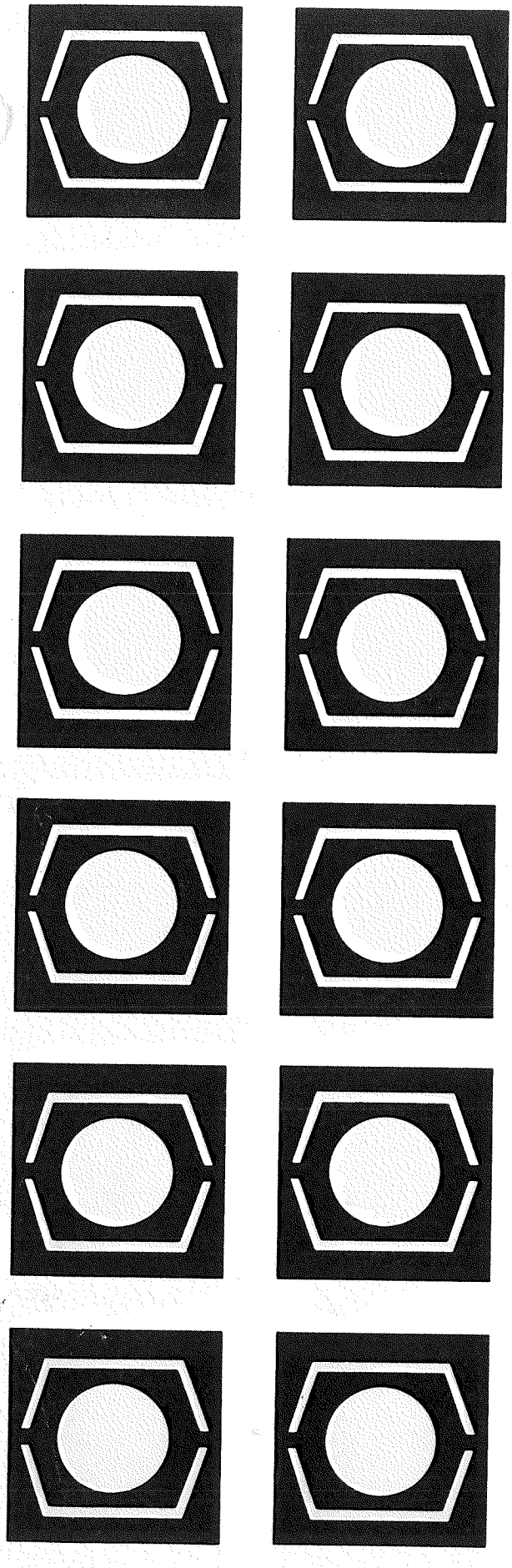

DECUS

PROGRAM LIBRARY CATALOG

DECUS PROGRAM LIBRARY

The DECUS Program Library contains programs for the PDP-5, PDP-6, PDP-7, PDP-8 family, PDP-9, PDP-10, LINC and LINC-8, and also a section containing programs that require FOCAL. Users interested in programs for the PDP-1 should contact the DECUS Program Librarian.

This catalog is divided into four major sections: Category Index, Programs Available from Authors, Programs for Sale or Lease, and Numerical Index with Abstracts.

The Numerical Index indicates what is available on the program and should be referenced when requesting programs. A sample request form follows. The programs in the Category Index are listed according to the following categories:

I.	Programming Language, Monitor, Programming System
II.	Text Editing, Text Manipulation
III.	Debugging, Disassembly, Simulation, Trace, Dump
IV.	Binary Loading, Binary Punching
V.	Duplication, Verification
VI.	Numerical Function, Numerical Input/Output
VII.	Utility
VIII.	Display
IX.	Data Management, Symbol Manipulation, Sorting
X.	Probability, Statistics, Curve Fitting
XI.	Scientific Application, Engineering Application
XII.	Hardware Control
XIII.	Game, Demonstration
XIV.	Plotting
XV.	Desk Calculator, Business Application
XVI.	Maintenance
XVII.	Miscellaneous

In the Category Index, programs are listed in each category grouped by computer line with FOCAL programs inserted at the end. The Numerical Index and Abstracts are divided into machine lines. New programs added to the Library will be published in a Monthly Newsletter which will also contain information on programs that are submitted for approval. Catalog addenda will be issued quarterly.

A DECUS Program Submittal Form and instructions are included in this catalog. All programs should be submitted with the necessary software for program operation to: DECUS Program Librarian, Digital Equipment Computer Users Society, 146 Main Street, Maynard, Massachusetts 01754. Additional forms may be obtained from the DECUS Office.

DECUS LIBRARY PROGRAM SUBMITTAL INFORMATION

Programs may be contributed to or requested by any DECUS member from the

DECUS Program Librarian
Digital Equipment Computer Users Society
146 Main Street
Maynard, Massachusetts 01754

PROGRAM SUBMISSION

Each Program should include the following:

1) Program Submittal Form (complete as possible)
2) Write-up - (existing documentation permissible):
   Contents: Full operating instructions; Program Description; References for mathematical techniques employed; Additional information pertinent to users.

   Format: Preferably typewritten or printed (black and white), for reproduction purposes. In general, write-ups will be reproduced without alteration.
3) Paper Tapes or DECtape*: Object (Binary) and Source (Symbolic).
   Cards (Source Deck)
   Label paper tapes with the following information:
   a) Program Title
   b) Subtitles (indicate various program subroutines)
   c) Tape Format, i.e., Binary or ASCII
   d) Starting Address
   e) Version Date

   *User-supplied DECtapes will be replaced by DECUS when required.

4) Listings and Flowcharts, whenever possible.

PROGRAM REVISIONS AND CORRECTIONS

Please include: New tapes; Write-up addendum indicating change; New Listings reflecting changes.

PROGRAM CATEGORIES (reference Submittal Form)

I. Programming Language, Monitor, Programming System
II. Text Editing, Text Manipulation
III. Debugging, Disassembly, Simulation, Trace, Dump
IV. Binary Loading, Binary Punching
V. Duplication, Verification
VI. Numerical Function, Numerical Input/Output
VII. Utility
VIII. Display
IX. Data Management, Symbol Manipulation, Sorting
X. Probability, Statistics, Curve Fitting
XI. Scientific Application, Engineering Application
XII. Hardware Control
XIII. Game, Demonstration
XIV. Plotting
XV. Desk Calculator, Business Application
XVI. Maintenance
XVII. Miscellaneous

The program will be announced in the Monthly Newsletter and Catalog Addendum. Information for the announcement will be extracted from this form.

DECUS welcomes your comments, criticisms and suggestions.

DECUS LIBRARY PROGRAM SUBMITTAL FORM

Submitted to the PDP-____ LINC-8____ Library
(Indicate computer(s) on which program may be run)

Title: _____

Author: _____ Date: _____

Submitted by: _____
(other than author)

Company: _____

Address: _____

Categories: _____
(reference "Program Categories")

Minimum Hardware Required: _____

_____

Other Programs or Subroutines Needed: _____

_____

Programming Language: _____

Storage Requirement: _____

Restrictions: _____

Execution Time: _____

Miscellaneous: _____

Abstract (purpose of program and short description): _____

_____

_____

_____

_____

Material (indicate number of copies of each item submitted):

Paper Tape
Object: Binary ☐ RIM ☐ Source: ASCII ☐
____ ☐ ____ ☐ ____ ☐

DECtape
Object: Binary ☐ Source: ASCII ☐
____ ☐ ____ ☐

LINCtape
Object: Binary ☐ Manuscript: LAP-4 ☐
LAP-6 ☐
____ ☐

Cards (Source Deck) ☐ Listing ☐ Writeup ☐

Flowcharts ☐ Other Documentation ☐

I, the undersigned, give full permission to DECUS to publish information regarding this program in DECUSCOPE and to reproduce and distribute this program in full or part, to all interested parties.

Signed: _____

DECUS LIBRARY - PROGRAM ORDER FORM

DECUS NUMBER	[1] PAPER TAPES		[2] DECTAPES		WRITE-UP NO CHARGE (✓)	[3] LISTINGS ($)	[4] CARD DECK ($)	TOTAL PRICE	TO BE COMPLETED BY DECUS OFFICE	
	BIN	SYM	USER	DECUS					SENT	[5] COMMENTS
								$		
								$		
								$		
								$		
								$		

GRAND TOTAL $_____

1. Paper Tapes - Reproduction and Handling Charge - Binary or Object Program $1.00 per program. Symbolic or Source tapes $5.00 per program.

No charge for Delegates, (Please (✓) check appropriate column) all others* please indicate unit price.

*For Individual members only. If form is signed by a Delegate from your installation there will be no charge for paper tapes and user-supplied DECtapes.

2. DECtapes or LINCtapes - $20.00 program and tape (tape supplied by DECUS). $5.00 program and tape (tape supplied by user). For Delegates only, $15.00 for program and tape - (tape supplied by DECUS).

3. Listings - $5.00 if Listing is not included as part of the write-up.

4. Card Decks - $7.00 per program.

5. Comments - BTOA - Binary Tape Only Available, STOA - Symbolic Tape Only Available, LU - Listing Unavailable, NT - No Tapes available for this program.

NAME_____ DELEGATE'S SIGNATURE _____

INSTALLATION_____

ADDRESS_____

_____

CITY_____ STATE_____ ZIP CODE_____

Please indicate on which computer these programs will be used_____

TO BE COMPLETED BY DECUS OFFICE:

Date received_____ Amount received_____ Cash_____ Check_____

Approved_____ Completed by_____ Date Sent_____ Refund Amount_____

Reason_____

REQUESTER: PLEASE RETAIN PINK COPY FOR YOUR RECORDS. PLEASE SEND BALANCE TO DECUS. GREEN COPY WILL BE RETURNED TO YOU WITH YOUR ORDER AS A RECEIPT.

Charges for programs indicated on this form are being made to help defray the cost of handling and postage.

NOTE:

The information below should be noted when ordering programs that are available on LINCtape or DECtape. In the past problems have arisen due to the confusion in the interpretation of our policy.

EXPLANATION OF CHARGES FOR PROGRAMS AVAILABLE ON DECTAPE OR LINCTAPE

I. Delegates

A. Request Forms Signed by Delegate

1. Form accompanied by DECtape or LINCtape - No Charge.

2. Form not accompanied by DECtape or LINCtape - $15.00 for the tape.

II. Individual Members

A. Request Forms Signed by Delegate

1. Form accompanied by DECtape or LINCtape - No Charge.

2. Form not accompanied by DECtape or LINCtape - $15.00 for the tape.

B. Request Forms Not Signed by Delegate

1. Form accompanied by DECtape or LINCtape - $5.00 Reproduction Charge.

2. Form not accompanied by DECtape or LINCtape - $20.00 ($5.00 for reproduction, $15.00 for tape.)

III. Non-Members

A. Form accompanied by DECtape or LINCtape - $5.00 Reproduction Charge.

B. Form not accompanied by DECtape or LINCtape - $20.00 ($5.00 for reproduction, $15.00 for the tape.)

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DECUS-8-136	Fourier Transform Program in FORTRAN II
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XI. Scientific Application, Engineering Application

DECUS-8-49	Relativistic Dynamics
DECUS-8-65	A Programmed Associative Multichannel Analyzer
DECUS-8-76	PDP NAVIG 2/2
DECUS-5/8-90	Histogram on Teletype
DECUS-8-92	Analysis of Pulse-Height Analyzer Test Data with a Small Computer
DECUS-8-117	A PDP-8 Interface for a Charged-Particle Nuclear Physics Experiment
DECUS-8-118	General Linear Regression
DECUS-8-133	First Order Kinetics
DECUS-8-145	A Time-of-Flight Analyzer Based on a Small On-Line Computer
DECUS-8-161	EXPO: A Flexible PDP-8 Data-Acquisition Program
DECUS-8-164	Prime Number Determination
DECUS-8-167	CIRCUITS
DECUS-8-169	Physical Oceanography Data Reduction Programs for the PDP-8 (II)
DECUS-8-171	Real-Time System for Behavioral Science Experiments
DECUS-8-175	Post Stimulus Interval Histogram for AX-Ø8
DECUS-8-194	NMR Simulator
DECUS-8-208	Evaluating Determinants
DECUS-6-21	Critical Path Scheduling
DECUS-6-26	WIRE
DECUS-7-5	KINEMATICS
DECUS-7-6	CGC Function
DECUS-7-7	INPUT ND 180, INFLT ND 180, INPUT VICTOREEN, and INFLT VICTOREEN
DECUS-7-16	Single-Level Breit Wigner Fit
DECUS-7-19	DUMP ND 180 and FDUMP ND 180
DECUS-7-21	Reaction Kinematics
DECUS-7-24	ENLOSS
DECUS-7/9-30	GRASP: Gaussian Reduction and Analysis of Spectrum Peaks
DECUS-7/9-34	BESSEL
DECUS-7/9-35	Coulomb Excitation
DECUS-7/9-36	Finite Geometry Attenuation Coefficients

XI. Scientific Application, Engineering Application (Continued)

DECUS-7/9-37	DIRECS and LUBITZ
DECUS-7/9-38	Gamma Ray Peeling Program
DECUS-7-49	ONER Mark III - Single Parameter Pulse Height Analysis Program
DECUS-9-19	PIPHA, CALPIT - Particle Indentification System
DECUS-9-20	Conversational Mode Software for Control System Analysis
DECUS-9-21	CLOSS
DECUS-L-3	Off-Line LABCOM System
DECUS-L-4.1	IN HISTO
DECUS-L-10	LINC-8 Multianalyzer
DECUS-L-11	DATUM8
DECUS-L-25	LINC Spectrum Program
DECUS-L-33	On-Line LABCOM System (Version IV)
DECUS-L-40	AVERAGER
FOCAL-4	PRIME NUMBER PLOTS
FOCAL-20	MULTIPULSE
FOCAL-21	MULTIPULSE-2
FOCAL-22	Monte-Carlo Solution to Neutron Penetration Problem
FOCAL-23	Seismic Refraction Sloping Layer Program
FOCAL-24	GRADE: A Grade Averaging and Display Program
FOCAL-27	Δ -Y Complex, Y- Δ Complex, Series Resonant Circuit Analysis
FOCAL-28	Column Width, TRAVERSE, Least Square "Linear" Fit, Nozzle Weight Flow, Filter Design, Ohm's Law
FOCAL-29	Second Order Differential Equation
FOCAL-30	One Line Routines, X^3 and Circle, Superposition, Circle
FOCAL-31	Sines, Factors, Figure Eight, Right Triangle Solutions
FOCAL-35	ROOTFINDER Program
FOCAL-36	DETERMINOT Program
FOCAL-38	Magic Square Generator

XII. Hardware Control

DECUS-5/8-17	Type 250 Drum Transfer Routine for use on the PDP-5/8
DECUS-5-40	ICS DECtape Routines (One-Page 552 Control)
DECUS-8-58	One-Page DECtape Routines (552 Control)
DECUS-8-77	PDP-8 Dual Process System
DECUS-8-82	Library System for 580 Magnetic Tape (Preliminary Version)
DECUS-8-104	Card Reader Subroutine for the PDP-8 FORTRAN Compiler
DECUS-8-121	DECtape Handler (552 Control)
DECUS-8-201	DECSW: Decimal Switch
DECUS-6/10-16	FILER
DECUS-6-22	MEM2 and MEM4
DECUS-6/10-42	LST9: A Program to List PDP-9 DECtapes on a PDP-10 Line Printer
DECUS-7-14	ISENSE
DECUS-7-19	DUMP ND 180 and FDUMP ND 180
DECUS-7-28	.IODEC Revision
DECUS-7-48	Magnetic Tape Device Handlers for the PDP-7 ADVANCED Software System
DECUS-7/9-52	Analog-to-Digital Conversion Subroutine Package
DECUS-9-6	Scatter-Gather Magnetic Tape Routines
DECUS-9-8	TT-6 Bit Teletype I/O Handler
DECUS-9-16	Real-Time Clock Handler - 4 Level Queue
DECUS-9-25	RCA Bootstrap
DECUS-9-26	DTF. (DTG.): DECtape Handlers for FORTRAN Compiling
DECUS-9-27	PRGLDR: Program Loader for RCA Bootstrap
DECUS-10-1	UT6RD
DECUS-L-5	Tape Subroutine
DECUS-L-6	TRIGGR
DECUS-L-8	DECtape Interface for LINC-8
DECUS-L-16	RWTAPE
DECUS-L-18	BUFFER - Fully Buffered Teletype I/O
DECUS-L-22	A New PDP-8 Display Instruction for LINC-8
DECUS-L-23	Control to Designate Left or Right LINC-8 Tape Transport as Unit Zero
DECUS-L-32	XMARK
DECUS-L-42	Using the Teletype with the LINC-8

XIII. Game, Demonstration

DECUS-5/8-14	Dice Game for the PDP-5/8
DECUS-5/8-15	ATEPO: Auto Test in Elementary Programming and Operation of a PDP-5/8 Computer
DECUS-5/8-54	TIC-TAC-TOE Learning Program
DECUS-8-71	Perpetual Calendar
DECUS-8-79	TIC-TAC-TOE (Trinity College Version)
DECUS-8-94A	BLACKJACK
DECUS-8-94B	Patch for BLACKJACK
DECUS-8-98	3D DRAW for the 338
DECUS-8-99A	Kaleidoscope
DECUS-8-99B	Kaleidoscope - 338
DECUS-8-107	CHESSBOARD Display on the 338
DECUS-8-108	INCMOD: Increment Mode Compiler (338)
DECUS-8-112	Sentence Generator
DECUS-8-119	Off-Line TIC-TAC-TOE (PAL)
DECUS-8-151	On-Line TIC-TAC-TOE
DECUS-8-152	PDP-8 Music Program
DECUS-8-162	Demonstration Programs for the PDP-8
DECUS-8-173	TIC-5/8 (Scope Version)
DECUS-8-174	Medium
DECUS-8-191	Fields
DECUS-8-196	DET: Detect Key Words
DECUS-6-4	NUMBER
DECUS-6-14	The Dots Playing Program
DECUS-6-25	1KCLOK
DECUS-7/9-25	PDP-7/9 DICE Playing Game
DECUS-7-40	DUEL
DECUS-7-43	A PDP-7 Music System
DECUS-9-2	3D DRAW for 339 Display
DECUS-9-23	KALSD9
DECUS-L-2.1	"Clock 1" for LINC and "Clock 8" for LINC-8
DECUS-L-39	SPCWAR
FOCAL-4	PRIME NUMBER PLOTS
FOCAL-5	The Sumer Game
FOCAL-9	Hexapawn
FOCAL-38	Magic Square Generator
FOCAL-41	Fran the Barmaid
FOCAL-42	The Hangman Game

XIV. Plotting

DECUS-5-30	GENPLOT: General Plotting Subroutines for the PDP-5
DECUS-5-31	FORPLOT: FORTRAN Plotting Program for PDP-5
DECUS-8-147	Incremental Plotter Printout Subroutines
DECUS-8-148	Plotter System
DECUS-8-168	CalComp Plotting Package
DECUS-8-202	PLOT
DECUS-8-203	ALPHA
DECUS-7-45	FORTRAN Plotter Library
DECUS-7-50	Plotter and Display Output Routines for the PDP-7 ADVANCED Software System
DECUS-9-13	Plotter and Display Output Routines for the PDP-9 ADVANCED Software System
DECUS-L-9a	LINC-CalComp Plot Subroutine Package (LAP5)
DECUS-L-24	PLTKBD: Plot Keyboard
DECUS-L-45	PLOT and PLOTTEST
FOCAL-7	STRIP FOCAL - Storage of Data Arrays
FOCAL-12	QUIP1: QUick Plot in Quandrant 1
FOCAL-13	3-D PLOTTER

XV. Desk Calculator, Business Application

DECUS-5-5	Expanded Adding Machine
DECUS-8-122A	SNAP: Simplified Numerical Analysis Program (without EAE)
DECUS-8-122B	SNAP: Simplified Numerical Analysis Program (with EAE)
DECUS-8-155	HEP
DECUS-8-192	T.A.L.C. (Taylor's Algebraic Linear Calculator)
FOCAL-25	Payroll Calculations (California, 1968)

XVI. Maintenance

DECUS-5-10	Paper Tape Reader Test
DECUS-L-26	RELTS8-1C (LINC-8 Only)

XVII. Miscellaneous

DECUS-6-5	TIMEF4
DECUS-6-8	BELL STAR
DECUS-6-10	DATE
DECUS-6-31	CARD
DECUS-7-28	.IODEC Revision
DECUS-9-10	TIME
DECUS-L-27	Q & A Subroutine (Modification for LAP6 Characters)
DECUS-L-28	Text TTY Subroutines
DECUS-L-46	SERINDEX: Search LAP6 Index

PART I
CATEGORY INDEX

PART II
PROGRAMS AVAILABLE FROM AUTHOR

PROGRAMS AVAILABLE FROM AUTHOR

Many users have programs which for various reasons are not fully debugged or documented for submission into the DECUS Library but are working to a certain extent. Authors who would like to make these programs available to other users have submitted them to DECUS as "Programs Available from Authors." New additions are announced in DECUSCOPE and programs presently available are listed below. Persons interested in using these programs should request them directly from authors. Authors interested in submitting programs under this category should send a short summary of the program length, I/O equipment needed, etc. and information regarding material available for tapes and documentation to the DECUS Program Librarian, Digital Equipment Computer Users Society, 146 Main Street, Maynard, Massachusetts 01754.

COMPUTER - PDP-5 or PDP-8

Title: Morse Code Sender for PDP-5/8

Author: Jack Harvey, Communication System, Inc., Paramus, New Jersey

This subroutine is entered with an ASCII character (trimmed or untrimmed) in the AC.

A square wave tone of the international Morse Code for the character is sent to any appropriate output device such as digital to analog converter, binary channel, or scope display. The program is easily altered to suit the particular output channel available. An ordinary audio amplifier and speaker on the channel make the tone audible. Three registers on page zero control tone pitch, code speed, and character spacing.

Documentation available from author:

1. Binary tape (routine uses 400-577)
2. Symbolic tape with relative addresses (no comments)
3. Photocopies of the author's notes on the listing of (2).

COMPUTER - PDP-5, PDP-8, or PDP-8/S

Title: Wire List Package

Author: C. W. Peck, Synchrotron Laboratory, California Institute of Technology, Pasadena, California

This is a group of four routines used to prepare wire lists for Flip Chip modules to be installed in, at most, two DEC Type 1943 Mounting Panels (128 modules). With the wire lists and associated redundancy checks provided by the program, the author has had mounting panels hand wired with no errors.

The four programs are:

1. WIRE LIST ORGANIZE (50-1777, 6400-6777, Connection List 2000-6377)

This program accepts paper tape input of a wire list taken from the engineering drawings and generates a connection list in core. It outputs an ordered wire list in which each connection terminal used is referred to only once. The connection sequence generated does not necessarily result in minimum wire length, but usually does. The three subsequent programs assume that a connection list such as generated by this program is in core.

2. TERMINAL USE PRINT (50-1777, Connection List 2000-6377)

This program generates a table indicating which cards are used and the number of connections on each terminal (0, 1, or 2).

3. EDITOR (50-1777, Connection List 2000-6377)

This program allows the user to edit a connection list. It checks for elementary wiring errors in the editing.

4. BUS INCLUDE (50-1777, 6400-6777, Connection List 2000-6377)

This program includes all bussing into the connection list. It allows the designer to make a complete check of signal loading.

Material available from author:

1. IBM compatible magnetic tape (200) density. Upon request, binary paper tapes could be created.
2. Operating instructions.

COMPUTER - PDP-8 with 338 DISPLAY

Title: Core Display Program

Author: A. M. Romaya, Design Automation Department, International Computers Ltd. Kidsgrove, Stoke-on-Trent, Staffs., England

This program allows the user to display, change, dump and punch the contents of any core location by commands initiated from the 338 Display light pen and push buttons. The program occupies locations 5000-7340 of memory field 1. It does not set the push-down pointer or the interrupt system, therefore, field Ø is absolutely free for use by other programs. It is possible to run this program concurrently with another which uses the interrupt system.

COMPUTER - PDP-8 with 338 DISPLAY

Title: Drawing Applications Program

Author: A. M. Romaya, Design Automation Department, International Computers Ltd., Kidsgrove, Stoke-on-Trent, Staffs., England.

The program is intended to show the facilities the 338 Display offers when considered as a drawing board.

The program allows the user to:

1. Draw straight lines or "free hand" over a total area of 75x75 inches.

2. Include symbols which may be formed by means of the program.

3. Label the drawing in alphanumeric and other characters.

4. Delete items drawn.

5. Output the display and symbol files created.

6. Input a display file and its symbols for updating.

The program incorporates a tracking cross and raster, and the coordinates of the tracking are shown when required. Control is obtained by a set of light buttons, push buttons and the switch register.

Possible core location changes for adapting the dimensions drawn to special cases if required are given.

COMPUTER - PDP-8 with 338 Display

Title: Scan and Analysis Program

Author: A. M. Romaya, Design Automation Department, International Computers Ltd., Kidsgrove, Stoke-on-Trent, Staffs., England

The program is an investigation of the possibility of using a graphic display for a highly efficient method of inputting graphic data.

The program is divided into two parts. The first part scans the graphic data set as rectangular shaped elements or routings on a transparency. A digitized image of the transparency is obtained and displayed.

This image is then analyzed by the second part to obtain the desired symbols or routings.

COMPUTER - LINC

Title: Datamec Diagnostic

Author: D. W. Hazelton, Biomedical Computing Center, University of Wisconsin, Madison, Wisconsin

This program checks Datamec tapes for accuracy and also contains several "hardware" service routines.

The general user will find this program useful for checking CDC compatible tapes. Specifically, the check section tests in even or odd parity for the following:

1. Lateral Parity Errors
2. Missing Record Characters
3. Missing Longitudinal Redudancy Check Character (LRCC's)
4. Longitudinal Parity Errors

Also, if desired, one can count the total number (octal) of Datamec words in each record. The results of these tests are displayed on the scope.

To assist the user in tape manipulation, a backspace routine capable of backing over any number of records less than 7777_8 is included:

Four routines are included to check various aspects of Datamec operation.

1. Parity Test
2. Test-Record Generation
3. General Purpose Tape Checking
4. Test Record Verification

COMPUTER - LINC

Title: General Sampling Program (GENSAM)

Author: D. W. Hazelton, Biomedical Computing Center, University of Wisconsin, Madison, Wisconsin

This general-purpose program takes digitized samples from the LINC analog-to-digital converter and writes them on Datamec tape in a CDC compatible format. From one to four channels can be sampled with the time interval between sample variables at any multiple of one milliscond from 1 to 4095_{10}. The individual channels are sampled almost simultaneously; with reference to the preceding channel, each succeeding channel is sampled 112 μsec later. Any of the LINC lines or potentiometers can be sampled. Starting and stopping can be effected by either a sense switch or a pulse on an external line. To assist the user in suceeding data manipulations, a sample counter is included which displays the total number of samples collected per channel.

COMPUTER - LINC

Title: LINC Computer User-Interactive Programs and MACRO Instructions

Authors: Walter E. Reynolds, Robert B. Tucker, Timothy B. Coburn, James C. Bridges, Stanford University School of Medicine, Stanford Medical Center, Palo Alto, California

This report describes four program packages for use on the LINC computer.

1. A program package which enables the LINC and a Teletype to be used as a very sophisticated desk calculator including graphical output with a CalComp Plotter.

2. A general-purpose double precision floating point subroutine package for the LINC.

3. A set of input-output routines providing for the communication of octal, decimal and alphanumeric information via a Teletype.

4. Also included is additional information on the LOSS system (see "An Operating System for the LINC Computer," R. K. Moore, NASA Technical Report No. IRL-1038) under which the above packages may be used.

The first program described, CALCULATOR III, is a complete program that enables the LINC and a Teletype to perform in a manner quite comparable to the most sophisticated electronic calculators on the market today. In addition, vector or single dimension array operations are included, direct communication with data blocks on LINCtape is permitted, and if a CalComp Plotter is available, output may be graphically displayed.

The second package is a set of floating-point routines. They also exist in CALCULATOR III, but here in a form more suitable for inclusion in any LINC program where double-precision floating point arithmetic is desired. They occupy two quarters of LINC memory and when so included, become a comprehensive set of floating point macro instructions.

The third package contains numerous general-purpose routines in source code form invaluable to any LINC program where conversational input-output is desired. These may be inserted into LINC programs as desired to allow octal, decimal or alphanumeric communication with the LINC using a Model 33 Teletype in half-duplex mode.

These packages are presently utilized under the LOSS system, a general description of which is contained in this report.

Documentation for the above is available from:

Mr. Timothy Coburn
Stanford University School of Medicine
Stanford Medical Center
Palo Alto, California 94304

COMPUTER - LINC

Title: DECUS No. L-9A
LINC CalComp Plot Subroutine Package

Revisions to L-9A were made by A. Maynard Engelbretson and Don J. Manson.

The tapes and write-up for the revision are available from:

The Biomedical Computer Laboratory
Washington University
St. Louis, Missouri

COMPUTER - LINC-8

Title: Wisconsin Programmed Medicine Interviewer (WPMI)

Author: Dr. W. V. Slack and Lawrence J. Van Cura, University of Wisconsin Medical Center, 1300 University Avenue, Madison, Wisconsin

This is a conversational program written for use with the Laboratory INstrument Computer (LINC). It is designed for verbal interaction between computer and people involved in the practice of medicine--patients and medical personnel. Patient interviewing and patient instruction (operations traditionally performed by physicans and nurses) have been conducted on the LINC with WPMI. The program can also be used for interviewing and instruction in non-medical situations.

Generally, the program operates as follows: questions and statements are displayed on the cathode-ray screen and responses are made on the computer keyboard. Printed summaries of patients' histories and physicans' physical examination findings are generated by Teletype upon completion of each interview. All responses are saved on magnetic tape for future computer processing both for patient care and clinical research.

There are 3 frame formats used in WPMI. These are designated mode 1, mode 2 and mode 3 and differ on the basis of the responses available to the respondent. Mode 1 frames have 4, fixed, mutually exclusive responses. Otherwise, mode 3 and mode 1 frames are identical.

The computer, with its capability of rapid branching, can present questions and statements as a function of the responses made. Thus, the following are possible--questions presented multiple times with varied wording before an affirmative or negative response is accepted; "YES" answers followed by complex groups of questions in turn involving and branching and designed to cover the item in-depth; and "NO" answers resulting in the instantaneous skipping of irrelevant questions. All of these enable information to be elicited from respondents in great detail.

Further, the computer can exert a useful control over the interviewing process. Programmed to proceed only after an appropriate response; to reinforce the respondent's progress through the interview with meaningful words of encouragement; to explain and teach the meaning of concepts not understood and to delve further into the subject of a question whose answer is initially unknown; the computer can increase the likelihood of successful completion of the interview with valid data having been obtained.

For more detailed information contact either Dr. Slack or Mr. Van Cura at the address given above.

PART III
PROGRAMS FOR SALE OR LEASE

PROGRAMS FOR SALE OR LEASE

The programs listed below may be purchased or leased. Pricing information should be obtained directly from the supplier. DECUS makes no charge for announcing these programs and reserves the right to discontinue this service at any time. DECUS cannot guarantee the accuracy of these announcements. A complaint file will be maintained at the DECUS office for each offering and this file may be inspected by any DECUS member.

Programs will be announced for sale or lease only if they are submitted on behalf of corporations; no individual person may offer a program for sale or lease through DECUS.

SUBMITTED BY

INFORMATION CONTROL SYSTEMS, INC.

Information Control Systems is leasing its 4K version of extended FORTRAN II and ALICS II programming systems. These systems bring to the 4K PDP-8 family a capability that is not available with existing software.

USA FORTRAN II programs compile into ALICS II assembly code in a single pass. ALICS II assembles this FORTRAN output or directly coded ALICS in a single pass. It produces relocatable binary object programs.

A linking loader automatically loads and links the main program and all subroutines. These programs and subroutines may be coded in ALICS or FORTRAN. Standard subroutines may be added from the user or ICS Library.

The system has been especially useful for real-time applications due to the building block structure and the compatibility between the machine level ALICS language and the high level FORTRAN language. The system is equally effective for scientific programming and small scale data processing. Important system features include:

Extended FORTRAN II

1. Large Capacity - A true compiler concept eliminates interpretive execution time systems. Programs of up to 200 FORTRAN statements may be fitted into a 4K memory.

2. Subroutines - Full provisions are made for either FORTRAN or ALICS II assembly language subroutines and external functions.

3. Precision - Floating point numbers are accurate to 8 significant digits, making the system suitable for accounting applications.

4. Speed - Object programs execute up to 4 times as fast as those processed with other compilers available for the PDP-8 family.

5. Relocation - Object programs are relocatable. They are automatically linked by the loader.

ALICS II Assembler

1. Relocatable - Binary object programs are produced which can be relocated without reassembling. A linking loader automatically establishes linkages between your program and subroutines and fits them into the available core.

2. Automatic Paging - Allows the programmer to directly reference all of core without considering page boundaries.

3. Single Pass Assembly

4. Powerful Diagnostics - To help you find errors quickly.

5. Easily Learned - People with no previous language experience will find ALICS easy to master.

ICS Library

1. Floating Point - Features 27 bit mantissa, 8 bit exponent, and sign. All operations fit on 3 pages.

2. Format Interpreter - Features full A, E, F, H, I, and X format term specifications for formatted I/O with conversion. I/O is device independent.

3. Integer MUL/DIV two's complement single precision.

4. Subscripts - One and two dimensional for FORTRAN arrays.

5. Mathematical functions - Includes ABS, IABS, SQRT, SIN, COS, TAN, EXP, ELOG, ATAN, and IRDSW for reading the console switches.

For more information contact:

Mr. John Wyman, Sales Manager
Information Control Systems, Inc.
327 South Fourth Avenue
Ann Arbor, Michigan 48104

SUBMITTED BY

AGRIPPA-ORD CORPORATION

AGRIPPA-ORD Corporation is offering for sale the following LINC-8 programs.

PLAP Assembler

1. Completely compatible with the LAP6 utility system.

2. Assembles LINC code or PDP-8 code or both.

3. Six letter tags - 2047 user defined symbols.

4. Error diagnostics with listing.

5. Produces up to 16 blocks of binary.

6. Will load PDP-8 code into Bank 0 (new LO command).

CALCOMP Plotter Routines

1. Three subroutines: Plot alphanumeric, Plot graph, Plot line drawings.

2. Size - two quarters each subroutine (easily overlaid).

3. Self-relocating into any two consecutive quarters of Field 0 (lower 4K of PDP-8 memory).

4. 100% PDP-8 code - runs with the interrupt enabled - the LINC program can assign a task and go about its business.

5. Array driven, will plot text buffers, graph buffers, histogram buffers, or line drawings.

6. Data may be half or full-word packed, interleaved or sequential, and reside in any size machine.

7. Conversational subroutine driver supplied free of charge with purchase of three subroutines.

Isometric Scope Display

1. Displays isometric surface, 3D histogram or slices along X or Z axis.

2. Size - three quarters (1, 2, 3).

3. Data may be half or full-word packed, interleaved or sequential, up to 30K.

4. Display may be scaled, complemented and inverted.

5. Subroutine is called with four operands.

Graph and Text Display

1. Displays half-word packed LINC text strings and/or graph data.

2. Size - two quarters (binary for any two consecutive quarters).

3. Performs an operation (nop, add, subtract, multiply, divide) between two half or full-word packed data sets and displays result on the scope. If the operation is "nop", data set 1 is displayed.

4. Cursor, histogram, and scaling options.

5. Subroutine is called with nine operands.

t Test Subroutine

1. Computes and stores t Test values for related points of two data sets.

2. Size - three quarters (1, 2, 3).

3. Data sets may be half or full-word packed, sequential or interleaved, up to 2047 points each. An entry in a data set consists of a 12 bit mean value (6 bit optional) and a 12 bit standard deviation (6 bit optional).

4. Biased or unbiased option.

5. Subroutine called with 11 operands.

Correlation Subroutine

1. Generates the correlation function and correlation coefficient between two data sets at a specified lag value.

2. Size - three quarters (1, 2, 3).

3. Data sets may be half or full-word packed, sequential or interleaved, up to 1023 points each.

4. "Tail wrapping" option.

5. Subroutine called with nine operands.

Curve Fitting System

1. Keyboard or tape entry of 128 7-digit number.

2. Conversational operation.

3. Data and "best fit curve" can be displayed.

4. Analysis routines are completely modular - new versions may be added easily.

5. Present version includes: polynomial least-square approximations, simple linear regression, log-log and semi-log displays and multiple partition approximations, error analysis, and correlation coefficient.

For further information on these and other, more specialized, programs contact:

N. David Culver, President
AGRIPPA-ORD Corporation
Monument Square
Carlisle, Massachusetts 01741
Phone: (617) 369-2912

SUBMITTED BY

APPLIED DATA RESEARCH, INC.

MACRO ASSEMBLER

MACRO8X is an improved and expanded version of the MACRO-8 Assembler (DEC-08-CMA1). It is now a two-pass assembler which operates on PDP-5, 8, 8/S, 8/I, or LINC-8 with 8192 words of memory and a high-speed paper tape reader and punch. MACRO8X is fully compatible with both PAL III and MACRO-8.

General Enhancements

Larger Symbol Table - There is now room for over 750 user-defined symbols, minus that part of the user symbol area that is used to store macro definitions-- more than five times the capacity provided by MACRO-8.

Improved Literal and Link Processing - The processing of literals and the generation of links have been improved in two significant ways. Literals will not be dumped in the middle of a page and there is no duplication of literals. Second, MACRO8X will, when assigning any literal defined by parentheses or link, determine whether that literal has earlier in the source program been assigned to page 0. If the value has already been assigned a location on page 0, the page 0 literal will be used and no literal will be assigned on the current page.

Paginated and Formatted Output - Output listings produced during pass 2 of the assembler are divided into 8-1/2 X 11 inch pages. The MACRO8X listing routines also perform tabulation, converting tab characters into that number of spaces needed to produce a neat tabular listing.

Memory Allocation Table - At the end of each assembly, a table is printed showing what parts of memory were not used by the program. This table is intended for use as a guide in making patches and corrections to an assembled program.

Improved functioning of FIELD Pseudo-op - When a FIELD command is encountered in the course of a MACRO8X assembly, all page zero literals are dumped and assignment of page zero literals begins for the new field.

Added Pseudo-Ops

UNLIST, LIST - The UNLIST pseudo-op suspends listing of the source and object programs on the teleprinter during pass 2. The printing of error messages, allocation, or the symbol table is not suppressed, however. The LIST pseudo-op resumes listing subsequent to the use of UNLIST.

LGM, NOLGM - The NOLGM pseudo-op suspends printing of the diagnostic message "LG" during pass 2. The LGM pseudo-op resumes printing of the diagnostic message "LG" subsequent to the use of NOLGM.

LIT - The LIT pseudo-op causes the current-page-literal-buffer to be printed and punched on paper tape during pass 2. This command is intended for use at the end of a page to improve readability of listings.

LITBAS - The LITBAS pseudo-op permits the user to specify an origin for the generation of literals which is other than location 177 of the page for which they are generated. The format of the LITBAS command is LITBAS n, where n is any number or symbolic expression.

VFD - The VFD pseudo-op permits the assembly of a word consisting of the concatenation of bit patterns representing several numbers of symbolic expressions. Its format is:

VFD A:B,C:D,E:F...

It is terminated by the occurrence of any punctuation or expression which does not fit the VFD syntax. The meaning of the expression above is "Assemble a word consisting of A bits of B followed by C bits of D followed by E bits of F, etc." A,B,C,D, etc. may be numbers or symbolic expressions. VFD may also be used in any context in which a symbolic expression is legal.

Availability

MACRO8X is available on a lease basis at nominal cost from:

The Research Computation Center
APPLIED DATA RESEARCH, INC.
Route 206
Princeton, New Jersey 08540
(609) 921-8550

A MACRO8X assembly service is also available from the center--card or paper tape input, line printer output.

SUBMITTED BY

DECISION SCIENCE, INC.

Decision Science, Inc. is offering for sale its SIMUL8S programming system consisting of an assembler for and a simulator of the PDP-8/S, PDP-8, PDP-8/I, and PDP-8/L, this is available for the IBM 360/40 or larger, 7090, 7094; CDC 3600, 6400, 6600; Univac 1108 or GE 635.

Specifically, SIMUL8S permits programming utilizing cards rather than paper tape, thus simplifying development and programming changes. It provides additional debugging aids to the programmer in that program tracing under on/off timing control, time dumps, and core dumps are available during execution. This time analysis feature can be used to determine the execution time between two points in the program, this being useful to determine compatibility with real time problems.

Complete program development can be achieved by using SIMUL8S for diagnostics, assembling, debugging, executing the program, and/or providing a binary paper tape for direct read in by the PDP-8 series computer, thus eliminating source paper tape punching, assembly and debugging on the smaller computer. SIMUL8S permits software development prior to the installation of the PDP-8 series computer or while it is in use performing its dedicated function.

It can be used to simulate propsed systems for evaluation, thorough checkout of programs by simulating "worst case" conditions since it allows simulation of interface equipment and signals difficult to generate with hardware.

The input language to cards and the printed output includes the basic format and features of the PAL III assembler as well as the page linkage feature of MACRO-8.

For more information contact:

Dr. A. J. Owens, Vice President
Decision Science, Inc.
4508 Mission Bay Drive
San Diego, California 92109

SUBMITTED BY
GRASON-STADLER COMPANY

SCAT (State Change Algorithm Terminology) is a conversational, real time, time sharing, process control system designed to run on a 4K or larger DEC (Digital Equipment Corporation) PDP-8 computer which is interfaced to a Grason-Stadler "Job Control Multiplexer."

SCAT software consists of two major parts. The first is the Executive and the second is the SCAT Language Processor. The Executive adminsters the use of the computer. It divides the processor time between the various experiments, or jobs, and the Teletype and other output devices. It allocates storage space for the various programs which are active. The SCAT Language Processor is itself divided into two sections--the SCAT translator and the SCAT interpreter. The SCAT translator accepts the SCAT statements which form the experimental description (the program), checks them for internal consistency and translates them into a code which the SCAT interpreter understands. The SCAT interpreter controls each experiment using the user generated program for guidance.

For more information contact:

Mr. Steven J. Stadler
Grason-Stadler Company
Box 2
West Concord, Massachusetts 01781

SUBMITTED BY
FORDAX Corporation

FORDAX Corp. is offering for sale its SAIBOL Compiler. The compiler resembles a COBOL compiler, but was designed specifically for the PDP-8 Family of computers. Although the system has been especially designed for business oriented applications, such as Payroll, Job Costing, Accounts Receivable, Accounts Payable, General Ledger and Inventory Control, it can be equally effective for scientific programming as well.

SAIBOL is an interpretive compiler which allows any PDP-8 Family computer to function as a character-oriented machine. It is designed to reside in a 4K PDP-8 with optional DECtape, DECdisk, high speed paper tape reader and punch and an ASR-33 Teletype. It is core-resident, requiring about 3K of core. The remaining 1K is available for the user program statements.

Some important features include:

1. The system includes a Monitor which allows user programs to be stored on disk.

These programs may be called into core via keyboard commands.

The language includes six classes of commands:

a. Input/Output - for entry of data via keyboard and paper tape, and outputting data to printer and paper tape.

b. Arithmetic - for loading, storing, adding, subtracting, multiplying, and dividing quantities represented as BCD digit strings, and testing the result of arithmetic operations.

c. String manipulation - for moving and comparing strings of alphanumeric characters.

d. File - for filing and retrieving records of information on and from disk storage.

e. Monitor - for calling the Monitor, or requesting other programs on disk in the event of segmented programs.

f. PAL Language - Routines in the PDP-8 PAL III assembly language can be freely intermixed with SAIBOL statements.

The SAIBOL interpretive compiler is a core-resident interpreter which analyzes user statements stored in core. As each statement is analyzed, it is executed by SAIBOL, and the next statement is then accessed.

The SAIBOL interpreter is stored in the upper 23 pages of core. Page 0 is also used in part by the system for common storage and monitoring purposes.

The rest of core (locations 200-2177) is both word-addressable and character addressable. Characters are represented by six bits, and packed two to a word. The character in the high half of the word (bits 0-5) is defined as the first character, and the character in the low half of the word (bits 6-11) is defined as the second character. Thus, user core can be addressed as words 200-2177, or characters 400-4377.

2. Easy to Use and Learn - SAIBOL is conversational mode through the Teletype. SAIBOL will tell you where you went wrong and how to fix it; a truly turnkey system.

3. Easy to Interface - SAIBOL will interface to nonstandard I/O devices, i.e., if you require upper and lower case printing, color change and a variable width carriage, then SAIBOL will let you talk to a Flexowriter.

4. Precision - Data Fields are accurate to 10 significant digits (ideal for accounting purposes).

5. Internal Power - Interpretive Picture strings to direct data manipulation, editing and calculation.

Programs Available from FORDAX Corp.

1. Payroll - provides complete payroll accounting, from the maintenance of the basic employee payroll records to the preparation of checks, W-2 Forms and 941 Forms.

2. Job Cost Analysis - provides easy means of distributing labor and material costs across the appropriate departments for each job, with a complete profit report including the preparation of invoices if desired.

3. Accounts Payable - provides complete accounts payable account from the maintenance of the Master Vendor File to the preparation of checks and the generation of a Check Register File.

4. Accounts Receivable - provides complete accounts receivable accounting for daily updating of the accounts receivable accounts, billing, credit analysis, and activity reporting.

5. Inventory Control - provides a complete inventory control accounting system from the recording of all inventory transactions to the preparation of a Cost of Sales Report.

6. General Ledger - provides for classification, summarization, and recording of the cumulative effects of all transactions on assets, liabilities, revenue and expenses.

7. Display and Classified Ad Billing (Typesetting) - provide a complete display and classified billing system. Information prepared on off-line keyboards is read via the high speed paper tape reader and is stored and manipulated as required.

8. Circulation Package (Typesetting) - provides an integrated draw and billing system for all editions of one or more newspapers. Inputs may be entered on-line, or prepared off-line on punched paper tape and entered via high-speed reader.

FORDAX's newly formed Machine Tool Products Division in Los Angeles is offering a complete line of programs for the preparation of tape for numerically controlled machine tools. NC programs may be used in conjunction with FORDAX's business programs.

Programs Available for NC are:

1. Two and three axis point-to-point and two axis contouring programs for basic PDP-8/I or 8/L configurations.

2. Wire wrap program providing tapes for numerically controlled, hand aided, wire wrap systems. Program allows definition of panel layout and use of standard wire list information as input.

3. Full three axis APT language contouring software for expanded PDP-8/I and 8/L. Requires 8K core, 262K disk, high-speed paper tape I/O.

4. APT-III implemented on PDP-10.

For more information contact:

Mr. William Landis
FORDAX Corporation
20 Walnut Street
Wellesley Hills, Massachusetts 02181

EXCERPT FROM A TYPICAL SAIBOL-8 PAYROLL PROGRAM WITH NO COMMENTS

```
NEXTRECORD, READ 215 WRONGTAPE

    HRS, ACCEPT HOURS HRS

        TAKING REGHOURS MULTIPLY RATE
        GIVING REGPAY 2 NOSIGN

        TAKE OVRHOURS MULTIPLY RATE MULTIPLY
        OVERTIME GIVING OVRPAY 2 NOSIGN
```

EXCERPT FROM A TYPICAL SAIBOL-8 PAYROLL DOCUMENTED WITH COMMENTS

```
NEXTRECORD,  READ(EMPLOYEE'S PAY RECORD. IF MORE
             THAN) 215 (CHARACTERS, GO TO)
             WRONG TAPE

    HRS, ACCEPT (REGULAR AND OVERTIME) HOURS
         (IF FORMAT ERROR, GO TO) HRS

        TAKE REGHOURS (AND) MULTIPLY (BY)
        RATE GIVING REGPAY (WITH) 2 (DIGITS
        TO LEFT OF DECIMAL POINT AND) NOSIGN
```

SUBMITTED BY
CALCOMP, California Computer Products, Inc.

The following six subroutines constitute of the basic software packages available for the CalComp Plotter.

Subprogram AXIS - Provides the capability of drawing an annotated axis for linear graphs.

Subprogram SCALE - A functional subroutine which scans a set of values and computes a "desirable" scale factor to present the information at the desired size.

Subprogram LINE - Provides the capability of connecting data points with straight lines and/or producing centered symbols at specified data points.

Subprogram NUMBER - Provides the capability of converting a machine format number to decimal representation and plotting the number to the specified precision.

Subprogram SYMBOL - Provides capability of drawing the full character set of the particular computer at any specified location, size, and orientation. In addition, a number of additional characters are included for data point plotting.

Subprogram PLOT - Provides the basic capability of producing the necessary string of plotter commands to move the pen from one point to another. For on-line plotters, this subroutine includes the I/O Commands for driving the plotter; for off-line systems, all tape formatting, tape writing, and checking are included. This subroutine is the heart of the plotting package, and all data, whether from other subprograms in this group or user programs, are passed to this subroutine in the form of straight line segments for plotting.

In addition to the basic six routines described above; a FORTRAN program called SAMPLE is normally provided to exercise the subroutine package for initial installation and check-out.

	Calcomp Product No.	Computer	Interface	Tape Density	Plotter Series
1.	34000	PDP-8	DEC Interface	N/A	500
2.	35000	PDP-9	DEC Interface	N/A	500
3.	36000	PDP-10	DEC Interface	N/A	500
4.	36350	PDP-10	Calcomp 760 Off-line	500/2	500
5.	Time Sharing	PDP-10	Calcomp 210	N/A	500

For more information contact:

Richard H. Hinkley
California Computer Products, Inc.
118 Cedar Street
Wellesley, Massachusetts 02181

SUBMITTED BY
INFOTEC, Inc.

Infotec, Inc. offers for sale an assembler for the PDP-8 computers which operates on the IBM-1130 computer. Source programs in PAL - III language are normally punched into cards and read by the 1130 card reader. The 1130 program assembles the PDP-8 program, prints out diagnostics, lists the DEC program on the printer and punches out a paper tape for input to the DEC binary loader. Sale price is $1,500. Those in the vicinity of Rye, New York, may use the Infotec service bureau at a cost of five cents per printed line of assembly listing.

For further information contact:

Michael J. Kelly
Infotec, Inc.
22 Purchase Street
Rye, New York 10580

Tel: (914) 967-1325

SUBMITTED BY
STRATEGIC TIME-SHARING, INC.

Strategic Time-Sharing, Inc. of New York City is currently providing time-sharing services (STIDAC - STI Direct Access Computing) on the first available commercial TSS-8 system. Languages provided include BASIC, FORTRAN, FOCAL, ASSEMBLY, DDT and EDITOR.

STI's time-sharing computers have 24K words of core storage, operate with a cycle time of 1.5 microseconds, and have the capability of accommodating up to 32 simultaneous users. A high-speed swapping disk with 17 millisconds average access time is used for system programs and active users programs. Large bulk storage is provided by removable disk packs, each of which holds 8.2 million characters. Magnetic tape and line printers are also available. The printer may be used for lengthy printouts which are not practical to transmit over telephone lines to the customer's terminal.

STIDAC prices are as follows:

$6.50/hour terminal connect time
$ .03/unit CPU usage
$1.75/unit storage - 2048 characters/unit

Unlimited use and full-time accessibility are available to heavy time-sharing users at a cost of only $1000 per month for a dedicated port (or channel) into the computer. STI will also operate complete systems dedicated to specific users or industries, for those who need a computer or communications system but want to avoid the programming and operational problems associated with an in-house data processing system.

In addition to conventional time-sharing services, STI also offers what it calls "On-Time Processing." Data is entered into the computer from an on-line terminal, which permits the file information to be queried on a real-time basis. The reports or other information is processed later and supplied to the user at the time he requires--be it the next day, week, or month.

For more information contact:

Strategic Time-Sharing, Inc.
132 West 31 Street
New York, New York 10001

or

Call (212) 736-6266

PART IV
PROGRAM ABSTRACTS AND NUMERICAL INDEX

PDP-5 and PDP-8
INDEX

PDP-5 and PDP-8 INDEX

DECUS NO.	TITLE	TAPES AVAILABLE	LISTING
6/8-12	PDP-8 Assembler for PDP-6	D	X
5/8-1.1	BPAK - A Binary Input/Output Package	B	X
5-2.1	OPAK - An On-Line Debugging Program	B	
5-3	BRL - A Binary Relocatable Loader with Transfer Vector Options for the PDP-5	B	
5-4	Octal Typeout of Memory Area with Format Option		X
5-5	Expanded Adding Machine		X
5-6	BCD to Binary Conversion of 3-Digit Numbers		X
5/8-7	Decimal to Binary Conversion by Radix Deflation on PDP-8		X
5-8	Obsolete		
5/8-9	Analysis of Variance PDP-5/8	B	X
5-10	Paper Tape Reader Test	B	
5-11	PDP-5 Debug System	B	
5-12	Pack-Punch Processor and Reader for the PDP-5	S	X
5-13	PDP-5 Assembler (for use on IBM 7044/7094)	Source Deck	
5/8-14	Dice Game for the PDP-5/8	B	
5/8-15	ATEPO: Auto Test in Elementary Programming and Operation of a PDP-5/8 Computer	B	
5-16	Tape Duplicator for the PDP-5	B	XX
5/8-17	Type 250 Drum Transfer Routine for use on the PDP-5/8	B,S	X
5/8-18A	Binary Tape Disassembly Program	B	X
5/8-18B	Obsolete		
5/8-18C	Disassembler with Symbols	B	X
8-19a	DDT-UP: Octal Symbolic Debugging Program	B	
5/8-20	Remote Operator FORTRAN System	B	X
5/8-21	Triple Precision Arithmetic Package for the PDP-5/8	B,S	X

Code

A - ASCII Source
B - Binary Object
D - DECtape
H - High Binary Loader
L - LINCtape
LL - Linking Loader
R - RIM
S - Symbolic (Source)
X - Listing with write-up
XX - Listing available at a handling charge

Write-ups are available for all programs.

DECUS NO.	TITLE	TAPES AVAILABLE	LISTING
5-22	DECtape Duplicate (552)	B,S	X
5/8-23A	PDP-5/8 Oscilloscope Symbol Generator (4x6 Matrix)	B	X
5/8-23B	PDP-5/8 Oscilloscope Symbol Generator (5x7 Matrix)	B,S	X
5-24	Obsolete		
5-25	A Pseudo Random Number Generator	B	X
8-26A	Compressed Binary Loader (CBL)	B	X
8-26B.1	CBL2BN and BN2CBL	B	XX
8-26C	XCBL: Extended Memory CBL Loader	B	XX
8-26D	XCBL Punch Program	B	XX
5/8-27 & 27a	Bootstrap Loader and Absolute Memory Clear	B	X
5/8-28a	PAL III Modifications - Phoenix Assembler	B	X
5/8-29	BCD to Binary Conversion Subroutines	B,S	X
5-30	GENPLOT: General Plotting Subroutines for the PDP-5	B	
5-31	FORPLOT: FORTRAN Plotting Program for PDP-5	B	
5/8-32a	Program to Relocate and Pack Programs in Binary Format	B	
5/8-33	Tape to Memory Comparator	S	X
5-34	Memory Halt - A PDP-5 Program to Store HALT in Most of Memory	B	X
5/8-35	BCD to Binary Conversion Subroutine and Binary to BCD Subroutine (Double Precision)	S	X
5-36	Octal Memory Dump Revised	B,S	
5-37	Transfer II	B,S	X
5/8-38	FTYPE: Fractional Signed Decimal Type-In	B	X
5/8-39	DSDPRINT, DDTYPE: Double Precision Signed Decimal Input-Output Package	B	X
5-40	ICS DECtape Routines (One-Page-552 Control)	B,S	
5-41	Breakpoint	B,S	
5-42	Obsolete		
5/8-43	Unsigned Octal - Decimal Fraction Conversion	B,A	X
8-44	Modifications to the Fixed Point Output in the PDP-8 Floating Point Package (Digital 8-5-S)	B,S	X
5/8-45	PDP-5/8 Remote and Time-Shared System	B	

DECUS NO.	TITLE	TAPES AVAILABLE	LISTING
5/8-46a	PDP-5/8 Utility Programs	B	
8-47	ALBIN - A PDP-8 Loader for Relocatable Binary Programs	B,S	
5/8-48	Modified Binary Loader MKIV	R	X
8-49	Relativistic Dynamics	B	X
5/8-50	Additions to Symbolic Tape Format Generator (DEC-8-21-4)	B,S	X
5/8-51	Character Packing and Unpacking Routines	B,S	X
8-52	Tiny Tape Editor	B,S	X
5/8-53	COPCAT (DECtape Copy 552)	B,A	X
5/8-54	TIC-TAC-TOE Learning Program	B,S	X
5/8-55	PALEX - An On-Line Debugging Program for the PDP-5/8	B,S	X
8-56	Fixed Point Trace No. 1	B,A	X
8-57	Fixed Point Trace No. 2	B,A	X
8-58	One-Page DECtape Routines (552 Control)	S	X
8-59	PALDT - PAL Modifications for DECtape (552 Control)	B,S	X
8-60	Square Root Function by Subtraction Reduction	S	X
8-61	Improvement to Digital 8-9-F Square Root	S	X
8-62a	Obsolete		
5-63	SBUG-4	R	X
5/8-64	DECtape Programming System (552 & TCØ1 Controls)	D	XX
8-65	A Programmed Associative Multichannel Analyzer	B,R	
8-66	Editor Modified for DECtape (552)	B,S	X
8-67	PAL Modified for DECtape Input (552)	B,S	X
8-68a	LABEL for PDP-8	B	
5/8-69	LESQ29 and LESQ11	D,S	X
8-70	EAE Routines for FORTRAN Operating System (DEC-08-CFA3)	B,A	X
8-71	Perpetual Calendar	B,S	X
8-72	Matrix Inversion, Real Numbers	B,S	X
8-73	Matrix Inversion, Complex Numbers	B,S	X
8-74	Solution of System of Linear Equations: AX=B, by Matrix Inversion and Vector Multiplication	B,S	X

DECUS NO.	TITLE	TAPES AVAILABLE	LISTING
8-75	Matrix Multiplication - Including Conforming Rectangular Matrices	B,S	X
8-76	PDP NAVIG 2/2	B,S	
8-77	PDP-8 Dual Process System	B,S	X
8-78	Diagnose: A Versatile Trace Routine for the PDP-8 with EAE	B,A	X
8-79	TIC-TAC-TOE (Trinity College Version)	B,S	X
8-80	Determination of Real Eigenvalues of a Real Matrix	B,S	X
8-81	A BIN or RIM Format Data or Program Tape Generator	B,S	X
8-82	Library System for 580 Magnetic Tape (Preliminary Version)	B	X
8-83 A & B	Octal Debugging Package (with and without Floating Point)	B,A	X
8-84	One-Pass PAL III	B,A	X
5/8-85	Set Memory Equal to Anything		X
8-86	Obsolete		
8-87	XMAP	D	X
8-88	DECtape Symbolic Format Generator	D	
8-89	XOD: Extended Octal Debugging Program	B	
5/8-90	Histogram on Teletype	S	X
8-91	MICRO-8: An On-Line Assembler	B	
8-92	Analysis of Pulse-Height Analyzer Test Data with a Small Computer	B	X
8-93	CHEW - Convert Any BCD to Binary Double Precision	S	X
8-94A	BLACKJACK	B,S	X
8-94B	Patch for BLACKJACK	B	
8-95	TRACE for EAE	B,S	X
8-96	J Bessel Function (FORTRAN)	B,S	X
8-97	GOOF	S	X
8-98	3D DRAW for the 338	B,S	
8-99A	Kaleidoscope	B,S	X
8-99B	Kaleidoscope - 338	B	
8-100	Double Precision Binary Coded Decimal Arithmetic Package	S	X

DECUS NO.	TITLE	TAPES AVAILABLE	LISTING
8-101	Symbolic Editor with View (338)	B,S	
8-102a	A LISP Interpreter for the PDP-8	B	
8-103A	Four Word Floating Point Function Package	B,S	X
8-103B	Four Word Floating Point Rudimentary Calculator	B,S	X
8-103C	Four Word Floating Point Output Controller with Rounding	B,S	X
8-103D	Additional Instructions for use with Four Word Floating Point Package	B,S	X
8-104	Card Reader Subroutine for the PDP-8 FORTRAN Compiler	B,A	X
8-105	D-BUG	B,A	X
8-106	Readable Punch	B,S	X
8-107	CHESSBOARD Display on the 338	B	XX
8-108	INCMOD: Increment Mode Compiler (338)	B	XX
8-109	SEETXT Subroutine (338)	B	XX
8-110	DIREC: Directory Print	B	XX
8-111	DISKLOOK	B	XX
8-112	Sentence Generator	B,A	X
8-113	Conversion of Friden (EIA) to ASCII	B,A	X
8-114	Rounded Decimal Output Modifications for PDP-8 FORTRAN	B	X
8-115a	Double Precision Integer Interpretive Package	B,A	X
8-116	PDP-8 Automatic Magnetic Tape Control (Type 57A) Library System	B	
8-117	A PDP-8 Interface for a Charged-Particle Nuclear Physics Experiment		X
8-118	General Linear Regression	A	X
8-119	Off-Line TIC-TAC-TOE (PAL)	B,A	XX
8-120	Disk/DECtape FAILSAFE	B,A	XX
8-121	DECtape Handler (552 Control)	B,A	XX
8-122A	SNAP: Simplified Numerical Analysis Program (without EAE)	B	
8-122B	SNAP: Simplified Numerical Analysis Program (with EAE)	B	
8-123	UNIDEC Assembler	Source Deck	XX

DECUS NO.	TITLE	TAPES AVAILABLE	LISTING
8-124	PDP-8 Assembler for IBM 360/50 and above	Source Deck	XX
8-125	PDP-8 Relocatable Assembler for IBM 360/50 and above	Source Deck	
5/8-126	Cumulative Gaussian Distribution Curve Fitting	S	
8-127	XDDT: Extended Octal-Symbolic Debugging Program	B	XX
8-128	PDP-8 Oscilloscope Display of Mathematical Functions	A	X
8-129	PDP-8/57A Magnetic Tape Program Library System	B,S	X
8-130A	REBIL8: Relocating Binary Tape Loader for the PDP-8/S	B,S	X
8-130B	RELCON: Binary to Relocatable Binary Tape Converter	B,S	X
8-131	SRCD: Software Rapid Character Display		
8-132	STRIP: A Data Display and Analysis Program for the PDP-8, 8/I	B	X
8-133	First Order Kinetics	B,S	X
8-134	LSQ: Least Squares Subroutine	B,S	X
8-135	DNHELP: Directory Assistor Program	B	XX
8-136	Fourier Transform Program in FORTRAN II	S	X
8-137	Programs for Storage, Manipulation and Calculation of Data Using DECtape	D	X
8-138	PAL III.5	B	
8-139	Editor	B	
8-140	Binary Tape Consolidator	B	
8-141	SYSLUK	B	XX
8-142	Binary Punch - Extended Memory	B,S	X
8-143	FFTS-R: Fast Fourier Transform Subroutine For Real Valued Functions	B	
8-144	FFTS-C: Fast Fourier Transform Subroutine for Complex Data	B	XX
8-145	A Time-of-Flight Analyzer Based on a Small On-Line Computer	B	X
8-146	High Speed Interrupt Executive	S	X
8-147	Incremental Plotter Printout Subroutines	B,A	X
8-148	Plotter System	B	
8-149	Core Window	B,A	X
8-150	PTOD8 High and PTOD8 Low	B	X

DECUS NO.	TITLE	TAPES AVAILABLE	LISTING
8-151	On-Line TIC-TAC-TOE	A,B	
8-152	PDP-8 Music Program	B,S	
8-153	Tape/Disk Transfer Programs	D	X
8-154	SWAP	B	XX
8-155	HEP	B	
8-156	HEPTRACE	B	
8-157	Square Root Patch for DEC-8-5-S	B	
8-158	AX-Ø8 Symbol Generator	A,B	X
8-159	CINET-BASIC	B	X
8-160	FASTLOAD	B	X
8-161	EXPO: A Flexible PDP-8 Data-Aquisition Program	Source Deck, B	XX
8-162	Demonstration Programs for tbe PDP-8	B	X
8-163	See FOCAL Section		
8-164	Prime Number Determination	A,B	X
8-165	The PDP-8 Simulator System for Philco 212		
8-166	The PDPMAP Assembly System		
8-167	CIRCUITS	B,S	XX
8-168	CalComp Plotting Package	D	X
8-169	Physical Oceanography Data Reduction Programs for the PDP-8 (II)	A,B	X
8-170	FORTRAN Source Conversion Program	A,B	X
8-171	Real-Time System for Behavioral Science Experiments		XX
8-172	Octal Systems Edit	A,B	XX
8-173	TIC 5/8 (Scope Version)	B	X
8-174	Medium	B	X
8-175	Post Stimulus Interval Histogram for AX-Ø8	B	XX
8-176	PAL CHOP	A,B	XX
8-177	COPY	A,B	XX
8-178	Reverse Assembler	A,B	XX
8-179	EAE Modifications for Binary Disassembler with Symbols	A,B	X
8-180	Editor and Assembler for 57A Magnetic Tape System	A	XX
8-181	Automatic Binary Loader and Duplicator-Coder for Auto Bin	A, B	XX
8-182	Memory Compare	B, S	X

DECUS NO.	TITLE	TAPES AVAILABLE	LISTING
8-183	The WANG Loader	B	X
8-184	Page Routine	B,S	XX
8-185	Modifications to Symbolic Editor and Symbolic Tape Format Generator	B	X
8-186	EAE FORTRAN Patch for the PDP-8	B	XX
8-187	Keyboard Controlled Binary Punch	A,B	X
8-188	Extended Memory Patch for Four Word Floating Point Package (DEC-08-FMHA-8B)	B	X
8-189	LKDN: Look into the Directory Name Block	B	XX
8-190	PATCH Utility Program	B	XX
8-191	Fields	B	XX
8-192	T.A.L.C. (Taylor's Algebraic Linear Calculator)	B	XX
8-193	DISP	A,B	X
8-194	NMR Simulator	B	XX
8-195	POLY BASIC	A,B	
8-196	DET: Detect Key Words		X
8-197	Overlay for Standard Editor and PAL III Assembler		X
8-198	SYSHLP: Monitor System Utility Program	B	XX
8-199	Accessing Data Arrays and Teletype Text Input/Output	A	
8-200	BOSS	B	X
8-201	DECSW: Decimal Switch	A,B	X
8-202	PLOT	B	XX
8-203	ALPHA	B	XX
8-204	PATCH: A PDP-8 Binary Paper Tape Patch Program	D	XX
8-205	MTSAFE	A,B	XX
8-206	DUMP	A,B	
8-207	Cube Root Subroutine	A,B	X
8-208	Evaluating Determinants		X
8-209	Editor-with-View (VD 8/I or 34D Scope)	B	

PDP-5 and PDP-8
PROGRAM ABSTRACTS

PDP-5 and PDP-8 PROGRAM ABSTRACTS

DECUS No. 6/8-12

PDP-8 Assembler for PDP-6

Henry Burkhardt, Digital Equipment Corporation, Maynard, Massachusetts

Assembles PDP-8 programs written in PAL on a PDP-6 using any I/O devices.

DECUS No. 5/8-1.1

BPAK - A Binary Input/Output Package

P. T. Brady, New York University, New York, New York

A revision of the binary package originally written by A. D. Hause of Bell Telephone Laboratories. With BPAK the user can read in binary tapes via the photoreader and punch them out via the Teletype punch. It may be used with any in-out device, but is presently written for the photoreader and Teletype punch. A simple modification converts BPAK so that it reads from the Teletype reader if the photoreader is disabled. In its present form it occupies locations 7600 - 7777.

DECUS No. 5-2.1

OPAK - An On-Line Debugging Program

P. T. Brady, New York University, New York, New York

A utility program which enables the user to load, examine, and modify computer programs by means of the Teletype. This program is a revision of the program written by A. D. Hause, Bell Telephone Laboratories. Extensive use of the program has suggested many refinements and revisions of the original program, the most significant additions being the word search and the breakpoint. The standard version of OPAK is stored in 6200 to 7577 and also 0006. An abbreviated version is available (7000 to 7577, 0006), which is identical to the other except that it has no provision for symbolic dump. Both programs are easily relocated. Control is via Teletype, with mnemonic codes, (e.g. "B" for inserting breakpoint, "P" for proceed, etc.).

DECUS No. 5-3

BRL - A Binary Relocatable Loader with Transfer Vector Options for the PDP-5

P. T. Brady, Bell Telephone Laboratories, Inc., Murray Hill, New Jersey

A binary loader program occupying 4640_8 to 6177_8 registers, also 160 to 177. It has two main functions:

1) It allows a PDP-5 operator to read a suitably prepared binary program into any page location in memory except the registers occupied by BRL.

2) It greatly simplifies the calling of programmed subroutines by allowing the programmer to use an arbitary subroutine calling sequence when writing his program, instead of having to remember the location of the subroutines.

DECUS No. 5-4

Octal Typeout of Memory Area with Format Option

Donald V. Weaver, New York, New York

(Write-up and Listing Only)

DECUS No. 5-5

Expanded Adding Machine

Donald V. Weaver, New York, New York

Expanded Adding Machine is a minimum-space version of Expensive Adding Machine (DEC-5-43-D) using a table look-up method including an error space facility.

This is a basic version to which additional control functions can easily be added. Optional vertical or horizontal format, optional storage of intermediate result without reentry fixed-point output of results within reason, and other features that can be had in little additional space under switch register control. (Write-up and Listing Only)

DECUS No. 5-6

BCD to Binary Conversion of 3-Digit Numbers

Donald V. Weaver, New York, New York

This program is based on DEC-5-4 and is intended to illustrate the use of alternative models in program construction.

While not the fastest possible, this program has one or two interesting features. It converts any 3-digit BCD-coded decimal number, $D_1D_2D_3$ into binary in the invariant time of 372 microseconds. Efficient use is made of BCD positional logic to work the conversion formula $(10D_1 + D_2)\ 10 + D_3$ by right shifts in the accumulator. In special situations, it could be profitable to insert an initial test/exit on zero, adding 12 microseconds to the time for nonzero numbers. (Write-up and Listing Only)

* Note: Programs listed as DECUS No. 5-(number) indicate that they work on the PDP-5, and compatibility to the PDP-8 is uncertain. Programs marked DECUS No. 5/8-(number) indicate they can be used on both 5 and 8 computers. Those marked DECUS No. 8-(number) work on PDP-8, and compatibility to PDP-5 is uncertain.

DECUS No. 5/8-7

Decimal to Binary Conversion by Radix Deflation on PDP-8

Donald V. Weaver, New York, New York

(Write-up and Listing Only)

DECUS No. 5-8

Obsolete

DECUS No. 5/8-9

Analysis of Variance PDP-5/8

Henry Burkhardt, Digital Equipment Corporation, Maynard, Massachusetts

An analysis of variance program for the standard PDP-5/8 configuration. The output consists of:

A. For each sample:
   1) sample number
   2) sample size
   3) sample mean
   4) sample variance
   5) sample standard deviation

B. The grand mean

C. Analysis of Variance Table:

   1) the grand mean
   2) the weighted sum of squares of class means about the grand means
   3) the degrees of freedom between samples
   4) the variance between samples
   5) the pooled sum of squares of individual values about the means of their respective classes
   6) the degrees of freedom within samples
   7) the variance within samples
   8) the total sum of squares of deviations from the grand mean
   9) the degrees of freedom
   10) the total variance
   11) the ratio of the variance between samples to the variance with samples.

This is the standard analysis of variance table that can be used with the F test to determine the significance, if any, of the differences between sample means. The output is also useful as a first description of the data.

Other Programs Needed: Floating Point Interpretive Package (DEC-8-5-S)

DECUS No. 5-10

Paper Tape Reader Test

Tony Schaeffer, Lawrence Radiation Laboratory, Berkeley, California

A test tape can be produced and will be continuously read as an endless tape. Five kinds of errors will be detected and printed out. The Read routine is in 6033-6040.

Storage Requirement: Locations 10, 11, 40-67 (save 63,64), and 6000-7777.

DECUS No. 5-11

PDP-5 Debug System

Tony Schaeffer and Don Zurlinden, Lawrence Radiation Laboratory, Berkeley, California

Purpose of this program is to provide a system capable of:

1. Octal dump 1 word per line.
2. Octal dump 10_8 words per line.
3. Modifying memory using the typewriter keyboard.
4. Clearing to zero parts of memory.
5. Setting to HALT codes part of memory.
6. Entering breakpoints into a program.
7. Initiating jumps to any part of memory.
8. Punching leader on tape.
9. Punching memory on tape in RIM format.
10. Punching memory on tape in PARITY format.
11. Load memory from tape in PARITY format.

DECUS No. 5-12

Pack-Punch Processor and Reader for the PDP-5

R. L. Becker, Boston College, Boston, Massachusetts

The processor converts a standard binary-format tape into a more compressed format, with two 12-bit words contained on every three lines of tape. Checksums are punched at frequent intervals, with each origin setting, or at least every 200 words.

The reader, which occupies locations 7421 to 7577 in the memory will load a program which is punched in the compressed format. A test for checksum error is made for each group of 200 or less and the program will halt on error detection. Only the most recent group of words need be reloaded. Read-in time is about 10% less than for conventional binary format, but the principal advantage is that little time is lost when a checksum error is detected, no matter how long the tape.

DECUS No. 5-13

PDP-5 Assembler (for use on IBM 7044/7094)

Tony Schaeffer, Lawrence Radiation Laboratory, Berkeley, California

This program accepts IBM 7044/7094 symbolic programs punched on cards and assembles them for the PDP-5. An assembly listing is produced, and a magnetic tape is generated containing the program. This magnetic tape can be converted to paper tape and then read into the PDP-5 or it can be read directly into a PDP-5 with an IBM compatible tape unit. Cards are available.

DECUS No. 5/8-14

Dice Game for the PDP-5/8

Edward Steinberger, Digital Equipment Corporation, Maynard, Massachusetts

Enables a user to play the game DICE on either the PDP-5 or PDP-8.

DECUS No. 5/8-15

ATEPO: Auto Test in Elementary Programming and Operation of a PDP-5/8 Computer

Submitted by: Rutgers University, Electrical Engineering Department, New Brunswick, New Jersey

The program will type questions or instructions to be performed by the operator of a 4K PDP-5/8. The program will check to see if the operator has answered the questions correctly. If this is the case, it will type the next question or instruction.

DECUS No. 5-16

Paper Tape Duplicator for the PDP-5

Henry Burkhardt, Digital Equipment Corporation, Maynard, Massachusetts

The Paper Tape Duplicator for the PDP-5 is a single-buffered read and punch program utilizing the program interrupt. It computes a character count and checksum for each tape and compares with checks at the end of the tape. Checks are also computed and compared during punching.

DECUS No. 5/8-17

Type 250 Drum Transfer Routine for use on PDP-5/8

S. Arthur MacIlroy, Foxboro Company, Foxboro, Massachusetts

Transfers data from drum to core (Read) or core to drum (Write) via ASR-33 Keyboard Control.

DECUS No. 5/8-18A

Binary Tape Disassembly Program

G. A. Sabin, NRL-USRD, Orlando, Florida

Disassembles a PDP-5 or 8 program, which is on tape in BIN format. It prints the margin setting, address, octal contents, mnemonic interpretation (PAL) of the octal contents. A normal program or a program which uses Floating Point may be disassembled.

DECUS No. 5/8-18B

Obsolete

DECUS No. 5/8-18C

Disassembler with Symbols

Eberhard Werner, University of California, Marine Physical Laboratory of the Scripps Institution of Oceanography, San Diego, California

This disassembler accepts a binary tape of standard format and produces a listing of the tape in PAL III mnemonics, and a cross-reference table of all addresses referenced by any memory-reference instruction. A symbol table may be entered to produce a listing similar to a PAL III Pass 3 listing. A patch to produce only a cross reference table is included. See DECUS No. 8-179.

Minimum Hardware: PDP-8 with 4K, ASR-33, High-Speed Reader, EAE

Storage Requirement: $20\text{-}1773_8$ for program, $1774\text{-}7577_8$ for scratch

DECUS No. 8-19a

DDT-UP: Octal-Symbolic Debugging Program

Michael S. Wolfberg and Robb N. Russell, The Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

DDT-UP is an octal-symbolic debugging program for a 4K PDP-8 which occupies locations 5600-7667. The mnemonics for the eight basic instructions are defined internal to this area. Other symbols are stored, four locations per symbol, from 5577 down towards 0000. The mnemonics for the standard OPR and IOT group instructions are initially defined in this area. Thus, the highest location initially available to the user is 5363. Beginning at this location the user may define symbols one at a time using the comma(,) operator.

From the Teletype, the user can symbolically examine and modify the contents of any memory location. DDT-UP allows the user to punch a corrected program in CBL format.

DDT-UP has a breakpoint facility to help the user run sections

DECUS No. 8-19a (Continued)

of his program. When this facility is used the debugger also uses location 0005.

DECUS No. 5/8-20

Remote Operator FORTRAN System

James Miller, Dow Badische, Freeport, Texas

Program modification and instructions to make the FORTRAN OTS version dated 2/12/65 operate from remote stations.

DECUS No. 5/8-21

Triple Precision Arithmetic Package for the PDP-5/8

Joseph A. Rodnite, Information Control Systems, Ann Arbor, Michigan

An arithmetic package to operate on 36-bit signed integers. The operations are add, subtract, multiply, divide, input conversion, and output conversion. The largest integer which may be represented is 2^{35} -1 or 10 decimal digits. The routines simulate a 36-bit (3 word) accumulator in core locations 40, 41, and 42 and a 36-bit multiplier quotient register in core locations 43, 44, and 45. Aside from the few locations in page 0, the routines use less core storage space than the equivalent double precision routines.

DECUS No. 5-22

DECtape Duplicate (552)

Jim Miller, Dow Badische, Freeport, Texas

A DECtape routine for the PDP-5 to transfer all of one reel (transport1) to another (transport 2). Occupies one page of memory beginning at 7400. The last page of memory is not used during the operation of the program; however, the memory from 1 to 7436 is used to set the DECtape reels in the proper starting attitude and is then destroyed during duplication. Duplication will commence after which both reels will rewind. Parity error will cause the program to halt with 0040 in the accumulator.

DECUS No. 5/8-23A

PDP-5/8 Oscilloscope Symbol Generator (4 x 6 Matrix)

Gary H. Sanders, Columbia Radiation Laboratory, New York City, New York

The subroutine may be called to write a string of characters, a pair of characters, or a single character on an oscilloscope. Seventy (octal) symbols in ASCII Trimmed Code and four special "format" commands are acceptable to this routine. The program is operated in a fashion similar to the DEC Teletype Output Package.

DECUS No. 5/8-23B

PDP-5/8 Oscilloscope Symbol Generator (5 x 7 Matrix)

Larry T. Gell, Center for Visual Science, University of Rochester, Rochester, New York

This subroutine may be called to write a string of characters, a pair of characters, or a single character on a 34D Oscilloscope. Twenty-six alphabetic characters and 0 - 9 numeric characters are acceptable. However, there is space available to include any symbol the user desires. The program is operated in a fashion similar to the DEC Teletype Output Package (Digital 8-19-U).

Source Language: MACRO-8

Storage Requirement: 200_8-777_8 registers

DECUS No. 5-24

Obsolete

DECUS No. 5-25

A Pseudo Random Number Generator

Paul T. Brady, New York University, Bronx, New York

The random number generator subroutine, when called repeatedly, will return a sequence of 12-bit numbers which, though deterministic, appears to be drawn from a random sequence uniform over the interval 0000_8 to 7777_8. Successive numbers will be found statistically uncorrelated. The sequence will not repeat itself until it has been called over 4 billion times. (See DECUS, FOCAL-1).

DECUS No. 8-26A

Compressed Binary Loader (CBL)

Michael S. Wolfberg, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

The CBL (Compressed Binary Loader) format in contrast to BIN format utilizes all eight information channels of the tape, thus achieving nearly 25% in time savings.

As BIN tapes include only one checksum at the end of the tape, CBL tapes are divided into many independent blocks, each of which includes its own checksum. Each block has an initial loading address for the block and a word count of the number of words to be loaded.

Storage Requirement: 7700-7777

DECUS No. 8-26B.1

CBL2BN and BN2CBL

David M. Kristol, University of Pennsylvania, Philadelphia, Pennsylvania

CBL2BN is a short utility program which converts paper tape in CBL format to BIN and BN2CBL converts paper tape from BIN to CBL format. It offers high or low speed I/O and proper punching of field characters.

Program Language: PDPMAP - (DECUS No. 8-166)

Storage Requirement: 300_8 and 200_8 Buffer; 400_8 and 200_8 Buffer

DECUS No. 8-26C

XCBL: Extended Memory CBL Loader

Michael S. Wolfberg, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

XCBL is used to load binary tapes punched in CBL format into a PDP-8 with more than standard 4K memory. This loader occupies locations 7670 through 7777 of any memory field.

DECUS No. 8-26D

XCBL Punch Program

Michael S. Wolfberg, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

This program permits a user to prepare an XCBL tape of portions of a PDP-8 extended memory through the control of the keyboard of the on-line Teletype.

The program is loaded by the BIN Loader.

There are two versions of the program so that any section of memory may be punched:

LOW XCBL occupies 00000-00377
and its starting address is 00000.

HIGH XCBL occupies 17200-17577
and its starting address is 17200.

DECUS No. 5/8-27 and 5/8-27a

Bootstrap Loader and Absolute Memory Clear

Willard Crittenden, Ann Arbor Computer Corporation, Ann Arbor, Michigan

Bootstrap Loader inserts a bootstrap loading program in page 0 from a minimum of toggled instructions.

Absolute Memory Clear leaves the machine in an absolutely clear state and, therefore, cycling around memory obeying an AND instruction with location zero. Should not be used unless one plans to reinsert the loader program.

DECUS No. 5/8-28a

PAL III Modifications - Phoenix Assembler

Terrel L. Miedaner, Space Astronomy Laboratory, Madison, Wisconsin

This modification of the PAL III Assembler speeds up assembly on the ASR-33/35 and operates only with this I/O device. Operation is essentially the same as PAL III, except that an additional pass has been added, Pass 0. This pass, started in the usual manner, but with the switches set to zero, reads the symbolic tape into a core buffer area. Subsequent passes then read the tape image from storage instead of from the Teletype.

DECUS No. 5/8-29

BCD to Binary Conversion Subroutines

Terrel L. Miedaner, Space Astronomy Laboratory, Madison, Wisconsin

These two subroutines improve upon the DEC-supplied conversion routine. Comparison cannot be made to the DECUS-supplied fixed-time conversions, DECUS No. 5-6, because it is specified only for the PDP-5. One routine is designed for minimal storage, the other for minimal time. Both are fixed-time conversions; time specified is for a 1.5 - μsec. machine.

Execution Time: Minimal Time routine - 73.6 μsec, 32 locations
Minimal Storage routine - 85 μsec, 29 locations
DEC routine - 64 - 237 μsec, 37 locations

DECUS No. 5-30

GENPLOT: General Plotting Subroutines for the PDP-5

M. Adamowicz, Department of Electrical Engineering, New York University, New York City, New York

This self-contained subroutine is for the PDP-5 with a 4K memory and a CalComp incremental plotter. The subroutine can move (with the pen in the up position) to locations (x,y), make an "x" at this location, draw a line from this present position to location (x,y) and initialize the plotter location counters.

DECUS No. 5-31

FORPLOT: FORTRAN Plotting Program for PDP-5

Jerome Feder, Department of Electrical Engineering, New York University, New York City, New York

FORPLOT is a general-purpose plotting program for the PDP-5 computer in conjunction with the CalComp 560 Plotter. It is self-contained and occupies memory locations 0000_8 up to 4177_8. FORPLOT accepts decimal data inputted on paper tape in either fixed or floating point formats. Formats can be mixed at will. PDP-5 FORTRAN output tapes are acceptable directly and any comment on these are filtered out.

Storage Requirement: $0000\text{-}4177_8$

DECUS No. 5/8-32a

Program to Relocate and Pack Programs in Binary Format

J. W. Bowman, Atomic Energy of Canada Ltd., Chalk River, Ontario, Canada

This program provides a means to shuffle machine language programs around in memory to make the most efficient use of computer store.

DECUS No. 5/8-33

Tape to Memory Comparator

Milton Collins, Teradyne, Boston, Massachusetts

Tape to Memory Comparator is a debugging program which allows comparison of the computer memory with a binary tape. It is particularly useful for detecting reader problems, or during stages of debugging a new program. Presently uses high-speed reader, but may be modified for TTY reader.

DECUS No. 5-34

Memory Halt - A PDP-5 Program to Store HALT in Most of Memory

P. T. Brady, Department of Electrical Engineering, New York University, New York City, New York

With Memory Halt and OPAK in memory, it is possible to store HALT (7402) in the following memory locations: 0001 to 0005, 0007 to 6177, and 7402 to 7403.

Other Programs Needed: OPAK (DECUS No. 5-2.1)

DECUS No. 5/8-35

BCD to Binary Conversion Subroutine and Binary to BCD Subroutine (Double Precision)

Selene H. C. Wise, Bermuda Press Ltd., Hamilton, Bermuda

This program consists of a pair of relatively simple and straightforward double precision conversions.

DECUS No. 5-36

Octal Memory Dump Revised

Paul Hammond, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts

The Octal Memory Dump on Teletype is a DEC routine (DEC-5-8-U) which dumps memory by reading the switch register twice; once for a lower limit and again for an upper limit. It then types an address, the contents of the program and the next three locations, issues a CR/LF, then repeats the process for the next four locations. This leaves the right two-thirds of the Teletype page unused. The 78_{10} instructions occupy two pages.

This revised routine uses the complete width of the Teletype page and occupies only one memory page, using less paper and two less instructions. Now an address and the contents of 15 locations are typed out before a carriage return.

DECUS No. 5-37

Transfer II

Paul Hammond, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts

For users who have more than one memory bank attached to the PDP-5/8, Transfer II may prove valuable in moving information from one field to another. When debugging, Transfer II enables a programmer to make a few changes in a new program and test it without reading in the original program again. Transfer II enables more extensive use of memory banks.

DECUS No. 5/8-38

FTYPE: Fractional Signed Decimal Type-In

P. T. Brady, Department of Electrical Engineering, New York University, New York City, New York

Enables a user to type fractions of the form: .582, - .73, etc., which will be interpreted as sign plus 11 bits (e.g., $0.5 = 2000_8$). Subroutine reads into 300-3177 and is easily relocated, as it will work on any page without modifications.

DECUS No. 5/8-39

DSDPRINT, DDTYPE: Double Precision Signed Decimal Input-Output Package

P. T. Brady, Department of Electrical Engineering, New York University, New York City, New York

DSDPRINT, when given a signed 24-bit integer, types a space or minus sign, and then a 7-digit decimal number in the range -8388608 to +8388607. DDTYPE enables a user to type in a signed decimal number in either single or double precision. These routines are already separately available, but the present subroutine package occupies only one memory page and allows for more efficient memory allocation. Located in 3000-3177, but will work on any page.

DECUS No. 5-40

ICS DECtape Routines (One-Page 552 Control)

Submitted by: Information Control Systems, Inc., Ann Arbor, Michigan

The routines will read or write from the specified DECtape unit and delay the program until all I/O is completed. The last block read will overflow the specified region and destroy one core location. Only standard 129 word DECtape blocks will be read or written. The routines will halt if an error occurs with the status bits in the AC.

DECUS No. 5-41

Breakpoint

Arthur R. Miller, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts

This debugging routine has been reduced to a minimum operation. It is a mobile routine which can operate around any program that leaves an extra 30 cells of memory space.

Its function is to insert break points in any given location of the program being debugged, and to hold the contents of AC and Link. The programmer may examine any locations desired and then continue to the next breakpoint. It is presently located in 140_8 - 170_8, but may be easily relocated.

Storage Requirement: 140_8 - 170_8

DECUS No. 5-42

Obsolete

DECUS No. 5/8-43

Unsigned Octal - Decimal Fraction Conversion

Frank Ollie, Defence Research Telecommunications Establishment, Ottawa, Ontario, Canada

This routine accepts a four-digit octal fraction in the accumulator and prints it out as an N-digit decimal fraction where N = 12 unless otherwise specified. After N digits, the fraction is truncated. Programs are included for use on the PDP-5 with Type 153 Automatic Multiply-Divide and the PDP-8 with Type 182 Extended Arithmetic Element.

Storage Requirement: 55_8 locations for the PDP-5.
47_8 locations for the PDP-8.

DECUS No. 8-44

Modifications to the Fixed Point Output in the PDP-8 Floating Point Package (Digital 8-5-S)

A. R. McKenzie, Data Systems Division, Standard Telephone & Cables, Ltd., England

The Floating Point Package (Digital 8-5-S) includes an Output Controller which allows output in fixed point as well as floating point format. This Output Controller takes the form of a certain number of patches to the "Floating Output E Format" routine, plus an additional page of coding.

Using the Calculator program (Digital 8-10-S), which includes the Floating Point Package, certain deficiencies were noted in the fixed-point output format, particularly the lack of any automatic rounding off.

This new version of the Output Controller is also in the form of patches to the Floating Output with an additional page of coding, thereby not increasing the size of the Floating Point Package.

The following summarizes this new version:

1. The number output is automatically rounded off to the last digit printed, or the sixth significant digit, whichever is reached first. Floating point output is rounded off to six significant figures since the seventh is usually meaningless.

2. A number less than one is printed with a zero preceding the decimal point (e.g., "+0.5" instead of "+.5").

3. A zero result, after rounding off, is printed as "+0" instead of "+".

4. The basic Floating Point Package includes the facility to specify a carriage return/line feed after the number using location 55 as a flag for this purpose. The patches for the Output Controller caused this facility to be lost. This version restores this facility.

DECUS No. 5/8-45

PDP-5/8 Remote and Time-Shared System

James Miller, Dow Badische Chemical Company, Freeport, Texas

A time-shared programming system which allows remote stations immediate access to the computer and a wide selection of programs.

DECUS No. 5/8-46a

PDP-5/8 Utility Programs

Edward Della Torre, American-Standard, Princeton, New Jersey

Consists of seven programs (listed below) each of which may be selected via the Teletypewriter. When the program is started, either by a self-starting binary loader or by manually starting the computer in address 200_8, it is in its executive mode. In this mode, it will respond only to eight keys and perform the following functions:

B - go to BIN to QK Converter Program
E - go to Editor Program
F - FORTRAN Tape formatter
L - type a section of leader and stay in executive
N - go to Editor program without typing leader
P - go to Page Format Program
T - Assembly language tape formatter
Q - go to QK to BIN Converter Program

DECUS No. 8-47

ALBIN - A PDP-8 Loader for Relocatable Binary Programs

J. L. Visschers, P. U. ten Kate and M. A. A. Sonnemans, Instituut Voar Kernphysisch Onderzoek (IKO), Amsterdam, The Netherlands

ALBIN is a simple method for constructing relocatable binary formatted programs, using the PAL III Assembler. Allocation of these programs can be varied in units of one memory page (128_{10} registers). When loading an ALBIN program, the actual absolute addresses of indicated program elements (e.g., the keypoint of subroutines) are noted down in fixed program-specified location on page zero. In order to make a DEC symbolic program suitable for translation into its relocatable binary equivalent, minor changes are required which, however, do not influence the length of the program. Due to its similarity to the standard DEC BIN loader, the ALBIN loader is also able to read-in normal DEC binary tapes. ALBIN requires 122_{10} locations, RIM loader included. Piling-up in core memory of ALBIN programs stored on conventional or DECtape can be achieved using the same method with some modifications.

DECUS No. 5/8-48

Modified Binary Loader MK IV

R. Ward, American-Standard Research Division, New Brunswick, New Jersey

The Mark IV Loader was developed to accomplish four objectives:

1. Incorporate the self-starting format described in DECUS 5/8-27, Bootstrap Loader.

2. Select the reader in use, automatically, without switch register settings.

3. Enable a newly-prepared binary tape to be checked prior to loading by calculating the checksum.

4. Reduce the storage requirements for the loader so that a special program would fit on the last page of memory with it.

DECUS No. 8-49

Relativistic Dynamics

G. Sharman, Southampton University, Southampton, England

Prints tables for relativistic particle collisions and decay in the same format as the Oxford Kinematic Tables. It can be used in two ways:

1. Two-particle Collisions - Given the masses of incident, target, and emitted particles, the incident energy and centre-of-mass angles, the program calculates angles and energies of the emitted particles in the Lab frame. If the process is forbidden energetically, program outputs "E" allowing the threshold energy to be found.

2. Single-Particle Decays - By specifying M2=0 (target), the problem will be treated as a decay, and similar tables to the above will be printed.

DECUS No. 5/8-50

Additions to Symbolic Tape Format Generator (DEC-8-21-4)

Richard Merrill, Digital Equipment Corporation, Maynard, Massachusetts

These routines allow the user to perform further useful functions by the addition of a few octal patches. By making the appropriate octal patches via the toggles, the Format Generator can also format FORTRAN tapes, shorten tape by converting space to tabs, and convert the type of tape.

DECUS No. 5/8-51

Character Packing and Unpacking Routines

Richard Merrill, Digital Equipment Corporation, Maynard, Massachusetts

ASCII characters may be packed two to a word and recovered. Control characters are also packable but are preceded by a 37 before being packed into the buffer.

Storage Requirement: 63_{10} words

DECUS No. 8-52

Tiny Tape Editor

Richard Merrill, Digital Equipment Corporation, Maynard, Massachusetts

This Tiny Tape Character Editor fits in core at the same time as the PAL III or MACRO-8 assemblers. A tape may be duplicated at three speeds and stopped at any character for insertion or deletion. The toggle switches control the speed and the functions desired.

Storage Requirement: 72_{10} registers.

DECUS No. 5/8-53

COPCAT (DECtape Copy 552)

Russell Winslow, Digital Equipment Corporation, Maynard, Massachusetts

COPCAT is a tape-to-tape copy routine for the PDP-5 and PDP-8 DECtape (552 Control).

DECUS No. 5/8-54

TIC-TAC-TOE Learning Program

Michael Green, Stevens Institute of Technology, Hoboken, New Jersey

This program plays TIC-TAC-TOE basing its moves on stored descriptions of previously lost games. The main program is written in FORTRAN. There is a short subroutine written in PAL II used to print out the TIC-TAC-TOE board. The program comes already educated with about 32 lost games stored.

Other Programs Needed: FORTRAN Object Time System

DECUS No. 5/8-55

PALEX - An On-Line Debugging Program for the PDP-5/8

Robert Berger, Bell Telephone Laboratories, New York, New York

One problem with programs written in Program Assembly Language (PAL) for operation on a PDP-5/8 computer is the danger of an untested program being self-destructive, running wild, destroying other programs residing in memory such as loading programs. PALEX prevents any of the above unwanted operations from occuring while it gives the operator-programmer valuable debugging information and enables him to make changes in his program and try out the modified program. Once running, PALEX cannot be destroyed by any program or instruction in memory, the operator need not touch any manual console controls, and all required information is printed in easy-to-read format on the Teletype console.

DECUS No. 8-56

Fixed Point Trace No. 1

B. J. Biavati, Columbia University, New York, New York

A minimum size monitor program which executes the users' program one instruction at a time and reports the contents of the program counter, the octal instruction, the contents of the accumulator and link and the contents of the effective address by means of the ASR-33 Teletype. (See DECUS No. 8-57)

Storage Requirement: two pages.

DECUS No. 8-57

Fixed Point Trace No. 2

B. J. Biavati, Columbia University, New York, New York

Similar to Fixed Point Trace No. 1 (DECUS No. 8-56) except that the symbolic tape provided has a single origin setting instruction of 6000. Any four consecutive memory pages can be used, with the exception of page zero, by changing this one instruction.

DECUS No. 8-58

One-Page DECtape Routine (552 Control)

Submitted by: Massachusetts Institute of Technology, Cambridge, Massachusetts

A general-purpose program for reading, writing, and searching of magnetic tape. This program was written for the Type 552 Control. It has many advantages over both the standard DEC routines and also over the DECUS No. 5-40. The routines are one page long and can be operated with the interrupt on or off. The DEC program delays the calling program while waiting for the unit and movement delays to time-out. This routine returns control to the calling program. This saves 1/4

DECUS No. 8-58 (Continued)

second every time the tape searches forward and half that time when it reverses. In addition, it will read and write block 0. This program is an advantage over the previous one-page routines in that it allows interrupt operations, does not overflow by one location, interprets the end zone correctly and not as an error, and provides a calling sequence indentical to the DEC program.

DECUS No. 8-59

PALDT - PAL Modifications for DECtape (552 Control)

George Friedman, Massachusetts Institute of Technology, Cambridge, Massachusetts

When assembling programs, PALDT requires that the symbolic tape be read in only once. The program writes on the library tape itself after finding the next available block from the directory. During pass 0 the tape is read in using the entire user's symbol table. During passes 1,2,3, as much of the symbol table is used as possible. This means the fewest tape passes as possible. As an added advantage pass 0 ignores blank tape, leader-trailer, line feeds, form feeds, and rubouts; saving space. The whole program decreases the users symbol table by only three pages: one for the DECtape program above, one for pass 0, and one for the minimal length read-in buffer.

DECUS No. 8-60

Square Root Function by Subtraction Reduction

George Friedman, Massachusetts Institute of Technology, Cambridge, Massachusetts

A single precision square root routine using EAE. This routine is usually faster than the DEC routine and can easily be modified for double precision calculation at only twice the computation time.

DECUS No. 8-61

Improvement to Digital 8-9-F Square Root

George Friedman, Massachusetts Institute of Technology, Cambridge, Massachusetts

An improved version of the DEC Single Precision Square Root Routine (without EAE). Saves a few words of storage and execution is speeded up 12 percent.

DECUS No. 8-62a

Obsolete

DECUS No. 5-63

SBUG-4

Robert LaFore, Lawrence Radiation Laboratory, Berkeley, California

SBUG-4 allows the PDP-5 to execute one instruction of any given program at a time, returning to SBUG-4 following each instruction and printing out the contents of various registers. This permits following the path of a program which has gone astray or examining some defective operation.

DECUS No. 5/8-64

DECtape Programming System (552 & TCØ1 Controls)

Submitted by : DEC Software Services Group, Digital Equipment Corporation, Maynard, Massachusetts

This program provides rapid access to DEC software and utilizes routines through the use of DECtape. Programs may be stored, edited, assembled, listed, or executed without reliance upon paper tape.

May be used with both TCØ1 and 552 DECtape Controls. When requesting this program please specify which version.

DECUS No. 8-65

A Programmed Associative Multichannel Analyzer

G. C. Best, Atomic Energy Research Establishment, Harwell, England

The program describes the use of a small computer as an associative analyzer with special reference to the PDP-8. The advantages and limitations of the method are discussed in the write-up, and general program algorithms are presented.

DECUS No. 8-66

Editor Modified for DECtape (552)

Robin B. Wadleigh, Johns Hopkins University, Baltimore, Maryland

This program consists of modifications to the Digital 8-1-S Symbolic Editor to enable reading and writing on DECtape. This results in considerable time savings in assembling PAL programs since PAL has also been modified to accept the symbolic program directly from DECtape. The DECtape compatability is also useful for storing text for later use and for regaining Editor memory space lost due to delete and change commands.

DECUS No. 8-66 (Continued)

In addition, the overflow detection routine is now foolproof and results in a HALT.

Storage Requirement: Editor: <Ø, 1502>
Modifications: <1462, 1502>
<6376, 7177>
DECtape Routines: <7200, 7577>

Minimum Hardware: PDP-8 with EAE, ASR-33, DECtape

DECUS No. 8-67

PAL Modified for DECtape Input (552)

Robin B. Wadleigh, Johns Hopkins University, Baltimore, Maryland

This program is a modification to the Digital 8-3L-S PAL Assembly Program enabling PAL to obtain the symbolic program from DECtape (in addition to paper tape), and outputting the assembled program in the usual manner. (The symbolic program is written onto DECtape by use of the "Editor Modified for DECtape" Program.) This modification also makes it possible to assemble sections or commands from the keyboard with those from DECtape. The resulting assembly is limited in speed mainly by the punching of the assembled program during Pass 2; and Pass 1 is speeded considerably. Also included is a tabulator interpreter, providing Pass 3 listings in tabulated format.

Storage Requirement: PAL III: <Ø, 3561> plus symbol table
Modifications: <6555, 7177>
DECtape Routines: <7200, 7577>

Minimum Hardware: PDP-8 with EAE, ASR-33, DECtape

DECUS No. 8-68a

LABEL for PDP-8

Michael S. Wolfberg, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

The LABEL Program punches labels for paper tapes on the Teletype punch. When a key on the Teletype keyboard is depressed, no echo is performed, but a few characters of tape are punched which form the outline of the character associated with the key. Outlines are punched for all characters whose code is between 240 and 337.

Storage Requirement: Locations 200-677 of any memory field. 400-677 of Readable Punch.

Note: See DECUS No. 8-106

DECUS No. 5/8-69

LESQ29 and LESQ11

Michael W. King, Phillips Petroleum Company, Idaho Falls, Idaho

The purpose of the program is to fit the best sequences of parabolas to a given 400 point data curve in order to remove extraneous noise; rather than rely on a single 400 point parabola least squares fit to approximate a given data curve. Approximately 400 individual parabolas are computed as follows.

LESQ29

Data values 1 through 29 are subjected to a second order Least Squares fit. The median point of the resulting parabola (point #15) is then substituted for the original data value #15.*

A second parabola is then computed using data values 2 through 30. The median point of this parabola (point #16) is then substituted for point #16 of the original data curve.

This procedure is repeated until all data values have been replaced (except for the first and last 14 points which are excluded by the mechanics of the operation).

LESQ11

Process identical to LESQ29 except that an 11 rather than a 29 point smooth interval is used. First point replaced is point #6, and only the first and last 5 points are excluded from smoothing.

LESQ11 will preserve higher frequency data than LESQ29 for a given data curve with constant time between data points.

Minimum Hardware: 4K PDP-5 or PDP-8, Teletypewriter (plotter, DECtape optional)

Other Programs Needed: Floating Point Interpretive Package (Digital 8-5-S) and appropriate data handling routines.

Storage Requirement: LESQ11: 400-564; 700-716
LESQ29: 400-564; 700-751

Execution Time: (PDP-5) LESQ11: 1 minute.
LESQ29: 2.5 minutes.

Restrictions: Positive integer data $<3777_8$; time between data points constant.

*See B. J. Power, R. N. Hagen, S. O. Johnson, "SPORT, A System for Processing Reactor Transient Data on the IBM-7040 Computer, " pp. 4-8, AEC Research and Development Report (IDO-17078), Available from: The Clearinghouse for Federal Scientific and Technical Information, National Bureau of Standards, U. S. Department of Commerce, Springfield, Virginia.

DECUS No. 8-70

EAE Routines for FORTRAN Operating System (DEC-08-CFA3)

Russell B. Ham, U. S. Public Health Service, Winchester, Massachusetts

These are two binary patches to the FORTRAN Operating System which utilizes the Type 182 EAE hardware for single precision multiplication and normalization, replacing the software routines in FOSSIL (the operating system). The binary tape is loaded by the BIN Loader after FOSSIL has been loaded. Execution time of a Gauss-Jordan matrix inversion is reduced by approximately 30%.

Minimum Hardware: PDP-8 with Type 182 EAE

Other Programs Needed: FORTRAN Operating System DEC-08-CFA3-PB dated March 2, 1967

DECUS No. 8-71

Perpetual Calendar

E. Singer, McGill University, Montreal, Quebec, Canada

The program is designed as a computer demonstration. When a valid date is fed into the computer, the corresponding day of the week is typed out. The program is based on the Gregorian Calendar and is limited to years between 1500 and 4095.

Minimum Hardware: PDP-8 with an ASR-33 Teletype

Storage Requirement: 20-1333

DECUS No. 8-72

Matrix Inversion, Real Numbers

A. E. Sapega, Trinity College, Hartford, Connecticut

The program inverts a matrix, up to size 12 x 12, of real numbers. The algorithm used is the Gauss-Jordan method. A unit vector of appropriate size is generated internally at each stage. Following the Gauss sweep-out, the matrix is shifted in storage, another unit vector is generated and the calculation proceeds.

Minimum Hardware: PDP-8

Other Programs Needed: FORTRAN Compiler and FORTRAN Operating System

Storage Requirement: Uses all of core not used by the FORTRAN Operating System.

Execution Time: Actual computation takes less than 10 seconds. Data read-in and read-out may take up to five minutes.

DECUS No. 8-73

Matrix Inversion, Complex Numbers

A. E. Sapega, Trinity College, Hartford, Connecticut

The program inverts a matrix, up to size 6 x 6 of complex numbers. The algorithm used is the Gauss-Jordan method, programmed to carry out complex number calculations. A unit vector of appropriate size is generated internally. Following the Gauss sweep-out, the matrix is shifted, another unit vector is generated, and the calculation proceeds.

Other Programs Needed: FORTRAN Compiler and FORTRAN Operating System

Storage Requirement: This program uses essentially all core not used by the FORTRAN Operating System

Execution Time: Actual computation takes less than 10 seconds. Data read-in may take up to five minutes.

DECUS No. 8-74

Solution of System of Linear Equations AX= B, by Matrix Inversion and Vector Multiplication

A. E. Sapega, Trinity College, Hartford, Connecticut

This program solves the set of linear algebraic equations AX= B by inverting matrix A using a Gauss-Jordan method. When the inverse matrix has been calculated, it is printed out. At that point, the program requests the B-vector entries. After read-in of the B-vector, the product is computed and printed out. The program then loops back to request another B-vector, allowing the system to solve many sets of B-vectors without the need to invert matrix A again. Maximum size is 8 x 8.

Other Programs Needed: FORTRAN Compiler and FORTRAN Operating System

Storage Requirement: This program uses essentially all of core not used by the FORTRAN Operating System

DECUS No. 8-75

Matrix Multiplication - Including Conforming Rectangular Matrices

A. E. Sapega and Chester Sic, Trinity College, Hartford, Connecticut

This program multiplies two matrices, not necessarily square but which conform for multiplication.

Other Programs Needed: FORTRAN Operating System and FORTRAN Compiler

DECUS No. 8-76

PDP NAVIG 2/2

M. Talwani and J. Dorman, Lamont Geological Observatory, Columbia University, Palisades, New York

This program utilizes the output of the U. S. Navy's AN/SRN-9 satellite navigation receiver to obtain fixes on a PDP-8 or PDP-8/S. This program, except for some details of input and output, follows very closely NAVIG2 written for the IBM 1620 which in turn is derived from the TRIDON program written at the Applied Physics Laboratory of Johns Hopkins University for the IBM 7090.

PDP NAVIG 2/2 is written in PAL III for 4K machine with ASR-33. Floating point numbers using two 12-bit words as mantissa and one 12-bit word as exponent are employed.

Restriction: The accuracy is slightly less than that using 7 decimal digits per word.

Minimum Hardware: PDP-8 with an ASR-33.

DECUS No. 8-77

PDP-8 Dual Process System

Richard M. Merrill, Digital Equipment Corporation, Maynard, Massachusetts

The purpose of this system is to expedite the programming of multiprocessing problems on the PDP-8 and PDP-8/S. It maximizes both the input speed and the portion of real time actually used for calculations by allowing the program to run during the intervals between issuing I/O commands and the raising of the device flag to signal completion of the command. The technique also allows queuing of input data or commands so that the user need not wait while his last line is being processed, and so that each line of input may be processed as fast as possible regardless of its length. The system uses the interrupt facilities and has less than 3% overhead on the PDP-8/S (about 0.1% on the PDP-8).

This method is especially useful for a slower machine where the problem may easily be calculation limited but would, without such a system, become I/O bound.

The program may also be easily extended to handle input from an A/D converter. Here, the input would be buffered by groups of readings terminated either arbitarily in groups of N or by zero crossings.

This program can increase the I/O to computation efficiency of some programs by 100%. It can do this even for single Teletype. Each user will probably want to tailor the program to his individual needs.

Storage Requirement: 600_8 registers for two TTY's plus buffer space. (Several device configurations are possible.)

DECUS No. 8-78

Diagnose: A Versatile Trace Routine for the PDP-8 with EAE

Keith B. Oldham, North American Aviation Science Center, Thousand Oaks, California

This trace routine will track down logical errors in a program (the "sick" program). Starting at any convenient location in the "sick" program, instructions are executed, one at a time, and a record of all operations is printed out via the Teletype. To avoid tracing proven subroutines, an option is provided to omit subroutine tracing. The present routine is significantly more versatile than two other trace routines in the DECUS Library (DECUS Nos. 8-56 and 8-57) for the PDP-8 in that it is able to trace "sick" programs containing floating point, extended arithmetic and a variety of input/output instructions. Diagnose is, however, at a disadvantage compared with DECUS No. 8-56 in requiring more memory space (five pages as opposed to two); and compared with DECUS No. 8-57 in not possessing the trace-suppression features of the latter. The mode of operation of Diagnose is quite different from the other trace routines.

Minimum Hardware: PDP-8 with EAE

Other Programs Needed: Floating Point Package needed for floating point tracing. (DEC-8-5-S)

Miscellaneous: Program is Relocatable

DECUS No. 8-79

TIC-TAC-TOE (Trinity College Version)

Gunnar Walmet, Trinity College, Hartford, Connecticut

This TIC-TAC-TOE game is programmed, using internal logic, so that the computer will either win or stalemate, but not lose a game. At the termination of a game, the program restarts for the next game.

DECUS No. 8-80

Determination of Real Eigenvalues of a Real Matrix

A. E. Sapega, Trinity College, Hartford, Connecticut

This is a two-part program for determining the real eigenvalues of a real-valued matrix. The matrix does not have to be symmetric. Part I uses the power method of iterating on an eigenvector to determine the largest eigenvalue of the matrix. Part II then deflates the matrix using the results of Part I so as to produce a matrix of order one less than that solved for in Part I. Part I can then be reloaded, and the next eigenvalue in line may be calculated. In this, all the real eigenvalues may be computed in order.

DECUS No. 8-81

A BIN or RIM Format Data or Program Tape Generator

R. F. Templeman, The Physical Laboratories, The University, Manchester, England

This program enables a PDP-8 operator to generate tapes under Teletype control in RIM or PAL BIN format without formal assembly, assuming the operator knows the octal codes corresponding to each instruction. This is particularly useful when one is dealing with small programs for testing interface equipment or when making small modifications to larger programs saving reassembling time. Tapes generated using this program can be appended to existing BIN or RIM tapes and can then be loaded with the original tape into core with the appropriate loader. Another use of this program is in the preparation of data tapes in RIM or BIN format so that data can be loaded directly into PDP-8 core via the usual loaders. The program also generates leader/trailer code and a checksum under program control.

Storage Requirement: Locations 6000-6077.

DECUS No. 8-82

Library System for 580 Magnetic Tape (Preliminary Version)

G. Sharman, University of Southampton, Southampton, England

The system provides for storing program files (or other files) on the 580 Magnetic Tape with PDP-8, and recalling them at will without altering the state of the rest of the computer. In general principle, it is similar to the DECtape Library System, and the only effective storage requirement is the last page of memory.

At present, the system consists of three programs known as BOOTSTRAP 1, BOOTSTRAP 2, and the LIBRARY Routines.

BOOTSTRAP 1 is a minimal loader program which resides in the last page of memory. Its function is to rewind the tape and load BOOTSTRAP 2 into the last page, automatically transferring control to it. Bootstrap saves the area of core to be used by the system as a record on the magnetic tape, loads the LIBRARY Routines into core, and transfers control to them.

The LIBRARY Routines comprise a Directory of the files on tape, an Input-Output package, enabling communication with the Teletype, and four system programs:

LIst	Types out the names of files in the Directory
CAll	Transfers a file into core and exits
DUmp	Writes a file on tape, rewrites the Directory, and exits
EXit	Restores the computer to its original state, with BOOTSTRAP 1 and BIN on the last page.

The magnetic tape subroutine and some control functions are included in BOOTSTRAP 2. Each entry in the directory consists of three words: the name of the file, its first location in core, and the number of words it occupies. The capacity of the directory is 22_{10} entries.

DECUS No. 5/8-83A & B

Octal Debugging Package (with and without Floating Point)

James Rothman, Digital Equipment Corporation, Maynard, Massachusetts

This program is an on-line debugger which will communicate with the operator through the ASR-33 Teletype. It allows register examination and modification, octal dumping, binary punching, multiple and simultaneous breakpoints, starting a program, and running at a particular location with preset AC and link. ODP is completely relocatable at the beginning of all pages except page zero, and is compatible with the PDP-5, the PDP-8, and the PDP-8/S.

Storage Requirement:	The high version of ODP requires locations 7000-7577. The low version requires locations 0200-0777. All versions will require three pages. Also, location 0002 is used for a breakpoint pointer to ODP.
Minimum Hardware:	The standard PDP-5, 8, or 8/S, with ASR-33 Teletype is required. A high-speed punch is optional.

DECUS No. 8-84

One-Pass PAL III

Krause and Riedl, Siemens, Erlangen, Germany

This is a modification to Digital 8-3L-S, for use on an 8K PDP-8 with ASR-33. The principle of the modification is to store the incoming characters during Pass 1 into the memory extension and taking them from there during Pass 2 and 3. Source programs must be limited to 4095 characters. This modification can save about 40% of assembly time.

Operation of the program is the same as for PAL III except that the reading of the source program for Pass 2 and 3 need not be repeated. For these passes, one simply presses CONTINUE after setting the correct switches.

Restriction:	The program does not work with high-speed reader and punch.

DECUS No. 5/8-85

Set Memory Equal to Anything

Roy S. Taylor, Department of Defense, Fort George G. Meade, Maryland

This program will preset all locations to any desired settings, thus, combining a memory clear, set memory equal to HALT, etc. into a single program. The program is loaded via the switch registers into core.

DECUS No. 8-86

Obsolete

DECUS No. 8-87

XMAP

Curtis Jansky and Robert B. Brown, Communications Systems, Inc., Paramus, New Jersey

This program types out the contents of the DECtape directory on TTY keyboard. The list includes the name of the program, its initial block number, the amount of blocks used, the starting address and the location(s) of the program in core. The above restriction is only a format restriction due to the line length on the TTY unit. At present, this program is operational only with the TCØ1 control; however, the symbolic version may be modified for use with the 552 control.

Storage Requirement: 0000-1232, 6000-6577 (directory)

Restrictions: Each program on tape is assumed to occupy no more than three successive sequences of memory pages.

DECUS No. 8-88

DECtape Symbolic Format Generator

Jack Harvey, Communications Systems, Inc., Paramus, New Jersey

These are DECtape versions of the Symbolic Tape Format Generator, Digital 8-21-U, that operate under the DECtape Programming System, DECUS No. 5/8-64. They provide neat format for symbolic files generated with XEDIT, and a means to get symbolic programs out on paper. They compact a program containing extra spaces and give the number of blocks actually used in the output file. The library tape is executable on TCØ1 equipment only, but instructions are given for altering it for 552 equipment.

Minimum Hardware: PDP-8 with TCØ1 Control

Other Programs Needed: XRDCT, XWDCT, XBUFF, (DECUS No. 5/8-64)

DECUS No. 8-89

XOD: Extended Octal Debugging Program

Michael S. Wolfberg, The Moore School of Electrical Engineering, Philadelphia, Pennsylvania

XOD is an octal debugging program for a PDP-8 with extended memory which preserves the status of program interrupt system at breakpoints. The program occupies locations 6430 through 7577 of any memory field.

From the on-line Teletype, the user can examine and modify the contents of any memory location. Positive and negative block searches with a mask also may be performed.

XOD includes an elaborate breakpoint facility to help the user run sections of his program. When this facility is used, the debugger also uses locations 0005, 0006, and 0007 of every memory field. (See DECUS No. FOCAL-2)

Restrictions: The ability to punch binary tapes is not included in XOD.

DECUS No. 8-90

Histogram on Teletype

J. B. Levin, University of Arizona, Tucson, Arizona.

This routine plots histograms on the Teletype when there is no CRT display available or a means of making a permanent copy of a CRT display. Input to the routine consists of a vertical scaling factor, the size of the table to be plotted (limited only by the size of the Teletype print line), the starting address of two core areas: one containing the data to be plotted, and one for use as temporary storage by the machine.

Storage Requirement: 128_{10} words plus tables

DECUS No. 8-91

MICRO-8: An On-Line Assembler

K. F. Kinsey, State University of New York, Geneseo, New York

M. E. Nordberg, Jr., Cornell University, Ithaca, New York

MICRO-8 is a short assembler program for the PDP-8 that translates typed mnemonic instructions into the appropriate binary code and places them in specified memory locations immediately ready to function. It processes the typed instructions by a table-lookup procedure.

It is especially useful for programs of less than one page which are to be run immediately. Only octal (not symbolic) addresses may be specified, but the user has control of the zero page and indirect addressing bits. An octal typeout routine permits examination of any memory location.

DECUS No. 8-91 (Continued)

Storage Requirement: 3200-4200

Restrictions: MICRO-8 is quite capable of modifying itself.

DECUS No. 8-92

Analysis of Pulse-Height Analyzer Test Data with a Small Computer

E. McDaniel and J. W. Woody, Jr., Oak Ridge National Laboratory, Oak Ridge, Tennessee

This PDP-8 computer program is used in the evaluation of test data for multichannel pulse-height anaylzers. The program determines integral and differential nonlinearities and examines smooth spectra of radioactive decay.

DECUS No. 8-93

CHEW - Convert Any BCD to Binary - Double Precision

Louis O. Cropp, Sandia Corporation, Albuquerque, New Mexico

This subroutine converts a double precision (6-digit) unsigned-integral binary-coded decimal (BCD) number with bit values of 4,2,2, and 1 to its integral-positive-binary equivalent in two computer words. It is possible to change the bit values to any desired values and thereby convert any BCD number to binary.

Storage Requirement: 0109_{10}

DECUS No. 8-94A

BLACKJACK

Dennis J. Frailey, Ford Motor Company, Dearborn, Michigan

This program enables a person to play BLACKJACK with the computer. The computer acts as dealer and keeps track of bets, cards played, etc.

Storage Requirement: $0 - 3777_8$

Minimum Hardware: PDP-8 with EAE

DECUS No. 8-94B

Patch for BLACKJACK

Steven L. Bard, U. S. Army Nuclear Defense Laboratory, Edgewood Arsenal, Maryland

This patch contains two overlays for BLACKJACK (DECUS No. 8-94A). The first eliminates the need for the EAE hardware, the second allows one to "double down" on any two cards with the instruction "D" (Ø response to "HIT?" is made invalid).

Minimum Hardware: PDP-8, 8/S, or 8/I

Other Programs Needed: DECUS No. 8-94A

DECUS No. 8-95

TRACE for EAE

Eberhard Werner, Scripps Institution of Oceanography, University of California, San Diego, California

TRACE interpretively executes a PDP-8 program. At the same time a printout is provided of the contents of the program counter, the instruction, the link, accumulator, and multiplier-quotient registers, and where applicable the effective address and the contents of the effective address. This printout may be for all or a selected type of instruction within selected memory bounds. The program is capable of handling any PDP-8 instruction including IOT, two-word EAE, and interrupt instructions. TRACE cannot be destroyed by the program being traced while TRACE is in control.

Minimum Hardware: PDP-8 with Type 182 EAE, ASR-33 Teletype

Storage Requirement: 400_8 or 500_8 locations.

DECUS No. 8-96

J Bessel Function (FORTRAN)

J. A. Crawford, Communications Systems, Inc., Paramus, New Jersey

This program computes the J Bessel Function for a given argument and order. It is a complete PDP-8 FORTRAN program that operates in a conversational mode.

Other Programs Needed: FORTRAN Compiler/Operating System

DECUS No. 8-97

GOOF

Peter Andrews and Charles Wagner, Fairchild R & D, Palo Alto, California

A one-page program which allows insertion of instruction (xxxx) in location (nnnn) by means of the TTY keyboard. A feature of automatically incrementing the current address permits rapid insertion of blocks of data or instructions. Typing "RUB-OUT" reinitializes the program.

Storage Requirement: 175_8 locations (1 page)

DECUS No. 8-98

3D DRAW for the 338

Barry Wessler

This program is a demonstration of the capabilities of the 338 system. The program allows the user to sketch three dimensional objects on the scope and rotate them in real time.

Minimum Hardware: PDP-8 with 338 Display

DECUS No. 8-99A

Kaleidoscope

The program creates pictures on the PDP-8 or PDP-8/S with 34D Display. They are varied by manipulating the sense switches (within the range 0000 - 0007). The program was submitted without comments by an anonymous donor.

DECUS No. 8-99B

Kaleidoscope - 338

Michael S. Wolfberg, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

The program creates varied pictures by manipulating the buttons of the 338 Display pushbutton bank.

Storage Requirement: $200_8 - 274_8$

DECUS No. 8-100

Double Precision Binary Coded Decimal Arithmetic Package

Richard M. Merrill, Digital Equipment Corporation, Maynard, Massachusetts

Consists of the following routines:

BCDADD - The single precision BCD addition routine is the basic component of the BCD arithmetic package. This routine functions simply by masking out and adding together corresponding BCD digits (i.e., four bits) and checking for carry (i.e., when the sum of two four-bit numbers is greater than 9 (1001)).

MPYBCD - This routine multiplies a single precision (three digit) number times a double precision one to produce another double precision number. Overflow is indicated in the link; the arguments are not affected.

SUBBCD - One double precision BCD number is subtracted from a second by this routine. It uses a 9's complement routine and the double precision add routine.

DOLOUT - Special formats: ("$XXXX.YY "). ("XXXXXX "); (3 nonprinting data codes); ("XXX ").

DECUS No. 8-101

Symbolic Editor with View (338)

Barry Wessler

This program is an extended version of the standard PDP-8 Symbolic Editor (high-speed I/O) program. One extra command has been added, "V", which takes the lines specified by the arguments and displays them on the CRT (338). The program, otherwise, operates in the same way as the Editor. The following pushbutton options are provided:

Ø: Count Up Scale
1: Count Down Scale
2: Count Up Intensity
3: Count Down Intensity

Minimum Hardware: 8K PDP-8, 338 CRT, and VC-38 character generator.

DECUS No. 8-102a

A LISP Interpreter for the PDP-8

Dr. G. van der Mey and Dr. W. L. van der Poel, Technical University of Delft, The Netherlands

LISP is a programming language for list manipulation. The system is particularly suitable for conversational use and teaching. There are very few restrictions to the language apart from the total storage space. More than half of the storage is used as list space.

Minimum Hardware: 4K PDP-8 and ASR-33

DECUS No. 8-103A

Four Word Floating Point Function Package

D. A. Dalby, Bedford Insitute of Oceanography, Dartmouth, Nova Scotia, Canada

This program package, written for use with Digital's Four Word Floating Point Package (DEC-08-FMHA-PB), includes subroutines to evaluate square, square root, sine cosine, arctangent, natural logarithm, and exponential functions.

DECUS No. 8-103B

Four Word Floating Point Rudimentary Calculator

D. E. Wells, Bedford Insititute of Oceanography, Dartmouth, Nova Scotia, Canada

This is a minimum space program to perform calculations with the 10.5 decimal place precision of Digital's Four Word Floating Point Package (DEC-08-FMHA-PB), and uses the Four Word Floating Point Function Package (DECUS No. 8-103A). Operations are performed in the sequence in which they are entered. One storage register is provided. Up to five user-defined operation routines may be called.

DECUS No. 8-103C

Four Word Floating Point Output Controller with Rounding

C. K. Ross, Bedford Insitute of Oceanography, Dartmouth, Nova Scotia, Canada

This subprogram is almost identical to the output controller for the Three Word Floating Point Package (Digital 8-5-S) with the rounding addition (DECUS No. 8-44) except that the Four Word Floating Point Package (DEC-08-FMHA-PB) is used.

DECUS No. 8-103D

Additional Instructions for use with Four Word Floating Point Package

C. K. Ross, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada

These subroutines allow the Four Word Floating Point Interpreter to perform the operations: read a floating point number, skip positive floating point accumulator, skip zero floating point accumulator, no operation, unconditional jump, negate floating point accumulator, and halt. The two skip instructions and the jump instruction allow forward or backward jumping up to 15 locations from the location of the instruction.

DECUS No. 8-104

Card Reader Subroutine for the PDP-8 FORTRAN Compiler

Steven Sullivan, Oregon State University, Corvallis, Oregon

Modifications and additions which allow the PDP-8 FORTRAN Compiler to read source programs from cards. The standard FORTRAN card format is used with only minor modifications.

Minimum Hardware: 8K PDP-8 and a Type CR01-C Card Reader

DECUS No. 8-105

D-BUG

F. K. Williamson, Solartron Electronic Group Ltd., Farnbrough, Hampshire, England

D-BUG is an aid used in debugging PDP-8 programs by facilitating communication with the program being run. Communication between operator and program is via the ASR-33 Teletype. D-BUG is similar to DEC's program ODT II (DEC-08-COA1-PB); however, it uses the DEC Floating Point Interpreter (Digital 8-5-S).

Two modes of operation are possible, fixed and floating point. D-BUG features include register examination and modification, control transfer, octal dumping, and instruction trap-outs to D-BUG control. Registers containing floating point numbers may also be examined, and break-traps can be inserted in floating point programs.

DECUS No. 8-106

Readable Punch

A. M. Lane-Nott, Letchworth College of Technology, England

This program enables the user to type a character on the keyboard and produce the character in readable form on paper tape. The program uses the high-speed punch. The readable characters on tape are produced by means of a table which contains the format of a 6 x 5 matrix using three words of storage per character to be punched. In addition, channel 8 is punched throughout. The program is terminated by typing a carriage return which generates 6 inches of tape. (Reference DECUS No. 8-68a).

DECUS No. 8-107

CHESSBOARD Display on the 338

Michael S. Wolfberg, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

This program displays a chessborad on the screen of a DEC 338 Display with all thirty-two chessmen set up on their initial board positions. There is no provision to move them about the board; it is just a demonstration picture.

Storage Requirement: $03000 - 04230_8$

Minimum Hardware: PDP-8 with 338 Display

DECUS No. 8-108

INCMOD: Increment Mode Compiler (338)

Michael S. Wolfberg, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

The INCMOD program for the DEC 338 Display allows the user to build a display subroutine composed of increments only. The user inputs information by pointing with the light pen. The program displays the figure he is constructing in each of the four available scale settings. The program is of value as a demonstration and may be of help for maintenance purposes. It occupies locations 00000-01231 and builds the increment mode display file beginning at location 01232.

Storage Requirement: $0000-1231_8$

Minimum Hardware: PDP-8 with 338 Display

DECUS No. 8-109

SEETXT Subroutine (338)

Michael S. Wolfberg, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

SEETXT is a subroutine for the DEC 338 Display which can be called instead of the normal typeout subroutine. In addition to typing, it displays all printed characters on the screen corresponding to the last twenty lines which have been typed out.

The program includes the option of suppressing the typing so that output can occur at a much higher rate than ten characters per second. The user has the option of controlling the length of a delay loop in the subroutine so that output rate may range from nearly immediate to Teletype rate.

The maximum number of lines displayed, the scale, and intensity may be altered at any time. There is also the option of clearing the screen or displaying a blinking marker at the current typing position.

Minimum Hardware: PDP-8 with 338 Display

DECUS No. 8-110

DIREC: Directory Print

Michael S. Wolfberg, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

DIREC is a system program to be used with the PDP-8 Disk Monitor System. The program lists an index of the file directory for the disk on the on-line Teletype. The user has the option of seeing the index to system files or user files, or both.

DIREC can also be used in conjunction with the SEETXT Subroutine for the 338 Display to obtain a listing of the directory on the display screen.

Other Programs Needed: Disk Monitor System

Minimum Hardware: PDP-8 with Disk

DECUS No. 8-111

DISKLOOK

Michael S. Wolfberg, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

DISKLOOK is a small utility program for a PDP-8 with a 32K DF32 Disk. Using the on-line Teletype, the user may examine and alter any location (in octal) on the disk. Masked searches are also available.

Minimum Hardware: PDP-8 with 32K DF32 Disk

Storage Requirement: $200 - 777_8$

DECUS No. 8-112

Sentence Generator

D. Dyment, Digital Equipment of Canada Ltd., Carleton Place, Ontario, Canada

This program generates random English language sentences, using a dictionary (provided by the user) of ten basic word groups (A - J). The dictionary is used in conjunction with a random number generator and a syntactical algorithm to provide an output of randomly constructed English language sentences.

The program is an excellent vehicle for computer demonstration purposes. It may also be used in English teaching programs to aid students in perceiving sentence structure and errors in the use of words.

DECUS No. 8-113

Conversion of Frieden (EIA) to ASCII

John F. Puterbaugh, Continental Aviation and Engineering Corporation, Toledo, Ohio

This program will translate tapes prepared on a Friden Flexowriter (EIA) into ASCII for direct assembly, further editing, or feeding into the FORTRAN program. Alphabetic characters may be in either upper or lower case. The program uses a table lookup and comparison with the negative complement of the EIA character, then outputs the corresponding ASCII character.

Note: This is not Frieden FIO-DEC.

Storage Requirement: 213_8 including 2 autoindex registers

DECUS No. 8-114

Rounded Decimal Output Modification for PDP-8 FORTRAN

G. R. Hervey, University of Leeds, England

The program loads over the PDP-8 FORTRAN Operating System (DEC-08-AFA3-PB) and provides output in conventional decimal form: rounded, aligned, and with plus sign, leading zeros (other than one, in the case of fractional numbers), and trailing decimal point replaced by spaces. The FORTRAN trigonometrical routines are over-written. The source program must begin with two statements assigning integer variables representing, respectively, the numbers of digits required to the right of the decimal point, and the total number of digits (these can be reassigned, by program or manually). Output is called in the normal way, i.e. by TYPE statements referring to FORMAT statements containing the symbol E. If output of a number is not possible in the format requested, the decimal point is shifted to the right in the field; if formatted output is still impossible, or if zero or negative total digits were requested, output reverts to "E" format.

Restrictions: FORTRAN source language programs must begin with two special statements defining format required.

DECUS No. 8-115a

Double Precision Integer Interpretive Package

Roger E. Anderson, Lawrence Radiation Laboratory, Livermore, California

This program is similar in operation to the Floating Point Package (Digital 8-5-S). It consists of addition, subtraction, multiplication, division, load, store, jump and branch subroutines coupled to an interpreter. It allows direct and indirect addressing in the normal assembly language manner. The operation is faster and more compact than the collected individual double precision subroutines.

Minimum Hardware:	PDP-8, 8/S, or 8/I.
Storage Requirement:	14 words in page 0 and an additional 2 pages of memory

DECUS No. 8-116

PDP-8 Automatic Magnetic Tape Control (Type 57A) Library System

Robert E. McCullough and Jeffery B. Pearce, Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, Colorado

The PDP-8 Automatic Magnetic Tape Control (Type 57A) Library System is a series of bootstrap programs which load library programs into memory from an IBM-compatible magnetic tape read using a Type 57A Automatic Magnetic Tape Control. A program is selected by entering the appropriate code number into the switch register on the computer console.

A copy of the IBM-compatible library tape may be obtained by sending a 1/2" magnetic tape to the author.

DECUS No. 8-117

A PDP-8 Interface for a Charged-Particle Nuclear Physics Experiment

W. R. Burrus, E. Madden, C. O. McNew, and R. W. Peelle

Documentation (only) describing an interface constructed to use a PDP-8 computer with a charged-particle detector system employing three solid-state detectors and flight-time analysis. Up to 48 bits from each randomly-occurring event are transferred through the data (break) channel to a hardware-selected buffer region in the core of a PDP-8 computer. Designed for use as a magnetic tape analyzer for the most complex cases, the system assumes that the 48 bits originate in flag bits set by fast logic and in (presently four) amplitude digitizers, all of which are assumed to contain information for the same event. The system includes some limited capability for controlling the course of the experiment, and provides for read-out through the computer of a series of external fast counters. The report summarizes the design concepts, shows schematic flow diagrams, defines the computer in-

DECUS No. 8-117 (Continued)

structions associated with the interface system, and gives simple model programs to illustrate methods of applications.

DECUS No. 8-118

General Linear Regression

Ian E. Bush, Medical College of Virginia, Richmond, Virginia

The major section of this program is the "Main Arithmetic IX" which consists of four initializing statements; an input section; a weighting section; a section which cumulates means, sums of squares, etc.; a section which calculates the relevant regression coefficients, etc.; and a sections which calculates confidence limits as variances.

The section which calculates the relevant regression coefficients allows for both cases of linear regression, and in the computation of standard error of the intercept, uses (N-2) degrees of freedom to provide a better estimate for small values of N while providing negligible differences from conventional calculation when N is larger.

The section which calculates confidence limits as variances provides a calculation of the variance of the error of the estimate of the dependent variable again using (N-2) degrees of freedom for the general case. This calculation is fully corrected for both random variance within the tested population of data and for the difference between the independent variable and the mean of the independent variable for the population of data.

DECUS No. 8-119

Off-Line TIC-TAC-TOE (PAL)

Dave Hawkins, Foxboro Company, Foxboro, Massachusetts

TIC-TAC-TOE is a self-learning program which will improve its game as it plays. Whenever its human opponent wins, the program changes its strategy such that it can never be beaten again in the same way. Thus, the program gains "experience" every time it loses. The program will punch its experience on paper tape in binary format on request. This experience tape can be reread by the program at any time and will reset the program to the level of experience it had when the tape was punched. The program will notify the operator if any error is made in reading the experience tape and gets very upset if the player tries to cheat.

Storage Requirement:	locations 10-4000 (approximately) and will operate with low or high speed tape input/output equipment
Minimum Hardware:	PDP-8, ASR-33, or high-speed reader and punch

DECUS No. 8-120

Disk/DECtape FAILSAFE

Charles Conley, Digital Equipment Corporation, Maynard, Massachusetts

This program will punch the contents of the disk (or DECtape) onto paper tape which can be loaded back onto the disk using the same program. The paper tape is punched in 200_8 word blocks in binary format, with a checksum for each block. FAILSAFE simplifies and speeds the process of re-building the Disk System Monitor after running disk tests.

Minimum Hardware: PDP-8, 8/S, 8/I, with 32K Disk or DECtape

DECUS No. 8-121

DECtape Handler (552 Control)

B. Eiben, III Physikalisches Institut der T. H. Aachen, Aachen, West Germany

This program allows quick, controlled data-block transfers between the PDP-8 and DECtape. It reads, writes and searches in minimum time (interrupt mode), requires minimum space (overlay with last page BIN, RIM, DECSYS Loaders) and occupies only two blocks on tape (block Ø = System, block 1 = Return-System). It is protected against destruction and gives, after the transfer, the status levels for testing purposes. It is usuable as a Switch Register controlled program or as a subroutine with or without interrupt, giving the possibility of quick data storage, program shuffling and overlay technique with PDP-8 and DECtape.

Minimum Hardware: PDP-8, DECtape 552 Control

DECUS No. 8-122A

SNAP: Simplified Numerical Analysis Program (Without EAE)

Developed at Harvard Medical School, Boston, Massachusetts, under an NIH grant.

SNAP is a computer language for real-time interactive computation which can be learned in less than one hour. It is particularly useful in teaching programming to beginners.

A unique feature of SNAP is its ability to interact on-line with other laboratory instruments. SNAP can accept electrical inputs directly and can read inputs from a real-time clock. Both of these functions are incorporated in a single SNAP instruction.

Another feature particularly useful for biological problems is Table Instructions. A list of 100 numbers may be entered from the keyboard or from punched paper tape.

DECUS No. 8-122B

SNAP: Simplified Numerical Analysis Program (With EAE)

See DECUS No. 8-122 for Abstract.

DECUS No. 8-123

UNIDEC Assembler

C. Stephen Carr, University of Utah, Salt Lake City, Utah

The UNIDEC Assembler runs on the Univac 1108 and passes assembled PDP-8 code over the electronic link between the 1108 and PDP-8. The source statements are punched on cards for input into the 1108 in a format nearly identical to that of MACRO-8. A printed listing and object code are produced as fast as the cards can be read.

Note: Source deck and documentation only available.

DECUS No. 8-124

PDP-8 Assembler for IBM 360/50 and above

V. Michael Powers, University of Michigan, Ann Arbor, Michigan

The 360/PDP-8 Assembler is a collection of programs written mostly in FORTRAN IV (G) which operates on the IBM 360/50 and above. It assembles programs for PDP-5 and PDP-8 computers. Once a program has been assembled, it may be punched on cards, saved in a file, or transmitted through the Data Concentrator over data lines. It is also possible to obtain binary paper tapes by use of the Data Concentrator.

The Assembler follows the PAL III operation code and addressing conventions. The input format and program listing conventions are slightly different from those of PAL III, because it is orgainized around a line format, while PAL III is orgainized around a paper tape format.

Note: Source deck and documentation only avaiable.

DECUS No. 8-125

PDP-8 Relocatable Assembler for IBM 360/50 and above

D. L. Mills and V. Michael Powers, University of Michigan, Ann Arbor, Michigan

The documentation available describes a method for segmenting PDP-8 programs for the purpose of facilitating program maintenance and residence in MTS (Michigan Terminal System) files. The method provides for program storage on a page-relocatable basis with relocation information contiguous to but not necessarily integral with text information. Linkages between separately assembled program segments are provided in a form very similar to those used in IBM System/360 systems.

DECUS No. 8-125 (Continued)

Currently available utilities within MTS provides assembly and link-editing facilities, using programs stored either as punched card decks or in MTS files. Utilities are also included for the purpose of paper tape transcription either in PAL-compatible format or in a special format useful for dynamic loading via a data link to a remote machine. In addition to these MTS utilities, two relocating PDP-8 loaders are available which operate using the special dynamic-loading format. Each of these programs occupies one dedicated page of PDP-8 memory and operates in a multicore-bank environment. One of these programs is designed to operate as a stand-alone utility, while the other is designed to operate within the RAMP system.

DECUS No. 5/8-126

Cumulative Gaussian Distribution Curve Fitting

Gerald E. Zajac
Submitted by: Howard A. Sholl, University of Connecticut, Storrs, Connecticut

This a curve fitting program that will take a set of any number of points with any spacing describing a cumulative Gaussian distribution and determine the mean and standard deviation by an iterative least squares differential-correction technique. The mean square error of the final fitted curve is also computed.

Other Programs Needed: FORTRAN Compiler and Operating System

Source Language: PDP-5/8 FORTRAN

DECUS No. 8-127

XDDT: Extended Octal-Symbolic Debugging Program

Michael S. Wolfberg, Robb N. Russell, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

XDDT is an octal-symbolic debugging program for extended memory which preserves the status of the program interrupt system at breakpoints. It is the result of merging the features of the DDT-UP (DECUS No. 8-19a) and XOD (DECUS No. 8-89) debugging programs, and it includes many improvements over its predecessors.

From the Teletype, the user can symbolically examine and modify the contents of any memory location in a variety of formats. Positive and negative block searches with a mask may also be performed.

XDDT includes an elaborate single-breakpoint facility to help the user run sections of his program.

The ability to punch binary tapes is not included in XDDT.

DECUS No. 8-127 (Continued)

Minimum Hardware: Basic PDP-8, but recommended for 8K or more

Source Language: PDPMAP (DECUS No. 8-166)

Storage Requirement: With initial symbol table, 4200-7577 of any memory field.

DECUS No. 8-128

PDP-8 Oscilloscope Display of Mathematical Functions

A. E. Sapega and S. G. Wellcome, Trinity College, Hartford, Connecticut

This is a general-purpose FORTRAN program for oscilloscope display of single-valued functions, $y = f(x)$. The FORTRAN statement of the function can be changed by the user so as to display specific functions of interest to the user. The user must specify a range for the independent variable. Scaling of the function for an appropriate display is carried out automatically by the program. The user may then interrupt the display to respecify the range of either independent or dependent variable. The display will be flicker free on a conventional (nonstore) oscilloscope.

Minimum Hardware: 4K PDP-8, Type 34D Display Unit

Other Programs Needed: FORTRAN compiler and operating system, PAL Assembler

Source Language: FORTRAN (main program), PAL (subroutine)

DECUS No. 8-129

PDP-8/57A Magnetic Tape Program Library System

Donald C. Uber, Lawrence Radiation Laboratory, University of California, Livermore, California

Programs may be written on and called off IBM-compatible tape by name from the Teletype. BIN and RIM loaders may also be called in from the Teletype. Only the last page of core is used. Library programs may be corrected, modified, or added to at any time. When called in, programs may be relocated in core. It is possible to subdivide programs as they are written on tape and then individually relocate each portion as it is loaded in.

Minimum Hardware: Standard PDP-8, 57A Tape Control

Source Language: MACRO-8

Storage Requirement: 7600-7777

DECUS No. 8-130A

REBIL8: Relocating Binary Tape Loader for the PDP-8/S

R. F. LaFontaine, C.S.I.R.O., University of Melbourne, Victoria, Australia

Sections of the DEC-08-LBAA-LA Binary Loader have been rewritten to extend its duties to loading of suitably prepared relocatable binary program tapes as well as address and data modifications. Requirements are the same as the standard DEC loader, and REBIL8 will load standard DEC binary tapes.

Minimum Hardware: PDP-8/S and ASR-33

Source Language: MACRO-8

DECUS No. 8-130B

RELCON: Binary to Relocatable Binary Tape Converter

R. F. LaFontaine, C.S.I.R.O., University of Melbourne, Victoria, Australia

RELCON is used to tag data, used by memory reference instructions for indirect addressing, with the Data Modification Mark (376 Code). It may also be used to adjust addresses so that the relocatable version begins loading memory at page 0 if no address modification is specified. This does not mean that the program will operate in this area of memory but serves to simplify address specification at load time.

DECUS No. 8-131

SRCD: Software Rapid Character Display

David M. Kristol, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

SRCD (Software Rapid Character Display) is not a program but a method for quick display of a maximum number of text characters. A listing of increment-mode command words is supplied for the sixty-four characters on the Teletype keyboard. Each character is drawn within a 5 x 7 dot matrix followed by two blank points to provide spacing. It is mostly useful for displaying buffers of text, such as for editing programs or in utilization of the display as a satellite processor in time-sharing systems. In these applications, the PDP-8 is frequently sitting in a loop, "listening" for keyboard characters, or simply doing nothing. With SRCD, the main frame is constantly engaged in background work, helping to display characters, and I/O is handled by interrupt servicing routines.

DECUS No. 8-132

STRIP: A Data Display & Analysis Program for the PDP-8, 8/I

John C. Alderman, Jr. Georgia Institute of Technology, Atlanta, Georgia

This program accepts paper tape data listings and displays the result on the display unit. Some elementary computations are made on the data and are also displayed. The program is deliberately designed to be open ended, and most users will want to add features peculiar to their own problem. Almost all functions are carried out in subroutine form, and these subroutines can be called either from the keyboard or within another subroutine.

DECUS No. 8-133

First Order Kinetics

Kenneth B. Wiberg, Yale University, New Haven, Connecticut

First order kinetic processes are common in chemistry and in other areas. This program accepts up to 42 data points, calculates the rate constant and intercept by the method of least squares, and gives the rms deviation, the correlation coefficient, and an estimate of the error in slope. It permits graphical (CRT) examination of deviations from the least squares line and iteration to a "best" infinity value. It also provides options for plotting the deviation between observed and calculated quantities on a CRT and may be used in other cases in which one wishes to correlate the natural logarithm of one quantity with another, as in linear free energy relationships.

Source Language: MACRO-8

Storage Requirement: The program occupies essentially all of core.

DECUS No. 8-134

LSQ: Least Squares Subroutine

Kenneth B. Wiberg, Yale University, New Haven, Connecticut

The subroutine calculates the slop and intercept for the equation $y_i = mx_i + b$ by the method of least squares. It also returns the rms deviation of y, the correlation coefficent and an estimate of the error in the slope. The calculated values of y and the differences between the given and calculated values are also available on return from the subroutine.

Other Programs Needed: FLOAT, floating point interpreter "C" - (Digital 08-YQYA)

Source Language: MACRO-8

Storage Requirement: 1.5 pages plus page 0 locations

DECUS No. 8-135

DNHELP: Directory Assistor Program

David M. Kristol, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

DNHELP is a four-page disk utility program that may reside in core with DIREC (DECUS No. 8-110) and DISKLOOK (DECUS No. 8-111). It is designed to assist programmers in investigating the contents of the DN and SAM blocks on the disk under the DEC Disk Monitor System.

Minimum Hardware:	PDP-8 with DF-32 Disk, or TCØ1 DECtape.
Other Programs Needed:	System Monitor Head [DEC Disk (Tape)Monitor System] and SYSIO.
Storage Requirement:	5000-5777, Buffer from 7400-7577

DECUS No. 8-136

Fourier Transform Program in FORTRAN II

W. D. Strecker, Carnegie-Mellon University, Pittsburgh, Pennsylvania

The program, written in PDP-8 FORTRAN II, performs the discrete Fourier Transform of a function defined over N($N \leq 200$) evenly spaced points. I/O is via the ASR-33. The program requests the number of function points, then that number of function values, and then prints out the values of the sine and cosine components of the function at each defined harmonic. A conventional (not Cooley-Tukey) algorithm is used since I/O time relative to computing time is significant.

DECUS No. 8-137

Programs for Storage, Manipulation and Calculation of Data Using DECtape

D. Eugene Hokanson, Veterans Administration Hospital, Seattle, Washington

These programs use DECtape for the storage of data files. Once data has been stored on DECtape, the statistical or calculation programs will operate on particular parts of it selected by the user. All programs are conversant. They ask questions regarding execution and accept answers via the Teletype.

DATRIT is a program to write data on DECtape directly from the ASR-33. Numerical data is stored on DECtape in floating point format.

EDATA is a program to edit data files created on DECtape by DATRIT.

DECUS No. 8-137 (Continued)

SDT is a program to calculate Mean and Standard Deviation from data files stored on DECtape.

FORT calculates an analysis of variance table similar to DECUS No. 5/8-9 using data files stored on DECtape.

COVAR calculates the necessary values for an analysis of covariance from data files stored on DECtape. The paired input consists of matching files of x and y data.

LCOVAR is a semi-logarithmic version of COVAR. y values are converted to log y before calculation so that each "Y" in the output format means log y. This program is useful for semi-logarithmic regression analysis.

TPAIR performs a paired T test on data files stored on DECtape. The input consists of paired files x and y data.

BCALC enables the user to do calculations using data files on DECtape as variables in the calculation. Results of calculation are stored on DECtape. BCALC is a master program for handling the data files. The user must supply a floating point program, which is called by BCALC as a subroutine, for each specific calculation.

LCALC enables the user to do calculations from data stored on DECtape using specific lines of a file as variables in the calculation. The result of the calculation may be stored on one line of the same file or a different file. LCALC is similar to BCALC.

SUBS is a package of four subroutines used by most of these programs. SUBS contains six pointers on page zero and subroutines in the area from 4000 to 7577.

These subroutines are:

MESSAGE	Type packed text
UNFLOAT	Unfloat floating point numbers
RWTAPE	Read and write DECtape
FPOINT	Floating point output controller

FLEX is an extended version of Floating Point which lacks the Output Controller. It is used to overlay the FPOINT section of SUBS in the programs which use extended Floating Point.

DECUS No. 8-138

PAL III.5

James C. Kilbane, Belmont, Massachusetts

PAL III.5 features several mods making pass 3 output more legible. The line number feature makes subsequent editing significantly easier. With the exception of SR Bit 2, normal operating instructions apply. The tapes are complete (not an overlay to PAL III).

DECUS No. 8-139

Editor

James C. Kilbane, Belmont, Massachusetts

This editor is a program which adheres fairly closely to DEC traditions in the area of text editors with major exceptions, such as line numbers, line specification, buffer capacity, and availability.

Storage Requirement: $\emptyset_8$ - $25\emptyset7_8$

DECUS No. 8-140

Binary Tape Consolidator

James C. Kilbane, Belmont, Massachusetts

The Binary Tape Consolidator is an extremely useful system-generation tool. It will make a single tape from any number of smaller ones and may be used for duplicating tapes.

DECUS No. 8-141

SYSLUK

David M. Kristol, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

SYSLUK is a four-page utility program for examining and modifying blocks on the system I/O device, i.e., DF32 Disk or TCØ1 DECtape. Its operation is independent of which monitor head is resident, provided either is there. The user has the facility to examine and modify locations and to perform masked searches.

Minimum Hardware: PDP-8 with DF32 Disk or TCØ1 DECtape

Other Programs Needed: SYSIO - "system device" routine for DEC Disk (Tape) Monitor System

Source Language: MACRO-8

Storage Requirement: 200-1177 (buffer from 7377-7577)

DECUS No. 8-142

Binary Punch - Extended Memory

W. L. Lord, Argonne National Laboratory, Argonne, Illinois

This program is a revision of Digital 8-5-U Binary Punch which allows for extended memory. Tapes produced may be loaded by Digital 8-2-U Binary Loader.

Source Language: MACRO-8

Storage Requirement: 7600-7730

DECUS No. 8-143

FFTS-R: Fast Fourier Transform Subroutine for Real Valued Functions

James E. Rothman, Digital Equipment Corporation, Maynard, Massachusetts

This subroutine computes the Fast Fourier Transform (FFT) or its inverse of a data sequence which has been stored in core. It will accommodate up to 2048 time samples and will transform that number in under 5 seconds.

Minimum Hardware: PDP-8 or 8/I with EAE

Source Language: PAL

Storage Requirement: 3-7, 20-107, 400-6401

DECUS No. 8-144

FFTS-C: Fast Fourier Transform Subroutine for Complex Data

James E. Rothman, Digital Equipment Corporation, Maynard, Massachusetts

FFTS-C enables computation of the Discrete Fourier Transformation in a minimum amount of time. By using the Cooley-Tukey algorithm, up to 1024 points may be transformed in only 4.5 seconds, introducing a reduction of 99 percent in computation time.

Minimum Hardware: PDP-8 or PDP-8/I

Source Language: PAL III

Storage Requirement: 3-7, 20-55, 400-5777

DECUS No. 8-145

A Time-of-Flight Analyzer Based on a Small On-Line Computer

H. J. Metzdorf, CCR-Euratom, Ispra/Varese, Italy

This program enables the computer to interact with the TOF-converter and to generate spectrum displays on an oscilloscope. The TOF Converter provides the computer with digital information about the time a neutron takes to travel from the scattering sample to a detector (up to 12 detectors can be accommodated) and which detector was involved.

The TOF analyzer for which this program was written is in use with a double chopper facility installed at the ISPRA-1 reactor. It consists of a PDP-8 on-line computer with 4K memory, the automatic restart option, and a display unit; a TOF Converter; and conventional counting electronics.

DECUS No. 8-146

High Speed Interrupt Executive

R. L. Steel, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

These routines are designed to handle the priority scheduling of up to 12 interruptable devices. Each I/O device is assigned a priority level, and upon receipt of an interrupt from that device, execution of its routine is initiated. If the priority of an I/O device "x" is less than that of an I/O device "y" which is currently being serviced, device "x" will be queued until "y" has been serviced. These routines allow a user to prohibit interrupts on any (or all) levels.

Minimum Hardware: PDP-8 with EAE

Source Language: MACRO-8

Storage Requirement: Three memory pages

DECUS No. 8-147

Incremental Plotter Printout Subroutines

Michael P. Stryker and Phillip J. Best, University of Michigan, Ann Arbor, Michigan

A group of subroutines providing character-output facilities for the incremental plotter is presented as a package. Virtually all the ASCII characters may be printed in any of 8 formats and 63 sizes. One routine sets a control code to determine the size and orientation of the characters and the direction the line is to run, another prints out a string of characters according to this code, a third prints just one character held in AC 6-11, and a fourth routine prints the signed decimal equivalent of the contents of the accumulator.

Minimum Hardware: PDP-8, Type 350 Plotter and Control

Other Programs Needed: Digital 8-12-U "Incremental Plotter Subroutine"

Storage Requirement: Five memory pages (1177 locations)

DECUS No. 8-148

Plotter System

Bruce J. Biavati, Computer Applications, Inc., New York, New York

This is a generalized plotting system for the CalComp Plotter allowing "plot time" modification of the data. The main program tape accepts all plotting commands and data from the Teletype. Patch tape #1 modifies the system to a high-speed reader. Patch tape #2 modifies all input through the high-speed reader.

DECUS No. 8-148 (Continued)

Minimum Hardware: PDP-8, CalComp Plotter, and High-Speed Reader

Source Language: MACRO-8

Storage Requirement: 4K

DECUS No. 8-149

Core Window

Donald C. Uber, Lawrence Radiation Laboratory, University of California, Livermore, California

The 34D Scope displays the octal contents of any 64 consecutive core locations, beginning at the address set in the Switch Register and Data Field switches (if Extended Memory is used). There are 16 lines, each with an address plus four memory words. A special character generator program refreshes the display 11 times per second.

Minimum Hardware: PDP-8, 34D Scope

Source Language: MACRO-8

Storage Requirement: 15; 7240_8-7573_8

DECUS No. 8-150

PTOD8 High and PTOD8 Low

R. A. Gruenewald, Dr. Neher Laboratory, Netherlands Postal and Telecommunications Service, Leidschendam, Netherlands

PTOD8 (PTT Trace and Octal On-Line Debugging Program for the PDP-8), is a means to debug a running user's program. It features: register examination and modification, multiple breakpoints (traps), memory protection of a chosen block, word search (masked or not masked), tracing a running users program (gives a full printout of consequently executed instructions), is interrupt proof, and also features binary tape punching (automatic leader-trailer code and checksum).

Storage Requirement: PTOD8 requires 1343_8 registers
PTOD8 HIGH: 6200_8 - 7543_8,
PTOD8 LOW: 200_8 - 1543_8

DECUS No. 8-151

On-Line TIC-TAC-TOE

Richard B. Rothman, Groton School, Groton, Connecticut

This program plays the game of TIC-TAC-TOE with the user. By means of a previously stored algorithm, it selects the best move for any given situation. Conversation and ultimate defeat is via the Teletype.

Source Language: PAL

DECUS No. 8-152

PDP-8 Music Program

Submitted by: D. A. George
R. G. Smith and D. J. Harrison, Carleton University, Carleton, South Carolina

The coding program allows the user to type a song on the Teletype and produce a coded binary tape of that song. It accepts musical information in a form more compatible with ordinary sheet music and converts it to a coding scheme.

The playing program plays the song "Penny Lane" via the coding program with the use of a power amplifier and speaker.

Minimum Hardware: PDP-8 with D/A Converter, power amplifier, and speaker

Source Language: PAL III

Restrictions: 6577_8 notes

DECUS No. 8-153

Tape/Disk Transfer Programs

Daniel Parrish, Veterans Administration Hospital, Seattle, Washington

This series of programs was written to create and recall disk images on magnetic tape. They were written initially to facilitate rebuilding the disk system in the event of an accidental or deliberate wipe out. The usefulness of the DF-32 was significantly enhanced by the ability to store and easily recall a number of different disk images. A single reel of DECtape can hold up to five complete images, each of which occupies 400_8 blocks.

Minimum Hardware: PDP-8 with DF-32 Disk and TCØ1 DECtape.

Source Language: PAL III

DECUS No. 8-154

SWAP

David M. Kristol, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

Using self-contained I/O, SWAP may be employed to load the disk from or dump the disk onto DECtape. It is faster and more verstile than the Disk to DECtape FAILSAFE.

Minimum Hardware: PDP-8 with DF-32 and TCØ1 DECtape

Source Language: PDPMAP (DECUS No. 8-166)

Storage Requirement: $600_8 + 4200_8$ buffer

DECUS No. 8-155

HEP

Dr. A. K. Head, C. S. I. R. O. , University of Melbourne, Parkville, Victoria, Australia

HEP is a program which gives calculating machine type operation and stored program operation. It is based on Floating Point Package (DEC-8-5-S-D) and Floating Point Controller (DECUS No. 8-44). Calculations have an accuracy of just over six decimal digits and printout is rounded to six decimal digits. It includes facilities for format control, program control and tests, subroutines, and an array of variables. Although it was designed mainly for quick results from small calculations, it also has facilities and space for quite large and elaborate programs. Note, HEPTRACE, DECUS No. 8-156.

Minimum Hardware: PDP-8 with Teleprinter

Storage Requirement: 0003_8 - 7577_8

DECUS No. 8-156

HEPTRACE

A. K. Head, C.S.I.R.O., University of Melbourne, Parkville, Victoria, Australia

This program is used in conjunction with HEP (DECUS No. 8-155) to give trace and one shot facility during the execution of HEP programs.

DECUS No. 8-157

Square Root Patch for DEC-8-5-S

A. K. Head, C.S.I.R.O., University of Melbourne, Parkville, Victoria, Australia

This program is a patch to standard SQRT routine (DEC-8-5-S). It is a shorter and faster way of giving exact roots of exact squares.

Storage Requirement: 6656_8-6747_8

DECUS No. 8-158

AX-Ø8 Symbol Generator

D. Dyment, Digital Equipment of Canada, Ltd., Carleton Place, Ontario, Canada

This subroutine may be called to display single characters or a string of characters on the oscilloscope of an AX-Ø8 (LAB-8) system. Sixty different symbols, in addition to four special "format" codes, are provided by the routine. Software control of character scaling and "margins" on the display is provided.

Minimum Hardware: LAB-8 with oscilloscope

DECUS No. 8-158 (Continued)

Source Language: PAL

Storage Requirement: 223_{10} locations

DECUS No. 8-159

CINET-BASIC

Bud Pembroke and David Gillette, Computer Instruction NETWORK, Salem, Oregon

This interpretive compiler was patterned after Dartmouth's BASIC. It was built by modifying DEC's FOCAL, and uses many of the same subroutines and/or methods. Error messages are given in terms of an error number and line number.

Storage Requirement: Main program locations 0000-3252 and 4600-7600 and user's code from 3252 on.

Minimum Hardware: A PDP-8 with 4K and an ASR-33

DECUS No. 8-160

FASTLOAD

Doug Dyment, Digital Equipment of Canada, Ltd., Carleton Place, Ontario, Canada

FASTLOAD is a minimal bootstrap loader for the PDP-8, requiring only eight instructions to load in the upper page of memory.

DECUS No. 8-161

EXPO: A Flexible PDP-8 Data-Acquisition Program

Bruce Arne Sherwood, California Institute of Technology, Pasadena, California

EXPO is a PDP-8 program which reads various kinds of data from experimental apparatus, optionally logs data on magnetic tape, and accumulates one - or two-dimensional histograms of selected variables. These histograms may be displayed on the Teletype or scope, simultaneously with data-acquisition. From the keyboard the user defines what variables are to be histogrammed and under what conditions; variable names are symbolic and numerical parameters are decimal. Also from the keyboard, the user may call for Teletype or scope output with some control of format. Because of its flexible user-oriented input-output, EXPO has proven to be very useful in debugging and utilizing complex apparatus in a high-energy physics experiment; it is likely to be useful in similar experimental situations in science or engineering. The write-up includes a useful general discussion of interrupt handling on the PDP-8.

Minimum Hardware: 4K PDP-8 with EAE, Magtape, Scope Display, and Plotter optional

DECUS No. 8-161 (Continued)

Source Language: LRL Assembler (DECUS No. 5-13) on cards

Storage Requirement: 0-7177 if all options used

DECUS No. 8-162

Demonstration Programs for the PDP-8

1. World War I - Snoopy (338 Display)
2. PDP-8 Music
3. Night Watchman's Clock (338 Display)
4. Matching Pennies

DECUS No. 8-163

See FOCAL Section

DECUS No. 8-164

Prime Number Determination

Richard D. Cherrington, U. K. Atomic Energy Authority, Springfield Works, Salwick, Preston, England

This program types out by successive division all previously determined primes which are less than or equal to square roots of the numbers being evaluated.

Short additional programs cause additional type out of all nonprime numbers as a product of two integers.

Other Programs Needed: Floating Point Interpretive Package (DEC-8-5-S)

Storage Requirement: 4K

DECUS No. 8-165

The PDP-8 Simulator System for Philco 212

Neal Laurance, Ford Motor Company, Dearborn, Michigan

A program has been developed which provides the facility to simulate the operation of a PDP-8 computer within a Philco 212 computer. The system includes the ability to assemble PDP-8 programs in assembly language, produce paper tapes suitable for running on a PDP-8 and to simulate the execution of a PDP-8 program completely within the Philco 212. The simulation facility should be of use to people who are anticipating the delivery of a PDP-8 computer, and who wish to do program development before its arrival. The simulator portion is written in Philco 212 assembly language (it is not 211 compatible), and the remainder of the system is written in the MAD language.

Write-up only available.

DECUS No. 8-166

The PDPMAP Assembly System

Thomas H. Johnson and Michael S. Wolfberg, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

This report describes the PDPMAP Assembly System which is used to assemble symbolic programs written for a PDP-8 or DEC-338 with up to 16K memory locations. The system is implemented at the University of Pennsylvania on an IBM 7040 and DEC PDP-8 connected by a high-speed data channel (IBM 7904 and DEC DM03). The PDPMAP System uses the powerful assembler of a large computer (IBM 7040 MAP Assembler) to quickly assemble programs for a small computer.

Report only available.

DECUS No. 8-167

CIRCUITS

D. Whiteley, International Computers, Ltd., Kidsgrove, Stoke-on-Trent, Staffs., United Kingdom

CIRCUITS is a program which enables Electronic Circuits to be drawn using the DEC-338 Display system. The complete circuit can be stored on paper tape and read in for future modifications.

Minimum Hardware: A PDP-8 with 338 Display, Teletype, High-Speed Reader and Punch, and character generator

DECUS No. 8-168

CalComp Plotting Package

John W. Fitzgerald, Stanford Medical School, Stanford University, Stanford, California

This package is a series of subroutines designed to be used with the CalComp and PDP-8. The subroutines are:

PLOTX - a modified 8-12-U, general move routine
ALPHA - alphanumeric packed string plotting
DLTR - an 8-bit ASCII letter drawer
AXIS - an axis drawing routine
NUMBER - a signed 11-bit binary number output routine
DSYM - centered symbol drawing routine
LINE - vector plotting routine.

This package is issued only on DECtape.

Minimum Hardware: A PDP-8 computer with DECtape 350B interface and CalComp Model 565 digital plotter with a step size of 0.01 inches.

DECUS No. 8-169

Physical Oceanography Data Reduction Programs for the PDP-8 (II)

C. K. Ross, R. Reiniger and A. B. Grant
Submitted by: Joann E. Gauan, Department of Energy, Mines & Resources, Marine Sciences Branch, Dartmouth, Nova Scotia, Canada

This system gives the capability of automating and improving handling and processing of oceanographic data at sea.

It presents an oceanographic data processing system for use at sea on a small computer with a basic configuration of 4K memory, ASR-33 Teletype, high-speed paper tape reader/punch and a 31 inch CalComp Plotter. The system was written:

1) to increase the speed, ease and accuracy of the data reduction at sea.

2) to give quality control on the original data. This allows malfunctioning instruments to be quickly detected so that appropriate action may be taken.

3) to calculate various parameters which are used by the oceanographer. The manual calculation of these parameters is not practical because of their complexity.

4) to digitize the data suitable for transfer to a larger and more powerful shore-based system.

This PDP-8 oceanographic data processing system is capable of accepting pressure, temperature, salinity, oxygen and silicate as measured parameters. It is usual to have the information necessary to calculate the pressure and temperature shortly after the completion of an oceanographic station. However, it is not possible to complete the determination of the chemistry (salinity, oxygen and silicate) until several hours later. Hence, the data input to the system is divided into two parts. The first basic input contains the information from the 'deck sheet' which is used to calculate the corrected temperatures and observed pressures. A least square polynomial is fitted to the observed pressures to give a final pressure at each sampling depth. At this point a plot of temperature vs. pressure may be obtained. To continue processing, it is necessary to have the chemistry data which constitutes the second basic input to the system. For each station the chemistry data are combined with the pressures and corrected temperatures. From these data the depth, specific volume anomaly, potential temperature and density anomalies are calculated.

Certain approximations were made in the system because of the limited core memory and to simplify the programming. However, in all cases sufficient accuracy has been retained to ensure meaningful results.

DECUS No. 8-169 (Continued)

The following routines are included:

Temperature Formatting
Additions to Floating Point Package
Pack Thermometer Calibration
Pressure Curve Fit
Final Pass
DHUN
PLOPRM
Distance and Bearing
Formatting of Chemistry
Department PLOTCO

DECUS No. 8-170

FORTRAN Source Conversion Program

Charles Conley
Submitted by: Richard Palmer, Digital Equipment Corporation, Maynard, Massachusetts

This program will allow the user to convert FORTRAN source programs written for DEC-08-AFC1 (FORTRAN Compiler, Old Version) to the new format, FORTRAN (DEC-08-AFC1-PB).

DECUS No. 8-171

Real-Time System for Behavioral Science Experiments

Robert H. Tedford, Union Carbide, Tuxedo, New York

This program controls the operations of ten behavioral chambers using four classical experimental designs; Punishment Discrimination (PD), Nondiscriminated Avoidance (NDA), Fixed Ratio (FR), and Differential Rate of Low Response (DRL). Besides controlling the experiments, certain statistics are accumulated during the experiments for printout at the end of each test run.

Write-up only available.

Minimum Hardware:	PDP-8 with an ASR-33, Requires a special interface between computer and behavioral equipment.
Storage Requirement:	4K

DECUS No. 8-172

Octal Systems Edit

Edward A. Taft III, St. Mark's School, Southboro, Massachusetts

Octal System Edit allows advanced users to perform direct octal editing of the information on their systems device. It makes block format compatible with system blocks. All editing is via the Teletype; commands allow reading, writing, and moving blocks; listing, changing, and punching individual words in a block.

Minimum Hardware:	PDP-8, 8/I, 8/S with DF-32 or TCØ1/TU55
Other Programs Needed:	Disk/DECtape monitor (DEC-D8-SBAC-PB)
Source Language:	PAL-D
Storage Requirement:	200_8-1177_8 (may be reassembled into any 4 pages)
Restrictions:	Requires that Monitor Head be present in 7600_8-7777_8

DECUS No. 8-173

TIC 5/8 (Scope Version)

Jim Gillespie, Lawrence Radiation Laboratory, Berkeley, California

TIC 5/8 plays a master game of TIC-TAC-TOE on the display scope. The program can be reset to a learning configuration by hitting two keys on the Teletype, and will begin to learn winning strategies from each game it loses until it has become a master player again. The program makes use of the program interrupt facility and makes necessary changes for a PDP-5 or PDP-8.

Minimum Hardware:	PDP-5/8 faimily and 34D scope
Source Language:	LRL PDP Assembly Language (DECUS No. 5-13)
Storage Requirement:	1-3 and 41-3000
Restrictions:	Should not be copied after use. Execution time excludes use on PDP-8/S. All program interrupt flags must be cleared for use (room is provided).

DECUS No. 8-174

Medium

Lance A. Carnes
Submitted by: James A. Gillespie, Lawrence Radiation Laboratory, Berkeley, California

Medium is a demonstration program for use on the PDP-5 or PDP-8 family. Messages typed on the Teletype are displayed on the scope, advancing across the screen from right to left similar to the Times Square News Sign.

Minimum Hardware:	PDP-5 or PDP-8 family with 34D or VC8/I Scope.
Source Language:	LRL PDP-5 Assembly Language (DECUS No. 5-13)
Storage Requirement:	41_8-1500_8

DECUS No. 8-175

Post Stimulus Interval Histogram for AX-Ø8

Peter Goldstern, Digital Equipment Corporation, Anaheim, California

This program, using the Schmitt triggers, generates a post stimulus interval histogram for one channel.

Minimum Hardware:	LAB-8
Other Programs Needed:	LAB-8 compiler
Restrictions:	Maximum count per interval is 4095_{10} Maximum number of epochs is 4095_{10} Maximum number of intervals is 3456_{10}

DECUS No. 8-176

PAL CHOP

Edward A. Taft, III, St. Mark's School, Southboro, Massachusetts

PAL CHOP produces minimum-length copies of PAL source tapes by removing all comments, tabs, multiple spaces, and multiple carriage-return/line-feed's. It is especially useful in facilitating the handling and storage of sections of extremely large programs which have been debugged.

Minimum Hardware:	PDP-8, 8/I, 8/L and ASR-33. High-Speed reader and punch optional.
Source Language:	PAL-D
Storage Requirement:	Program occupies 10_8-366_8: uses 400_8-1177_8 as buffer
Execution time:	I/O limited

DECUS No. 8-177

COPY

Alexander Symthe
Submitted by: Theodore Green, Taft School, Waterbury, Connecticut

COPY is an extension of PIP. Its purpose is to copy disk files onto paper tape and vice-versa. COPY's major advantage is that it saves time in putting files on and off the disk. This can be very useful for those with one disk and limited space.

Minimum Hardware:	PDP-8, 8/I or 8/S with disk and Teletype
Other Programs Needed:	Disk Monitor I/O routine in core and command decoder stored on disk starting in block 15.
Source Language:	PAL-D
Storage Requirement:	0-2777_8: only 0-1474_8 for program - rest buffers

DECUS No. 8-178

Reverse Assembler

Henry G. duPont, St. George's School, Newport, Rhode Island

The Reverse Assembler accepts a paper tape in binary format and produces either a printed listing or a paper tape that is acceptable to the PAL Assembler as a symbolic tape. It produces the mnemonics for almost all input-output devices as well as PAL III and Floating Point instructions.

Minimum Hardware:	PDP-8 with ASR-33
Source Language:	PAL III
Storage Requirement:	0-5400_8
Execution time:	Input/Output limited two-five seconds for ASR-33 per line.

DECUS No. 8-179

EAE Modifications for Binary Disassembler with Symbols

Alec Smythe
Submitted by: Theodore Green, The Taft School, Waterbury, Connecticut

This patch permits use of the Binary Disassembler with Symbols, (DECUS No. 5/8-18C) by users without EAE. The patch shortens the space for the cross reference table by approximately one page, and changes all EAE instructions to JMS's to routines which take their place. The patch also changes the octal type routine to make space for links on page zero.

Minimum Hardware: PDP-8 with 4K, ASR-33, High-Speed reader

Other Programs Needed: Binary Disassembler with Symbols (DECUS No. 5/8-18C)

DECUS No. 8-180

Editor and Assembler for 57A Magnetic Tape System

Donald C. Uber, Lawrence Radiation Laboratory, Livermore, California

The Symbolic Editor and MACRO-8 Assembler have been modified to replace paper tape with IBM-compatible magnetic tape for more rapid and convenient program development. The system requires an 8K PDP-8 and a 57A Tape Control with one transport.

The Editor reads and writes ASCII text in a file on magnetic tape. Text is stored in "pages" which may be individually accessed by Teletype commands. All the original operations are retained, including paper tape I/O.

MACRO-8 assembles the text file, completing all three passes before halting. Binary output is on high or low speed paper tape. The symbol table and Pass 3 listing may be on Teletype or written in a second tape file for listing on a line printer.

A third program moves pages of text from one area of tape to another whenever re-editing and re-assembly are necessary.

Minimum Hardware: PDP-8, 8K memory, ASR-33, 57A Magnetic Tape Control with one transport.

Other Programs Needed: Symbolic Editor (DEC-08-ESAB) High-Speed MACRO-8 (DEC-8-8-S)

Storage Requirement: Fields 0 and 1; locations 0-7577

Source Language: MACRO-8

Restrictions: The 57A needs modification for Extended Memory operations.

DECUS No. 8-181

Automatic Binary Loader and Duplicator-Coder for Auto Bin

Michael A. Robinton, National Semiconductor, Santa Clare, California

Automatic Binary Loader will automatically start tapes it has loaded into core in any memory field.

The Duplicator-Coder for Auto Bin computes checksums and notifies the operator of an error. It will select the correct input/output devices to be used. It can also be used to format the tapes for the Automatic Binary Loader.

Minimum Hardware: Basic PDP-8

Source Language: PAL

Storage Requirement: Automatic Binary Loader 7600_8-7754_8
Duplicator-Coder for Auto Bin 0010_8-0431_8

Restrictions: These programs will not load tapes formatted for automatic, memory extension control. (i.e. channel 8 punched); both programs will indicate a checksum error.

DECUS No. 8-182

Memory Compare

Ray H. Jones, Digital Equipment Company, Ltd., Reading, England

Memory Compare resides in page 36_8 of either field. It compares contents of similar addresses in pages 0-35_8 of both fields and outputs any differences detected.

Minimum Hardware: PDP-8 with extended memory

Source Language: PAL-D

Storage Requirement: 1 page

DECUS No. 8-183

The WANG Loader

L. C. Wang
Submitted by: Richard E. Hummer, University of Maryland, College Park, Maryland

The WANG Loader will load any program that ends at location 7777. The program consists of 8 instructions that are loaded via the toggle switches, and a tape that will boot-in the BIN and RIM loaders.

Minimum Hardware: PDP-8 with ASR-33

DECUS No. 8-184

Page Routine

F. Weil, Automatic Control Engineering, Ltd.,Kent, England

This program will arrange listings in page lengths and sequentially number the pages.

Minimum Hardware: PDP-8 with ASR-33

Source Language: PAL III

Storage Requirement: Approximately 200_8 words

Restrictions: Maximum of 99 pages per listing.

DECUS No. 8-185

Modifications to Symbolic Editor and Symbolic Tape Format Generator

G. R. Hervey, University of Leeds, The School of Medicine, Leeds, England

The modifications to Symbolic Editor (DEC-08-ESAB) are: 200_8 code becomes a valid character which can be stored or generated; T and F output 200_8 code; all three (3) punching commands, T,F and P are followed by halts to enable the punch to be turned on; T also halts after punching trailer. These changes simplify editing of tapes which contain sections of text or data separated by lengths of leader/trailer.

The modified Format Generator produces a symbolic format which saves tape, editor buffer space and Teletype time.

Minimum Hardware: PDP-8

Other Programs Needed: Symbolic Editor (DEC-08-ESAB) and Symbolic Tape Format Generator (Digital 8-21)

Source Language: PAL III

DECUS No. 8-186

EAE FORTRAN Patch for the PDP-8

P. D. Siemens, Lawrence Radiation Laboratory, University of California, Livermore, California

This patch to the PDP-8 FORTRAN Operating System utilizes the extended arithmetic unit option (Type 182 EAE). Four arithmetic routines were rewritten - alignment, normalize, multiply and divide. The reduction in execution time is rather significant.

Another improvement besides the faster execution time was gained with EAE FORTRAN. Since the multiply routine calculates a full 48-bit product and rounds instead of truncates to 24-bits, an increase in significance of the product was noted.

These modifications work with the FORTRAN Operating System of March 2, 1967. They have not been tested with any other version, but would "probably" work. No changes must be made in operating procedure or any other portion of the program, as this modification loads over the regular arithmetic subroutines.

Minimum Hardware: PDP-8 with Type 182 EAE

Other Programs Needed: FORTRAN Operating System (DEC-08-AFCO)

Source Language: FORTRAN

DECUS No. 8-187

Keyboard Controlled Binary Punch

Edward A. Taft III, St. Mark's School, Southboro, Massachusetts

This program makes binary tape copies of selected areas of core. It is entirely keyboard controlled, and has provisions for punching leader, data, checksums and field marks for extended memory programming.

Minimum Hardware: PDP-8, High-Speed Punch and Extended Memory (optional)

Source Language: PAL-D

Storage Requirement: 1 page (versions included occupy 1, 36 and 37).

DECUS No. 8-188

Extended Memory Patch for Four Word Floating Point Package (DEC-08-FMHA-8B)

Peter Goldstern, Digital Equipment Corporation, Anaheim, California

This patch will allow the DEC Floating Point Package to be entered from any memory bank if the arguments and operands processed by the Floating Point Routine all reside in the same memory bank that the package is called from. The patch only uses free locations within the package.

Other Programs Needed: Floating Point Package (DEC-08-FMHA-8B)

DECUS No. 8-189

LKDN: Look into the Directory Name Block

Barbara M. Rollman, Educational Testing Service, Princeton, New Jersey

LKDN will find the appropriate directory name entry when given a file name. It will decode and type out the contents the entry. The output gives the disk location of the directory entry (in xxx.yyy form, see DISKLOOK DECUS No. 8-111) and, optionally, the disk block locations for each core page stored.

Minimum Hardware:	PDP-8 with DF32 Disk
Other Programs Needed:	Disk Operating System (DEC-08-SDAA)
Source Language:	PAL-D
Storage Requirment:	Program - location 12_8 and 20_8-1377_8, Buffer - locations 1400_8 - 1777_8. If stored on disk, the program requires 6 blocks; it can be saved with the command "SAVE LKDN ! 0-1377; 200"

DECUS No. 8-190

PATCH Utility Program

James A. McDonough, Concord Control, Boston, Massachusetts

This program, a utility routine, allows duplicating and updating of a DECtape file of any PDP-8 TCØ1 format. It is derived from a combination of ODT (DEC-08-COBO-D) and XDUP (DECUS No. 5/8-64). The user should be familiar with the operation of both of these programs.

Minimum Hardware:	PDP-8 with TCØ1 Control

DECUS No. 8-191

Fields

D. Whiteley, International Computers Limited, Kidsgrove, Stoke-on-Trent, England

Fields, a demonstration program, calculates and displays the surface potential of a given boundary conditional plane. Each output facility is called by a 338 Display pushbutton giving a numerical and/or pictorial result.

Minimum Hardware:	PDP-8 with High-Speed punch ASR-33 Teletype and 338 Display
Storage Requirement:	8K

DECUS No. 8-192

T.A.L.C. (Taylor's Algebraic Linear Calculator)

Bruce J. Taylor, Submitted by: Theodore Green, The Taft School, Waterbury, Connecticut

T.A.L.C. is a general-purpose calculator designed to evaluate a general algebraic equation, given all quantities involved in the equation. In effect, T.A.L.C. turns any of the family-of-eight computers into a powerful desk calculator capable of evaluating complex algebraic, trigonometric, and logarithmic functions. In addition, T.A.L.C. utilizes the concept of "idiot-proofing" to virtually eliminate the possibility of an operator error invalidating the equation. Thus, T.A.L.C. is easy to use and presents unlimited possibilities in any field where fast and accurate calculations are required.

Minimum Hardware:	4K PDP-8, High-Speed Reader, DF32 Disk File and ASR-33/35
Other Programs Needed:	Floating Point Package (Digital-8-5-S)
Storage Requirement:	4K
Source Language:	PAL III

DECUS No. 8-193

DISP

S. G. Wellcome, Trinity College, Hartford, Connecticut

DISP provides a simple means of using the 34D Display with FORTRAN-D. It allows the operator to display varying numbers of points with movable X and Y axes.

Minimum Hardware:	4K PDP-8 with DF32 Disk
Other Programs Needed:	FORTRAN-D Compiler (DEC-08-AFCO)
Source Language:	PAL-D
Storage Requirement:	600-777_8, 7400-7577_8
Restrictions:	Destroys FORTRAN-D disk read/write option (e.g. Read 3, 10)

DECUS No. 8-194

NMR Simulator

D. F. Juers, R. J. Boettcher, V. J. Hull, and H. E. Zimmerman, University of Wisconsin, Madison, Wisconsin

NMR Simulator is designed to calculate the theoretical spectrum of compounds containing hydrogen, florine, carbon-13 and other nuclei of spin 112. The calculated theoretical spectrum is displayed on an oscilloscope.

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Options for punched and typewritten output, change in X-axis offset (sweep offset) and spectrum resolution are available. Chemical shifts and coupling constant parameters may be varied sucessively until the displayed spectrum matches that obtained experimentally. Redisplay of a "library" of theoretical spectra is possible by retaining punched output tapes.

Minimum Hardware:	8K PDP-8, Oscilloscope, and High-Speed Reader/ Punch
Source Language:	PAL III
Storage Requirement:	8K
Execution Time:	1 second to 15 minutes

DECUS No. 8-195

POLY BASIC

Lenny Elekman and Richard Lary, Digital Equipment Corporation, Long Island, New York

POLY BASIC is a compiler and operating stand-alone system designed for the PDP-8 family. It has a total user program storage of 32K characters in which the disk is utilized. Some of the features of the compiler are:

a. It has all BASIC system commands,
b. It has all BASIC operations,
c. It contains all built-in functions except TAN,
d. Its accuracy is 1 part in 2^{23} rather than 1 part in 2^{35}, because of word size difference,
e. Maximum program size is 6144 characters as in regular (Dartmouth) BASIC,
f. Maximum usable statement number 4095 rather than 99999,
g. Maximum array space is 3600 characters, and maximum number of statements is 330; however, these can be traded off against one another at the rate of 25 array elements per statement,
h. There are no matrix operations,
i. The argument "EDIT resequence" is implemented and the command "EDIT" renumbers the user file from line number 100 in steps of 10,
j. There is a set of error messages to signal compilation errors and a set for execution errors.

Minimum Hardware:	PDP-8 with ASR-33 Teletype and DF32 Disk

DECUS No. 8-196

DET: Detect Key Words

S. G. Cannon, UNIVAC, Salt Lake City, Utah

DET will detect a key word or words from any sentence that is typed via the Teletype. This program contains "spell", a routine that will check the spelling of all the States in the U.S.

DECUS No. 8-197

Overlay for Standard Editor and PAL III Assembler

John Knox, International Controls Corporation, Houston, Texas

This overlay enables the user of Editor (DEC-08-ESAB) and PAL III Assembler (DEC-08-ASAC) to save approximately half the time required when using the ASR-33/35. This patch has proven to be a great time saver when debugging was necessary.

Minimum Hardware:	PDP-8 with 8K
Other Programs Needed:	Editor (DEC-08-ESAB) and PAL III (DEC-08-ASAC)

DECUS No. 8-198

SYSHLP: Monitor System Utility Program

David M. Kristol, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania

SYSHLP is a combined version of DNHELP (DECUS No. 8-135) and SYSLUK (DECUS No. 8-141). Besides more convenient alternation between the two programs, SYSHLP features improved search coding in the SYSLUK portion.

Minimum Hardware:	PDP-8 with DF32 or TCØ1
Other Programs Needed:	System Monitor Head (DEC-D8-SDAA)
Source Language:	PDPMAP (DECUS No. 8-166)
Storage Requirement:	200_8 - 2177_8

DECUS No. 8-199

Accessing Data Arrays and Teletype Text Input/Output

David G. Frutchey, Beckman Instruments, Inc., Fullerton, California

These two subroutines provide the user with a powerful, yet concise, programming methodology when used with the Floating Point Package (DEC-08-FMHA).

The array accessing subroutine permits the user to access both fixed and floating point data located anywhere in the first 2K words of core storage regardless of page overlap. Both data storage and retrieval can be performed on terms analogous to single variable, subscripted FORTRAN array terms such as "ARRAY (a*J±b)."

The second subroutine, TTY Text I/O, provides a concise facility for text output (63 characters), character input,

DECUS No. 8-199 (Continued)

line spacing and page tabulation.

Other Programs Needed:	Floating Point Package (DEC-08-FMHA)
Source Language:	PAL III
Storage Requirement:	Array Accessing - 119_{10} words; Teletype Text I/O - 56_{10} words

DECUS No. 8-200

BOSS

Dr. A. S. French,
Submitted by: Dr. R. B. Stein, University of Alberta, Edmonton, Alberta, Canada

BOSS allows a series of system programs to be brought into core and executed in either one or any number of runs without keyboard input, other than the initial listing of programs and a single decision input at the end of each run.

Minimum Hardware:	PDP-8 with DF32 or DECtape
Source Language:	PAL III
Other Programs Needed:	Disk Monitor System (DEC-08-SDAA)
Storage Requirement:	Disk - 2 blocks DECtape - 3 blocks
Restriction:	File name must begin with a letter.

DECUS No. 8-201

DECSW: Decimal Switch

Kenneth B. Wiberg, Yale University, New Haven, Connecticut

DECSW is a subroutine which accepts the contents of decimal switches at a remote location and converts the number into the following forms:

1. As an insert into a BCD string which may by typed out or displayed on CRT screen.

2. As a floating point number in the floating point accumulator.

3. As the binary equivalent in the accumulator, if the number was an integer.

Minimum Hardware:	PDP-8 with Digital Switches

DECUS No. 8-202

PLOT

J. J. Spruit and L. R. Davila, Fels Research Institute, Yellow Springs, Ohio

PLOT will plot data points on a graph; calculate and plot a linear, least squares regression line and print out the coefficient of correlation, the equation of the regression line and other pertinent parameters.

Minimum Hardware:	4K PDP-8 with a Houston Instrument Complot Plotter Model 6650, DP-1-1 or equivalent
Other Programs Needed:	Floating Point Package (Digital 8-5C-S), ALPHA (DECUS No. 8-203), requiring extended memory if used.
Storage Requirement:	2, 3, 15, 16, 17, 20-177, 200-2277· 2300-4656 for storage and 4757-up for Floating Point Package. (all numbers are octal)
Restriction:	Maximum number of data points is 220.

DECUS No. 8-203

ALPHA

J. J. Spruit and L. R. Davila, Fels Research Institute, Yellow Springs, Ohio

ALPHA is used for titling graphs on the plotter. It can be used in conjunction with (DECUS No. 8-202).

Minimum Hardware:	4K PDP-8 with a Houston Instrument Complot Plotter Model 6650, DP-1-1 or equivalent
Storage Requirement:	2, 10, 11, 12, 20-167, 200-3654, 4000-7777 is reserved for storage
Restriction:	When used in conjunction with PLOT (DECUS No. 8-202) extended memory is required.

DECUS No. 8-204

PATCH: A PDP-8 Binary Paper Tape Patch Program

Charles McComas, Digital Equipment Corporation, Maynard, Massachusetts

PATCH provides a simple, convenient means for making changes to PDP-8 binary format paper tapes, and for creating short binary tapes. Single binary tapes may be patched or merely copied. Several tapes may be combined, with or without