and manufacture. This

New Memory Costs Less Occupies Less Space

A new high-density core memory developed by Hewlett–Packard, Palo Alto, Calif., makes it possible for two new HP computers to have twice as much memory capacity as their predecessors had in the same size mainframes.

The new computers, 2116C and 2114C, will operate in the same configurations as earlier models, and are compatible with all existing HP software, peripherals, processor options, and accessories.

The new memory that makes the new computers possible takes full advantage of up-to-date core and integrated-circuit technology to achieve not only small size, but also better serviceability.

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

Reduce Application Time

Development of on-line applications in a few days rather than a few months, is said by Informatics Inc., Canoga Park, Calif., to be possible with the use of its new software product, DiSPLAYALL.

According to Informatics, DiSPLAYALL permits development of on-line applications without a specialized knowledge of terminals and debugging without having to use the terminal. Initially, the system

differs from the approach taken by most other computer manufacturers, who continue to produce different memories for different computers.

The RCA 2, 3, 6 and 7 computers are also the first to offer video operators consoles on medium-priced computer systems.

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

will support local and remote terminals under OS on IBM S/360 computers.

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

3M Offers Disk Pack for Honeywell Drives

A disk pack designed specifically for use on the Honeywell 273 and 274 disk drives has been introduced by 3M Company, St. Paul.

Called the "Scotch" Brand 913 Disk Pack, this eleven-high pack becomes the fifth direct access memory device to be produced by 3M since the company began manufacturing this electronic data processing storage medium in 1968.

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

Ultra-Microfiche Information Available

A six-page folder explaining and illustrating the new ultra-microfiche (UMF) technology is now available from Images Enterprises, Inc., Los Angeles. The technology makes it possible to place as many as 6,000 images on a transparent plastic card, typically three by five or four by six inches.

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

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new products

Large Core Store Increases Performance, Lowers Costs

A new plug-to-plug peripheral, the System/6000 Large Core Store, is described in a new six-page brochure available from Data Products Corporation's Systems Division, Los Angeles.

The brochure describes how the Large Core Store increases performance while lowering the costs of IBM System/360 Models 50, 65, 67 or 75 computers. The Data Products memory can replace or augment an IBM 2361 Large Core Storage unit, replace a part of main CPU memory, or expand main CPU memory.

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

Monitor/Control System Utilizes Radex Sensors

A production monitor/control system designed to optimize production efficiency has been jointly announced by A. B. Dick Company, Chicago and Radex Corporation, Detroit. This system combines automatic inputs—provided by Radex machine sensors—with inputs from machine operators, supervisors and maintenance personnel.

Primary production system benefits include reduced machine downtime, accurate piece count, current production status efficient communications and timely summary reporting. This particular system design enables manufacturing managers to maintain timely control over product quality, inventory, and production schedules in order to improve production planning and machine utilization.

For more information, circle No. 33 on the Reader Service Card

IBM Announces New Computers

Major advances in low-cost computing power for the office, factory and laboratory were announced recently by International Business Machines Corporation, New York, as two new computer systems were introduced by the company.

IBM System/3 Model 6 can be used by almost anyone who works in an office. IBM System/7 can operate unattended in most manufacturing and process environments. The sensor-based system, designed for real-time industrial and laboratory control applications, is IBM's lowest-cost computer.

Model 6 is a new version of the widely accepted System/3 announced last year for small business accounting applications. The new model features direct data entry from a typewriter-like keyboard, "conversational" problem-solving and ledger card processing. The rugged IBM System/7 is designed to measure, test, analyze and control thousands of operations as they happen in factories, refineries, chemical plants or laboratories.

For more information, circle No. 35 on the Reader Service Card

Free Sample Lesson in Systems & Procedures

North American School of Systems & Procedures is offering an actual free sample lesson, taken from its home-study course in Systems & Procedures so that prospective students may "preview" the course before actually purchasing it.

The lesson—which is one of fifty contained in the comprehensive course which is sponsored by the Association for Systems Management. The course is designed for personnel presently in Systems Departments who want to "brush up" or broaden their knowledge of the subject, as well as for companies—both large and small—who want to train their own personnel in Systems & Procedures.

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

Westinghouse Introduces New Small Computer Line

Westinghouse Electric Corporation, Orlando, Fla., recently introduced a new computer designed for a new market.

The new computer is a high-speed, general-purpose machine particularly suited to industrial, communications and scientific markets. Called the Westinghouse 2500, it has a 16-bit word length and a memory speed of 850 nanoseconds.

For more information, circle No. 36 on the Reader Service Card