Applications Software Bulletin
INTRODUCTION

The DECsystem-10 Applications Software Bulletin serves as a catalog of software available to DECsystem-10 users from either Digital Equipment Corporation Users Society (DECUS) or from suppliers of software. DEC supplied and supported software is described in the DECsystem-10 Handbooks and Introduction to DECsystem-10 Software.

This Bulletin is divided into two parts:

PART I: Software available from the Digital Equipment Corporation Users Society (DECUS). These packages are generally available at no cost other than clerical overhead charges, postage, etc.

PART II: Software available from various other sources, the terms and conditions of which are a matter of negotiation for the interested party. This section in particular is far from complete and we encourage everyone who has DECsystem-10 related software available to contact DECsystem-10 Marketing so that it can be listed in the next issue.
# DECUS CONTRIBUTIONS

## PART I

### BASIC LIBRARY

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JOVIAL '70
LISP 1.6
MLISP
MACRO7
PALX-11
PAL-12
PDP-8 ASSEMBLER FOR PDP-6
SAIL
SNOBOL

MATHMETICAL & STATISTICAL

FORTRAN SCIENTIFIC SUBROUTINE PACKAGE (SSP)  MST 1
STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES (SPSS)  MST 10
LININV  MST 11
MATHLAB  MST 11
FIT  MST 11
MXNOUT  MST 12
REDUCE  MST 13
JACOBI  MST 13
TSUM, DERIV and CONPOL  MST 14
CHISQ  MST 14
PDP-15/9 STATISTICS PACKAGE (STATPAC)  MST 15
W-COMPLEX (Complex Error Function for Complex Argument)  MST 15
MATRIX  MST 15
MREC - Multiple Regression  MST 15
IRAND - Random Number Generation  MST 16
RAND  MST 16
FORTRAN MATRIX/VECTOR ROUTINES  MST 16

PHYSICS

MATHLAB  PHY 1
NVERTX  PHY 1
The PDP-8/PDP-10 RT DATA ACQUISITION  PHY 1
REDUCE2  PHY 2
TVGP and SQUAW  PHY 2

PLANNING

CRITICAL PATH SCHEDULING  PLN 1
CRITICAL PATH METHOD  PLN 1
SIMULATION

CSMP-10        SIM 1
GASP II         SIM 1
PDP-8 SIMULATOR ON THE DECsystem-10  SIM 1
SIMII           SIM 2
SIMPLE          SIM 3

UTILITIES-FORTRAN

RUNH             UTL 1
RAND: 71 RANDOM BITS       UTL 1
CRAND: COMPLES RANDOM NUMBER  UTL 1
RANDOM: REAL NUMBER UNIFORM BETWEEN TWO LIMITS  UTL 1
GETRAN: GET BOTH HALVES OR RANDOM NUMBER  UTL 1
DRAND: DOUBLE PRECISION RANDOM NUMBER  UTL 1
GRAND: GAUSSIAN RANDOM NUMBER GENERATOR  UTL 2
SEC: REAL RESULT OF NUMBER OF SECONDS SINCE MIDNIGHT  UTL 2
TIN: GIVES A REAL RESULT OF TIME OF DAY HHHMM  UTL 2
DTE: REAL RESULT OF DATE IN FORM MMDDYY  UTL 2
TANGENT FUNCTION  UTL 2
CONTANGENT FUNCTION  UTL 2
DATE             UTL 3
BELL STAR        UTL 3
I_BYTE           UTL 3
P_LIST           UTL 3
PACK, UNPACK, REPACK  UTL 4
RN               UTL 4
SETRAN           UTL 4
IRAND            UTL 4
ARP Alphanumeric & Report Generator Utility Package  UTL 4
TRACE            UTL 4
CARD             UTL 5
MEM2 and MEM4    UTL 5
OPEN             UTL 5
IFTYP            UTL 5
FAKE             UTL 6

UTILITIES-DISKS

ALLOCSP          UTL 7
PURIFY           UTL 7
DSKOK            UTL 7
ONCE ONLY CODE - USER MODE  UTL 7
UTILITIES—MACTAPE

TRANS
TAPBLK, MAC
FILER
IBM 360 TAPE COMPATIBILITY PROGRAMS TCP1, TCP2

UTILITIES—DECTAPE

LST9: A Program to List PDP-9 DEctapes on a PDP-10 Line Printer

EIGHT AND EDIT8
EXCON
DTADIR
DTAPIC
GOOF. MAC
CONVRT
UT6ND
DTLOTS
DSKDTA
RESDEC
PIP3 VO2

UTILITIES—EIGHTS & NINES, ETC.

PDP-10/8 LOADER
PDP-10 to PDP-9 MONITOR SOFTWARE (DA10)
TALK8F
680 PUMP
SEVAMC

UTILITIES—SYSTEMS

PDP-10 SINGLE USER MONITOR SYSTEM
SCNSER—Improved but Untested SCNSER
RAPID PROGRAM GENERATION SYSTEM
CFILE
COPYDC
LOADER
CREF
FCROX
TELPLT
FILDMP.MAC
HELP
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BASIC

BASIC LIBRARY

I  Bank. Dir - Commercial Banking Programs (DECUS NO. 10-72)

A  Data Processing Programs:

ACCRUA  Accural of interest - installment loans
DEMAND  Demand loan billing
DEMIN   Instructions for entering demand data
INSTA   Installment loan ledgers
INSTAL   Installment loan statements
MORTGA  Monthly payment loan calculations
RECONC  Statement reconcilment
SBA1   Amortization schedules - SBA loans

B  Planning and Decision Making Programs:

BNKPRO  Bank planning model - statement projections
PROJIN  Instructions for entering bankproj data
BONYLD  Bond yields
RESERV  Analysis of reserve position

II  Customer Service Programs

SALES  Example program to assist department stores
BNKSIM  Savings bank simulation

III  Calcul. Dir - Calculations (DECUS NO. 10-73)

DIFEQ1  Num, Diff, Eq, Solution (2nd order RUNGA-KUTTA)
DIFEQ2  2nd order Diff, Eq, Solver RUNGA-KUTTA
DIFEQ3  Diff, Eq, Solver for Math 33
DERIV   Calculates derivative of function FNF AT PT, X = A
FNZERO  Finds zero of given function
GREINT  Gregory's method of integration
INTGRT  Simple integration routine
ROMINT  Subroutine -- Romberg's integration.

IV  Demos. Dir - Demonstration Programs (DECUS NO. 10-74)

ACCEL  Calculates automobile acceleration
AMAXIN  Draws a maze, up to 23 by 25
ANNUIT  Computes annuities

BASBAL  Generates a baseball game
BASTEA  First program in a sequence that teaches BASIC
BELOOP  Detailed explanation of the loop process
CALEND  Gives day of week for any date
FACTOR  Finds prime factorization of a number
KENNEDY  Prints portrait of J.F.K.
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LETTER  No time to write?? Let us help you.
MATTEA  Teaching program for matrix instructions
MORTG A  Computes life of home mortgage
NIM  Plays a simplified version of "NIM"
POPULA  Projects population growth
SALE S1  Salesman problem
SNOOPY  Prints Snoopy--punt
STATEA  Teaching program for statistics
TRUINT  True interest rates from installment payments
XMAS  Christmas sing-a-long

V  Engeer.Dir - Engineering Programs (DECUS NO. 10-75)

ADIST3  Distillation column simulator
BIDYP2  Dynamic programming
DECIDE  Helps you decide among three alternatives
DECID2  Decides which of 2 poss, test progs, to use, (RUN)
DIFEQ  Solves differential equations
E17981  Example from Engg. 179 (FRANKEL)
FALSE  False position subroutine (Prof, Converse)
FIB  MAX(MIN) of unimodal PCN of 1 VAR, (FIDONACCI)
FSMMIN  Determine classes of EQ, states of specified
         finite-state mealy machine
FSMSIM  Simulates input/output behavior of specified
         finite-state mealy machine
HOOK  Hook jeeves pattern search
LINQD1  Linear and/or quadratic programming algorithm
NWINS  Instructions for program "network"
NETWRK  Water flow through network of pipes (hardy
cross)
PERFGS  Finds properties of 14 common gases, treated
         as though they were perfect gases, (RUN).
PRFGSE  Explanations for PERFGS

VI  Funct.Dir - Commonly Used Functions (DECUS NO. 10-76)

ALLRTS  Calculates roots for both real and complex
         numbers
BESSEL  Subroutine--BESSEL function calculator
         (First Kind)
DEBYE  Computes either DEBYE or Einstein function
DGMINV  Finds inverse of DIGAMMA function
DIGAMA  Finds DIGAMMA of Z for Z>0 (NBS AMS55)

VII  LINALG. DIR - Linear Algebra (DECUS NO. 10-77)

CDETER  Solves complex determinants
CROUT1  Solves linear equations using crout algorithm
DIVIDE  Does synthetic division
INVERS  Inverts MATRIX by exchange method
INVHIL  Gives inverse of HILBERT MATRIX (Subroutine)
RATINV  Inverts matrices with rational coefficients

VIII LOGIC.Dir - Logic  (DECUS NO. 10-78)

NTRUTH  Truth table calculator for N-valued logic
TAUTOL  Tautology check (propositional logic)
TURMUL  Turing machine simulator
WELLFM  Well formed formula check (propositional logic)

IX NUMBER.Dir - Number Theory  (DECUS NO. 10-79)

4SQRS  Writes a number as the sum of 4 squares
ARITHM  Arithmetic with numbers of up to 300 digits
CHINES  Chinese remainder theorem
EUCLID  Euclidean algorithm
HUPRIM  Finds primes of up to 11 digits in range of 1000
LEGEND  Evaluates the legendre symbol
PYTHAG  Generates primitive Pythagorean triplets (RUN)
SIEVE  Demonstrates sieving for primes (RUN)

X PROBAB.Dir - Probability Theory  (DECUS NO. 10-80)

BINOMC  Computer Binomial Coefficients
BINOMD  Binomial distribution
BINOPO  Normal + poisson approximation to binomial probs.
BINORM  Normal approximation to binomial probabilities
ECHAIN  General purpose Markov chain
TCHAIN  General purpose Markov chain

XI STATIS.Dir - Statistics Programs  (DECUS NO. 10-81)

ANOVAR  Factorial analysis of variance for up to 14 factors
BACT2L  Bayesian analysis of 2-level contingency table
CHISQ  Finds prob, of Chi-square statistic
CURREL  Computes a correlation coefficient
FTEST  F-ratio probabilities (Function)
FVALUE  Finds Prob, of F statis
GEOMEN  Geometric normality analysis
LINFIT  Linear curve fit
LSFC  Least squares polynomial curve fit subroutine
NORDEV  Random normal deviates, $\phi,1$
PHICOE  Computes phi coefficient
PRBSTA  Calculates probabilities
STATG1  Computes statistics for single group
STATG2  Computes STAT, for 2 groups - equal variance
STATG3  Computes STAT, for 2 groups - unequal variance
STATG4  Computes chi squares for 2 by 2 contingency tables
BASIC

STAT05 Computes chi squares for M by N tables
STAT06 Sign test and confidence interval
STAT07 Signed rank sum (WILCOXON)
STAT08 Median test for 2 groups
STAT09 Rank sum test (MAN-WHITNEY)
STAT09 Linear regression — grouped observations
STAT10 One variable linear regression
STAT11 Spearman rank correlation coefficient
STAT12 Product moment correlation MATRIX
STAT13 Anova — one way, completely randomized
STAT15 Anova — Latin squares
STAT16 Anova — Graeco-Latin squares
STAT17 Anova — balanced incomplete block
STAT18 Anova — Youden square
STAT20 Step-wise multiple linear regression
STAT21 Multiple linear regression — fancy output
STAT33 Line 'STAT13' but different data arrangement
STATNW Computes 34 STAT, measures (non-weighted data)
STATWE Computes 34 STAT, measures (weighted data)
TVALUE Finds prob, of T statistic
WALDS Wald's sequential test

XII TUCKPR. Dir - Tuck School Programs (DECUS No. 10-82)

LEASE PROGRAMS

LESSEE Lease analysis from point of view of lessee
LESSOR Lease analysis from point of view of lessor
LESSIM Simulation of a lease

MORTGAGE PROGRAMS

MORTGA Computes rate, life, amount & monthly payment

STOCK EVALUATION

NICK63 Required continuation of growth to justify price
RETURN Computes MATRIX of rates of return on investment

FORECASTING PROGRAMS

FCST1 Linear trend with multiplicative seasonals
FCST3 Exponential smoothing—with seasonals
FCST4 H. Theil's measures of quality of forecast
FCSTST Generates time series to test forecasting progs,
FCST2 Exponential smoothing—annual data

FINANCIAL PROGRAMS

PV-ROR Present value and multiple rates of return
DEPREC Calculates depreciation by alternative methods
BASIC

MAKEBU    Make or buy decision
CAPBUD    Gives internal rate of return & compares
          4 projects

ECONOMIC PROGRAMS

INOUT    Leontief input output model
MACRO    Multiple regressions of nat'l income &
          products accts
INSTRU   Instructions for program 'MACRO'

PRODUCTION PROGRAMS

ASSIGN    Solves general assignment problem
PERT      Network analysis for pert time

LINEAR PROGRAMMING

DESCRB    Working comments for program 'LINPRO'
LINPRO    Linear Programming -- 2 phase
REVISIM   Revised simplex linear programming algorithm

STATISTICAL PROGRAMS

BINOMI    Prints a table of binomial probabilities
HYPERG    Prints a table of hypergeometric probabilities

GRADING PROGRAMS

CGRAGE    Cumulative grade program
MSTDEV    Computes mean and standard deviation of your
          grades

XIII UTILI,Dir - General Purpose Utility Programs  (DECUS NO. 10-83)

CHARS    Character representations, Oct,DEC, ASCII,
          TTY (RUN)
GHEADER  Computes term averages
GRAPH    Graphing routine--shows X and Y axes
GRAPH1   Graphing routine with options
HISTGR   Plots histogram of scores on a test
INDEX    Makes an index for a book
PLOT     Plots slt of points, to true scale
RANDOM   Subroutine to randomly order integers 1 to N
SIGNUP   Prints a signup sheet
SORTME   Sorts 2 alphabetic and 2 numeric lists
TEACH    Skeleton teach program

XIV BASIC GAME PACKAGE  (DECUS NO. 10-96)

ACYDUC    A card game
BANDIT    A simulated one arm bandit (slot machine)
BASIC

BATNUM  A number game (NIM)
BLKJAK  A game of 21 (cards)
CRAPPS  A game of dice
DIGITS  A number guessing game
FTBALL  A simulated football game
GUNER   A field artillery game
HORSES  A simulated horse race
TICTAC  A game of tic-tac-toe

XV BASIC TEACHING PROGRAMS (DECUS NO. 10-97)

Educational/Tutorial Programs

TUTR01  Arithmetic symbols, line numbers, and the input, let, print, and end statements
TUTR02  Print and go to statements. Run, save, unsave, stop and goodbye systems commands
TUTR03  Rules for naming a variable
TUTR04  Read and data statements
TUTR05  Subscripts and the dim statement
TUTR06  The if... then statements
TUTR07  If.. then, for, and next statements
TUTR08  Paper tape punch and read operations and standard functions (explanation)
TUTR09  Paper tape input/output exercise
TUTR10  Standard functions (usage)
TUTR11  Standard function review. Function definitions (DEF statement)
TUTR12  GOSUB, return and rem statements
TUTR13  Review of functions and subroutine usage
TUTR14  Review of statements and system commands and edit resequence statement. Instructions for test program TUTRLE.
TUTR14  Review of statement and system commands and edit resequence statement. Instructions for test program TUTRLE.
TUTR15  Test program to demonstrate the resequence and delete commands. Explanation of save, unsave, old and new system commands.
TUTR16  General review
TUTR17  Explanation of additional system edit commands

XVI Mathematical and Statistical (DECUS NO. 10-100A)

1 PROVAR - Perform Calculations for Normal and T Distributions

PURPOSE

To perform several types of calculations for normal and student's-T distributions. Given one- or two-tailed
probabilities, it will produce the corresponding limits; given a variate or a set of limits, it will produce the corresponding probabilities.

2 STATAN - Statistical Analysis on Data for One Variable

PURPOSE

To perform a statistical analysis on data for one variable. It computes 34 different measures for an array of weighted (as with frequencies) or unweighted values of the variable. It also gives a 10-class frequency distribution summary, and a recapitulation of the input data in terms of deviations from the mean and as an ordered array.

3 TESTUD - Test An Unknown Population Mean

PURPOSE

To test an unknown population mean using sample statistics.

INSTRUCTIONS

To use this program simply supply values for the 5 variables N, M, S, W, and X.

Where:

N = Sample size
M = Sample mean
S = Sample standard deviation
W = Population size (0 if infinite)
X = The population mean to be tested

Additional instructions may be found in the listing.

4 TWOWAY - Analysis of Variance

PURPOSE

To perform an analysis of variance for 1-way or 2-way classifications, with replication in each cell if present.

5 UNISTA - Determine Statistical Characteristics of Univariate Date

PURPOSE

To provide a description of univariate data with up to 300 observations on one variable
6 CURFIT - Curve Fitting

PURPOSE

To determine which of 6 curves best fits the supplied data.

7 ROOTER - Finding Roots of Polynomials
   - Bairstow's Method -

PURPOSE

To find the roots of Polynomials using Bairstow's method.

8 MULTRY - Multiple Regression Analysis with Elimination of Variables

PURPOSE

To permit you to successively eliminate variables from a multiple regression analysis.

9 MULREG - Multiple Regression Analysis

PURPOSE

To perform a multiple regression analysis containing one dependent variable and up to six independent variables.

10 BINDIS - Compute Binomial Distribution

PURPOSE

To compute the binomial distribution function for problems of this type: In a series of N independent trials, each with probability of success P, what is the probability that there will be exactly X successes?

11 BITEST - Statistical Test of a Binomial Proportion

PURPOSE

To perform a statistical test of a binomial proportion.
12 CONLIM - Confidence Limits for an Unknown Mean

PURPOSE
To compute confidence limits for an unknown population mean based on random sample data.

13 CONDIF - Confidence Limits for a Difference Between Two Population Means

PURPOSE
To compute confidence limits for the difference between 2 population means, based on data supplied for 2 samples, 1 from each population.

14 DESTAT - Analyze a Set of Observations on One Variable

PURPOSE
To analyze a set of observations on one variable.

15 MANDSD - Calculate Mean, Variance and Standard Deviation

PURPOSE
To calculate the mean, variance, and standard deviation for each of several sets of individual values of frequency distributions.

16 POLFIT - Fit Least-Square Polynomials to Bivariate Data

PURPOSE
To fit least-square polynomials to bivariate data, using an orthogonal polynomial method. Limits are 11th degree fit and a max of 100 data points. Program allows user to specify the lowest degree polynomial to be fit, and then fits the polynomials in order of ascending degree. At each stage, the index of determination is printed, and the user has the choice of going to the next higher degree fit, seeing either of two summaries of fit at that stage, or of stopping the program.

17 AMPLEX - Integration of First-Order Differential Equations

PURPOSE
To integrate a system of first-order ordinary differential equations by the fourth-order Adams-Moulton method.
18  RKPBX - Integrate Differential Equations
     - Runge-Kutta Method -

PURPOSE
To integrate a system of first-order ordinary differential equations by the fourth-order Runge-Kutta method.

19  GAUSS - Compute Definite Integral $F(T)$
     - Gaussian Quadrature -

PURPOSE
To compute the definite integral of $F(T)$ from $T = A$ to $T = B$ by Gaussian quadrature.

20  DIFPLT - Integration of First-Order Differential
     Equations; Runge-Kutta Method

PURPOSE
This program integrates up to four systems of first-order differential equations by the fourth-order Runge-Kutta method and gives the choices of seeing a printout, a plot of the functions, or both. The function will be shown as a function of time.

21  ZEROES - To Locate Maximum/Minimum and Zeroes

PURPOSE
To locate "interesting" values of $X$ for any function of $X$. Specifically, to locate the values of $X$ at which relative maximums and minimums of $F(X)$ occur, and the values of $X$ for which $F(X)$ is zero (i.e., the zeroes or roots of the function).

22  TMFCEV - Evaluation of Time Functions

PURPOSE
To evaluate time functions which are sums of exponentials and exponential sine-cosine terms.

23  PROTFRE - Compute Mean, Standard Deviation and Skewness
     for a Distribution

PURPOSE
To compute the mean, standard deviation, and skewness for the distribution of any function consisting of up
to 9 discreet variables. Each variable may have up to 40 values, with a frequency assigned to each.

24 NUMINT - Evaluation of Definite Integrals
- Gauss' Rule -

PURPOSE
To evaluate definite integrals using Gauss' rule with ten points.

25 SIXCUR - Least-Squares Curve Fit to Bivariate Data

PURPOSE
To fit six different curve types to bivariate data supplied by applying a least-squares procedure to the corresponding linear transform. Calculate Y's corresponding to additional values of X supplied.

XVII General Engineering Programs  (DECUS NO. 10-100A)

SCVSIZ - Calculate Steam Valve Coefficients and Rangeability

PURPOSE
To calculate steam control valve coefficients and the required valve rangeability.

LEVSIZ - Calculate Liquid Valve Coefficients and Required Rangeability

PURPOSE
To calculate liquid valve coefficients and the required valve rangeability.

GCVSIZ - Calculate Gas and Vapor Control Valve Coefficients/Rangeability

PURPOSE
To calculate gas and vapor (but not steam) control valve coefficients and the required valve rangeability.
LPFILT - Design Low Pass Filters

PURPOSE

To design low pass filters using constant K prototype T section and M derived (M=0.6) termination L sections. Up to nine additional M derived T sections may be included to give high attenuation at specified frequencies in the stop band.

BEMDES - Calculate Recommended Steel Beam

PURPOSE

To recommend the correct steel beam to be used in a number of load and support applications. Available options include:

LOADING (L)
- Uniformly distributed load.
- Concentrated midpoint load.
- Uniformly distributed load and concentrated midpoint load.
- Two symmetric concentrated loads. (quarter pt loading)

SUPPORTS (B)
- Simple supports at both ends.
- Simple support at one end; other end fixed.
- Both ends fixed.
- One end fixed; other end unsupported (Cantilever).

XVIII Business and Financial Programs (DECUS NO. 10-100A)

ANNUIT - Calculate Payment and Withdrawal Annuities

PURPOSE

To perform the calculations necessary for determining both payment and withdrawal annuities.
DISRAT - Calculations on Cash Flows

PURPOSE

To calculate the discounted rate of return (period and continuous), the double-life, and the payback period for a sequence of cash flows.

GROWTH - Calculate Growth Rates

PURPOSE

To calculate growth rates using data representing a number of equispaced periods.

SAVING - Calculate Yield on an Investment

PURPOSE

To calculate the amount of money that would accumulate after N years at an annual interest rate R compounded T times per year, when the initial amount is P and an amount D is added at the beginning of each subsequent year.

TRVINT - Calculate True Annual Interest Rate On An Installment Loan

PURPOSE

To calculate the true annual interest rate charged on an installment loan.

XIX Critical Path Method Program (DECUS NO. 10-100A)

CPM - Checks CPM Network for Network Errors and Analyzes CPM Networks for Project Duration and Cost

PURPOSE

To find the critical path(s) in a network composed of events interconnected by activities, and to compute project duration and total cost. Prior to finding the critical path(s), checks of the network and made for (1) multiple starts, (2) multiple ends, (3) duplicate activities, and (4) illogical loops.
XX    Geometric/Trigometric Programs  (DECUS NO. 10-100A)

CIRCLE - Divide a Circle Into Any Number of Equal Parts

PURPOSE

To divide circles into any number of equal parts, giving the angles in decimal degrees and degrees, minutes, and seconds, and to calculate the horizontal and vertical distances from the center to the point on the circumference.

SPHERE - To Solve Spherical Triangles

PURPOSE

To solve spherical triangles having the apex at the North Pole and the other two corners defined by their respective latitudes and longitudes.

TRIANG - To Find the Unknown Features of Any Triangle

PURPOSE

To find the unknown features of any triangle, given one side and any other two parts.

XXI  Linear Programming  (DECUS NO. 10-100A)

LINPRO - Maximize an Objective Function
    - Two-Phase Method -

PURPOSE

To maximize an objective function using the two-phase method. It automatically supplies slack, surplus, and artificial variables as required for the solution.

XXII  Plotting Programs  (DECUS NO. 10-100A)

CALPLO - To Calculate and/or Plot the Values of a Function of T

PURPOSE

To calculate and/or plot the values of a function of the variable T, for values of T from Tmin to Tmax in steps of TSTEP.
PLOTTO - Plot 1 to 6 Functions of X Simultaneously

PURPOSE
To plot 1 to 6 functions of X simultaneously. All functions have the same upper and lower limits for the plot. The functions are called A, B, C, D, E, F and are plotted in that order of priority. Where plots would overlap, the lower priority functions are suppressed. Values exceeding the selected bounds are disregarded.

XYPLOT - Plot Single-Valued Functions of X

PURPOSE
To plot single-valued functions of X, with X on the vertical axis.

TWOPLTO - Simultaneous Plot of Two Functions

PURPOSE
To plot simultaneously 2 functions of a single variable, X.
SBATCH is a spooling batch supervisor which buffers jobs into disk form from the card reader and places them in a wait queue according to a priority scheme, supervises their execution (several at a time, in parallel) while buffering their printed output to disk, then retrieves and prints the output as the line printer becomes available.
BUSINESS DATA PROCESSING

COB300 (DECUS NO. 10-137)

COB300 is a COBOL program which assists in converting Burroughs 300 Cobol to Digital ANS1 standard COBOL.

Items which cannot be unambiguously converted are flagged for programmer attention.

COBSTD (DECUS NO. 10-143)

This program converts COBOL programs in conventional format to standard format.

COBOL CREF (DECUS NO. 10-123)

Author: George Newton

A cross reference program for COBOL source program. Note: Version 3 or later of the DECSYSTEM-10 COBOL compiler normally produces its own CREF.

FFM-A FORTRAN File Maintenance System (DECUS NO. 10-138)

The System is designed for a computer with a random access storage device (disk or core). The system consists of a set of conventions for file design and a set of FORTRAN subroutines that operate on an arbitrary file. These subroutines do most of the routine jobs necessary to keep data files up to date and to write reports from these files. The subroutines are written in FORTRAN with the exception of the disk input/output routine which is a machine language routine. The system was written at Bowdoin College in FORTRAN II for the IBM 1620 and has been modified and extended in FORTRAN IV for the DEC PDP-10; it defines the data base for their general ledger accounting system and Student Record File System.
CIRCUIT-AIDED DESIGN

WIRE (DECUS No. 6-26)

Richard J. Plano, Rutgers - The State University,
New Brunswick, New Jersey

WIRE is a program designed to help with the tedious and
detailed bookkeeping involved in wiring digital circuits.
It assumes the circuit is known with all module and pin
assignments made. Given this information, it will optimize
the wiring connections in the sense of making the wire lengths
short, bussing where advantageous, and keeping wiring between
rows to a minimum. It assumes 32 modules in a row with 15
possible connections on each (as for Digital Equipment
Corporation Flip Chip modules neglecting pins A, B, C, which
generally carry power and ground).

It can then produce a variety of output including a list of
loops of connected points, a list of busses and grounds, a
wiring list which contains the number of connections on each
pin to which a connection is about to be made, and the length
of wire needed for the connection. A detailed map can also
be printed out showing both ends of each connection as well
as busses, grounds, and module names.

An updating or editing facility is also provided so that
the map and loops can be kept up-to-date as the circuit is
modified or debugged.

The program is written for a PDP-6 computer using the DEC
multiprogramming system. It requires approximately (6+N)
*100 decimal words of core, where N is the number of rows
of modules. The storage is automatically expanded at run
time. Running time for a 20-row circuit, including all print
out and optimizing but no editing, is approximately 20 minutes.

Minimum Hardware: PDP-6, Teletype, DECtape and Line Printer
CIRCUIT AIDED DESIGN

ECAP (DECUS No.10-34)

Stevens Institute of Technology

ECAP is an Electronic Circuit Analysis Program that is available from the teletype terminals or from Batch. ECAP provides for DC, AC and transient analysis; a description of ECAP may be found in "1620 Electronic Circuit Analysis Program User's Manual" (#H20-0170-1).
COMPUTER-ASSISTED INSTRUCTION

LEARNS  (DECUS NO. 10-65)

LEARNS is an interpretive type assembly that will execute one instruction. The op code and AC+E contents are supplied by the user. The AC+E are typed back so he can see exactly how that instruction manipulated the bits. He learns by doing.

Storage Requirement: 2K
Source Language: MACRO-10

SCHOLAR-TEACH  (DECUS NO. 10-6)

SCHOLAR-TEACH is a generalized system for computer-assisted instruction. The system is designed to provide for both the easy on-line construction of lessons on a variety of subjects, and the actual presentation of the completed lessons to students at communications terminals remote from the computer. In comparison to many other systems for computer-assisted instruction, an instructor using "SCHOLAR-TEACH" will spend fewer hours in lesson preparation.

The "SCHOLAR" portion of the system consists of a single generalized program which can summon, read, interpret, and execute coding from any lesson file created by "TEACH" and stored in a "lesson library" on mass storage devices such as the disc or DECTape on the DECSYSTEM-10. "SCHOLAR" presents the lesson on-line to a student at a communications terminal.

Submitted by: The Boeing Company, Aerospace Group,

17 TEACHING PROGRAMS FOR BASIC  (DECUS NO. 10-97)

Submitted by: Bernhard Eiben, DEC
This tape contains seventeen lessons for learning BASIC and writing BASIC programs for the PDP-10
EDITOR

DESCRIPTION

This editor is designed to meet the editing needs of 90-95% of the users of the PDP-10 Time-Sharing System.

The editor is neither fully context-oriented nor fully line-oriented but takes maximum advantage of both approaches. All commands are issued one at a time by the user to perform desired editing functions.

The editor is designed so as not to be dependent in any way on a teletype as the user's console. e.g. - No control characters are used except for carriage return, line-feed, and form-feed; also, commands may be issued in either upper- or lower-case, but text and specific character strings are taken exactly as typed.

The editor is available in two versions.

Brent Byer
LOGOS, Inc.
64 Brington Road
Brookline, Massachusetts
EDITOR

PROCON-10 (DECUS No. 10-7)

Paul R. Condit, Digital Equipment Corporation, Princeton, New Jersey

The PROCON-10 system is a set of programs designed to aid the programmer in the maintenance and alteration of existing programs and to facilitate the preparation of new ones. It also includes a selected group of self-contained device handlers which are useful in debugging more comprehensive handlers.

Minimum Hardware: 16K PDP-10 with KE10 and KT10 options
Source Language: MACRO-10
Available: RIM paper tapes, Source file, DECTape, write-up, listing at a handling charge of $5.00

DECTAPE DDT VERSION 3 (New Version of DECUS No. 6-20)
(DECUS No. 10-8)

Ian Pugsley, Digital Equipment Australia, Pty. Ltd.
South Melbourne, Victoria, Australia

DECTape DDT will read or write unformatted DECTapes (or magtapes or disk files) with minimal processing so that the user can examine, copy, and modify or write any word, words or blocks.

Other Programs Needed: DDT (DEC-10-CDDA) and JOBDAT (DEC-10-SSB1-UA)
Source Language: MACRO-10
Available: ASCII paper tapes, write up which includes listing
EDITOR

ALVINE
An editor for LISP. see LISP 1.6 under Languages.

SCOPE TECO (DECUS NO. 6/10-40)
Richard N. Freedman, Massachusetts Institute of Technology
LNS, Cambridge, Massachusetts

This program is a modification to the standard DEC Program
Library version of TECO, (DEC-10-ETEA-D). It is usable with
the Type 30 Scope.

Minimum Hardware: PDP-6 or PDP-10 with Type 30 Scope

RUNOFF (DECUS NO. 10-85-Obsolete)

This program is now supported by DEC.

QED (DECUS NO. 10-116)

Computer Science Department, University of Utah

Submitted by: Ed Nemeth, DEC, Maynard, Massachusetts

This version of QED, written in TECO, is a line editor modeled
after similarly named editors. The main differences lie in
input/output commands, in control character functions, and in
buffer usage. It was developed and maintained by a student at
the University of Utah. No support will be maintained by the
University.
ENGINEERING

LA PLACE TRANSFORM COMPUTER PROGRAM  (DECUS NO. 6/10-44)

R. Soli, Missile Systems Division, Raytheon Company, Bedford, Massachusetts

This program is intended to be an engineering tool; it is easy to use and plots the result. The program requires a reasonable knowledge of LaPlace or Fourier transforms as well as some ability in block diagram manipulation. A minimum of knowledge is required about FORTRAN IV; all that is needed is the ability to understand a FORTRAN statement such as:

\[ G_1 = \frac{(11*S+1)}{(T2*S+1)} \]

The user describes the various portions of his system using system parameters and S to form transfer functions. Then a block diagram reduction is done to combine the various transfer functions such as:

\[ G_2 = \frac{G_1}{(1+G_1)} \]

The documentation contains figures demonstrating examples of uses of the program.

Minimum Hardware: PDP-10 with card reader and line printer.

Source Language: FORTRAN IV

COGO  (Coordinate Geometry)  (In Process)

COGO is a language to assist civil engineers in doing plane geometry computations that are needed in surveying.

BARTEE  (DECUS NO. 10-90)

BARTEE is a PDP-10 program to perform a minimization of a multiple input/output logic network, according to the method of Bartee, McClusky and Quine. The program will optionally print the table of prime implicants or a coverage table or a possible core selection from the coverage table (or any or all of the tables).
ENGINEERING

MATRIX - (DECUS NO. 10-87)

MATRIX is a system of commands designed to perform all types of matrix mathematics. Since the system was originally designed for structural mechanics applications, some of the operations are peculiar to the discipline. However, MATRIX is by no means restricted in scope: the flexibility of the commands allow from simple matrix operations to easily obtained solutions to eigenvalue problems and differential equations in many other disciplines. The current version of MATRIX is designed to handle real matrices only.

MATRIX is an interactive time-sharing version of SMIS (Symbolic Matrix Interpretive System), originally developed at the University of California at Berkeley and substantially expanded by Professor Billy J. Hartz and his graduate staff at the University of Washington, Department of Civil Engineering.
GAMES AND DEMOS

BASIC Game Package (DECUS NO. 10-96)

Dartmouth BASIC Library
Submitted by: Bernhard Eiben, DEC

This tape contains several games, in BASIC, for use on the PDP-10. Among the games are: Baseball, Horserace, Roulette, Basketball, Bridge, Football and several others.

CHESS - (DECUS NO. 10-110)

The CHESS program (MACHACK) runs under control of the DEC time-sharing monitor for the PDP-6/10.

DEMOS (DECUS NO. 10-74)

Dartmouth BASIC Library
Submitted by: Bernhard Eiben, DEC

A combination of nineteen games and demonstrations, both frivolous and serious, including such subjects as a Christmas sing-a-long, a baseball game, a program for computing the life of a home mortgage and true interest rates from installment payments.

DOCTOR and ELIZA (DECUS NO. 10-105)

Computer programs capable of conversing in natural language.
DOCTOR is a particular member of a family of programs known as ELIZA. DOCTOR causes ELIZA to respond roughly as would certain psychotherapists. ELIZA performs best when its human correspondent is initially instructed to "talk" to it, via the teletype, of course, just as one would to a psychiatrist. Requires LISP 1.6 for compilation.

THE DOTS PLAYING PROGRAM (DECUS NO. 6-14)


The Dots Playing Program allows the PDP-6/10 computer to play the game of dots against a human opponent. This program illustrates the strengths and weaknesses of tree-searching methods and the methods of eliminating branches from the tree.

FISHER (DECUS NO. 10-34)

FISHER calculates the probability of a set of scores being obtained
by chance according to the Fisher method of Randomization. It
prints the probability, as well as all combinations as extreme
as the data, and a frequency distribution of their sums. By
inputting data in descending order, it will provide all possible
combinations of any N numbers taken R at a time in a systematic
order, with sums and frequency distribution of those sums. This
latter characteristic makes it a useful teaching tool in non-
parametric statistics courses.

Source Language: BASIC

HELP (DECUS NO. 10-95)

D. H. Edvi-illes, Aeronautical Research Laboratories
Melbourne, Australia

Submitted by: Ian Pugsley, Digital Equipment Australia, Pty.,
Ltd., South Melbourne, Victoria, Australia

When the user gives the "HELP" or "HELP PROG" monitor command, the
program determines the users status (logged in?) and proceeds to
type operating instruction, etc. for the appropriate requirement.

Source Language: MACRO-10

JOTTO (DECUS NO. 10-89)

This program allows the user to play a word game with the computer.
A three letter word is chosen from a file of 100 randomly. By
using probe words the user must guess the three letter word.

MATTAC Matrix Tic-Tac-Toe (DECUS NO. 10-114)

Matrix Tic-Tac-Toe is played on a ten by ten matrix in a manner
similar to ordinary Tic-Tac-Toe. The player and the computer will
alternately place a move at one of the matrix coordinates. Each
will try to place five moves in a row to effect a win. The player
will always be given the first move. This forces the computer to
play defensively and gives the player a reasonable probability of
winning. There are 190 possible win combinations using the ten
by ten matrix as a playing board.

Optional player moves will allow the player to terminate the game,
restart the game, or have the current board status typed on his
terminal. The player can also, at his option, have a list of the
accepted moves and/or instructions typed on his terminal at run
time.
GAMES AND DEMOS

Storage Requirement: 1K

Restrictions: Output is device dependent; uses TTCALL UVO's for all I/O

Source Language: MACRO-10

MUSIC SYSTEM (DECUS NO. 10-9)

This program is a complete music-compiling and playing system for the PDP-10. Music is compiled under the time-sharing system and played in the executive mode. An initial library, mostly Bach and Beatles, is supplied to which users are encouraged to submit additions.

The music is played by turning the six low-order bits of the MI on and off at an audio rate. This information must be tapped off and fed to an audio amplifier, in order to be heard.

A simple scheme for doing this, the MK10 which involves only plugging a module extender in series with the lamp-driver card behind the PDP-10 console, is included in the write-up.

(NOTE: For, quick and dirty listening, placing a transistor radio near the MI or near Bay 2 of the KA10 will produce the music, but hardly in Hi Fi.)

Using the MK10, each of the six lamp drivers now feeds two volume controls in addition to the lamps. This load is easily within the ratings of the lamp drivers. The volume controls adjust how much signal from each lamp is sent to each of two stereo output connectors. The signals are filtered slightly by capacitors to dull the raspy quality of the square waves produced by the lamp drivers.

By cutting the circuit in half, a simpler, monophonic MK10 could be built. By adding switched capacitors, or R-L-C networks, more variety in the sound of the voices can be obtained.

The output of the MK10 shown is suitable for the "TUNER" or "TAPE AMP" inputs of the usual Hi Fi amplifiers.

PDP-10 Demonstration Package (DECUS NO. 10-136)


This package of seven programs and related data files demonstrates the PDP-10 system with games, plots and visual displays. The programs were written by Seattle area high school and college students.

Source Language: BASIC, MACRO-10, FORTRAN IV
GRAPHICS

VB10 Display Package  (DECUS NO. 10-24)

The VB10 graphics terminal is a highly interactive display system for DECsystem-10. The VB10 system was designed to allow complete user freedom and flexibility under normal DECsystem-10 timesharing. The basic hardware system consists of a precision display connected directly to DECsystem-10 memory through a special memory channel. Several important features included in the VB10 display are memory protection and relocation, slave mode operation, master mode, and subroutining. To allow complete user-display interaction, the VB10 graphics terminal has a function box, light pen and a Rand Tablet as options.

The VB10 software package contains all of the basic routines for displaying vectors, points, and text, and for controlling the scale and intensity of the picture. The user can define his own number space or sets of number spaces and the viewports on the display where the pictures are to be displayed. Pictures can be generated as a set of subpictures or nested subpictures. Any part of a picture which falls outside of the user's number space or window will not be displayed. Subpictures and pictures can be blanked from the display and unblanked at a later time. Core space used by a picture can be released and reused for generating new pictures. The VB10 package also contains all of the routines necessary to create three-dimensional pictures. The user can rotate the picture by changing the pitch, yaw, and roll coefficients of the picture of zoom-in or back off from a picture by changing the viewpoint value. All of the routines are accessible through a high level language such as FORTRAN or LISP.

The VB10 graphics terminal provides several levels of user interaction. Simple data inputs can be entered through the function box or the teletype. The identification of lines or points within a picture can be accomplished with the light pen. However, the most important interactive feature of the VB10 terminal is that a user can input graphical data through the Rand Tablet.

Submitted by: National Institute of Health
GRAPHICS

DISSUBS (DECUS No. 6-18)

M. J. Erickson, The University of Western Australia
Computing Centre, Nedlands, Western Australia

DISSUBS is a group of subroutines which allows easy access to
the display and light pen from a FORTRAN IV program.

The following subroutines are available:

- INTAB(A,L)
- POINT(A,X,Y)
- LINE(A,X1,Y1,X2,Y2)
- VECINT(A,X1,Y1,X2,Y2)
- CHAR(A,B)
- SPOT(A,X,Y)
- FLOTE(A,Z)
- GFLOTE(A,Z,K,L)
- OFIX(A,K)
- DISPLY(K,A,B,C,...)
- LITEPN(L,X,Y)

To estimate the size required for an array in general, a
point requires a full 36-bit word; a line whose length is
equal to one-tenth of the screen width requires 18 bits; and
each character requires 6 bits. The subroutines themselves
require less than 1K.

Source Language: MACRO-6

1KCIOLK (DECUS No. 6-25)

R. L. Macmillan, The University of Western Australia
Computing Centre, Nedlands, Western Australia

This is a demonstration program in which the date and time
are converted from their number form into a clock face on
the display. Display routines used are taken directly from
DISSUBS, (DECUS No. 6-18)

Minimum Hardware: Power line frequency must be 50 CPS.
Storage Requirement: 1K core
Source Lanaguage: MACRO-6
Other Programs Needed: DISSUBS(DECUS No. 6-18)
GRAPHICS

DISDAT (DECUS NO. 6-32)

C. B. Horan, The University of Western Australia Computing Centre, Nedlands, Western Australia

This program calls DISUBS (DECUS NO. 6-18) to display data at current display position. Display parameters must be set by calling the program.

Source Language: MACRO

Other Programs Needed: DISUBS (DECUS NO. 6-18)

LDS-1 DISPLAY SERVICE - (DECUS NO. 10-94)

AUTHOR: Peter Hurley, DEC

Display service routines to add LDS-1 to 4872 monitor. Used at 1970 SJCC.

ALPHAS (DECUS NO. 6-1)

Richard Gruen, Digital Equipment Corporation
Palo Alto, California

ALPHAS contains a set of frequently used ASCII characters (letters, numbers, and a few other characters) for use with the 340 Display. Included also is a small driver program illustrating use of the display in time sharing.
LANGUAGES

ALGOLW-SYNTAX-META2 (DECUS NO. 10-133ABC)

This is a set of three routines, each its own programming language, written for use on the PDP-10.

ALGOLW is the W subset of ALGOL.

SYNTAX is used to analyze the grammar of a language and determine if it is a simple precedence grammar. It lists the production and the symbols of the grammar. It then lists any identical right parts and any symbol pairs with more than one relation. It then lists the precedence matrix and produces a binary copy.

META2 is a compiler writer. ALGOLW was written with it.

BLISS (DECUS NO. 10-118)

BLISS is a language specifically designed for writing software systems such as compilers and operating systems for the DECsystem-10. While much of the language is relatively "machine independent" and could be implemented on another machine, the 10 was always present in our minds during the design, and as a result BLISS can be implemented very efficiently on the 10. This is probably not true for other machines.

We refer to BLISS as an "implementation language". To us the phrase connotes a higher level language suitable for writing production software; a truly successful implementation language need not be machine independent--in fact, for reasons of efficiency, it is unlikely to be.

Many reasons have been advanced for the use of a higher level language for implementing software. One of the most often mentioned is that of speeding up its production. This will undoubtedly occur, but it is one of the less important benefits, except insofar as it permits fewer, and better programmers to be used. Far more important, we believe, are the benefits of documentation, clarity, correctness and modifiability. These were the most important goals in the design of BLISS.

Submitted by: Carnegie-Mellon University/DEC

There are two parts to the documentation:

Volume II: Collected readings.
LANGUAGES

FAIL (DECUS NO. 10-15)

FAIL is a fast one-pass assembler for the DECsystem-10 (MACRO-10 is two pass). Block structured symbol organization is used.

Submitted by: Stanford Artificial Intelligence Laboratory

FORTTRAN (DECUS NO. 10-48)

The language specification (syntax) for the FORTTRAN-70 project is available. Write up only.

GIST (DECUS NO. 6/10-39)

Don A. Witcraft, DEC, Maynard, Massachusetts

GIST (General Interpretive String Translator) for the PDP-6/10 contains the 1964 version of TRAC*, variable precision JOSS** type arithmetic primatives, ASCII file primatives, and primatives to interface with the PDP-6 time-sharing system. Complete documentation is contained in the source file.

* TRAC is a registered trademark of the Rockford Research Institute.

** JOSS is a registered trademark of the RAND Corporation.

Minimum Hardware: PDP-6 or PDP-10

JOVIAL '70 (Available late '72)

JOVIAL '70 (a greatly extended J3) is to be developed as a compiler that will facilitate the development of system-level and applications software in support of research activities of the center for computer-based behavioral studies located at UCLA. JOVIAL '70 is to be a reentrant compiler, on-line, time-shared system that will produce reentrant code and that will operate under the time-sharing monitor.

LISP 1.6 (DECUS NO. 6/10-38A)

LISP is a general-purpose programming language which utilizes a list-structure storage scheme for both program and data. It is primarily suited for manipulation of symbolic quantities, although it offers arbitrary precision arithmetic as well. LISP functions may be recursive.

LISP is used effectively for arithmetic simplification and for
symbolic differentiation and integration. It has been used extensively for studies in artificial intelligence, man-machine communication, and solution of game-playing problems.

On DECsystem-10 the LISP interpreter and compiler run under control of the system Monitor. They include device-independent input/output capability, and the ability to process character-by-character input. The system also includes a large set of LISP functions as subroutines. All storage made available to LISP will be used for the data structure.

DECsystem-10 is especially well suited for LISP, due both to their large word size, which is able to store two address links in a single word, and to the push down list-handling instructions.

This package is a current version of LISP 1.6 and includes a LISP-compiler and editing subsystem. Compiled functions are approximately ten times as fast as interpreted functions. FORTRAN and MACRO programs may be interfaced with LISP and CRT routines are also available.

Submitted by: Stanford Artificial Intelligence Laboratory
Stanford University

MLISP (DECUS NO. 6/10-38B)

MLISP is a LISP pre-processor designed to facilitate the writing, use, and understanding of LISP programs. This is accomplished through parentheses reduction, comments, introduction of a more visual flow of control with block structure and mnemonic key words, and language redundancy. In addition, some "meta-constructs" are introduced to increase the power of the language.

Storage Requirement: 25K core minimum
Execution Time: Translates 3000-5000 lines per minute
Source Language: LISP 1.6

MACRO7 - (DECUS NO. 10-40)

Submitted by Robert S. Hallis - University of Pittsburgh
A PDP-7 assembler for the PDP-10.

PALX-11 (DECUS NO. 10-31)

The PALX-11 Assembler can be used to assemble PDP-11 source programs
on DECSYSTEM-10 timesharing systems. It provides the user with the power of a disk-based system for assembly of programs. These may then be run under SIM-11 (the PDP-11 simulator for the DECSYSTEM-10) or punched on paper tape and run on a PDP-11.

PALX-11 will assemble PDP-11 code on any PDP-6 or DECSYSTEM-10 based system. Any hardware options handled by the monitor may be used.

The source code for PALX-11 may come from any input device other than the papertape reader. All papertapes must be transferred to some other device such as disk or DECTape before the assembly is performed.

Submitted by: DEC

PAL-12 (DECUS NO. 10-68)

PAL-12 is a program written for the DECSYSTEM-10 which allows a user to assemble programs written in LAP6-DIAL code (commonly called DIAL or DIAL-V2). The extreme differences in assembly times (due to the speed and size of the -10) greatly increase the ease and speed in which programs are prepared for the PDP-12.

Submitted by: DEC

PDP-8 ASSEMBLER FOR PDP-6 (DECUS NO. 6/8-12)

Henry Burkhardt, DEC, Maynard, Massachusetts

Assembles PDP-8 program written in PAL on a PDP-6.

SAIL (DECUS NO. 10-86)

SAIL is a high-level programming system for the DECSYSTEM-10 computer. It includes an extended ALGOL compiler and a companion set of execution-time routines. A non-standard ALGOL 60 compiler is extended to provide facilities for describing manipulations of an associative data structure. This structure contains information about ITEMS, stored as unordered collections of items (sets) or as ordered triples of items (associations). The algebraic capabilities of the language are linked to the associative capabilities by means of the DATUM operator, which can associate with any ITEM an algebraic datum.

Submitted by: Stanford Artificial Intelligence Laboratory

Documentation: Reference manual. 245 pages including many programming examples.
SNOBOL (DECUS NO. 10-104)

The DECSYSTEM-10 version of SNOBOL4 is almost wholly compatible with the Bell Telephone Laboratories version running on other systems. Minor changes were required because of slightly different character sets and operating systems. In addition, several modifications were made to take advantage of the DECSYSTEM-10 timesharing features.

The basic element of SNOBOL4 is a string of characters. The language has facilities for joining and separating strings, for testing their contents, and for making replacements in them.

SNOBOL4 provides numerical capabilities with both real and integer numbers. However, the arithmetical facilities are not extensive since the language is essentially character oriented.

Requires at least 35K of user core.

Submitted by: DEC
MATHEMATICAL & STATISTICAL

FORTRAN SCIENTIFIC SUBROUTINE PACKAGE (DECUS No. 10-35)

FORTRAN scientific subroutine package is a collection of input/output free computational building blocks that can be combined with a user's input, output or computational routines to meet his need. All routines are accessible by simple FORTRAN CALL statements and are treated as standard FORTRAN subroutines.

STATISTICS - GROUP I (STAT I)

Data Screening

TALLY - Totals, means, standard deviations, minimums, and maximums
BOUND - Selection of observations within bounds
SUBST - Subset selection from observation matrix
ABSNT - Detection of missing data
TAB1 - Tabulation of data (1 variable)
TAB2 - Tabulation of data (2 variables)
SUBMX - Building of subset matrix

Correlation and Regression

CORRE - Means, standard deviations, and correlations
MISR - Means, standard deviations, third and fourth moments. Correlations, simple regression coefficients and their standard errors; considers that data may be missing.
ORDER - Rearrangement of intercorrelations
MULTR - Multiple linear regression
GDATA - Data matrix generation for polynomial regression
STPRG - Stepwise multiple linear regression
PROBT - Probit analysis
CANOR - Canonical correlation

Design Analysis

AVDAT - Data storage allocation
AVCAL - Σ and Δ operation
MEANQ - Mean square operation

Discriminant Analysis

DMATX - Means and dispersion matrix
DISCR - Discriminant functions

Factor Analysis

TRACE - Cumulative percentage of eigenvalues
LOAD - Factor loading
VARMX - Varimax rotation
MATHEMATICAL & STATISTICAL

MATHEMATICS - GROUP I (MAT I) Continued

Matrices: Operations

GMADD - Add two general matrices
GMSUB - Subtract two general matrices
GMPRD - Product of two general matrices
GMTRA - Transpose of a general matrix
GTPRD - Transpose product of two general matrices
MADD - Add two matrices
MSUB - Subtract two matrices
MPRD - Matrix product (row into column)
MTRA - Transpose a matrix
TPRD - Transpose product
MATP - Transpose product of matrix by itself
SADD - Add scalar to matrix
SSUB - Subtract scalar from a matrix
 SMPY - Matrix multiplied by a scalar
SDIV - Matrix divided by a scalar
SCLA - Matrix clear and add scalar
DCLA - Replace diagonal with scalar
RADD - Add row of one matrix to row of another matrix
CADD - Add column of one matrix to column of another matrix
SRMA - Scalar multiply row and add to another row
SCMA - Scalar multiply column and add to another column
RINT - Interchange two rows
CINT - Interchange two columns
RSUM - Sum the rows of a matrix
CSUM - Sum the columns of a matrix
RTAB - Tabulate the rows of a matrix
CTAB - Tabulate the columns of a matrix
RSRT - Sort matrix rows
CSRT - Sort matrix columns
RCUT - Partition by row
CCUT - Partition by column
RTIE - Adjoin two matrices by row
CTIE - Adjoin two matrices by column
MPRC - Permute rows or columns
DMPRC - Matrix transformation by a function
MFUN - Reciprocal function of MFUN
MATHMATICA L & STATISTICAL

NONLINEAR EQUATIONS - GROUP I (NON-LIN I)

Roots
RTWI, DRTWI - Refine estimate of root by Wegstein's iteration
RTMI, DRTMI - Determine root within a range by Mueller's iteration
RTNI, DRTNI - Refine estimate of root by Newton's iteration

Extremum of Functions
FMFP, DFMFP - Unconstrained minimum of a function of several variables - Davidon method
FMCG, DFMCG - Unconstrained minimum of a function of several variables - conjugate gradient method

Permutations
PPRCN - Composition of permutations
PERM - Operations with permutations and transpositions

Sequences
TEAS, DTEAS - Limit of a given sequence
TEUL, DTEUL - Sum of a given function sequence
MATHMATICAL & STATISTICAL

INTERPOLATION, APPROXIMATION, SMOOTHING - GROUP I (INTERP I)

ALI, DALI - Aitken-Lagrange interpolation
AHI, DAHI - Aitken-Hermite interpolation
ACFL, DACFI - Continued fraction interpolation
ATSG, DATSG - Table selection out of a general table
ATSM, DATSM - Table selection out of a monotonic table
ATSE, DATSE - Table selection out of an equidistant table
SG13, DSG13 - Local least-squares smoothing of tabulated functions
SE13, DSE13 - Local least-squares smoothing of equidistantly tabulated functions
SE15, DSE15 - Local least-squares smoothing of equidistantly tabulated functions
SE35, DSE35 - Local least-squares smoothing of equidistantly tabulated functions
APFS, DAPFS - Solve normal equations for least-squares fit
APCH, DAPCH - Least-squares polynomial approximation
ARAT, DARAT - Rational least-squares approximation
FRAT, DFRAT - Used by ARAT, DARAT
APLL, DAPLL - Linear least-squares approximation
FORIF - Fourier analysis of a given function
FORIT - Fourier analysis of a tabulated function
HARM, DHARM - Complex three-dimensional analysis
RHARM, DRHARM - Real one-dimensional analysis
APMM, DAPMM - Linear Chebyshev approximation over a discrete range
NUMERICAL QUADRATURE

QTFG, DQTFG - Integration of monotonically tabulated function by trapezoidal rule
QTFE, DQTFE - Integration of equidistantly tabulated function by trapezoidal rule
QSF, DQSF - Integration of equidistantly tabulated function Simpson's rule
QHFG, DQHFG - Integration of monotonically tabulated function with first derivative by Hermitian formula of first order
QHFE, DQHFE - Integration of equidistantly tabulated function with first derivative by Hermitian formula of first order
QHSG, DQHSG - Integration of monotonically tabulated function with first and second derivatives by Hermitian formula of first order
QHSE, DQHSE - Integration of equidistantly tabulated function with first and second derivatives by Hermitian formula of second order
QATR, DQATR - Integration of a given function by trapezoidal rule together with Romberg's extrapolation method

QG2-QG10 } - Integration of a given function by Gaussian quadrature formulas
DQG4-DQG32 } - Integration of a given function by Gaussian-Laguerre quadrature formulas
QL2-QL10 } - Integration of a given function by Gaussian-Laguerre quadrature formulas
DQL4-DQL16 } - Integration of a given function by Gaussian-Laguerre quadrature formulas
QH2-QH10 } - Integration of a given function by Gaussian-Hermite quadrature formulas
DQH8-DQH32 } - Integration of a given function by associated Gaussian-Laguerre quadrature formulas
DQA4-DQA16 }
MATHMATICAL & STATISTICAL

DIFFERENTIAL EQUATIONS (DIFF EQ)

Numerical Differentiation
DGT3, DDGT3 - Differentiation of a tabulated function by parabolic interpolation
DET3, DDET3 - Differentiation of an equidistantly tabulated function
DET5, DDET5 - Differentiation of an equidistantly tabulated function
DCAR, DDCAR - Derivative of a function at the center of an interval
DBAR, DDBAR - Derivative of a function at the border of an interval

Ordinary Differential Equations
RK1 - Solution of first-order differential equation by Runge-Kutta method
RK2 - Tabulated solution of first-order differential equation by Runge-Kutta method
RKGS - Solution of system of first-order ordinary differential equations with given initial values by the Runge-Kutta method.
DRKGS - Ordinary differential equations with given initial values by Hamming's modified predictor-corrector method.
HPCG - Solution of general system of first-order differential equations with linear boundary conditions by method of adjoint equations.
DHPCG - Solution of linear system of first-order ordinary differential equations with given initial values by Hamming's modified predictor-corrector method.

SPECIAL FUNCTIONS (SPEC FNS)
GAMMA - Gamma function
BESJ - J Bessel function
EXPI - Exponential integral
SICI - Sine cosine integral
CS - Fresnel integrals
CEL1, DCEL1 - Complete elliptic integral of the first kind
CEL2, DCEL2 - Complete elliptic integral of the second kind
ELI1, DELI1 - Generalized elliptic integral of the first kind
ELI2, DELI2 - Generalized elliptic integral of the second kind
JELF, DJELF - Jacobian elliptic functions
MATHEMATICAL & STATISTICAL

STATISTICS - GROUP II (STAT II)

Time Series
AUTO - Autocovariances
CROSS - Crosscovariances
SMO - Application of filter coefficients (weights)
EXSMO - Triple exponential smoothing

Nonparametric Statistics
KOLMO - Kolmogorov-Smirnov one-sample test
KOLM2 - Kolmogorov-Smirnov two-sample test
SMIRN - Kolmogorov-Smirnov limiting distribution values
CHISQ - X² test for contingency tables
KRANK - Kendall rank correlation
MPAIR - Wilcoxon's signed ranks test
QTEST - Cochran Q-test
RANK - Rank observations
SIGNT - Sign test
SRANK - Spearman rank correlation
TIE - Calculation of ties in ranked observations
TWOAV - Friedman two-way analysis of variance statistic
UTEST - Mann-Whitney U-test
WTEST - Kendall coefficient of concordance

STATISTICS - GROUP III (STAT III)

Generation of Random Variates - Distribution Functions
RANDU - Uniform random variates
GAUSS - Normal deviates
NDTR - Normal distribution function
BDTR - Beta distribution function
CDTR - X² distribution function
NDTRI - Inverse of normal distribution function

Elementary Statistics and Miscellany
MOMEN - First four moments
TTEST - Test on population means
BISER - Biserial correlation coefficient
PHI - Phi coefficient
POINT - Point-biserial correlation coefficient
TETRA - Tetrachoric correlation coefficient
SRATE - Survival rates
MATHEMATICAL & STATISTICAL

POLYNOMIALS - GROUP I (POLY I)

Operations

PADD  - Add two polynomials
PSUB  - Subtract one polynomial from another
PCLA  - Replace one polynomial by another
PADDM - Multiply polynomial by constant and add to another polynomial
PMPY  - Multiply two polynomials
PDIV  - Divide one polynomial by another
PVVAL - Value of a polynomial
PVSUB - Substitute variable of polynomial by another polynomial
PILD  - Evaluate polynomial and its first derivative
PDER  - Derivative of a polynomial
PINT  - Integral of a polynomial
PQSD  - Quadratic synthetic division of a polynomial
PCLD  - Complete linear synthetic division
PGCD  - Greatest common divisor of two polynomials
PNORM - Normalize coefficient vector of polynomial
PECN  - Economization of a polynomial for symmetric range
DPECN - Economization of a polynomial for unsymmetric range
PECS  -
DPECS -

Roots

POLRT - Real and complex roots of a real polynomial
PRQD  - Roots of a real polynomial by QD algorithm/displacement
DPRQD -
PRBM  - Roots of a real polynomial by Bairstow's algorithm
DPRBM -
PQFB  - Determine a quadratic factor of a real polynomial
DPQFB -
MATHEMATICAL & STATISTICAL

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CROSS - Crosscovariances
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PRQD  - Roots of a real polynomial by QD algorithm/displacement
DPRQD - Roots of a real polynomial by QD algorithm/displacement
PRBM  - Roots of a real polynomial by Bairstow's algorithm
DPRBM - Roots of a real polynomial by Bairstow's algorithm
PFQB  - Determine a quadratic factor of a real polynomial
DPFQB - Determine a quadratic factor of a real polynomial
POLYNOMIALS - GROUP II (POLY II)

Special Types
CNP, DCNP - Value of \( N^{th} \) Chebyshev polynomial
CNPS, DCNPS- Value of series expansion in Chebyshev polynomials
TCNP, DTCNP- Transform series expansion in Chebyshev polynomials to a polynomial
CSP, DCSP - Value of \( N^{th} \) shifted Chebyshev polynomial
CSPS, DCSPS- Value of series expansion in shifted Chebyshev polynomials
TCSP, DTCSP- Transform series expansion in shifted Chebyshev polynomials to a polynomial
HEP, DHEP - Value of Hermite polynomial
HEPS, DHEPS- Value of series expansion in Hermite polynomials
THEP, DTHEP- Transform series expansion in Hermite polynomials to a polynomial
LAP, DLAP - Value of Laguerre polynomial
LAPS, DLAPS- Value of series expansion in Laguerre polynomials
TLAP, DTLAP- Transform series expansion in Laguerre polynomials to a polynomial
LEP, DLEP - Value of Legendre polynomial
LEPS, DLEPS- Value of series expansion in Legendre polynomials
TLEP, DLEPA- Transform a series expansion in Legendre polynomials to a polynomial

MATHEMATICS - GROUP I (MAT I)

Matrices: Storage
MCPY - Matrix copy
RCPY - Copy row of matrix into vector
CCPY - Copy column of matrix into vector
DCPY - Copy diagonal of matrix into vector
XCPY - Copy submatrix from given matrix
MSTR - Storage conversion
LOC - Location in compressed-stored matrix
CONVT - Single-precision/double-precision conversion
ARRAY - Vector storage/double-dimensioned storage conversion
MATHEMATICAL & STATISTICAL

STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES (SPSS) (DECUS NO. 10-35)

The Statistical Package for the Social Sciences (SPSS) is an integrated system of computer programs for the analysis of social science data. The system has been designed to provide the social scientist with a unified and comprehensive package enabling him to perform many different types of data analysis in a simple and convenient manner. SPSS allows a great deal of flexibility in the format of data. It provides the user with a comprehensive set of procedures for data transformation and file manipulation, and it offers the researcher a large number of statistical routines commonly used in the social sciences. In addition to the usual descriptive statistics, simple frequency distributions, and cross tabulations, SPSS contains procedures for simple correlation (for both ordinal and interval data), partial correlation, multiple regression, factor analysis and Guttman scaling. The data-management facilities can be used to modify a file of data permanently and can also be used in conjunction with any of the statistical procedures. These facilities enable the user to generate variable transformations, to recode variables sample select, or weight specified cases, and to add to or alter the data or the file-defining information. SPSS enables the social scientist to perform his analysis through the use of natural-language control statements and requires no programming experience on the part of the user.

The distribution of SPSS is limited to universities and non-profit organizations only. Any other organization wishing to receive a copy of SPSS should contact:

Patrick Bova
National Opinion Research Center
University of Chicago
6030 South Ellis Avenue
Chicago, Illinois 60637

DECUS must receive a letter from Mr. Bova authorizing the distribution of SPSS to that customer. DECUS also requires that all parties receiving SPSS must sign a standard non-disclosure agreement to prevent the passing of SPSS to other unauthorized DECsystem-10 customers.

SERG: An Interactive Program to Perform Simple Regression Analysis (DECUS NO. 10-2)

Ross T. Newkirk, Computing Centre, University of Western Ontario, London, Ontario, Canada
MATHMATICAL & STATISTICAL

SERG uses the least squares method to fit a regression equation to a dataset of up to 100 pairs of data entries. Input listings and editing features are provided. The output is as follows: sample size, input data typed in "normalized form" (optional), sums for each of the two variables, sums of squares for each of the two variables, cross product of the two variables, means for each of the two variables, variances for each of the two variables, correlation between the first and second variable, regression equation relating the second variable to the first, table of residuals (optional), and standard error of residuals.

Minimum Hardware: PDP-10 Teletype

Source Language: FORTRAN IV

Restrictions: Any Teletype input is valid except Z which terminates the program. The program is entirely interactive and instructions for its use are typed as required.

LININV (DECUS NO. 6-9)

D.W.G. Moore, The University of Western Australia Computing Centre, Nedlands, Western Australia

LININV is a matrix inversion and/or linear equation solver. All I/O is from the user’s teletype.

MATHLAB (DECUS NO. 10-142)

SEE DESCRIPTION UNDER PHYSICS.

FIT (DECUS NO. 6-17)

C. L. Jarvis and D. G. Moore, The University of Western Australia Computing Centre, Nedlands, W. Australia

This subroutine has the following calling sequences: CALL FIT (XX,YY,K,A,SMR,L,M,DELTA). XX and YY are the observation arrays, K is the number of observations, A returns with Chebyshev coefficients, SMR returns with mean square residuals, L=order required, DELTA returns with the sum of squares of the residuals and M is the switch which is initially set to 1. If the fit of order L+1 is required, then if M is set to a value 1 and L incremented. Less computation is required when the subprogram is reentered.

Source Language: FORTRAN IV
MXNOUT (DECUS NO. 6-19)

D.W.G. Moore, The University of Western Australia Computing Centre, Nedlands, Western Australia

MXNOUT, a FORTRAN IV subroutine, will output an MXN matrix suitably partitioned for a 120-column printer.

Source Language: FORTRAN IV
MATHEMATICAL & STATISTICAL

REDUCE (DECUS No. 10-214)

SEE DETAILS IN PHYSICS

JACOBI (DECUS No. 10-22)

Author: Todd Wagner

Submitted by: William Merserve, Digital Equipment Corporation, West Los Angeles, California

JACOBI will diagonalize a real symmetric matrix of up to 60 x 60.

Source Language: MACRO-10

Available: ASXII paper tapes, write-up which includes listing.
MATHMATICAL & STATISTICAL

TSUM, DERIV and CONPOL (DECUS No.6-23)

Mr. Boundy, C. L. Jarvis, and D. W. G. Moore - The University of Western Australia, Nedlands, Western Australia

Chebyshev polynomial subroutines:

TSUM
This function evaluates -

\[ A(1)/2 + A(2)T(1) + \ldots + A(N+1)T(N) \]

DERIV
This subroutine calculates the derivative of the polynomial Chebyshev coefficients at a point, i.e. the first derivative of \[ A(1)/2 + A(2)T(1) + \ldots + A(N+1)T(N) = C(1)/2 + C(2)T(1) + \ldots \]

\[ + C(N)T(N-1). \] The C(1)'s overwrite the A(1)'s.

CONPOL
This subroutine converts -

\[ A(1)/2 + A(2)T(1) + \ldots + A(N+1)T(N) \text{ to } C(1) + C(2)X + C(3)X^2 + \ldots + C(N+1)X^N \]

(i.e. the equivalent polynomial)

In all cases, maximum order of polynomial is 25.

CHISQ (DECUS No.6-24)

N. S. Stenhouse, The University of Western Australia Computing Centre, Nedlands, Western Australia

This program calculates chi-squared up to order 6 x 12 on users TTY. Yates corrections are applied for 2 x 2 matrix.

Source Language: FORTRAN IV

Other Programs Needed: STAR (Subroutine)
MATHEMATICAL & STATISTICAL

PDP-15/9 STATISTICS PACKAGE (STATPAC) (In Process)

STATPAC is a FORTRAN coded program used to perform statistical analysis on user supplied data. The descriptive statistics include mean, skewness, kurtosis, maximum, minimum, range, a correlation matrix, stepwise and multiple linear regression.

W-COMPLEX (Complex Error Function for Complex Argument) (DECUS NO.10-33)

Submitted by: Ian Pugsley, Aeronautical Research Laboratories, Australia

This program computes the probability integral (error function) which arises in problems of diffusion, heat flow, and distributed electrical networks. Special cases include Dawson's integral, Fresnel integrals, confluent hypergeometric function, parabolic cyclinder functions and spherical Bessel Functions.

Source: FORTRAN

Other Programs Needed: Standard L1B4 or L1B40

MATRIX - (DECUS NO. 10-87)

MATRIX is a system of commands designed to perform all types of matrix mathematics. Since the system was originally designed for structural mechanics applications, some of the operations are peculiar to the discipline. However, MATRIX is by no means restricted in scope: the flexibility of the commands allow from simple matrix operations to easily obtained solutions to eigenvalue problems and differential equations in many other disciplines. The current version of MATRIX is designed to handle real matrices only.

MATRIX is an interactive time-sharing version of SMIS (Symbolic Matrix Interpretive System), originally developed at the University of California at Berkeley and substantially expanded by Professor Billy J. Hartz and his graduate staff at the University of Washington, Department of Civil Engineering.

MREG - Multiple Regression - (DECUS NO. 10-100A)

PURPOSE

To fit the model

\[ Y - Y = (X_1 - X_1) B_1 + (X_2 - X_2) B_2 + \ldots + (X_m - X_m) B_m \]
MATHMATICAL & STATISTICAL

to a series of $n$ discrete observations where: $X_1 \cdot X_2 \cdot X_3 \cdot \ldots \cdot X_m$ represent the independent variables; $Y$ represents an observed data point; $\bar{X}_1 \cdot \bar{X}_2 \cdot \bar{X}_3 \cdot \ldots \cdot \bar{X}$ represent the mean value of the independent variables; and $\bar{Y}$ represents the mean value of the observed data points.

IRAND - Random Number Generation (DECUS NOS. 10-46, 10-49)

RAND

There are many uses for numbers which appear to be random samples from some particular probability distribution. The most frequent demand is for samples from a uniform (rectangular) distribution or a normal (Gaussian) distribution. Both of these are available from the Library. Other distributions can be generated using these two.

IRAND generates a uniformly distributed integer random number between 0 and $2^{35}$. RAND generates a uniformly distributed real random number between zero and one. They are the same, except for mode.

FORTRAN MATRIX/VECTOR ROUTINES (DECUS NO. 10-100A)

DETEx - Evaluate the Determinant of a Real Matrix

PURPOSE

To evaluate the determinant of a matrix of real elements.

EIG1 - Eigenvalues/Eigenvectors of a Real Symmetric Matrix - Jacobi-Corbato Method

PURPOSE

To find the Eigenvalues and Eigenvectors of a real symmetric matrix by the Jacobi-Corbato method.

EIGSR - Eigenvalues and Eigenvectors of a real symmetric matrix.

PURPOSE

To compute the Eigenvalues and Eigenvectors of a real symmetric matrix.

The maximum-size, real-symmetric matrix that can be accepted by the program is $25 \times 25$. 
MATHEMATICAL & STATISTICAL

MTMPY - Product of Two Matrices

PURPOSE

To evaluate the product of two matrices.

FORIR - Least-Square Estimates of Finite Fourier Series

PURPOSE

To determine the least square estimates of the finite Fourier series model:

\[ Y = \frac{A}{2} + \sum_{j=1}^{M} A \cos (j\theta) + B \sin (j\theta) \]
PHYSICS

MATLAB (DECUS NO. 10-142)

"MATLAB is an on-line system providing machine aid for the mechanical symbolic processes encountered in analysis. It is capable of performing, automatically and symbolically, such common procedures as simplification, substitution, differentiation, polynomial factorization, indefinite integration, direct and inverse Laplace transforms, the solution of linear differential equations with constant coefficients, the solution of simultaneous linear equations, and the inversion of matrices. It also supplies fairly elaborate bookkeeping facilities appropriate to its on-line operation."

-From the Matlab Manual-

It is directly applicable to problems encountered in reliability theory, celestial mechanics, astrophysics, high energy physics and basic engineering and calculus: Therefore, it is an attractive package for universities, and timesharing utilities alike. It is also of interest to computer scientists and mathematicians and can act as a starting point for research into many areas.

The current release consists of a SAV file which is compatible with 5 series monitors, a set of sources for LISP and MATLAB and a users manual.

The full system runs in 59K of user core and makes use of additional core for difficult problems.

NVERTX (DECUS NO. 10-30)

NVERTX is a self-contained easily expanded Monte Carlo program for the study of interactions in high energy physics. The program is capable of generating events and plotting results for a very wide class of reactions, including those governed by LORENTZ invariant phase space, and also those exhibiting residence or other non-trivial matrix elements.

The PDP-8/PDP-10 RT DATA ACQUISITION (DECUS 10-29)

The PDP-8/PDP-10 RT DATA ACQUISITION system connects up to 16 PDP-8's to a PDP-10 using a DA25. The PDP-8 programs can communicate to PDP-10 programs through a software interrupt and priority scheduling network. The PDP-10 programs can read and write PDP-8 core and interrupt the PDP-8 users program.
REDUCE (DECUS NO. 10-21A)

REDUCE is a program designed for general algebraic computations of interest to mathematicians, physicists and engineers.

Its capabilities include:

1) Expansion and ordering of rational functions of polynomials.
2) Symbolic differentiation of rational functions of polynomials and general functions.
3) Substitutions and pattern matching in a wide variety of forms.
4) Calculation of the greatest common divisor of two polynomials.
5) Automatic and user controlled simplification of expressions.
6) Calculations with symbolic matrices.
7) A complete language for symbolic calculations, in which the REDUCE program itself is written.
8) Calculations of interest to high energy physicists including spin ½ and spin 1 algebra.
9) Tensor operations.

TVGP and SQUAW (DECUS NO. 10-66)

TVGP is a three view track reconstruction program used for spatial reconstruction of bubble chamber traces. User dependent subroutines allow for adaption to specific bubble chamber configurations, begins moments, and event topologies.

SQUAW is a kinematic fitting program designed to use TVGP results as input. Kinematic fits to specific event hypotheses are attempted using energy and momentum conservation.

Storage Requirement: 30K of core

Source Language: FORTRAN
CRITICAL PATH SCHEDULING (DECUS No. 6-21)

D.W.G. Moore, The University of Western Australia Computing Centre, Nedlands, Western Australia

This program, written in FORTRAN IV for the PDP-6, computes the earliest starts, latest starts, earliest finishes, latest finishes, total float and free float of jobs constrained by an arrow diagram network. Familiarity with arrow diagramming techniques is assumed.

Output from this program may be used as input to scheduling programs developed for limited resource problems.

Source Language: FORTRAN IV

Other Programs needed: LSH, DATE (Subroutines)

CRITICAL PATH METHOD (DECUS No. 10-100A)

SEE BASIC SECTION.
SIMULATION

CSMP-10 (DECUS NO. 10-122)

Block CSMP is a block oriented continuous dynamic system modeling program for the PDP-9 or DECsystem-10 digital computers. It is upwards compatible in all major aspects to 1130-CSMP, an IBM supported system for the IBM-1130. 1130-CSMP is in turn a modification of the PACTOLUS simulation program for the IBM 1620.

The word "block" is employed in the system title to stress the relationship of the input language to the block diagram representation of dynamic systems. The block diagram approach to the modeling simulation of dynamic systems has a long history of successful employment in analog and hybrid computation. It has also served as the input representation in digital simulation languages such as SCADS which was available on the CMU G-21.

There is another family of languages designed to facilitate the digital simulation of dynamic systems which are classified as "equation oriented". 360-CSMP and CSSL are examples of equation oriented simulation languages. For purposes of interactive simulation and modeling on a small digital computer, however, the block approach of Block CSMP-9 offers distinct advantages.

Source Language: FORTRAN

GASP II (DECUS NO. 10-27)

Author: A. Alan, B. Pritsker and Philip J. Kiviat

Submitted by: Donald R. Mick, Sanders Associates, South Nashua, New Hampshire

GASP II consists of a set of FORTRAN subprograms organized to assist in performing discrete simulation studies.

Reference: "Simulation with GASP-II" by Pritsker and Kiviat.

Source Language: FORTRAN

PDP-8 SIMULATOR ON THE DECsystem-10 (DECUS NO. 6/10-43)

The simulator attempts to duplicate all PDP-8 functions (including 10 device timings) so that the results of starting any program in either the simulator or an actual PDP-8 will be identical.
SIMULATION

To do this we have simulated core which contains PDP-8 12BIT words which are the PDP-8 program. These "PDP-8 words" are then read, decoded, and executed as PDP-8 instructions. Under favourable conditions the simulation proceeds at a rate approximately 1/30 the rate an actual PDP-8 could execute the code.

The following devices may be simulated:

- Console teletype keyboard and teleprinter
- High speed paper tape and punch
- Calcomp Plotter
- DDF 32 (mini) disk

SIM11 (DECUS NO. 10-28)

The PDP-11 simulator for the DECsystem-10 (SIM-11) is designed to allow PDP-11 systems, applications and diagnostics programs to be developed without the aid of a PDP-11 processor. This is of great importance if a processor is not available or if sufficient time is not available on the machine. In addition, the simulator provides on-line debugging aids which may not be available when testing programs on the PDP-11 itself.

The major features and characteristics of SIM-11 are as follows:

a. Written in FORTRAN except for certain small I/O routines and the alphanumeric and report generator package which are written in assembly language.

b. Provides simulation of all PDP-11 instructions.

c. Provides TTY and paper tape I/O capabilities through simulation of the device registers in the external page.

d. Provides an on-line debugging and program correcting facility.

e. Detects errors such as executing undefined OP codes and referencing non-existent memory.

Hardware Requirements:

SIM requires a DECsystem-10 with TTY and paper tape reader/punch, and also requires 15K of user core.

Submitted by: DEC
SIMULATION

SIMPLE (DECUS NO. 10-57)

SIMPLE is a problem oriented simulator of an Analog Computer. The user enters a system description via the terminal, in the form of equations relating the elements of the system.

Source Language: FORTRAN and MACRO-10.
RUNH (DECUS No. 10-145)
This FORTRAN subroutine has been implemented so that programs can transfer control to one another. Programs to be called must be in SAVE format.

RAND: 71 RANDOM BITS (DECUS No. 10-49)
Submitted by: R.S. Tomlinson, BB&N
Generate 71 bits of random number, 72nd bit always one call: JSA 16, Rand

CRAND: COMPLES RANDOM NUMBER (DECUS No. 10-50)
Submitted by: R. S. Tomlinson, BB&N
Complex random number.

RANDOM: REAL NUMBER UNIFORM BETWEEN TWO LIMITS (DECUS No. 10-51)
Submitted by: R.S. Tomlinson, BB&N
Real number uniform between two limits.

GETRAN: GET BOTH HALVES OR RANDOM NUMBER (DECUS No. 10-52)
Submitted by: R.S. Tomlinson, BB&N
This routine gets the origin of the random number sequence and is used in conjunction with SETRAN to allow a "Random" number sequence to be repeated.

DRAND: DOUBLE PRECISION RANDOM NUMBER (DECUS No. 10-53)
Submitted by R.S. Tomlinson, BB&N
Double precision random number.
UTILITIES -FORTRAN

GRAND:  GAUSSIAN RANDOM NUMBER GENERATOR (DECUS NO. 10-54)
Submitted by:  R.S. Tomlinson, BB&N
Gaussian random number generator.

SEC:REAL RESULT OF NUMBER OF SECONDS SINCE MIDNIGHT (DECUS No. 10-62)
Submitted by:  J. Burchfield, BB&N
Real result of number of seconds since midnight.

TIM:  GIVES A REAL RESULT OF TIME OF DAY HHMM (DECUS No. 10-63)
Submitted by:  J. Burchfield, BB&N
Gives a real result of time of day HHMM.

DTE:  REAL RESULT OF DATE IN FORM MMDDYY (DECUS No. 10-64)
Submitted by:  BB&N
Real result of date in form MMDDYY.

TANGENT FUNCTION (DECUS NO. 10-55)
Submitted by:  R.S. Tomlinson, BB&N
This program computes TAN(X) by the simple expedite of Tan (X) = SIN (X)/COT(X)

CONTANGENT FUNCTION (DECUS No. 10-56)
Submitted by:  R.S. Tomlinson, BB&N
This program computes COT(X) by the simple expedite of COT (X) =
COS (X)/SIN(X).
UTILITIES–FORTRAN

DATE (DECUS NO. 6-10)

I. D. Pugsley, The University of Western Australia Computing Centre, Nedlands, Western Australia

DATE returns today's date in form suitable for output from a FORTRAN program.

BELL STAR (DECUS NO. 6-8)

C. B. Horan, The University of Western Australia Computing Centre, Nedlands, Western Australia

BELL STAR consists of two subroutines which operate in DDT submode on the user's teletype. BELL outputs two teletype bells, and STAR outputs a carriage return and an asterisk, thus enabling FORTRAN programs to be written to accept input in the standard CUSP command manner.

IBYTE (DECUS NO. 6-34)

D. W. G. Moore, The University of Western Australia Computing Centre, Nedlands, Western Australia

Byte manipulation routines for FORTRAN IV are routines to allow a FORTRAN IV user to take successive bytes from an array. Up to 5 arrays may be manipulated simultaneously.

Source Language: MACRO-6

PLIST (DECUS NO. 6-33)

R. L. Macmillan, The University of Western Australia Computing Centre, Nedlands, Western Australia

PLIST is a series of subroutines enabling the user to manipulate up to five push-down lists from a FORTRAN IV program.

Arrays must be set up within the user's program in which the push-down lists reside. The size of these arrays can be approximated by using the following:

Each 'PUSH' onto the PDL uses 1 location, but for each 'PUSHJ' called, 17 locations are used.

Source Language: MACRO-6
PACK, UNPACK, REPACK (DECUS NO. 6-37)

D. W. Goodall, The University of Western Australia Computing Centre, Nedlands, Western Australia

These three subroutines, written in MACRO-6 for use in FORTRAN IV programs, enable integer data from a one-dimensional array to be packed in bytes of any chosen size into the successive words in a specified section of a two-dimensional array, and for individual entries to be retrieved or replaced.

RN (DECUS NO. 10-43)
Random Real from 1.0 to 131071

Submitted by J. Burchfield, BB&N

SETRAN (DECUS NO. 10-45)
SET RANDOM NUMBER SEED

Submitted by: R. S. Tomlinson, BB&N

This routine sets the origin of the random number sequence and is used in conjunction with getran to allow a "random" number sequence to be repeated.

IRAND: (DECUS NO. 10-46
INTEGER RANDOM NUMBER

Submitted by: R. S. Tomlinson, BB&N

Get random integer uniformly distributed between two limits.

ARP Alphanumeric & Report Generator Utility Package (DECUS NO. 10-46)

This program comprises a set of 27 subroutines for the following functions: character manipulation, byte manipulation, logical operations on full PDP-6/10 words, conversion from numerical to alphanumeric format, and the reverse, and a printer output report generator.

TRACE (DECUS NO. 10-37)

This provides a batch-oriented object time debugging package for the PDP-6/10. It is designed to serve the same function in the batch mode that DDT serves in the time-sharing mode. It is primarily intended to be run with FORTRAN programs and uses the ARP utility package.
UTILITIES-FORTRAN

CARD (DECUS NO. 6-31)

C. B. Horan, The University of Australia Computing Centre, Nedlands, Western Australia

CARD, a FORTRAN IV function, returns a false answer if either the device with the logical name LPT or the logical name CDR is a DECTape.

It's intended so that a program may request a file name when one of these assignments is made.

Source Language: MACRO-6

MEM2 and MEM4 (DECUS NO. 6-22)

R. H. Smith, The University of Western Australia Computing Centre, Nedlands, Western Australia

This program allows DECTape to be treated as a random access device. Storage on tape is in binary form. The FORTRAN calling program must have the statement - DIMENSION ARRAY (127).

Source Language: MACRO-6

Other Programs Needed: DISUBS (DECUS NO. 6-18)

OPEN (DECUS NO. 10-109)

Robert Hsu, First National City Bank of New York, New York, N. Y.

The routine OPEN should replace IFILE and OFILE routines in LIB-40. It enhances FORTRAN disk file I/O capability.

Storage Requirement: 1668 locations

Source Language: MACRO-10

IFTYP (DECUS NO. 10-117)

Stephen Kidd

Submitted by: Kay Latven, Brookings Institution Washington, D. C.

IFTYP is used in FORTRAN programs to detect, read, and test lines typed at a console while a program is running. When placed in the outer loop of a long program, IFTYP permits a program to be queried
regarding its status, or to dynamically set run-time parameters.

Source Language: MACRO-10

FAKE (DECUS NO. 10-70)

Philip J. Hagan, Nuclear Physics Laboratory, Oxford, England

FAKE is a FORTRAN IV routine which allows a FORTRAN IV user to dimension arrays dynamically, but with some restrictions.

Source Language: MACRO
UTILITIES-DISKS

ALOCSP  (DECUS NO. 10-135)

DESCRIPTION

In order that a user may be guaranteed that his program will successfully have enough space to write his disk file, the user may request that the required space be preallocated prior to running the program. The current allocation CUSP ALCFIL can do this but the user is limited to allocation in contiguous disk space. ALOCSP provides the capability for the user to get his space in fragments if necessary to get his total space requirements.

PURIFY  (DECUS NO. 10-32)

Submitted by:  Ian Pugsley, Aeronautical Research Laboratories, Australia

PURIFY builds a "SAT" table from the disk structure of MFD and UFD's. It then compares the monitor's "SAT" tables with it's own to find "lost" blocks. The "lost" blocks may have occurred because of operator errors or system crashes. PURIFY can then be enabled to over-write the monitor's "SAT" tables with the ones generated by the file searches, and may therefore free up the "lost" blocks.

Minimum Hardware:  PDP-10/6 with RD10 disk

Source:  MACRO

DSKOK  (DECUS NO. 10-91)

Author:  Dr. L. H. Mitchell

DSKOK is a PDP-10 program which may be used by a system manager to quickly determine which job may be responsible for a "disk-full" condition. It prints a summary of the numbers of disk blocks in use by persons currently logged-in.

ONCE ONLY CODE - USER MODE  (DECUS NO. 10-25)


"ONCE" enters into a dialogue with the user and asks if he wants to keep UDDT. It then scans the symbol table giving the user the option to keep the symbols for individual subroutines. It then moves remaining symbols on top of itself, as with Loader 1B.
UTILITIES—MAGTAPE

TRANS (DECUS NO. 10-119)

Patricia Osten, DEC, Maynard, Mass.

TRANS is a program to convert 9-track EPCDIC tapes to PDP-10 ASCII format. Converted files are placed on disk.

Minimum Hardware: PDP-10, 9-track magtape unit, disk
Source Language: MACRO-10

TAPBLK, MAC (DECUS NO. 10-115)

A. J. Copanas, DEC, Maynard, Massachusetts.

The purpose of this program is to read files from magtape that contain non-standard record sizes, and block them into standard size blocks on disk or DECTape. Default filename T00001 is given to first output file; names increase octally (T00002, T00003, etc.). The program will expand itself as needed to read oversize records on the tape.

Minimum Hardware: 1 PDP-10; 1 RP02 Disk (or drum)
1 Magtape Drive (7 or 9 Track)

Storage Requirement: 2K or more, depending on input
Source Language: MACRO-10

FILER (DECUS NO. 6/10-16)

R. N. Freedman, Massachusetts Institute of Technology

This program used magtape as a large random access storage. Under teletype control, it copies specified files from an input device onto magtape and later extracts desired files for further manipulation. The capacity of a magtape is much larger than DECTape, but the access time is still much shorter than card or paper tape files.

Minimum Hardware: PDP-6 or 10 with magtape
Source Language: MACRO-6
Storage Requirement: 2K

Restrictions: The program has been running only on Type 50 tape units, but should work on other units.

IBM 360 TAPE COMPATIBILITY PROGRAMS TCPl, TCP2 (DECUS NO. 6/10-46)

Ewart Davies, DEC, Maynard, Mass.

Two programs, TCPl and TCP2, provide magnetic tape data file compatibility between the IBM 360 and the PDP-6/10. To use these programs a general knowledge of IBM and DEC magnetic tape conventions is assumed. The program runs on the PDP-6/10, expects 9-track tape drives, and uses the unbuffered mode of I/O.
UTILITIES—DECTAPE

LST9: A Program to List PDP-9 DECTapes on a PDP-10 Line Printer (DECUS NO. 6/10-42)

Larry Wade, DEC, Maynard, Massachusetts

Given the command "ASSIGN dev LPT", this program will list the contents of a specified PDP-9 DECTape file on a PDP-10 line printer.

Minimum Hardware: PDP-10 with DECTape and line printer

Source Language: MACRO-10

EIGHT AND EDIT8 (DECUS NO. 10-10)

Author: Teunis Korteweg

Submitted by: Roger Pyle, DEC, Maynard, Massachusetts

EIGHT converts PDP-8 DECTapes to a transfer tape which can then be read on the PDP-10. EDIT8 transfers ASCII files from a transfer tape made with EIGHT to any PDP-10 device.

Minimum Hardware: PDP-10 with 2 DECTapes, and a PDP-8 with 2 DECTapes

Source Language: MACRO-10 and PAL-10

Available: Object and Source files on DECTape, write-up with no listing.

EXCON (DECUS NO. 10-141)

The R EXCON command runs the EXCON cusp which performs file compaction or expansion. The primary purpose of this cusp is to compact all of the files on a DECTape into one big file so that the 22 file capacity restriction for DECTapes is virtually eliminated. All types of files may be compacted including compacted files. Repeated specification of the expand switch will expand all compacted files (which may be nested) down to the original basic files.

DTADIR (DECUS NO. 6-6)

I. D. Pugsley, The University of Western Australia Computing Centre, Nedlands, Western Australia
DTADIR is a 1K program which manipulates DECTape directories.

Its functions are:

- Zero a DECTape directory.
- List a DECTape directory.
- Save a DECTape directory file.
- Get a saved file and write-up as a DECTape directory.

**DTAPIC (DECUS NO. 10-132)**

T. Ashby, British European Airways

Submitted by: W. Meserve, DEC Ltd.

DTAPIC shows which blocks of a DECTape are used for which files. It is useful to indicate when it is worth copying to a fresh DECTape, file by file, to obtain a better block allocation, especially for a non-disk system with DTAO as SYS.

Storage Requirement: 1K

Source Language: MACRO-10

**GOOF. MAC (DECUS NO. 10-112)**

Buren Hoffman


This program can be used to recover a destroyed DECTape. It automatically constructs files from DECTape based only on linkage information. Directory information is ignored. It also produces a cross-reference listing showing origin and member blocks of each file. Incomplete files are also handled. An optional mode of operation allows for manual construction of files, block by block, based on the cross-reference listing.

Storage Requirement: 4K - not reentrant

Source Language: MACRO-10

**CONVRT (DECUS NO. 10-5)**

P. Land and D. Nixon

UTILITIES-DECTAPE

CONVRT takes PDP-6 format DECTapes as input and produces PDP-10 format DECTapes as output and vice versa.

Minimum Hardware: PDP-10
Source Language: MACRO-10
Storage Requirement: 3K
Restriction: Available only on PDP-10 format DECTape

UT6RD (DECUS NO. 10-1)

R. Clements, DEC, Maynard, Mass.

UT6RD is a PDP-10 utility program intended to replace CONVRT in a limited set of cases.

Although it is not as general as CONVRT, it is much faster for those cases it does handle. Its function is to read PDP-6 format DECTapes and put the program onto the disk from tape as individual files.

DNLOTS: Lots of Copies of a DECTape (DECUS NO. 10-3)

Robert Clements, DEC, Maynard, Mass.

This program will rapidly copy and verify a DECTape onto a number of new DECTapes by wasting a lot of disk space as a scratch file.

Minimum Hardware: PDP-10 with Disk, 2 or more DECTapes, and line printer (optional)
Source Language: MACRO-10
Storage Requirement: 3K, or more for efficiency

DSKDTA (DECUS NO. 10-140A)

DSKDTA transfers files from a user's disk area to a number of DECTapes. Switching from one DECTape to the next is automatic. No file names need to be typed in, and appropriate DECTape directories are typed out.
RESDEC (DECUS NO. 10-103)

RESDEC is a program designed to be used mainly when a DECTape's directory gets overwritten with garbage, or zeroes unintentionally. It may be of use if some blocks get over-written, since certain partial files are recoverable.

PIP3 VO2 (DECUS NO. 10-20)

Ian Pugsley and David Nixon, DEC Ltd., Reading, Berkshire, England

This program lists DECTape data with minimal processing. The output format is controlled by switches included in the command string. It can be used for debugging programs with DECTape output, reading data with parity errors on tape, teaching, and general program listings.
UTILITIES-EIGHTS & NINES, ETC.

PDP-10/8 LOADER (DECUS NO. 10-23 and 8-227)

Allan B. Wilson, Max Planck Institut fuer Kohlen forschung, Muelheim, Germany

This interactive set of programs when used in conjunction with a special interface between the PDP-8 and PDP-10 allows the following:

1. The PDP-8 console teletype to be used as a regular PDP-10 time-sharing station; and

2. By means of commands to the PDP-10 time-sharing monitor, PDP-8 binary programs are stored on a PDP-10 device and sent to the PDP-8 and loaded. This eliminates the need for paper tape or other program storage means on the PDP-8.

Minimum Hardware: PDP-10 with line scanner and PDP-8 with special interface to PDP-10 line scanner.

Source Language: PAL-10 and MACRO-10

PDP-10 to PDP-9 MONITOR SOFTWARE (DA10) (DECUS NO. 10-108)

L. P. Wade and W. Newman, DEC, Maynard, Massachusetts

The software in this package contains two monitor related programs, one for the PDP-10 (SATSER) and one for the PDP-9 (MPX). MPX (for Multiplexor) is a specialized PDP-9 monitor written to handle the display stations. It is unlikely that any other installation will be able to use this software unmodified. One should be able to learn enough about the PDP-9’s handling of the DA10 to code his own handler.

SATSER (Satellite Service Routine) is a classic PDP-10 monitor device service routine. This software has been checked out under the 4 Series Monitor but only minor difficulty is anticipated when going to 5 Series.

Minimum Hardware: 8K PDP-9; PDP-10/50 System

Storage Requirement: $425_{10}$ PDP-10 words
UTILITIES-EIGHTS & NINES, ETC.

Source Language: MACRO-10

TALK8F (DECUS NO. 10-139)

TALK8F is a PDP-10 utility program which transforms the output of assemblers such as PALL0 or PALL2 into a form amenable to Dataphone Communication.

This program reads a PALL0 "BIN" output file from the disk and converts it to a form of ASCII character code. This code can be sent over the telephone lines and interpreted by the PDP-8 "TALK10" program running on the PDP-8 through "OCTMON", PDP-9 OCTAL debugger program (DECUS 8-298) which accepts this special code format.

The PALL0 binary output file must be on the user's DSK area. A "DAT" file, named by the user, will be generated and written in the user's disk area. He may then PIP it to his teletype (i.e. to his buffered PDP-8 TTY through the PDP-8 TALK10 program which is interfaced to the PDP-10 through the PT-08).

The beginning and end of the "DAT" file contain strings of A's which are used to enter and leave the TALK10 "OCTLDR" mode. If the user is talking to the PDP-10 via TALK10, sending the "DAT" file will load it into the PDP-8 memory.

Hardware Required: PDP-10 with dataphone or hardware interface to a PDP-8 with a PT-08 serial/parallel interface.

680 PUMP (DECUS NO. 10-39)

Submitted by Paul Condit, DEC.

680 PUMP is a user mode program which initializes 6801 communication systems. It may be used for initializing PDP-8's assuming that it is interfaced with the DA10 option.

SEVAMC (DECUS NO. 10-41)

Submitted by Ilona J. Haines Tumas - University of Pittsburg

SEVAMC converts PDP-7 assembler language to PDP-10 format for use in "7" (see PDP-7 assembler for -10 under Languages.)
PDP-10 SINGLE USER MONITOR SYSTEM (DECUS NO. 10-131)

Submitted by: Andrew J. Copanas, DEC, Maynard, Massachusetts

This is a PDP-10 executive program (Monitor) for a single user (no log-ins) to be run from a console Teletype. It handles I/O and user programs. It can handle all I/O devices on a PDP-10. The complete kit contains documentation and instructions to build. No DEC support is implied or guaranteed.

Minimum Hardware: 1 KA10 CPU, 16K core, 2 DECTapes

Source Language: MACRO-10

SCNSER—Improved but Untested SCNSER (DECUS NO. 10-67)

DEC, Maynard, Massachusetts

This software was submitted to DECUS to offer customers access to programs developed by DEC which will not normally be released for general distribution. This software does not constitute DEC supported software and DEC will not supply support to implement, maintain, or improve it.

This software is not debugged and is intended as a guide to users desiring to implement some of its features.

The specification describes the modifications to the PDP-10 timesharing monitor system which are a part of the local communications project. The modifications are primarily a replacement of subprogram SCNSRF, along with attendant changes to other subprograms as required. The revised scanner service is called SCNSER.

The general technique to be used in this rewrite is simply to apply new understanding of the needs of timesharing users while rewriting the existing scanner service from the ground up. The appearance of the terminal as seen by the typist and by the program will not be changed except by the addition of new facilities. No existing user programs should need to be modified.

Modification of the specification is in terms of changes from the existing scanner service, SCNSRF. Unless specified, the technical description of the existing SCNSRF carries over into
the new SCNSER.

Source Language: MACRO-10

**RAPID PROGRAM GENERATION SYSTEM** (DECUS NO. 6/10-41 OBSOLETE)

This software is now supported by DEC.

**CFILE** (DECUS NO. 10-107)

Author: Walter Metcalf

Submitted by: Kay Latven, Brookings Institution
Washington, D.C.

CFILE is a shareable and reentrant program which allows an arbitrary sequence of Monitor commands to be executed from a file on a retrievable device (disk, DECTape, etc.). This permits commands to be built by either a user or a program and then executed with no intervention by the user.

Storage Requirement: 1K

Source Language: MACRO-10

**COPYDC** (DECUS NO. 10-129)

Author: Jon Cole, Bolt, Beranek and Newman, Inc.

Submitted by: Anne L. Drazen, DEC

COPYDC is a program which converts level D failsafe magnetic tape to level C Failsafe tape. It reads the level D tape on device "INN" and writes the level C tape on device "OUT".

**LOADER** (DECUS NO. 10-17)

W. Weiher, Stanford Artificial Intelligence Laboratory,
Stanford University, Stanford, California

Modifications and full compatible version of DEC loader having the capability of saving DMP files; placing the symbol table immediately after the program instead of at the top of core, and it will also reduce core to a minimum after loading.

Source Language: FAIL
UTILITIES-SYSTEMS

CREF (DECUS NO. 10-14)

W. Weiher, Stanford Artificial Intelligence Project, Stanford University, Stanford, California

CREF is a cross reference program that operates with FAIL block structure.

Source Language: MACRO-10

Available: Write-up consists only of listing.

FCROX (DECUS NO. 10-13)

A. Moorer, Stanford Artificial Intelligence Project, Stanford University, Stanford, California

FCROX will convert programs from MACRO source to FAIL source.

Source Language: FAIL

Available: Source files on DECTape, write-up consists only of listing

TELPLT (DECUS NO. 10-84 and available shortly)

Submitted by: Ed Nemeth, DEC

A set of programs allowing plotting data vectors on the users teletype.

FILDMP.MAC (DECUS NO. 10-111)

Author: Buren Hoffman


FILDMP provides the user a method for examination of the content of any file which can be read in binary mode. By proper use of switches, the user may read a "SAVE" file and have the output translated into MACRO assembly language. In either case, however, the output reflects the octal, ASCII, and SIXBIT translations of the text of the file. Additionally, the user may elect to merely expand a "SAVE" file, which may subsequently be dumped to obtain a core image dump.

Storage Requirement: 3K - not reentrant

Source Language: MACRO-10
HELP (DECUS NO. 10-95 and available soon)

Author:  D. H. Edvi-illes, ARL, Australia

When the user gives the "HELP or "HELP PROG" monitor commands, the program determines the user's status (logged-in?) and proceeds to type operating instructions etc., for the appropriate requirement.

CARD PUNCH STACKING CUSP - PUNCH & PUNCHR (DECUS NO. 10-92)

Author:  Blaine Belecki, DEC

This program is used identically as the DEC distributed line printer stacking cusp PRINT and PRINTR.

BCDPIP (DECUS NO. 10-93 and available soon)

Author:  Donald Todd, Brookings Institution

BCDPIP transfers data files from MAGtape to any standard DECSYSTEM I/O device and translates IBM 7000 series BCD records, labeled or unlabeled, to ASCII line more for the DECSYSTEM-10.

SPREAD (DECUS NO. 10-128)

Author:  Alan Blackington

Submitted by:  Gerry Harrington, DEC, Maynard, Massachusetts

SPREAD reads and writes ASCII files, converting tabs into spaces without changing the alignment of the printout. It is useful when using PDP-10 SORT program where file to be sorted contains tabs.

Source Language:  MACRO-10

FORTRAN FLOWCHART PROGRAMS (DECUS NO. 10-38A)

Submitted by Bob Boylan, DEC

FFP will accept FORTRAN input and product flowcharts.

DESK (DECUS NO. 6/10-45)

Author:  Steve Piner

Submitted by:  Nicholas Pappas, DEC, Maynard, Massachusetts
DESK improves man-machine communication by giving the computer user direct access to basic mathematical functions within the PDP-6/10 subroutine library. By means of the PDP-6/10 multi-user station, the operator is able to enter arguments, request specific functions, and obtain resultants at electronic speeds. DESK incorporates the macro operations programming aid.

Source Language: MACRO-10
Available: Source files on DECTape, write-up with no listing.

TIMEP4 (DECUS NO. 6-5)

Richard Gruen, DEC, Palo Alto, California

TIMEP4 calls each of the FORTRAN IV Library routines 20,000 times and publishes the average time per call. It uses randomly-generated numbers as input. This program was used to calculate the timings shown in the FORTRAN IV Library write-up.

CHAINB (DECUS NO. 10-69)

CHAINB provides an alternative method for overlaying programs, completely independent of the FORTRAN IV requirements of the standard CHAIN. Overlays are defined by appropriate LOADER command strings, and CHAINB loads appropriate overlays during program execution. This feature requires the SPCHN switch in LOADER to be non-zero, including code to process the command strings and create overlays for CHAINB.

There must be one resident area of any length and including any programs (not necessary to have a BLOCK DATA area, for example); CHAINB must be in the resident area. There may be up to 25 overlays.

MULPAC, A Multiple Precision Package for the PDP-10 (DECUS NO. 10-113)

J. M. Bennett, Computer Science Department, The University of Western Ontario

Submitted by: Ed Nemeth, DEC, Maynard, Massachusetts

This is a preliminary report describing a multiple-precision floating-point arithmetic package available for use from either FORTRAN or MACRO-10 on the DEC PDP-10. The exponent range of the numbers is

\[
\begin{align*}
34 & \quad (2, -1) \\
+2 &
\end{align*}
\]
and presently the mantissa can contain up to 1380 significant decimal digits, although this can be simply extended.

The package provides the four basic operations of arithmetic and the following mathematical functions: square root, sine, cosine, logarithm, and exponential. A convenient package is provided for easy conversion to and from the standard PDP-10 arithmetic types. No general input-output facilities have yet been provided. Also missing, but planned, are the power function, arctangent, and integer divide routines.

Source Language: FORTRAN or MACRO

ROCK: A Sort/Merge Program for the PDP-10 (DECUS NO. 10-4)

Robert Clements, DEC, Maynard, Mass.

ROCK is a specific-purpose sort/merge program for ASCII text files of a particular nature. It uses the disk in the same way that a conventional sort/merge uses magnetic tapes. It is not a "sort/merge package", but can be modified for a number of useful tasks. The name comes from its initial task, that of sorting the author's rock-and-roll catalog.

Source Language: MACRO-10

Storage Requirement: 4K minimum to 10K maximum, plus disk scratch files

RENBUR, the FORTRAN Renumbering Program (DECUS NO. 10-130)

Donald E. Barth, Department of Chemistry, Harvard University, Cambridge, Massachusetts

RENBUR is a program written in hardware independent FORTRAN which sequentially statement numbers and/or forms cross-reference listings of FORTRAN programs read as data. The FORTRAN program named RENBUR is provided to aid possible modification of the RENBUR syntax recognition table. RENBUR includes DATAST which generates FORTRAN DATA statements to represent single precision integer arrays.

Storage Requirement: 15K as supplied, 19K if practical

Source Language: FORTRAN
PART II

DECsystem-10 Software for Sale

The following list contains software that has been written for the DECsystem-10 and is available for purchase through the contact mentioned in the description. All contacts are to be made directly to that individual and not to any DIGITAL employee. DIGITAL, in no way, endorses, approves or verifies the software listed here. All tests and terms are strictly the responsibility of the parties concerned.

DIGITAL is pleased to serve as an intermediary for these products that could prove useful to DECsystem-10 Users.
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### CIVIL ENGINEERING

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DATA MANAGEMENT

EASYDATA
MIRS--Master Information Retrieval System
OLIVER
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EDITOR

SON OF STOPGAP (SOS) (DECUS NO. 10-16)
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HARVARD BUSINESS SCHOOL

AQD COLLECTIIN
MANECOL COLLECTION
CONVERSATIONAL LINEAR PROGRAMMING PACKAGE
SIMPAK
HARVARD MANAGEMENT SIMULATION TWO
BOSPAT
CLARKSON
CONTEL
IBMCSH2
COMCSH2
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HARVARD BUSINESS SCHOOL—continued

TEXTRIM
MIDTERM
JESSUP1
MINMAD
FLEMIN
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HEUBLLEN
HAMMS
MOONEY3
TST4YR
KINGC.F4
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MATH
VALUE
TICTAC
BOMINO
BANDIT
INGAME
PRFORM
NPV
BANK
CSHFLO
CORPMOD
EBIT
LINPRO1
FIPAC
PV
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BAGEL

HYBRID SYSTEMS

HMOS--HYBRID Monitor Operating System
HFOS--HYBRID FORTRAN Operating System

INPUT/OUTPUT

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BUSINESS APPLICATIONS

TSBP™ -- Time-Sharing Business Package

DESCRIPTION

The Time-Sharing Business Package (TSBP™), when installed on a
time-sharing PDP-10, allows remotely located teletypes or type-
writer terminals to become full fledged accounting and information
systems for small business. The package consists of 30 FORTRAN IV
programs which may be used, independently to perform accounting
functions of accounts receivable, accounts payable, cash dis-
bursements, payroll, general ledger, profit and loss, and
inventory; and has many convenient features for management
control and information retrieval. The programs, if used to-
gether, form a completely integrated double entry accounting
system with automatic "carry through".

The package consists of source code listings, source magnetic
tape, commented flow charts, detailed user's guide, and demon-
stration kit including printed continuous forms design.

TSBP is available for immediate delivery at $14,000, one-time
lease charge, plus $2,000 for installation and $3,600 for
training.

In addition, the package can be installed and "turnkeyed" for
PDP-10s to create an "in-house" Management Information and
Accounting System. Cost is $60,000.

STATUS

Running on the PDP-10. For one time lease only, no barter.

LANGUAGE

FORTRAN IV

W. E. Schmidt
Computing Corporation International
3375 South Bannock
Englewood, Colorado 80110
FBP™ — Financial Business Package

DESCRIPTION

The Financial Business Package (FBP™) is a group of nine FORTRAN IV programs that have been written to operate on time-sharing computers. The package provides the user with up-to-date management and accounting information. By merely entering ledger disbursement, the FBP will generate a detailed general ledger, year-to-date profit/loss statement, current period profit/loss statement, balance sheet, disbursement voucher, and a variety of charts of selected financial figures. The choice of reports is optional at run time so that any one, any combination, or all of the above may be produced at any given time.

For public accountants and computer utility operations, automatic customer billing is performed whereby clients can be conveniently charged on a transaction, report, or flat fee basis.

The package will operate with any appropriate terminal device supported by the time-sharing utilities. 33 ASR teletype with coupler or modem is adequate for many operations. Optionally, any report may be printed out on the central computer "high speed line printer" rather than at the terminal.

Paper tape, magnetic tape, or cards may be used for disbursement inputs.

FBP includes sample data base, installation, and detailed user's guide, for a one-time lease charge of $6,000.

STATUS

Running on the PDP-10.

LANGUAGE

FORTRAN IV

W. E. Schmidt
Computing Corporation International
3375 South Bannock
Englewood, Colorado 80110
PROFORMA

DESCRIPTION

PROFORMA is a timesharing business planning and reporting program developed for use by non-programmers to enable them to specify arithmetic calculations, design report formats, and enter data to produce reports from remote terminals. PROFORMA includes such features as on-line model-building, data file merging, selected output previews, and allows a variety of terminal devices to be utilized. PROFORMA is released with a teaching exercise set and a library of representative applications models.

Typical PROFORMA applications include forecasting, cash flow projections, budgeting, project accounting, balance sheet projections, depreciations, loan amortization, lease-purchase accounting, and general business planning functions which can be custom-designed by users.

Dick Reut
Computeria Incorporated
14 Wood Road
Braintree, Massachusetts 02184
INCON—INVENTORY CONTROL SYSTEM

DESCRIPTION

The INCON system is a general-purpose inventory control system that permits an unusually high degree of flexibility to the user. It is adaptable to the user's present inventory system controls.

INCON is modular in construction and allows such operations as:

- Variable Number of Inventory Classifications
- Inventory Deposits
- Inventory Withdrawals
- Bill of Materials Explosions
- Purchase Requests
  - Minimum-Maximum Levels
  - By Supplier
- Inventory Reports
  - Full Inventory
  - Selected Inventory Groups

INCON is currently under development and is expected to be demonstratetable around January 1. It is being written in FORTRAN. INCON is being designed to be a low cost general purpose system for use in either Batch or Time-shared mode.

T. J. Schulkind
CSP Consultants, Inc.
58 Diamond Drive
Plainview, New York 11803
BUSINESS APPLICATIONS

ABS - AUTOMATED BUSINESS SYSTEM

DESCRIPTION

The Automated Business System (ABS) is a preprogrammed, generalized accounting system designed for use by accountants and management. As a series of computer time-sharing programs, the ABS is a means of satisfying individual accounting requirements. No previous computer experience is required to use the package.

The ABS completely solves the problem of costly and inefficient manual accounting. The system handles accounts receivable (maintains records and prepares invoices and statements), inventory control (maintains records and allows inquiry by item or reorder level), accounts payable (maintains records and prepares payment checks), payroll (maintains employee payroll records and prepares payroll checks and tax forms), a general ledger (maintains a general ledger with year-to-date totals), financial statements (prepares current and year-to-date income statements and year-to-date balance sheets), and handles numerous miscellaneous accounting functions. In the convenience of the user's own office, such reports may be obtained when needed. Error free calculations are made and finished accounting documents are produced upon demand.

Computer knowledge and expensive equipment are not required to use this system. Well written and fully illustrated manuals are provided to eliminate costly training.

Compu-serv Network, Inc.
1387 W. Fifth Ave.
Columbus, Ohio 43212
(614) 457-3160
BUSINESS APPLICATIONS

FBS - FINANCIAL BUSINESS SYSTEM

DESCRIPTION

The Financial Business System (FBS) is an automated system of accounting designed to produce completely up-to-date financial business reports. As a series of computer time-sharing programs, FBS solves the problems of costly and inefficient manual accounting. In the convenience of the user's own office, journal entries may be made and a general ledger, income statement, and balance sheet can be produced. Regardless of the number of transactions made each month, the Financial Business System provides a most reliable and inexpensive means of obtaining completely up-to-date financial reports.

Reports produced by FBS:

- General Journal
- Transaction Vouchers
- General Ledger
- Chart of Accounts
- Income Statement
- Expensive Schedules
- Balance Sheet

Compu-serv Network, Inc.
1387 W. Fifth Ave.
Columbus, Ohio 43212
(614) 457-3160
DESCRIPTION

APRIL is an integrated business system that performs the tasks associated with prudent management of inventory and cash. APRIL controls finished goods inventories as large as 33000 items, performs associated billing and accounts receivable functions for up to 33000 active customers, and performs purchase notification and accounts payable processing for up to 33000 active vendors.

Automatic updating and monitoring of all inventory items with these built-in functions:
  . re-order point sensing and notification
  . exception logging
  . standard costs extension
  . invoice data capture

Customer and item inquiries which provide management with facts, when they are needed. Invoicing by line item on an as-required or scheduled basis.

Accounts receivable processing that includes customer file maintenance, statements on demand, aging, instant customer balance access.

Accounts payable processing with vendor file maintenance, requisitioned item status maintenance, accounts payable register, and check preparation.

Input to the system can be from a keyboard terminal, from Hollerith cards, paper tape, or other media.

Output can be directed to a line printer or keyboard terminal. APRIL reporting and report contents include:

  . Transaction log/exception list
  . Invoice/shipping notice
  . Inventory list
  . Customer statement
  . An aging report
BUSINESS APPLICATIONS

- Accounts receivable report
- Parts requisition report
- Accounts payable register
- Voucher checks and stubs

Peter J. Oeth
Executive Vice-President
Western Data Sciences
5055 North 12th Street
Phoenix, Arizona 85014
(602) 264-2630
CLAS - CASH INVESTMENT ANALYSIS

DESCRIPTION

The Cash Investment Analysis program is designed to be used for making quick calculations of the Return on Investment for a series of cash flows using a timeshared computer. In addition the program calculates the Present Value of the capital to be invested at a given cost of money, the Discounted Rate of Return at each cash flow period, and the Breakeven Point for the project (investment payback period).

The program provides a relatively simple means of comparing the relative merits of competing projects by being able to handle up to four sets of cash flows simultaneously. This last feature also enables the analyst to feed in data based on pessimistic, most likely, and optimistic projections for a given project. Additionally, by using the unique recursive feature of changing the cost of capital for all periods, it is possible to analyze the effect of changes in the cost of money on the project. The program, while still running, also has the ability to modify any of the individual cash flows and re-evaluate the project.

In summary, then, the program can be used by business planners, project leaders, businessmen, controllers, etc. for providing speedy analytical data regarding a projected business or project. The program takes into account and demonstrates to the prospective investor the effect of cash promised at some future date not being worth as much to the investor as that same amount of cash in hand right now.

Peter J. Oeth
Executive Vice-President
Western Data Sciences
5055 North 12th Street
Phoenix, Arizona 85014
(602) 264-2630
CLAS - DEPRECIATION ANALYSIS

DESCRIPTION

This program calculates depreciation using four standard methods: straight line, 150% declining balance, 200% or double declining balance and sum of the years digits.

Many user options--such as monthly detail or yearly summarization.

Output is clear, easy to use.

Complies with IRS instructions.

Peter J. Oeth
Executive Vice-President
Western Data Sciences
5055 North 12th Street
Phoenix, Arizona  85014
(602) 264-2630
CLAS - GENERAL LEDGER ACCOUNTING SYSTEM

DESCRIPTION

The CLAS General Ledger Accounting System is designed for use by accountants and small businesses. It is a sophisticated, versatile program set which performs automatically the majority of the standard bookkeeping functions.

The General Ledger System operates within the timesharing system.

The system processes from 3-to 6-digit account numbers for up to 50 separate divisions or departments. It can prepare individual income statements and balance sheets for each division or department plus a consolidated income statement and balance sheet. Alternatively, it can prepare income statements for each division, an overall balance sheet, and a consolidated income statement. Or, yet again, the system is capable of preparing a single income statement and balance sheet for a company where no consolidation is required but where various departmental reports are desired.

The system produces all of its standard end-of-accounting-period reports in acceptable formats which are readily established and controlled by its user.

The program set processes an unlimited number of individual journals, automatically checks each for balance, creates offsetting entries where required, or places the amount into a clearing account.

The General Ledger System can produce any of five optional types of ledger updates including beginning-of-year, end-of-year, beginning-of-period. In addition, a detail general ledger and/or a trial balance may be produced.

Further processing, under control of the user, produces various types of income statement, a balance sheet for each division if required, departmental or divisional income statements and three types of schedules.

Peter J. Oeth
Executive Vice-President
Western Data Sciences
5055 North 12th Street
Phoenix, Arizona  85014
(602) 264-2630
COMPUTER ASSISTED INSTRUCTION

Computer-Based Instructional Methods in Chemistry

The use of computers in the educational process and the results of such interactions has been described in detail in the literature.1-4 Basically, computer techniques can be used to augment a conventional course of instruction in the following ways: (1) tutorial/drill, (2) laboratory simulation, (3) examinations to establish a level of achievement, (4) record keeping. The use of computer techniques automatically dictates the development of a modular approach to the subject, which leads to a pedagogically desirable situation; viz., the possibility of creating a self-paced course of instruction. Thus, computer techniques can be used in conventional courses or in specially designed courses.

The information presented in the following pages represents (1) the chemistry programs available from CBIS and (2) examples of student guides, instructor guides, and typical student interactions for several of these programs. Further details can be obtained from:

CBIS, Inc.
4303 Woodway Drive
Austin, Texas 78731
(512) 478-9207

Equivalents and Solution Normality

This module is designed to give practice in calculating the number of moles and equivs in given weights of compounds; calculating the molarity of solutions; and the normality of solutions. The terminology of this module is similar to that used in previous modules related to the mole concept and solution concentrations.

- **Mole** - the gram molecular wt.
- **Equiv** - the gram equivalent wt.
- **Molarity** is the number of moles/liter
- **Normality** is the number of equivs/liter

Abbreviations used are:

- **WT** weight
- **G** gram
- **L** liter
- **ML** milliliter

The control commands, "skip" and "stop" are operational on all problems throughout the module.
THE OBJECT OF THIS MODULE IS TO GIVE YOU PRACTICE IN
CALCULATING MOLES, EQUIV, MOLARITY AND NORMALITY.
***** AND AWAY WE GO *****

WHAT IS THE MOLE WT. OF H3PO4?
? 90
THE MOLE WT. IS THE SUM OF ALL THE ATOMIC WTS.
PLEASE ANSWER AGAIN.
? 80
THE MOLE WT. IS 98

HOW MANY MOLES OF KOH ARE IN 19.7 G?
? 10
DID YOU DIVIDE THE NUMBER OF GRAMS BY THE MOLE WT.?
? NO
YOU SHOULD HAVE.
PLEASE HAVE ANOTHER GO AT IT.
? .323
THERE ARE 0.302611 MOLES

WHAT IS THE EQUIVALENT WT. OF NAACL?
? 5
THE EQUIVALENT WT. OF AN ACID IS EQUAL TO THE
MOLE WT. DIVIDED BY THE NUMBER OF REPLACEABLE
HYDROGEN ATOMS IN THE FORMULA. THE EQUIVALENT WT.
OF SALTS AND BASES (IN NON-REDOX REACTIONS) IS
EQUAL TO THE MOLE WT. DIVIDED BY THE TOTAL
POSITIVE VALENCE.
NOW HAVE ANOTHER GO AT IT.
WHAT IS THE EQUIVALENT WT. OF NAACL?
? 58.5
WELL DONE!

WHAT IS THE EQUIVALENT WT. OF Mg(NO3)2 ?
? 148.3
THAT'S THE MOLE WT.
NOW HAVE ANOTHER GO AT IT.
? 74.15  
WELL DONE!

WHAT IS THE MOLARITY OF A SOLUTION MADE BY
DISSOLVING 18.5 G OF KOH IN ENOUGH
WATER TO PRODUCE 562 ML OF SOLUTION?
? .00506
CONVERT ML TO L THEN DIVIDE THE NUMBER OF MOLES
BY THE NUMBER OF LITERS.
TAKE ANOTHER CRACK AT THE PROBLEM.
? .506
GOOD SHOW!
WHAT IS THE MOLARITY OF A SOLUTION MADE BY DISSOLVING 79 G OF MGSO4 IN ENOUGH WATER TO PRODUCE 573 ML OF SOLUTION?
? 2.295
THAT'S THE NORMALITY... WHAT'S THE MOLARITY?
? 1.145
VERY GOOD INDEED!

HOW MANY EQUIV ARE IN 5 G OF LI2SO4?
? 3
DID YOU DIVIDE THE NUMBER OF GRAMS BY THE EQUIVALENT WEIGHT?
? YES
HMMMM, WHAT DID YOU USE FOR THE EQUIVALENT WEIGHT?
? 1.25
IT APPEARS THIS MIGHT BE YOUR ERROR. THE EQUIVALENT WT. IS 55
NOW TAKE ANOTHER SHOT AT IT.
HOW MANY EQUIV ARE IN 5 G OF LI2SO4?
? .091
GOOD SHOW!

HOW MANY EQUIV ARE IN 25.8 G OF KCL03?
? .2104
WELL DONE!

IF 80.7 G OF KCL ARE DISSOLVED IN ENOUGH WATER TO MAKE 125 ML OF SOLUTION, WHAT IS THE NORMALITY OF THE RESULTING SOLUTION?
? 8.67
I'LL ACCEPT THAT!

IF 43.7 G OF MGS ARE DISSOLVED IN ENOUGH WATER TO MAKE 807 ML OF SOLUTION, WHAT IS THE NORMALITY OF THE RESULTING SOLUTION?
? .963
THAT'S THE MOLARITY; PLEASE TRY AGAIN.
? 1.924
EVER SO RIGHT!

WOULD YOU LIKE TO WORK MORE PROBLEMS OF THIS TYPE?
? NO
YOUR WISH IS MY COMMAND

THAT'S ALL FOR NOW. GOODBYE, SAM
APPLICATION: Simulated Instrumental Analysis

DESCRIPTION: This module is a simulated experiment in the use of spectrophotometers for quantitative analysis. The procedure is based upon that described in ASTM, Part 32, pp 78-80, May, 1965. Essentially the experiment requires that the student demonstrate he is familiar with the outlined procedure and then collect and analyze data as if he were in a real laboratory environment. The students' results are then examined for accuracy and recorded through the use of a sister program, PERMA. It will be necessary to assign each student an "unknown" number. The "actual" value of the unknown sample will be based upon the number assigned as follows:

<table>
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<th>Any number less than:</th>
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* The total package may be purchased for $1500.00; a discount savings of 7%. Student Manuals for the 36 modules may be purchased at $30.00 per dozen. Manuals for a custom-made package may be purchased at $3.00 per manual.
CIRCUIT AIDED DESIGN

AC-CAP

DESCRIPTION

AC-CAP is a simple to use circuit analysis program for analyzing the frequency response of electronic circuits. It features built in models for transistors, diodes, and operational amplifiers. By using sparse Matrix techniques it is able to analyze circuits having over 200 nodes and 100 components on a computer having only 16K words of memory. It is fully interactive and will be available around November for $6,000.

Dr. Peter Green
Environmental Computing, Inc.
21 George Street
Lowell, Massachusetts 01852
CIRCUIT AIDED DESIGN

IMPACT

DESCRIPTION

IMPACT is a steady state transient non-linear analysis program that uses non-linear Ebers-Moll models for the diodes, transistors, and zeners. It uses a non-linear characteristic model for the SCR and a saturating fifth order - Laplace transform operator for such devices as operational amplifiers. It can handle up to 50 state variables. It is fully interactive and is currently available for $15,000.

Dr. Peter Green
Environmental Computing, Inc.
21 George Street
Lowell, Massachusetts 01852
CIRCUIT AIDED DESIGN

I/CAP -- INTERACTIVE ELECTRONIC CIRCUIT ANALYSIS PROGRAM

DESCRIPTION

I/CAP is a completely revised and augmented interactive version of the well known IBM ECAP/360, which is a modified version of an original ECAP/1620 version. Data can be input using the full ECAP formats, specified in the 1620 or 360 ECAP manuals. In addition to all the features of 360 ECAP, the following features are noteworthy:

a. Full 50 node, 200 branch capability.
b. Conversational, easy to use, interactive language.
c. Efficient, accurate and fast analysis.
d. Free format input language.
e. Built in text Editor.
f. Selected output control.
g. Graphical output.
h. Stored subcircuit models.

$5,700 cash purchase for the binary version which includes free maintenance for a maximum of 2 years; $8,000 for a source version with no maintenance. Royalty arrangements can also be arranged.

Sergio Bernstein  
Berne Electronics, Inc.  
28 Havilands Lane  
White Plains, New York 10605
CIRCUIT AIDED DESIGN

TRAC

DESCRIPTION

TRAC program performs true non-linear DC and transient analysis of networks. Graphs and free format input have been added. According to a report by JPL (Jet Propulsion Laboratory) technical report 32-1429, it is the fastest general purpose non-linear DC and transient computer program for electrical circuits. Benchmarks have revealed that it is an order of magnitude faster than either SCRPTRE or CIRCUS. A model library for semiconductor parameters is available for use in conjunction with the program at a small additional cost. It is currently available for $7,500 for either the source version with no maintenance or the binary version with 2 years maintenance. Lease, rental agreements and demonstrations can be arranged.

Sergio Bernstein
Berne Electronics, Inc.
28 Havilands Lane
White Plains, New York 10605
CIVIL ENGINEERING

CORPLT

DESCRIPTION

CORPLT is a computer system that enables an engineer to determine directly the internal moments and edge reactions induced by a uniform load on an "L" shaped slab whose inner edge is supported by a central core wall and whose exterior edge is supported by columns. CORPLT consists of a language with which the engineer may describe his problem and an interpreter which will accept this language and a program to perform the analysis and produce the requested results. The engineer may describe his problem using the CORPLT language by writing a number of statements in the special stylized language which specify the physical and loading characteristics for a particular slab. The various statements describe the type of analysis to be performed, the stiffness of the walls, columns and the slab, and the spacing of columns. Likewise, the outer edge of the slab between columns can be declared either restrained or unrestrained by the spandrel beam. As optional output, the interior wall and slab deflections at the 1/6 points are given in inches. The standard output consists of moments and shears in the corner plate and wall. All moments are given in ft. kips per ft. of width, shears are given in kips per ft. of width, and reactions in kips. Moments are positive if they cause tension on the bottom of the slab. Shears are positive if they act upward on the right face of a free body section. Reactions are positive if they cause compression in the support. The format of the output data conforms roughly to the shape of the slab.

APPLICATIONS

This structural system generally known as the "core-hull" concept is described in detail in the PCA Advanced Engineering Bulletin #21, "Floor Systems Supported by Central Core and Exterior Columns". The CORPLT program determines directly the moments for a particular slab and loading. The stiffnesses of the walls, columns and the slab, and the spacing of columns are variables. The outer edge of the slab between columns can be considered as either restrained or unrestrained by the spandrel beam.

Computer Dynamics Incorp.
112 Shawmut Ave.
Boston, Mass. 02118
(617) 357-8170
EWORK1

DESCRIPTION

EWORK1 is a computer system that gives engineers the capability to compute the earthwork quantities in highway projects or similar projects such as canal or dike design. EWORK1 consists of a language with which the engineer may describe his problem, an interpreter which will translate instructions given in this language to be relayed to a program which performs the required earthwork quantity calculations. The simplified vocabulary of the EWORK1 language is used to prepare a sequence of statements specifying existing and proposed ground conditions, i.e., the ground cross sections, the design template and the vertical and horizontal alignment of the highway project.

From this project description, the program calculates and reports back for each cross section, the following: pavement profile elevation; slope stake offset and elevation on each side of roadway; offset from centerline, width and elevation of outside ditches; end areas of cut, fill and fill adjusted for shrinkage; cubic yards of cut, fill and adjusted fill between cross sections; the summation of cut and fill quantities and mass diagram ordinates, progressively from beginning to end of project.

APPLICATIONS

The computational aspects of EWORK1 are an adaptation of a program to compute earthwork quantities in State of Illinois highway projects. The original program, as written for several different computer systems, has been well checked out and approved by qualifying authorities for general application to the problem of calculating highway earthwork quantities.

Computer Dynamics Incorporated
112 Shawmut Ave.
Boston, Mass. 02118
(617) 357-8170
CIVIL ENGINEERING

FRAME

DESCRIPTION

FRAME is a computer system to perform the analysis of multistory frames (with or without shear walls) subjected to lateral loads of wind or earthquake. FRAME consists of a language with which the engineer may describe his problem, an interpreter which will accept this language to produce the desired results and a program to perform the necessary calculations. The engineer describes his problem for FRAME by writing a number of statements in the special stylized language to specify the physical and loading characteristics of the building frame to be analyzed, the layout of the frame, the component members and their physical properties and the loadings to which each level is subjected. The output provides the findings of the analysis (moments and shears), magnitude of sideways and critical joint displacements and rotations as well as an equilibrium check on all forces at all joints.

FRAME differs from the conventional frame analysis program in that moments due to beam shears acting at the face of vertical members and the effects on beam moments of vertical displacements arising from the vertical members’ rotations are taken into account. In addition, secondary moments produced by lateral displacements are also considered.

APPLICATIONS

FRAME may be used for the lateral load analysis of orthogonal high rise building frames subject to wind or earthquake thrusts. Earthquake forces are calculated in accordance with the Uniform Building Code, I.C.O.O., 1967. FRAME does not permit the inclusion of sloping members nor the omission of any members on the orthogonal grid.

Computer Dynamics Incorporated
112 Shawmut Ave.
Boston, Mass. 02118
(617) 357-8170
FSLAB

DESCRIPTION

FSLAB is an interactive computer program used to assist the engineer with calculations associated with the analysis of flat slab structures in accordance with section 2103 "Building Code Requirements for Reinforced Concrete (ACI 318-63)" of the American Concrete Institute.

APPLICATIONS

FSLAB calculates design moments and shears for flat slab configurations which may contain irregularities (drop panels, stairwell cutouts, etc.), may have randomly spaced bays and be supported by columns of varying length and/or end restraint. The user describes the details of the layout of his bent (geometry, member properties and loadings) to FSLAB and the program proceeds to calculate the stiffness and elastic properties of the described system's components. It calculates the slab fixed end moments and uses them to perform a Hardy Cross moment distribution through the single floor level as stiffened by two column lifts (or one, in the case of a roof). When the moments and shears have been balanced, maximum positive moments, their location and critical shears are calculated by FSLAB. These values are then further apportioned to the column, mid and edge strips of the bent in accordance with Table 2103c of the ACI Code. Investigation is made of the fully loaded condition and, if the live load exceeds 3/4 of the dead, the various unloaded span conditions are checked for maximum negative or positive bending using 3/4 of the live load. Output reports summarize the input data, the positive and negative moments at the conclusion of the Hardy Cross analysis, location of maximum positive moment and midspan deflection, the reapportioned moments and shears for each of the column, mid and edge strips. Column moments and shears are also reported.

Computer Dynamics Incorporated
112 Shawmut Ave.
Boston, Mass. 02118
(617) 357-8170
HYDNET-V

DESCRIPTION

HYDNET-V is a computer system to provide engineers with a convenient tool for mathematical modeling and analysis of water distribution systems. HYDNET-V consists of a language with which the engineer may describe his problem, an interpreter which will accept this language to construct a mathematical model of the described network problem and a program to manipulate the model and report results. An engineer may describe a problem with the HYDNET-V language by writing a number of statements in a special stylized language specifying the physical and demand characteristics of a network. HYDNET-V responds with tabular summaries of hydraulic gradient, pressure and system drawoffs at all nodes, and flows, velocities and head losses through all pipes and fittings.

HYDNET-V's unique capabilities include:
- File storage and recall capability to enable job interruption and subsequent resumption of solution
- On-line diagnostics enabling immediate user error correction to permit continuation of the problem without loss of contact with the program
- Dynamic storage allocation, scaling core usage to the problem size
- Extended constraint recognition (20 fittings, 79 response curves)
- Program generated initial assumption of pipe flows based on nodal drawoffs
- Selective output capabilities, including generation of modified input data files and/or output listings on disk
- On-line modification of network components and/or demands
- Recycling capability to extend solution techniques for additional iterations

APPLICATIONS

HYDNET-V may be used by hydraulics, sanitary and mechanical engineers for the analysis of municipal water supply, fire protection and cooling/heating systems. Insurance rating agencies may also use HYDNET-V for evaluation of fire protection systems.

Computer Dynamics Incorporated
112 Shawmut Ave.
Boston, Mass. 02118
(617) 357-8170
PLANE

DESCRIPTION

PLANE is a program used to assist the structural engineer in performing the calculations associated with the analysis of plane structures. PLANE maintains a dialogue with the user, in which the user defines his structure and describes successive loading conditions, and PLANE responds with a tabular summary of joint displacements and rotations; moments, thrusts, and shears affecting each member and all external reaction components.

APPLICATIONS

PLANE analyzes plane frames with rigid joints, but also may be used for plane trusses subject to joint loading (member loadings on plane trusses may also be analyzed by the introduction of internal hinges).

The stiffness method of analysis is employed. PLANE conserves computer resources by taking advantage of the symmetry and band width of the joint stiffness matrix. Structures of up to 80 joints can be handled.

In PLANE, both member and joint loading descriptors relate to the same orthogonal global coordinate system that is used to define the structure itself. By thus referencing a single coordinate system, a substantial potential source of error in problem definition (which may be encountered using other similar programs) is eliminated.
PLATE

DESCRIPTION

PLATE is a computer system to perform the analysis and design of flat plate floor systems. PLATE consists of a language with which the engineer may describe his problem, an interpreter which will accept this language to produce the desired results and a program to perform the necessary calculations. The engineer describes his problem for PLATE by writing a number of statements in the special stylized language which specify the physical and loading characteristics of the bent to be designed. These statements describe the type of analysis to be performed, the layout of the bent, the component members and their properties and the loadings to which each horizontal element is subjected. The output provides the findings of the analysis (moments and shears) and the resulting stresses, compares them with the allowable stresses for flexure and shear and also provides the required reinforcement (area, number, diameter and length of bars), quantities for cost estimates and deflections.

APPLICATIONS

PLATE can be used for the analysis and design of those flat plate structures governed by sections 2103 and 2104 of the ACI Building Code, or for the analysis of continuous reinforced concrete beam and column bents. Bents up to 12 bays long (plus cantilevers, if any) may be designed with PLATE. The design is performed in accordance with criteria set forth in the "Building Code Requirements for Reinforced Concrete (ACI 318-63)".

Computer Dynamics Incorporated
112 Shawmut Ave.
Boston, Mass. 02118
(617) 357-8170
RCBEAM

DESCRIPTION

RCBEAM is a conversational program used to assist the structural engineer by performing the calculations associated with the design of reinforced concrete floor framing (flexural) members. The program examines user supplied loading and dimensional criteria and selects reinforcement in accordance with Part IV-A of "Building Code Requirements for Reinforced Concrete (ACI 318-63)" of the American Concrete Institute.

APPLICATIONS

RCBEAM designs simple concrete floor framing, one floor level at a time. The user must describe the layout of the framing to the program and the various loadings to which each member is to be subjected, plus any extra constraints upon the design process which he may wish to impose (depth restrictions, deflections, bar sizes, etc.). For each member, RCBEAM reports back the reinforcement required, the location and magnitude of the maximum bending moment, beam end reactions and maximum bending and shear stresses, as well as the allowable bending stress, the governing ACI code criterion, and (optionally) shear and moment diagram ordinates and steel areas required. Floor levels of up to 100 discrete members may be described to RCBEAM for analysis and design in a single program run. Members may have cantilevered ends and may be subjected to applied loads of a variety of types: uniformly distributed, linearly varying, concentrated (including reactions from previously designed beams), and moment loads.

Computer Dynamics Incorporated
112 Shawmut Ave.
Boston, Mass. 02118
(617) 357-8170
RCCOL

DESCRIPTION

RCCOL is a computer system that gives engineers the capability to design reinforced concrete columns to resist a given combination of loadings or to investigate the adequacy of a given cross section to resist a similar set of loadings. RCCOL consists of a language with which the engineer may describe his problem and an interpreter which will accept this language and a program to perform the directed investigation or design calculations. The engineer may describe his problem using the RCCOL language by writing a number of statements in the special stylized language which specify the physical and loading characteristics of the reinforced concrete column to be investigated or designed. The various statements describe the type of analysis to be performed, the column cross section, the reinforcement pattern and the loadings to which the R/C column is subjected.

APPLICATIONS

RCCOL recognizes circular and rectangular concrete cross sections with circular or rectangular reinforcement patterns. A circular column implies a circular (spiral) reinforcement pattern whereas with a rectangular column, either a circular (spiral) reinforcement pattern or a rectangular (tied) reinforcement pattern may be specified. In the investigation option it is also possible to define irregular reinforcement patterns by means of individual bar areas and location. Under the design option, RCCOL will find the size, number and distribution of bars that will result in the minimum area of reinforcement with all bars of the same size required to satisfy all the loading conditions imposed on the column. For tied columns, the number of bars in the sides may be different than in the top and bottom of the cross section. The method of solution is based on accepted ultimate strength theories for reinforced concrete design and, where applicable, assumptions and limits conform to the ACI Building Code (ACI 318-63).

USF

Computer Dynamics Incorporated
112 Shawmut Ave.
Boston, Mass. 02118
(617) 357-8170
STLBM

DESCRIPTION

STLBM is a program used to assist the structural engineer by performing the calculations associated with the design of rolled steel floor framing (flexural) members. The program examines user-supplied loading criteria and selects a satisfactory rolled steel section in accordance with the document "Specification for the Design, Fabrication & Erection of Structural Steel for Buildings", published by the American Institute of Steel Construction (1969).

APPLICATIONS

STLBM designs Type 2 (simple) structural-steel floor framing, one floor level at a time. The user must describe the layout of the framing to the program and the various loadings to which each member is to be subjected, plus any extra constraints upon the design process which he may wish to impose (depth restrictions, deflections, shape, etc.).

For each member, STLBM reports back the selected steel section, the location and magnitude of the maximum bending moment, beam end reactions and maximum bending and shear stresses, as well as the allowable bending stress and shear stress, the governing AISC code criterion, and (optionally) shear and moment diagram ordinates.

Floor levels of up to 100 discrete members may be described to STLBM for analysis and design in a single computer run. Members may have cantilevered ends and may be subjected to applied loads of a variety of types: uniformly distributed, linearly varying, concentrated (including reactions from previously designed beams), and moment loads.

Computer Dynamics Incorporated
112 Shawmut Ave.
Boston, Mass. 02118
(617) 357-8170
STLCOL

DESCRIPTION

STLCOL is a program to perform a Structural Engineer's calculations associated with the design of triaxially loaded structural steel rolled column sections. Design calculations follow the criteria set forth in the "Specification for the Design, Fabrication & Erection of Structural Steel for Buildings (1969)" of the American Institute of Steel Construction.

APPLICATIONS

STLCOL designs steel column sections one column line at a time on a lift-by-lift basis, accumulating loads as the section for each successive lift is selected and applying the total to the lift below. The program reports back for each lift the selected steel section, the accumulated axial load, applicable critical interaction formula ratio and the six elements which comprise the ratio: actual axial stress, allowable axial stress, actual amplified bending stresses about both major and minor axes and the allowable bending stresses about these same axes. Also reported is the weight of column sections designed at each column line.

Column lines of up to 50 lifts may be designed, with no limit on the number of column lines which may be designed in a single machine run. The user may restrict design to specific section depth categories.

Input to the program may come from the user's keyboard or from a file on disk.

Computer Dynamics Incorporated
112 Shawmut Ave.
Boston, Mass. 02118
(617) 357-8170
STRAIN

DESCRIPTION

STRAIN (STRuctural Analytical INterpreter) is a computer system which provides an engineer with a convenient and general tool for the analysis of framed structures. STRAIN consists of a language with which the engineer may describe his problem and an interpreter which will accept this language and use it to produce the requested results. An engineer may describe a problem with the STRAIN language by writing a number of statements in a special, stylized language specifying the physical and loading characteristics of a structure. STRAIN responds with a tabular summary of joint displacements & rotations; moments, thrusts & shears affecting each member; and all external reaction components.

APPLICATIONS

STRAIN can be used for the analysis of the following general types of structures:

- PLANE TRUSS - A plane structure idealized as a system of members lying in the X-Y plane and interconnected at "hinged" joints. All applied loads are assumed to act in the plane of the structure.
- PLANE FRAME - A plane structure that is composed of continuous members that intersect one another at "rigid" joints. All applied loads are assumed to act in the plane of the structure.
- PLANE GRID - The fundamental difference between a PLANE FRAME and a PLANE GRID is that the FRAME is assumed to be loaded in its own plane, whereas the loads on the GRID are normal to the plane of the structure.
- SPACE TRUSS - A structure similar to the PLANE TRUSS, except that the members may have any direction in space and are presumed to be incapable of transmitting any twisting moments. The forces acting on such a structure may be in any arbitrary direction.
- SPACE FRAME - A general type of structure with no restrictions on the locations of joints, orientations of members or directions of loads.

Computer Dynamics Incorporated
112 Shawmut Ave.
Boston, Mass. 02118
(617) 357-8170
CIVIL ENGINEERING

XCOGO

DESCRIPTION

XCOGO is a problem-oriented language used to assist the engineer or surveyor with calculations associated with geometric problems. XCOGO may be used to lay out or adjust traverses, determine highway or railroad alignment, make subdivision layouts, or solve bridge geometry problems. The language is applicable to both horizontal and vertical profile calculations.

APPLICATIONS

XCOGO's expanded command structure (50% more commands than found in standard versions of COGO) offers added flexibility in performing "scratch pad" calculations, traverse adjustments, intersections and conversion of coordinates.

Using the language of XCOGO, the user gives a command together with several items of associated data which are to be operated upon. The program performs the required operation and reports back the results, usually in the form of coordinates of a newly located point. XCOGO has the capability of storing the coordinates of up to 999 points as well as tables of up to 50 distances, 50 angles, 30 alignment P.1.s and 20 profile P.1.s.

XCOGO possesses a powerful diagnostic capability that proves to be extremely helpful in directing the user towards a valid solution. Errors in XCOGO are fully recoverable.

User instructions in XCOGO may be furnished from the keyboard or from a file on the disk. Results of an exercise of XCOGO may be retained in a file to be used subsequently as input to a future exercise.
DATA MANAGEMENT

EASYDATA

EASYDATA is a sophisticated, yet simple and flexible, management information system. It is designed for use by the executive's secretary, or even by the executive himself, even though they have no previous computer experience. EASYDATA is also conversational and the conversation takes place in ordinary English, with no computer jargon or programming language to learn. Almost anyone who can read can learn to use EASYDATA.

Conversational Software, Ltd.
5 Hope Park Square
Meadow Lane
Edinburgh EH8 9NW
Scotland
Telephone 031 667 7331
DATA MANAGEMENT

MIRS -- MASTER INFORMATION RETRIEVAL SYSTEM

DESCRIPTION

MIRS (Master Information Retrieval System) is a new multi-user random-access IR system which provides instant access to your data base - wherever you are and whenever you need it.

For IR problems like inventory control, medical diagnosis, marketing studies, investment analysis, scientific analysis and retrieval, reservations systems - in short for any IR application which requires immediate system response, MIRS offers a uniquely powerful and flexible capability at a uniquely low price.

MIRS simultaneously provides large numbers of users with instant access to the same data base.

Herbert Fayer
AL/COM
One Palmer Square
Princeton, New Jersey 08540
OLIVER

DESCRIPTION

OLIVER is a data management and information retrieval system designed to provide the user with a tool which will efficiently accomplish nearly all of his data management problems. OLIVER operates on a specially structured data file in a command language designed to be simple enough for the non-programmer but powerful enough to accomplish the most complex tasks. A file in the OLIVER system contains any number of logical records with each record containing a number of data items (fields) defined by the user. Each field may be assigned many symbolic names. Any field may be protected so that a special password is required before that field can be read or written.

Data stored in an OLIVER file will on the average require 40% less disk storage than the equivalent ASCII representation of the data because of the data compression techniques in OLIVER and the special field types available to the user (e.g., 5 or 6 bit character representation and special field types for dates). An interface is provided so that OLIVER may be used as a subroutine in FORTRAN or COBOL programs to provide a sophisticated data handling capability; this subroutine capability may also be used to provide a "custom command language" interface to OLIVER for certain applications.

OLIVER can provide a facility for simple implementation of data management applications with large savings in programming costs. OLIVER provides a common command language for manipulating all data files regardless of the application. In addition, the easy-to-use report generation commands in OLIVER make generation of new reports or modifications of existing ones extremely simple.

OLIVER has been used, by On-Line Systems, in the commercial time-sharing environment for over one and a half years.

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Director—Marketing Services
On-Line Systems, Inc.
4721 McKnight Road
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TOTAL

DESCRIPTION

TOTAL is a complete integrated data base management system which performs all functions of data base maintenance, update, retrieval and data integrity at the host language level.

Data is structured in a logical and non-redundant manner in multi-file, multi-linkage, network structured environments. The requirements for both demand and batch processing are optimally served. Further, the system is continually self-optimizing, which eliminates both performance degradation and the requirement for periodic data base reorganization. As data requirements change, new data and data associations may be added without affecting the application programs.

The definition and structuring of the data base is defined in a Data Base Definition Language (DBDL) which provides for data independence down to the data element level. The application programs are insulated from their environment, such that changes of operating system, hardwaere, language, and new data will have little if any affect on operating application programs. These functions facilitate modular and evolutionary growth and expansion; eliminating conversion as a way of life.

All communication with the data base is accomplished by the programmer through the Data Manipulation Language (DML). Communication is fast, flexible, and secure. The DML is invoked by the host programmer at the CALL level. Powerful commands make complex data manipulation easy. Control functions monitor and virtually eliminate all error possibilities. The user programmer is presented only with the data segments that he requests.

Significant hardware enhancing features provide extremely fast performance while minimizing core storage and direct storage requirements. The system functions in any environment and provides the facility for processing in a direct (demand) environment or a batch serial mode. Facilities such as protection from Concurrent Updating, Dynamic Logging of Transactions, Automatic Data Base Recovery and Restoration are provided for processing in dynamic environments.

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SON OF STOPGAP (SOS) (DECUS NO. 10-16)

Stephen Saultsky, Stanford Artificial Intelligence Laboratory, Stanford University, Stanford, California

STOPGAP is a teletype-oriented text editor. SON OF STOPGAP?, known to the PDP-10 as SOS, is an augmented version which includes text-justifying commands, extended string searching of all commands, and includes other features such as optional suppression of line numbers on output.

Source Language: FAIL

Object and Source files on DECtape
write-up with no listing

DDT (DECUS NO. 10-18)

W. Weiher, Stanford Artificial Intelligence Laboratory, Stanford University, Stanford, California

This is an improved version of the DEC DDT with modifications to handle block structured symbol table output by FAIL. Other new features are added.

Source Language: FAIL

Available: Source file on DECtape, write-up
listing at a handling charge of $5.00
GRAPHICS

PLOT-10/TCS

DESCRIPTION

PLOT-10/Terminal Control System is designed to make the terminal as easy to use as a pencil and piece of paper. The tedious programming and general I/O handling are contained within PLOT-10/Terminal Control System. The modules communicate with each other primarily through the terminal status area. A set of common variables representing the current state of the terminal are maintained to generate output according to the user's current level of usage.

PLOT-10/FORTRAN 11

DESCRIPTION

The PLOT-10/FORTRAN 11 subroutine software package is an extensive set of FORTRAN routines to facilitate use of the Tektronix 4010 Computer Display Terminal. By using PLOT-10/FORTRAN software, the 4010 becomes a powerful tool for accomplishing computer graphics. The FORTRAN 11 timesharing package is available today on many timesharing computer systems throughout the U.S., allowing the user to easily adapt his systems to use the 4010 terminal in a graphics environment. Customers using timesharing systems with business applications can easily adapt their output to a graphic form by using FORTRAN 11 software. Under software control, you can perform windowing, rotation, and magnification. Flexible conventions allow windowing to be accomplished either by coordinate definition within a program or by using the built-in thumbwheel-controlled crosshair cursor upon visual inspection of a plot.

PLOT-10/ADVANCED GRAPHICS

DESCRIPTION

All PLOT-10 Advanced Graphing modules are written in FORTRAN IV and designed to generate a variety of common plots, as well as some specialized graphs, without involving the user in the programming details.
PLOT-10/Advanced Graphing software can interface with other software products offered by Tektronix.

A set of 20 easy-to-use graphing subroutines are available for pictorial representation of various kinds of data. With an appropriate choice of a routine, it is possible to draw single as well as multiple curve graphs with automatic or user-specified scaling of data in any of the four popular coordinate systems; cartesian, semi-log, log-log and polar.

GRAPH AND TITLE

For more sophisticated needs, the PLOT-10/Advanced Graphing subroutines called GRAPH and TITLE are powerful and versatile tools for drawing well-annotated multiple graphs on the same screen.

SPECIALIZED GRAPHING

Subroutines are also available for generation of polynominal fits, function plots, bode plots, histograms, pie charts, time series plots, and stock market plots, etc.

With the use of Tektronix 4010 Computer Display Terminals and the PLOT-10/Advanced Graphing software, the computer user can increase the usefulness of his output by viewing it in the form of graphs, immediately ready for use in making decisions.

DOCUMENTATION

PLOT-10/Advanced Graphing software is thoroughly documented with User's and Systems Reference Manuals complete with implementation procedures for your system.

For more information on how easily PLOT-10/Advanced Graphing software can interface to your applications, please contact your nearest Tektronix Applications Engineer or write to address below.

STATUS: Running on the DECsystem-10 (all models).

Tektronix User's Library
P. O. Box 500
Beaverton, Oregon 97005
The Harvard Business School package described in the following pages consists of two parts: general purpose program packages for statistical analysis, management simulation, etc., and a number of special purpose programs designed for specific case exercises.

These packages currently are being made available through joint efforts of the Harvard Business School and Digital Equipment Corporation.

For the present: contact DECsystem-10 Marketing for details on their availability and distribution.
AOD COLLECTION

For any data base which can be represented as a set of observations on a set of variables, the AOD collection consists of programs for processing and analyzing the data. The analytical programs provide facilities for obtaining various descriptions of the data in the form of cross-tabulations, frequency distributions, and lists for transforming the data; for running regressions, examining residuals, and making probabilistic forecasts based on a regression model; and for factor analyzing a set of data. The data processing programs allow the data bases to be stored in compact form (several variables to a single computer word), permit variables to be labelled, missing-value codes to be assigned, and work files to be extracted from the compactly stored data base. Additional data processing and analysis routines are being added to the collection as the need arises.

The programs are essentially self documented, in the sense that the user may obtain a complete description of what to do at any stage simply by typing a question mark when an input is demanded by the program. They serve to introduce first-year students to our set of canned program packages, and are subsequently used in the first year to provide students with hands-on experience in regression analysis, and to aid in forecasting and data analysis on various sets of data, including the data generated as output of the business game.

At the other end of the spectrum the programs are used by doctoral students and faculty researchers engaged in major research projects. One faculty member has performed extensive on-line analysis on a data base containing more than one million words of data; it should be noted that prior to this project he had never had anything to do with a computer.
MANECON COLLECTION

This program collection was written to facilitate the analysis of problems of decision under uncertainty. Part of the collection consists of a number of self-contained programs for interactive assessment of judgmental probability distributions and preference (utility) functions. Another part consists of self-contained programs which provide solutions for certain typical Bayesian statistical problems. Finally, the collection contains a number of subroutines and functions intended to facilitate the writing of special programs for analysis of decision problems whose diagrams are too complex to be conveniently analyzed by use of a general-purpose interactive program.

The self-contained, assessment programs are used by first-year students to obtain probability distributions and preference functions consistent with their own feelings about uncertainty and risk; and the general-purpose functions and subroutines are incorporated in programs which analyze cases, are used by researchers in the analysis of complex decision problems, and serve as part of the general software for other packages, including the AQD package.

The programs are fully documented in Robert Schlaifer's *Computer Programs for Elementary Decision Analysis*, Division of Research, Harvard Business School, 1971
CONVERSATIONAL LINEAR PROGRAMMING PACKAGE

This package permits non-mathematically oriented users to concentrate on the formulation of linear programming problems and on the interpretation of their solutions, and to learn about the power, scope, and limitations of these techniques while treating the underlying methodology as a "black box". The user can in a very easy way interrogate a solution, perform a variety of sensitivity analyses, and examine the manner in which solutions change as some of the parameters are varied. Data can be input under the control of a program which prompts the user and permits him to alter or correct his formulation of the problem. All outputs are labelled so as to have an intelligible economic interpretation; interpretations which depend on an understanding of the mathematics of linear programming are suppressed.

This package serves both to introduce the novice to the subject, and to permit the methodology of linear programming to be explored in greater depth by more advanced users.
SIMPAK

This package of computer programs and subroutines is designed to facilitate the Monte Carlo simulation of business decision problems, especially those of a "planning" nature, i.e., problems having consequences which range for a number of years into the future.

In problems of this sort, the analyst must decide which of the variables which affect the consequences of any decision he wishes to represent deterministically. He must then specify how the variables are to be combined to represent the situation being modeled. Further he must supply values of those variables which are to be modeled deterministically, and probability distributions for those which are to be modeled probabilistically; for the latter, he must specify any probabilistic dependencies which may exist among such variables.

In order to run the simulation, certain "housekeeping" chores must be performed. These include reading in the data, drawing random numbers, relating these to probability distributions so that appropriate random values are selected, computing the net present value of cash flows, keeping track of results that are to be reported, computing summary measures of resultant probability distributions, and printing out:

-Details of the probability distributions of a few output variables of great interest, including a complete description of the distribution of the net present value of the project, the so-called "risk profile".
-Summary measures of a number of variables on a year-by-year basis. These summaries provide additional insight to the decision maker, as well as providing for the analyst a convenient way of checking out the reasonableness of his model.

SIMPAK contains subroutines that perform the simulation and housekeeping chores described above. Its availability allows the user to concentrate his attention on the heart of his problem - the specification of the model and the inputs it requires. Use of SIMPAK reduces the time needed to get a simulation model running, frequently to just a few hours. The package is written in BASIC.
The user must specify his problem in the form of a BASIC computer program, following a few simple conventions in the naming of his variables. The program which the user writes can be made to accomplish the various housekeeping tasks discussed above by having it call appropriate subroutines in the SIMPAK package. The package, along with a number of other programs useful in decision analysis, is documented in Computer Programs for the Analysis of Complex Decision Problems by Stanley I. Buchin, available from the Case Clearing House at Harvard Business School.
HARVARD MANAGEMENT SIMULATION TWO

HMS2 is an integrative time-shared management simulation which provides participants the opportunity to play the role of managing a corporation in a realistic, complex competitive environment.

The simulation has been designed to capture the key aspects of operating a modern business. Its market regions contain consumers with differing demographic characteristics to whom products are sold through a number of different channels of distribution; its production processes utilize both capital- and labor-intensive equipment; financing is available through short-term, long-term, or equity capital; the corporation can be organized in different ways; and the information system can be modified in accordance with the participants' needs and desires. HMS2 thus places participants in a situation in which goals must be set, strategies developed, decisions implemented, and, on the basis of the results which evolve from the actions of each corporation and its competitors, the participants can adjust and adapt their actions in light of developing circumstances.

To assist participants in formulating and carrying out their strategies, and in analyzing the results of previous decisions so as to modify future strategy, time-shared computer models are provided. Their intent is to aid participants in understanding the environment and in making the complex calculations required to plan and balance sales, production, and cash. A terminal-based program also permits each corporation to input its decisions into HMS2.

Participants typically are put into the position of taking over a going concern, for which previous operating history is available, and are expected to operate the business for eight to ten months, leaving it in a strong competitive position.

HMS2 has been designed for teams of from 12 to 16 participants. Thus the simulation offers a challenge not only in formulating strategies and integrating cognitive knowledge of the functional fields of business, but of carrying out plans in an inter-personal, task-orientated setting.

The simulation is run in the first year, and occupies an entire week of each student's time. A number of other general management simulations are also available; students in the executive programs and in the doctoral program are usually exposed to at least one of these.
HARVARD BUSINESS SCHOOL
(Finance Programs)

BOSPAT

Program generates pro forma financial statements to help provide a realistic planning vehicle. User inputs estimates of revenue and information on accounting policy in response to computer's questioning.

Case: Boston Patriots
ICH 6C 13
EA-C 488R

Language: FORTRAN

CLARKSON

Program calculates pro forma income statements and balance sheets to observe the effects of a variety of financial assumptions. Program is non-interactive.

Case: Clarkson Lumber Company
ICH DCIF 34
F 701

Language: BASIC

CONTEL

This program can be used to examine the effects of a variety of financial policies by varying inputted data on capital structure. Output is generated on income data and financing quantities. Program is non-interactive.

Case: Consolidated Telephone Co. (A) and (B)
ICH 5F6 PM 371
ICH 5F7R 372R4

Language: BASIC
IBMCSH2

Program allows analyst to estimate IBM's cash profile from 1966 through 1970 as a function of its leasing activity with the System/360 series.

Key variables are total value of industry shipments, annual estimates of IBM's market share, and estimates of IBM's lease-to-sales ratio. These are entered during execution.

Case: Note: Computer Leasing Industry
      EA-F 308R2

Language: FORTRAN

COMCSH2

Program generates pro forma cash flow tables and computes internal rate of return on equity (on a discounted cash flow basis) under various sets of assumptions.

Key variables specified by user during execution are: annual increase in discount percentage offered lessees, number of years equipment remains out on lease, sale price of equipment when sold, percentage of debt leverage in capital structure, and effective rate of interest charged on debt.

Case: Compulease Corp. (A)
      EA-F 309R2

Language: FORTRAN

COMERN2

Program generates pro forma statements of earnings of firm as reported to stockholders to show the impact of management decisions.

Inputs are the same as COMCSH2 with the addition of depreciation policy information, and are also entered interactively.

Case: Compulease Corp. (A)
      EA-F 309R2

Language: FORTRAN
COMGRO

This program aids in the projection of the year-by-year earnings per share of a hypothetical computer leasing company.

In response to questions, user specifies the volume of computer purchases for a year and the price-earnings ratio at the start of that year. The interrelationships between those two factors and the growth in earnings per share each year can thus be examined.

Case: Compusease Corp. (B)  
EA-F 310R2

Language: BASIC

CONGLM

This program calculates the size of acquisitions necessary if a conglomerate without internal growth is to maintain a specific annual growth rate in e.p.s. by acquiring for common stock companies with lower price-earnings ratios.

User enters interactively the percentage growth in e.p.s. desired and the multiple of earnings he is willing to pay for the acquired companies.

Case: Compusease Corp. (B)  
EA-F 310R2

Language: BASIC

TEXAS

Program prepares pro forma income statements and portions of balance sheets under a variety of financing assumptions. User enters data during execution.

Case: Texas Northern Electric Co. 
ICH 5F38R  
EA-F 236

Language: BASIC
HARVARD BUSINESS SCHOOL

TEXAS2

Given a yearly target capital structure, this program computes pro forma income statement and balance sheet data. The input for capital structure may be made either constant or variable over the five-year period. Data is entered and modified by means of data statements.

Case: Texas Northern Electric Co.
ICH 5F38R
EA-F 236

Language: BASIC

TEXREG

TEXREG is a data bank manipulator performing multiple linear regression with options of 22 transformations and a plot or print display. It is a modification of the JESSUP 1 program. Data stored in the data statements of this version is taken from the Texas Northern Electric Company case. Information supplied by user is entered in response to program's query.

Language: BASIC

TEXREG2

This is a non-interactive version of TEXREG. The program has all the features of TEXREG except there is neither a restore transformation nor a plot option.

Language: BASIC

UPSTATE

Program prepares yearly pro forma profit projections, computes minimum income bond retirement schedule, and calculates owner's salary plus bonus. Program is useful for computing sensitivity of each to sales levels above or below forecasts. Data is entered during execution.

Case: Upstate Tanning Co., Inc.
ICH 2F11R
EA-F 179
HARVARD BUSINESS SCHOOL

Language:  Basic

TWACSH

Program outputs selected financial projections based on assumptions about financial policy supplied by the user during execution. It is used to help in making a decision about the timing and mix of securities to issue in a four-year period.

Case:  Trans World Airlines (B)
        EA-F 329

Language:  BASIC

AIRLIN

This program is designed to aid in decisions on equipment additions. Given data during execution on growth in passenger traffic and seat expansion for TWA and competitors (estimated), the computer calculates projections of market share, equipment investment and pre-tax profit.

Case:  Trans World Airlines (A)
        Note:  Competition among the U. S. Carriers
        EA-F 327

Language:  BASIC
PLANETS

PLANETS is a project management exercise which simulates the progress of a 5½ month development project. Successful completion of the project requires careful planning and scheduling of a variety of interrelated activities under severe time and cost constraints.

Case: Planning and Network simulation
      EA-P 438R

Language: FORTRAN

INV3

Computer calculates the inventory costs associated with a range of EOQ-reorder point combinations specified by the user to aid in decisions on inventory management under uncertain conditions.

Inputs required consist of cost data and time horizon information in the case and values calculated by the user for average demand per day, expected demand during lead time, and expected stockout during lead time for reorder points 0, 1, 2, 3, and 4. Data is entered in response to program's questions.

Case: Ace Welding Equipment, Inc.
      EA-P 457

Language: BASIC

INV4

Computer calculates inventory costs associated with a range of EOQ-reorder point combinations to aid in decisions on inventory management under uncertain conditions.

This program is a non-interactive version of the INV3 program.

Case: Ace Welding Equipment, Inc.
      EA-P 457

Language: BASIC
INVPOI
Program simulates the situation in the case to demonstrate the effects of inventory control policies. Decision rule and retail sales function may be altered to observe the impact. Program is interactive.
Case: Inventory Control Policies
   EA-P 375R
Language: FORTRAN

IPSIM
This is the INVPOI program with cost and revenue information built into it. Output includes an income statement showing revenues, costs, and profits. Program is interactive.
Case: Inventory Control Policies
   EA-P 375R
Language: FORTRAN

WEYBRN
Program allows the user to examine the effect of various methods of depreciation and the effect of delaying the machine - purchase decisions on net present value and internal rate of return for each of two alternative processes. Data is entered through data statements.
Case: Weyburn Wax
Language: BASIC

XHBSQ
XHBSZ
Program is an accounting practice set. Computer accepts transactions by user and calculates new statements for appropriate account on balance sheet or income statement. Each program reflects values from a different year's balance sheet for Student Stores. Program is interactive.
Case: Student Stores, Inc. (A) (B) (C)
EA-C 832
EA-C 833
EA-C 834

Language: BASIC
HARVARD BUSINESS SCHOOL
(Management Science I (Probability Models))

TEXTRIM

TEXTRIM uses a finite-population, multiple-server queuing model rather than a simulation technique to generate expected costs for alternative policies on machine rental and utilization.

Case: Textrim Company
IA 1168R

Language: BASIC

MIDTERM

Program employs a Monte Carlo simulation to compare alternative hull insurance policies for a trunk airline introducing 747s. The outputs are risk profiles for the alternative policies and the number of times each policy is preferred. Program is non-interactive.
JESSUP

JESSUP is a data bank manipulator performing multiple linear regression with options of 22 transformations and a plot or print display.

Data stored in the data statements of this program is taken from the case J. L. Jessup & Sons -ICH 9046 EA-C 598.

Language: BASIC
HARVARD BUSINESS SCHOOL
(Models for Planning Under Uncertainty)

MINMAD

The program is designed to project Minute Maid’s profit from frozen concentrate as a function of various environmental factors (e.g., crop size) and various decision variables (e.g., wholesale price differential). These are entered by means of data statements.

Case: Minute Maid Corp. (B)
ICH 13G 292 AI 257R2

Language: BASIC

FLEMIN

Program generates pro forma income and cash flow statements under varying assumptions about market and costs. Single-valued forecasts for industry demand growth per year, market share growth per year, final year’s (1971) price per ton, and cost growth per year are inputted through data statements.

Case: Fleming Chemical Co.
C 41R

Language: BASIC

FLMING

Program generates pro forma income and cash flow statements under conditions of probabilistic forecasts. The following are generated by Monte Carlo simulation within ranges specified by user: industry demand growth per year, market share growth per year, 1971 price per ton, and cost growth per year. Program is non-interactive.

Case: Fleming Chemical Co.
C 41R

Language: BASIC
HARVARD BUSINESS SCHOOL  
(Business Policy, Merc II)

HEUBLEIN

Program assists in the development of a simple gap analysis for planning. Based on current trends and present sales volume in seven product areas, the user develops growth rate forecasts. Given maximum, minimum and expected growth rates for the product areas, the computer calculates the future sales profile of the company and the gap between those results and the stated goals of management. Program is interactive.

Case: Heublein, Inc. (A)  
ICH 13G 125 BP 858R3

Language: BASIC

HAMMS

This program allows the user to examine the financial impact of the proposed merger between Heublein, Inc., and Hamm Brewery. It aids as well in the analysis of the future strategy for the acquired company if the acquisition were to be completed. The program contains a set of assumptions regarding such items as growth rates for the two companies, margins, ratio of assets to sales, etc. The user can accept these assumptions or adapt them through interactive questioning without any programming changes for additional pro forma calculations. In addition, the program is equipped for the insertion of subjective probability distributions for use as a simulation model.

Case: Heublein, Inc. (B)  
ICH 13G 126 BP 859R2

Language: BASIC

MOONEY3

The computer model is designed to help analyze the financial consequences of various assumptions about the future performance of the Mooney Aircraft Company. Initial assumptions have been made for all required inputs. The computer program allows the user to be selective about changes in assumptions and output options during execution. In addition, the program allows uncertainty to be introduced into estimates for future sales of each of the two product
lines and for R&D expenditures. With uncertainties introduced, the program can be run as a simulation model. The case offers wide latitude for discussion of the role of uncertainty in business decision, the problems of financial evaluation and the role of interdependencies among predicted results.

Case: Mooney Aircraft, Inc.
BP 935

Language: BASIC
TST4JR

Program is designed to calculate the rate of return to the investor from the purchase and sale of real estate property. As currently written, it cannot handle buildings to be constructed or building improvements depreciated on a different basis than the original building. Program is non-interactive.

A series of four general purpose subroutines is also available:

DEPREL calculates (for each year) the depreciation expense, beginning of year book value, and cumulative difference between accelerated and straight line depreciation for any building with a life from 1 to 40 years.

FSTMTG calculates (for each year) the beginning of year principal outstanding on a first mortgage, interest cost of the mortgage, and amortization of the mortgage. Level payment mortgages amortized at any rate up to 30% can be handled by this subroutine. Payments are made annually.

RECAPT calculates all the Federal taxes which are payable on the sale of a property for more than its book value. The recapture of accelerated depreciation is included in the calculation.

PRVAL2 computes the internal rate of return of up to 40 annual cash flows and up to 41 beginning-of-year lump sum cash payments. The annual flows are assumed to be equal daily payments.

Language: FORTRAN
KINGC.F4

This program is a model of King Charles County which permits manipulation of the stored data. Operations fall into two groups: those which permit user to make changes and display the results, and those which permit user to store and retrieve cumulative sets of decisions. Forty-six decision variables exist for experimentation.

King Charles County Model simulates, for purposes of county planning, a county in southern Maryland.

Case:  King Charles County Model
EA-R 572

Language:  FORTRAN
HARVARD BUSINESS SCHOOL
(Introductory Programs)

SORTER

Program orders any number of accounts from largest to smallest.
Language: BASIC

MATH

Program demonstrates two very simple programs written in BASIC
which perform arithmetic computation.
Language: BASIC

VALUE

Program calculates the value of an annuity with payment each year.
User specifies the number of payments to be received, the value of
each, and the interest rate.
Language: BASIC

TICTAC

Program plays game of tic-tac-toe with user.
Language: BASIC

DOMINO

Program plays the game of craps with user.
Language: BASIC

BANDIT

Program simulates a slot machine which user may play.
Language: BASIC
INGAME

This program is a game in which each participant is to select a set of inventory ordering rules which will produce the least inventory carrying cost in the replenishment of his company's field warehouse stocks from a centralized inventory. Computer generates actual units of demand and calculates inventory levels (by day) and costs of carrying inventory, ordering, and running out of inventory under the specified policy. User enters data in response to questions.

PRFORM

Program generates pro forma balance sheet and income statement for a maximum of five periods. Balance sheet data is entered non-interactively.

NPV

This program computes the net present value and internal rate of return for a cash stream.

Case: Frontier Rubber Company
ICH 4F 68R EA-F 205R

Language: BASIC

BANK

This program calculates the accumulated value resulting from a sequence of cash flows (as specified in statements 1000 and following), given any interest rate and initial flow. By changing the values for the cash flow sequence, interest rate and/or the initial flow, the following may be obtained with one or more trials: (1) Accumulated value, (2) present value, (3) equivalent annual flow, and (4) internal rate of return.

The program provides a printout of the beginning amount, interest earned during the period, cash flow occurring (at the end of the period), and the ending amount. At the option of the user, this
may be suppressed and only the accumulated value at the end of the last period will be printed.

Language: BASIC

CSHFLO

This is a general program which calculates the present values of up to four alternative cash flows for a given cost of capital. Up to 120 lump sum payments plus the zero year payment can be considered. All flows are assumed to occur at the end of a period. Program also computes the smallest positive rate of return for each alternative (i.e., that rate which yields a present value of zero). User enters data during execution.

Language: BASIC

CORPMOD

This is a general program which prepares pro forma income statements, balance sheets and funds flow statements for up to 10 periods. It determines a plug figure to indicate financing requirements. Program is non-interactive.

Language: BASIC

EBIT

EBIT is a general program which allows user to compute EBIT charts for as many years as he wishes. User enters during execution the tax rate, shares outstanding under debt and stock options, interest rate, dollar value of debt if issued, debt repayment per year, the per share dividend, and the low, expected and high EBIT for each year. Output then presents a debt-stock profile of the firm for each of the low, expected and high EBITS for each of the years he has requested. In a crude cash-flow form, program allows for marginal debt, computes the adjusted interest rate based on repayment, and calculates the earnings per share.

Language: BASIC
LINPRO1

LINPRO1 uses the two-phase Simplex method in solving linear programming problems. Up to 30 constraints and 61 variables (including slacks, surpluses and artificials) are allowed. The program permits maximization or minimization of the objective function, generates slack, surplus, and artificial variables, and calculates the possible reduction and possible increase for the right-hand side ranges. Program is non-interactive.

Language: BASIC

FIPAC

From the estimates of various expenditures for a period, FIPAC computes a series of financial data which are useful in appraising projects and projecting cash flow. Subroutines are available to compute depreciation schedules for stockholders and tax accounts, net present value, and internal rate of return. Data is entered by card or by subroutine.

PV

Program computes the present value of a time series. Given a list of the future values in order by period, the routine prepares a similar discounted list using the present value factor \( \frac{1}{(1 + i)^n} \) and sums this list to find the NPV. PV can work with time series that are compounded several times yearly if desired. Outputs include the present value factor, the adjusted time series and the sum of the series. Program is interactive.

TRANS

This is a program for solving linear allocation problems which have been formulated in the transportation format. It can accommodate problems having a total of up to 24 sources and destinations. Data on supplies, demand, and costs is entered by means of data statements.
KOEHR

The program calculates pro-forma statements (income, balance sheet) for three periods. Both the long form and a short version (calculates PAF, Retained Earnings, Cash, AR, AP, Inventory and Short-term debt) are available for use in conjunction with the Koehring Company finance case.

Case: Finance
ICH 9F98

Language: BASIC

FINSTRA

The program FINSTAT is a shorter version of the CORPMOD program that is written for use with cathode ray tube displays. It prepares pro-forma income statements, balance sheets, and funds flow statements for up to ten periods (in two five period increments on a teletype) using plug-in figures for finance requirements.

Case: Finance

Language: BASIC

DEPREC

The program calculates annual depreciation charge and remaining balance for straight line, sum-of-years digit, or double declining balance depreciation methods.

Case: Finance

Language: BASIC

BAGEL

The program prepares financial profiles of the individual units and/or the parent corporation for the Lox-O-Bagels case.

Case: Finance
ICH

Language: BASIC
HYBRID SYSTEMS

HMOS—HYBRID MONITOR OPERATING SYSTEM

DESCRIPTION

HMOS is an executive routine embedded in the DEC PDP-10 multi-
programming monitor and permits timeshared usage at the macro
language level of an EAI-680 analog computer linked to the
PDP-10 by an EAI-693 interface. HMOS provides the macro pro-
gramer with a higher level hybrid instruction set removing the
user from the idiosyncracies of the hardware. HMOS handles
timing considerations and continuously checks the hardware for
operational malfunctions.

STATUS

Running on PDP-10. Being developed on PDP-10.

LANGUAGE

MACRO-10

William J. Page
Hybrid Computer Laboratory
Penn State
Electrical Engineering West
University Park, Pa. 16802
HYBRID SYSTEMS

HFOS--HYBRID FORTRAN OPERATING SYSTEM

DESCRIPTION

HFOS consists of two sets of routines. A user level hybrid FORTRAN executive package and a set of FORTRAN callable hybrid operation routines. The subroutines perform specific hybrid functions by communicating with the executive package for operational control and with HMOS for actual execution of the function. This arrangement allows HFOS to extend the variability of the FORTRAN "CALL" statement and hybrid debugging and error handling capability. HFOS subroutines will accept virtually any argument type as in standard FORTRAN and need not maintain an argument convention within a single "CALL" or in successive "CALL"s. Error diagnostics from programming errors, hybrid operation errors and component checks may be passed to the program for processing. Facilities of HFOS are program controllable and may be in effect for entire routines or for any segment as determined by the user. HFOS has over 40 subroutines and is analog machine independent.

STATUS

Running on PDP-10

LANGUAGE

MACRO-10

William J. Page
Hybrid Computer Laboratory
Penn State
Electrical Engineering West
University Park, Pa. 16802
IOSUBS

DESCRIPTION

IOSUBS is a collection of device independent FORTRAN (and MACRO-10) callable input/output support routines which enable access to all PDP-10 files. IOSUBS supports OPEN, CLOSE, READ, and WRITE, and allows FORTRAN programs to handle data from files lacking the standard control words. The user calls IOSUBS supplying an array which contains data to be written, or an array to receive data on a read, and control is returned after the function is complete. Up to 16 independent files may be concurrently accessed, since buffer allocation is handled dynamically. An entry point is also provided to decode a character string of the standard form: dev: filename apt (user number) for specifying the required user file.

STATUS

Running on a PDP-10

LANGUAGE

MACRO-10

Henry P. Semmelhack
Comptek Research, Inc.
4548 Main Street
Buffalo, New York 14226
APL

APL Software Systems has developed an APL for the DECsystem-10 computer. There are two systems available: a basic system and an extended system.

The basic system is nearly identical to the APL system described in Sandra Pakin's APL/360 Reference Manual. The differences are mainly due to the dissimilarities between the DECsystem-10 and the 360. Hence, the format of some system commands is different. However, there have been no changes to the APL language, except to extend it.

The major extensions are:

1. Encode, decode and catenation may be applied to arrays.
2. A branch can occur anywhere in a statement line.
3. The last immediate line typed may be edited.
4. The symbol table size is variable.
5. The workspace size is dynamically variable, so the user automatically uses only as much core as is necessary at any given time.
6. A teletype system is supported, allowing the use of terminals which do not have an APL character set.

The extended system includes everything in the basic system plus:

1. The divide-quad operator which can solve a set of linear equations, take the inverse of a matrix, or solve an overdetermined set of linear equations using a least-squares fit.
2. An execute operator that will evaluate any APL character string (including system commands and function definitions).
3. A quote operator that will convert numeric data into character data. It can also be used to obtain the character string equivalent of a user-defined function.
4. A file system which allows the user to read and write three different types of files:
   a. Standard ASCII sequential files.
   b. Internal format random access files.
   c. Internal format sequential files.
All the code of both systems is completely sharable and resides in the DECsystem-10 high segment. Each user's low segment contains about 1500 words of system variables plus the user's workspace. The high segment size is 19K words (36-bit words) for the basic system and 23K words for the extended system. If the monitor takes 25K and APL is run on a 64K machine, workspaces can be as large as 19K words under the basic system. A 19K word workspace is equivalent to a 76K byte workspace in the APL/360 system.

APL Software Systems, Inc.
Box 7108
Pittsburgh, Pennsylvania 15213
(412) 683-9113
APT

An APT processor for programming numerically controlled machine tools is available for the DECSYSTEM-10 (all models).

The current UNIAAPT implementation does not include two little-used features of ITRI APT version 3.9: ruled surfaces (used only by Aerospace) and tool access normal (5 axis technique). They will be implemented on demand.

Over 100 post-processors for specific machine tools are also available. Other post-processors will be developed on demand.

UNIAAPT implementations are also available for the PDP-8/I, E, L as well as computers of other Manufacturers.

United Computing Corp.
22500 South Avalon Blvd.
Carson, California 90745
(213) 830-7720
NOMAC

DESCRIPTION

NOMAC is a MACRO Assembler which runs on a PDP-10 and assembles NOVA (Data General Corporation) programs. MACROS and nested expressions are supported, and the object file is both NOVA loadable and NOVASM compatible.

STATUS

Running on PDP-10

LANGUAGE

MACRO-10

Henry P. Semmelhack
Comptek Research, Inc.
4548 Main Street
Buffalo, New York 14226
LANGUAGES

NELIAC

DESCRIPTION

Compiler for NELIAC language

NELIAC is a form of ALGOL 58 and is rather more powerful than FORTRAN. Compilation is extremely efficient. NELIAC is suitable for writing software.

STATUS

Running, development continuing.

T. Ashby
British European Airways
Cavendish Avenue
South Ruislip
Middlesex, England
LIBNEL

DESCRIPTION

Library of NELIAC input and output procedures. Very flexible system.

STATUS

Running, development continuing.

LANGUAGE

NELIAC and MACRO-10

T. Ashby
British European Airways
Cavendish Avenue
South Ruislip
Middlesex, England
LANGUAGES

POP-2

POP-2 is an extremely powerful and truly conversational language. Its open-ended modular design allows the user to handle and interact with the most complex logical problems. Because of POP-2's unique structure handling facilities, problems involving, for example, complicated structures and the relationships between them can be handled with comparative ease and great flexibility. This makes POP-2 particularly useful as a research and development tool.

Conversational Software, Ltd.
5 Hope Park Square
Meadow Lane
Edinburgh EH8 9NW
Scotland
Telephone 031 667 7331
MATHEMATICAL

IAM--INTERACTIVE ALGEBRAIC MANIPULATION SYSTEM

DESCRIPTION

A self-contained system operating within the PDP-10 TSS monitor. Features include conversational mode of operation, stored program facility, resource allocation, and simplicity of use. The mathematical capabilities include symbolic differentiation, integration of rational functions, factorization of polynomials, powerful substitution facilities, automatic and user controlled simplification of expressions, expansion and simplification of rational functions of polynomials, manipulation of equations in many variables, and a facility for adding user defined operations.

STATUS

Running on PDP-10.

Burton Wheelock
Mass. Computer Associates/
Division of Applied Data
Research, Inc.
10 Lakeside Office Park
Wakefield, Massachusetts 01880
SPARSE -- A SPARSE MATRIX INVERSION PACKAGE

DESCRIPTION

SPARSE is a set of subroutines for inverting matrices which conserves core by not saving zero elements in the matrix. The price for the sources, program listing and manual is $2,000.

Dr. Peter Green
Environmental Computing, Inc.
21 George Street
Lowell, Massachusetts 01852
MIFIL

DESCRIPTION

MIFIL is a computer program that designs 3 of the most commonly used bandpass microwave filters: waveguide, combline and interdigital. It is interactive and presently available for $4,000.

Dr. Peter Green
Environmental Computing, Inc.
21 George Street
Lowell, Massachusetts 01852
AMCAP—ADVANCED MICROWAVE CIRCUIT ANALYSIS PROGRAM

DESCRIPTION

AMCAP (Advanced Microwave Circuit Analysis Program) — is used by Microwave Engineers to analyze their components and systems. The engineer can describe his microwave circuit, be it a simple filter, or the feed system for a phased array antenna and obtain data and plots on such characteristics as VSWR and transmission loss. He can include fringing capacitance and cross coupling and can also alter component values to determine the effect of tolerances. It is fully interactive, and is currently available for $6,000.

STATUS

Running on the PDP-10.

LANGUAGE

FORTRAN

Dr. Peter C. Green
Environmental Computing, Inc.
21 George Street
Lowell, Massachusetts 01852
MINICOMPUTER SIMULATION

MIMIC

DESCRIPTION

MIMIC, a proprietary software product of Applied Data Research, Inc., is a PDP-10 based small computer program development system that supports users of the PDP-8 family, PDP-11/05, PDP-11/15, PDP-11/20 and PDP-15. The system consists of text editors, assemblers, simulators and a debugging package and allows small computer users to perform all phases of program development on the PDP-10. When transfer of source and object programs to the actual small computer occurs, there is no conversion of these programs since compatibility with DEC's specifications is maintained in every system component.

The main text editor is entitled SOS, but other editors such as TECO are acceptable for preparation of program source files and documentation. SOS is a line-oriented editor which has such features as intra-line editing, transfer of contiguous lines of text from one portion of the edited file to another or from an entirely different file to the file currently being edited, text justification, resequencing of source lines, and search and substitute capabilities.

Each small computer has its own assembler: PALIOM for the PDP-8 family, PALX11 for the PDP-11, and MAX15 for the PDP-15. The assembler reference manuals provided with each of the computers serve adequately as guides when preparing source programs for the above assemblers. In addition to supporting features described in these manuals, the assemblers also provide cross-reference listings and macro definitions.

The debugging package commands, which are the same for all small computers, allow the user access, control and repeatability during program simulation without usurping user core space. These commands enable the user to 1) examine and modify the contents of all memory devices and all registers of the central processing units and peripheral devices, 2) set an unlimited number of breakpoints, 3) save and restore the state of the simulated small computer and 4) stop simulation, examine and possibly alter the state of the machine, and continue simulation.
MINICOMPUTER SIMULATION

The devices currently simulated for the respective machines are:

PDP-8 family: Teletype keyboard and printer, high-speed paper tape reader and punch, extended arithmetic element, analog-to-digital converter (not for PDP-8/E), DECtape, DF32 fixed head disk, RF08 fixed head disk, line frequency clock, power fail option and memory expandable from 4-32K 12-bit words.

PDP-11 family: Teletype keyboard and printer, high-speed paper tape reader and punch, line frequency clock, RF11/RS11 fixed head disk, DM-11 line multiplexor, and memory expandable from 8-56K bytes.

PDP-15: Teletype keyboard and printer, high-speed paper tape reader and punch, line frequency clock, extended arithmetic element, RF15/RF09 fixed head disk, and memory expandable from 4-32 16-bit words.

From these lists the user can select devices and thus configure a simulator to match his actual hardware environment. Each device's timing is simulated accurately (as described in DEC-provided hardware documentation), and the simulation of interrupt-driven programs can be performed with no interference from the debugging package.

Marilyn Ressler,
MIMIC Product Manager
Control Systems Division
Applied Data Research, Inc.
Route 206 Center
Princeton, New Jersey 08540
(609) 921-8550
MINICOMPUTER SIMULATION

NOVASM

DESCRIPTION

NOVASM is a PDP-10 program written in MACRO-10 and FORTRAN which simulates the Data General Corporation Nova Computer, including I/O and interrupts. An extremely powerful debugger is included which allows an unlimited number of breakpoints, including data breakpoints, single step execution, jump step execution (execute until a jump or jump to subroutine instruction is executed). All NOVA registers and memory are available for display on the user's teletype in decimal, octal, or symbolic mode. A range of protected memory may also be set up to prevent inadvertent modification of NOVA core. All basic NOVA I/O devices are supported, via simulation, on any PDP-10 device and nonstandard NOVA device routines may be written by the user in FORTRAN.

STATUS

Running on PDP-10

LANGUAGE

MACRO-10, FORTRAN

Henry P. Semmelhack
Comptek Research, Inc.
4548 Main Street
Buffalo, New York 14226
REPORT GENERATOR

RPG-10

DESCRIPTION

The CODON RPG system is a data processing system which allows a user to create, maintain, and update sequential data files. These files are termed either input files or output files depending upon how they are used. An input file supplies information to the user program for processing. The user program processes the input data, producing more data for output. The output data is saved in an output file as it is produced by the user program. An output file may be in the same format as an input file. This allows the output file to be processed as an input file at some later time. Alternatively, the information in an output file may be organized in the form of a printed report or a series invoice or paycheck.

The RPG system contains two system programs: (1) the Report Program Generator, called the RPG Compiler; (2) the Run-time Processor, called the RTP. The RPG compiler translates the user's source statements into an object program in binary format. When the user program is to be executed, the RTP and the object program are loaded into core. Then under control of the RTP the processing function desired by the user is performed. This function might be an operation such as producing an inventory status report or updating a DEC tape payroll file.

Steve Fish
CODON Corporation
Waltham, Massachusetts
(617) 891-1700
YARDSTICK

DESCRIPTION

YARDSTICK, written in BASIC for the DEC PDP-10 computer is designed to provide investors, potential investors, and time-shared computer center managers with projections of the profitability of the time-shared computer enterprise.

Based on estimated or actual figures, a 48-month projection of cash flow for the center is generated. An option allows all or only specific information about the time-shared center to be printed. This data includes projection of sales per user, sales and equipment loading for the center and the income from aged accounts receivables.

Hub Ratliff
3600 West Alabama
Houston, Texas 77027
(713) 622-1192
SIMULATION

BEATLES

DESCRIPTION

Library of NELIAC procedures forming a powerful and general discrete event simulation language.

STATUS

Running

LANGUAGE

NELIAC

PROGRAMS NEEDED

LIBNEL

T. Ashby
British European Airways
Cavendish Avenue
South Ruislip
Middlesex, England
SORT

DESCRIPTION
General Sort program for use with NELIAC files. Fixed and variable length records.

STATUS
Running on PDP-10

LANGUAGE
NELIAC

PROGRAMS NEEDED
LIBNEL

T. Ashby
British European Airways
Cavendish Avenue
South Ruislip
Middlesex, England