

DECUS NO. 8-336 (Continued)

features as is, but MODIND and OCTDMP will have to be modified to accommodate the different directory format.

Minimum Hardware: 4K PDP-8, 1TCØ1 DECTape Unit, EAE
Other Programs Needed: DEC-Ø8-SUA1-LA or Digital-8-7-S Rev. 7/25/66
Source Language: PAL III

DECUS NO. 8-337

DIBOL II Software System

Submitted by: Digital Equipment Corporation, Maynard, Massachusetts

Withdrawn

Contact DEC Business Products group for further information

DECUS NO. 8-338

BIN and CBL Loader

Brian E. Wood, Weston High School, Weston, Connecticut

The combination BIN and CBL loader is used to load paper tapes in either BIN or CBL format. The program features automatic selection of the format in use so no switch register setting is needed. The program currently operates with the PR-8 high speed paper tape reader but it can be modified to use the ASR-33 reader.

Minimum Hardware: PDP-8, PR8 reader or ASR33 reader (with modifications)
Storage Requirement: One page (7600-7777)
Source Language: PAL III

DECUS NO. 8-339A

PST (Post Stimulus Time) and Latency Histogram for the LAB-8

Charles P. Merrill, Digital Equipment Corporation, Maynard, Massachusetts

This program records all signals crossing a set threshold after a given event. The program is used most frequently in experiments dealing with the response of a single nerve cell to a stimulus. Either Post stimulus time or latency histograms

may be formed.

Minimum Hardware: PDP-8/I or 8/L with AXØ8 and RM503
Storage Requirement: 4K
Source Language: PAL III (PAL-10, PDP-10 formatted DECTape)

DECUS NO. 8-339B

Time Interval Histogram Program

Charles P. Merrill, Digital Equipment Corporation, Maynard, Massachusetts

Records the time between events occurring on Schmitt trigger 2 of the AXØ8. The display is a frequency distribution showing the duration of the interval vs. its frequency of occurrence.

Minimum Hardware: LAB-8 (PDP-8/I or 8/L with AXØ8)
Other Programs Needed: Write-up - DECUS NO. 8-339A
Storage Requirement: 4K
Source Language: PAL III

DECUS NO. 8-340

The Auto and Cross-Correlation Program for the LAB-8

Richard Rothman
Submitted by: Charles Merrill, Digital Equipment Corporation, Maynard, Massachusetts

This program will perform auto or cross-correlation on analog signals in real time. There are two versions, one for use with EAE and one for use without EAE. The delay between points is variable from 100 usec. to 204.7 msec. Number of points in correlogram can be varied down from 4 to 513.

Minimum Hardware: PDP-8/L or 8/I, AXØ8, RM503, EAE if available
Storage Requirement: 4K
Source Language: PAL IØ

DECUS NO. 8-341

LISP-8

William Leal
Submitted by: Ernest Hayden, Speech Communications Research Laboratory, Santa Barbara, California

LISP-8 is a semi-interpretative LISP-like list processing package. Problem programs are "compiled" by the assembler, and the object code is interpreted by the package. Its structure makes it incompatible with LISP 1.5, but many of the same problems may be solved. It is recursive, permits subroutines.

Minimum Hardware: 4K PDP-8, EAE
Storage Requirement: 12 pages
Source Language: PAL III

DECUS NO. 8-342

STAP-8; Spike Train Analysis Program

Urs R. Wyss
Submitted by: Charles Merrill, Digital Equipment Corporation, Maynard, Massachusetts

STAP-8 is a subroutine package for basic statistical analysis of stochastic point processes, written in PDP-8's PAL symbolic assembler language and available as a machine language perforated tape in binary format. Main effort was not made on sophisticated statistical techniques, but rather on a easy to control, variable program library, including CRT-display, paper tape output and teletype listings.

Minimum Hardware: PDP-8/I with AX08
Other Programs Needed: Floating point package DEC-8-25-E/A
Storage Requirement: 4K
Source Language: PAL III

DECUS NO. 8-343

Radial Interface Including Interrupt Mask for the PDP-8 or LINC-8

Paul F. Sullivan, Cornell Aeronautical Laboratory, Inc., Buffalo, New York

This document describes a hardware modification to the PDP-8 or LINC-8 which protects software from obsolescence caused by the addition of new devices to the interrupt and/or data break facilities and allows significant savings of money and effort in interfacing further devices to the computer. The hardware also provides the computer with a dynamic priority interrupt facility.

Source Language: Document only

DECUS NO. 8-344

Toledo Extended Memory Binary Punch

H. Bradford Thompson, University of Toledo, Toledo, Ohio

This program operates in exactly the same manner as does the DEC binary punch (DEC-8-5-U) when field designations are not desired on the binary tape. However, provision for changing the field from which data is taken, and for inserting a field designation on the punched tape are included.

Minimum Hardware: 8K PDP-8
Storage Requirement: One page
Source Language: PAL III

DECUS NO. 8-345

EDIT-PAL

F. C. Owen, General Railway Signal Company, Rochester, New York

EDIT-PAL is an overlay and addition to provide a coupling

between Editor (DEC-08-ESAB) and PAL III Assembler (DEC-08-ASB1) plus listing line numbers and reporting the vacant buffer balance.

Minimum Hardware: 8K PDP-8, ASR33
Other Programs Needed: Editor (DEC-08-ESAB) and PAL III (DEC-08-ASB1)
Storage Requirement: Field 0, 0000-1627 and buffer Field 1, PAL III
Source Language: PAL III

DECUS NO. 8-346

Pollution Game

James E. Storer, Lexington High School, Lexington, Massachusetts

The player is elected (?) premier of a small communist island and asked to administer it for several years.

Minimum Hardware: TSS-8
Source Language: BASIC

DECUS NO. 8-347

DUBAVG

Eugene E. Wells, Jr., U. S. Army Electronics, Fort Monmouth, New Jersey

DUBAVG is a subroutine which collects high speed data, smooths via two word arithmetic averaging, and scales the result to millivolts. As many as 4096 runs of 2048 points each may be averaged, limited only by the word length of the runs counter and size of the core field which contains the double word length sum, respectively.

The program has been optimized to allow both the minimum (adjustable) point spacing and the maximum run repetition rate. Minimum point spacing is about 35 microseconds. DUBAVG is core field relocatable, and allows its buffer and sum storage to occupy any core fields whatever.

Minimum Hardware: PDP-8 with AX08
Other Programs Needed: Signed Single Precision Divide (DEC-08-FMCA)
Storage Requirement: One page, plus 50_g locations, exclusive of auxiliary subroutines
Source Language: PAL-D

DECUS NO. 8-348

Mini Binary Punch

Frank Melchior, Jr., National Center for Atmospheric Research, Boulder, Colorado

This program accumulates patches onto a binary tape so that they can be reloaded if core gets wiped out.

Minimum Hardware: PDP-8, ASR33
Storage Requirement: 12 decimal locations
Source Language: Machine Language

DECUS NO. 8-349

Octal Debugging Technique with View

Larry McGimsey, Western Kentucky University, Bowling Green, Kentucky

This program permits the display of 20₈ consecutive core locations on a LAB-8 system from field 0 or field 1. The program is a modification of ODT that uses 4 pages instead of 3, and allows operations on both field 0 and field 1. The word search and punch routines have been deleted.

Minimum Hardware: 4K PDP-8, ASR33, AX08 with scope
 Storage Requirement: 1000₈ locations, plus 4 and 5 in field 0 and 4, 5 and 6 in field 1
 Source Language: PAL-D

DECUS NO. 8-350

Wilcoxon-White Two Sample Rank Test

Jens G. Rosenkrantz, M. D., Childrens Hospital of Los Angeles, Los Angeles, California

This nonparametric statistical test may be used in comparing unpaired samples and assigns ranks to the pooled measurements, comparing the ranks as ordinal numbers in two groups.

Minimum Hardware: 8K PDP-8, High Speed reader and punch
 Other Programs Needed: 8K FORTRAN System
 Source Language: 8K FORTRAN

DECUS NO. 8-351

ComBIN Loader

Peter Goodeve, University of California, Berkeley, California

An extended utility loader for BIN and RIM tapes, with all standard BIN load features, switch-controlled autostart in any memory field and automatic selection of input device. It may be located on any page of any field, and always protects its own page from accidental overwriting during loading. ComBIN is supplied as a punched tape in a special format read by a 9-instruction initial loader. The same tape can be used to place ComBIN on any page in core.

Minimum Hardware: 4K PDP-8, teletype or high speed reader
 Storage Requirement: 120₁₀ locations on any page in any field
 Source Language: PAL

DECUS NO. 8-352

Parity Hi-Lo Loader

Ronald Zane, University of Hawaii, Honolulu, Hawaii

Loads parity format punched paper tapes from either a high speed reader or the ASR33 teletype. It must be started on leader (8-level punch) and will halt on trailer (8-level punch). If a parity error is encountered the loader will halt with the erroneous character in the reader. SR0 (0) ⇒ High speed reader and SR0(1) ⇒ ASR33.

Minimum Hardware: 4K PDP-8, ASR33 or High Speed reader
 Storage Requirement: 70 locations (7400-7505)
 Source Language: PAL III

DECUS NO. 8-353

Disk Monitor Patch for BLACKJACK (DECUS NO. 8-94A)

Carl Kishline, University of Wisconsin, Parkside Computing Center, Kenosha, Wisconsin

The Disk Monitor Patch allows the BLACKJACK user to decide whether he wishes to start over after a 0 wager. An "N" response to "another victim?" returns control to 7600, the head of the monitor. Any other response returns control to 0200, the start of BLACKJACK. A system without a monitor could use this by changing location 3762 (the JMP I MON) to 7402 (HLT).

Minimum Hardware: 4K PDP-8, DF32 Disk
 Other Programs Needed: Disk Monitor System, BLACKJACK (DECUS NO. 8-94A)
 Storage Requirement: 41₁₀ or 50₈
 Source Language: PAL-D

DECUS NO. 8-354

Pass 3 ASR33 Format Overlay

Frank Melchior, Jr., National Center for Atmospheric Research, Boulder, Colorado

This overlay will automatically format the output from Pass 3 on the ASR33 teletype into page size blocks.

Minimum Hardware: PDP-8, ASR33
 Other Programs Needed: PAL III (Digital-8-3L-5)
 Storage Requirement: 33 locations
 Restrictions: High speed punch will NOT work with this program
 Miscellaneous: Symbol table will have to be punched on Pass 1
 Source Language: PAL III

DECUS NO. 8-355

PAL III.75

E. D. Huthnance, Newberry College, Newberry, South Carolina

This overlay to PAL III will enable it to generate links for off page references automatically, in a manner similar to MACRO-8.

Minimum Hardware: 4K PDP-8, ASR33
 Storage Requirement: 7100 to 7447
 Restrictions: Only low speed input and output may be used
 Source Language: PAL III

DECUS NO. 8-356

Page Printer

G. Kermez and W. Peters, Texas Instruments Limited, Bedford, England

This program is designed to produce pages of a required length from ASCII paper tape fed from either the low speed or high speed readers.

Minimum Hardware: 4K PDP-8/L, ASR33
 Restrictions: Tape to be read must be set at first character
 Miscellaneous: Set switch register to 1 to run program

DECUS NO. 8-357

ISOMER - Interactive Study of Organic Molecules by Educational Reinforcement

Dr. James W. Cooper, Digital Equipment Corporation, Maynard, Massachusetts

ISOMER was written to establish the utility of the LAB-8 as a tool for computer-assisted instruction. It is designed to assist students in learning organic nomenclature by asking them to identify all 21 isomers of $C_5H_{10}Br_2$. Carbon skeletons are

drawn on the scope by typing C's and the positions of the BR's are controlled by the LAB-8 knobs. After the bromines are adjusted to represent a legitimate isomer, typing N produces the IUPAC name on the Teletype. The program also informs the student if he has entered this compound before, and when he is done, lists any isomers that he omitted.

Minimum Hardware: LAB-8/L or 8/I with 4K of core and Teletype, LAB-8 Scope
 Storage Requirement: 0-5377
 Source Language: Can be assembled by MACRO-8, PAL-D, PAL-8 or PAL-10

DECUS NO. 8-358

Card Reader Patch

Peter Lincoln Barnett, Dubner Computer Systems, New York, New York

This patch may be used to modify a program which uses the teletype or paper tape to use a card reader. It is used as a subroutine which supplies a character each time it is called. The card is buffered and the BCD codes are converted to ASCII.

Minimum Hardware: PDP-8/I with CR03 card reader
 Storage Requirement: 260₈ locations
 Source Language: PAL

DECUS NO. 8-359

Hi-Q Game Playing Program

M. L. Fichtenbaum and R. E. Peterson, General Radio Company, Concord, Massachusetts

Hi-Q is a game played with pegs on a board. This program plays Hi-Q and finds solutions by means of a tree of possible move patterns. Several different printouts are available, selected by the switch register.

Minimum Hardware: 4K PDP-8 and Teletype
 Source Language: GR's PDP-8/1130 Assembly, similar to PAL III

DECUS NO. 8-360

ASCII to Friden (EIA)

Arnold V. Fish, Digital Equipment Corporation, Parsippany, New Jersey

This program converts from ASCII to Friden (EIA) using a restricted character list. It provides for operation with or without illegal character halts, but in either case output can continue with illegal character ignored. High or low speed paper tape equipment can be used.

Minimum Hardware: 4K PDP-8
 Restrictions: Converts only unique EIA characters
 Source Language: PAL-D

DECUS NO. 8-361

Game of Chance

Randall S. Battat, San Francisco, California

Similar to a dice game, but a little harder to win. Written in BASIC for use on the PDP-8

Minimum Hardware: PDP-8, ASR33
 Other Programs Needed: POLY-BASIC (DECUS NO. 8-195)
 Source Language: BASIC

DECUS NO. 8-362

IOFMAG

Giles Peterson

Submitted by: Ernest Hayden, Speech Communications
Research Laboratory, Santa Barbara, California

Four subroutines are provided which access DECTapes on TC-01 drives. In contrast to the routines provided by DEC, these routines do not use the interrupt. If the user does not require the use of the interrupt while doing DECTape I/O, the use of these routines has several advantages:

1) They occupy less storage (106 [10] vs. 128 [10] words); 2) The user need not establish page 0 linkages to service the interrupt; 3) Other devices (such as the teletype) will not interrupt the DECTape I/O. When, for instance, transferring from paper tape to DECTape, one need not buffer those characters which would have been read during DECTape output.

Minimum Hardware: 4K PDP-8, TC01 DECTape Drive
Storage Requirement: 106₁₀ words
Source Language: PAL III

DECUS NO. 8-363

DATOUT: A Simple Routine for Printing Sequential Data as an Array

Barry Millman, University of Calgary, Calgary, Alberta, Canada

DATOUT is a routine which enables octal numbers stored sequentially in the PDP-8 to be output as single precision positive decimal integers with up to 14 numbers per line and up to 4096 lines. Provision is made for automatic numbering of typed lines. Digital's Unsigned Decimal Print is required to convert and print the numbers.

Minimum Hardware: PDP-8, ASR33
Other Programs Needed: Digital's Unsigned Decimal Print 8-22-U
Source Language: PAL III

DECUS NO. 8-364

Extended Memory Patch to the 3-Word Floating Point Arithmetic Interpreter

Herbert Poppe, Lamont Geological Observatory of Columbia University, Palisades, New York

This patch allows the 3-word Floating Point Arithmetic Interpreter (DEC-08-YQYB) to reside in any memory field and to be entered from that field or any other memory field.

Minimum Hardware: PDP-8, extended memory, memory extension control
Other Programs Needed: DEC-08-YQYB
Restrictions: Does not work with previous version (DEC-08-YQYA)
Source Language: PAL-D

DECUS NO. 8-365

CARD

Herbert Poppe, Lamont Geological Observatory of Columbia University, Palisades, New York

Reads cards from a card reader and transfers the characters to DECTape as an ASCII file compatible with Disk/DECTape Monitor System. The program runs with the interrupt enabled. CARD, in effect, allows card input to the PAL-D Assembler, for example.

Minimum Hardware: 4K PDP-8, 1 DECTape Drive and Control, Card Reader (CR01, 2, 3 or CR81/L) and Control
Other Programs Needed: Disk/DECTape Monitor System (DEC-D8-SDAB)
Storage Requirement: Program: 0000-1577; Buffers: 2000-3001, 4000-5405
Restrictions: Ignores card columns 61-80
Source Language: PAL-D

DECUS NO. 8-366

Modified Readable Punch

Andres T. Siy, Capitol Institute of Technology, Kensington, Maryland

This program is similar in many respects to DECUS NOs. 8-68a and 8-106. It allows the user to type any characters whose ASCII code is 240 to 337, and produce an 8 X 6 matrix readable outline of the character on tape. The added features are: (a) new 6 words per character tags, and (b) there are provisions for output devices selection.

Minimum Hardware: 4K PDP-8, ASR33, HSP
Storage Requirement: Locations 20-43; 200-310 (SA=200); and 400-1177 for Tags
Source Language: PAL III

DECUS NO. 8-367

Digital 8-12-U Modified

Judson Gilbert, Florida State University, Tallahassee, Florida

The changes indicated allow the routine to recognize numbers in the range of ± 2047 instead of from 0 to 4095. As is usual with all software, making it more powerful takes a little more core or, eliminates some features or both. In this instance, the calling program will have to decide about initializing or plotting, and when plotting the pen will have to be raised or lowered, or commanded so, regardless of its up or down status of entry. The storage required is still 1 PDP-8 page.

This version of Digital-8-12-U is now serving us as an FNEW addition to FOCAL. It does a very nice job.

Minimum Hardware: PDP-8, LINC-8 and incremental plotter
Other Programs Needed: Calling program
Source Language: LAP6-DIAL

DECUS NO. 8-368

Tri-Data CartriFile PAL III Assembler

Jack R. Ellis, Tri-Data Corporation, Mountain View, California

This is a complete rewrite of the basic PDP-8 PAL III Assembler. In addition to providing magnetic tape source-program input and listing output on the Tri-Data CartriFile, the program provides for 11" paging, line numbering corresponding to the "pages" of the DEC Editor, a 4-column symbol table, and compressed source-tape formatting. Symbol table capacity is 532 symbols.

Minimum Hardware: 4K PDP-8, ASR33 (HSR/P and/or Cartrifile are optional)
 Storage Requirement: 4096 words (0-7577_g)
 Restrictions: Binary output tapes may not be used with DDT-8
 Source Language: PAL III

DECUS NO. 8-369

Tri-Data CartriFile DEC Editor

Jack R. Ellis, Tri-Data Corporation, Mountain View, California

This is an overlay to the DEC Editor which provides for magnetic-tape text input-output using the Tri-Data CartriFile. New switch options provide the user with the ability to use the Teletype, High Speed Punch or Cartri-File as I/O devices. In all other respects, the DEC Editor remains unchanged.

Minimum Hardware: 4K PDP-8, ASR33, (HSR/P and/or CartriFile are optional)
 Storage Requirement: 4096 words (0-7577_g)
 Source Language: PAL III

DECUS NO. 8-370A

FBUILD

Bruce L. Taylor, L. L. Thurstone Psychometric Laboratory, University of North Carolina, Chapel Hill, North Carolina

FBUILD builds LIBRA-FOCAL systems on DECTape for save-restore features outlined in DISK utility program.

Minimum Hardware: 8K PDP-8; 1 DF32 or RF08; TC01 DECTape; 1 TU55 Transport; EAE
 Other Programs Needed: LIBRA, FOCAL, Extensions to LIBRA-FOCAL (DECUS NO. 8-433)
 Storage Requirement: 0000-2177; SA=2000
 Miscellaneous: Need write-up for DISK (DECUS NO. 8-370B)
 Source Language: PAL-8 with conditional assemblies

DECUS NO. 8-370B

DISK

L. Gordon, R. A. Helwig, M. Conrad, B. Taylor, L. L. Thurstone Psychometric Laboratory, University of North Carolina, Chapel Hill, North Carolina

Maintains disk images in save-restore form on DECTape. Starting bootstrap for monitor systems: 4K Disk Monitor (Disk and tape); PS/8 (Disk and tape); TC01 Library System; LIBRA-FOCAL. Restores Binary and RIM loaders in 17600-17777; Special Disk image builder.

Minimum Hardware: 8K PDP-8; 64K DF32, EAE, TC01 DECTape; 1 TU55 Transport
 Storage Requirement: 0000-1777 SA=200
 Source Language: PAL-8 with conditional assemblies

DECUS NO. 8-371

Teletype Control of ND 50/50 Memory Unit (TYPED)

W. J. Blanchard, Louisiana State University, Baton Rouge, Louisiana

TYPED is a program to allow the user quick access to Nuclear Data's 50/50 Memory and Display unit via the ASR33 teletype. After entry through the monitor, the user types in the starting channel (1-4096) and the program echoes the contents which are then subject to modification. The program contains two control characters, one in case of error made in typing channel contents, the other is a terminal character which returns control to the monitor routine.

Minimum Hardware: 4K PDP-8 with Nuclear Data 50/50 interface system
 Other Programs Needed: Nuclear Data's Basic Software Package
 Storage Requirement: (115_g)
 Source Language: PAL III

DECUS NO. 8-372

ML Editor (Machine Language Editor)

Nobuhiro Sato, Rikei Corporation, Rikei Computer Center, Tokyo, Japan

This is an extension of the program GOOF (DECUS NO. 8-97). It is capable of printout, binary punchout, insert, swap and zero-clear of instructions and data in the core memory. It will enable the user to change instructions and data in core memory in case of debugging and gets the binary punched tape. All commands are via TTY.

Minimum Hardware: 4K PDP-8, ASR33, HSP
 Storage Requirement: 7200-7577; Binary Punchout Routine 7040-7177
 Source Language: PAL-D, MACRO-8

DECUS NO. 8-373

LISP Disk Array

Gary Coleman, Case-Western Reserve University, Cleveland, Ohio

This program allows the user to store up to 4096 individual numbers on disk. Storage is by a one-dimensional array. The function is accessed by EXPR. Both the READ and WRITE routines sit in the top of core, just under the monitor, and occupy only 26₁₀ locations (13 LISP cells). The function is similar to FOCAL'S FNEW for disk.

Minimum Hardware: PDP-8 with 1 DF32 Disk
Other Programs Needed: LISP Interpreter for the PDP-8 (DECUS NO. 8-102a)
Source Language: PAL-D

DECUS NO. 8-374

Binary or RIM Consolidator

Garth Peterson, South Dakota School of Mines and Technology, Rapid City, South Dakota

The Binary or RIM Consolidator program accepts input paper tapes in either binary or RIM format and punches them back out in binary format, in RIM format, or in a special RIM format compatible with the binary loader. Multiple input tapes, not necessarily all in the same format, may be combined into one output tape. Format conversions between binary and RIM may be made in either direction. The interrupt facility is used for efficiency.

Other Programs Needed: 0-777
Source Language: PAL-D

DECUS NO. 8-375A

3 Page Floating Point Package

Richard Rothman, Digital Equipment Corporation, Maynard, Massachusetts

This package makes available an alternative to the lengthy floating point package distributed by DEC and also utilizes the concept of cutting down exponent size to allow a larger mantissa. It uses 3 word numbers, with 27 bit mantissa and 8 bit exponent.

Minimum Hardware: 4K PDP-8
Storage Requirement: Locations 50-64, 5410-6177
Source Language: PAL 1Ø, Version 141

DECUS NO. 8-375B

3 Page Floating Point Package with Floating Output

Richard Rothman, Digital Equipment Corporation, Maynard, Massachusetts

This package is the same as the three page floating point package, except that a floating point output routine has been added.

Minimum Hardware: 4K PDP-8, ASR33
Storage Requirement: 50-64, 5400-6177 for arithmetic routines; 6200-6377, 6400-6501, 6566-6577 for floating output
Source Language: PAL 1Ø, Version 141

DECUS NO. 8-376A

Field 1 Symbol Table Storage for PALD (DEC-D8-ASAA-LA)

Peter F. Calder, Weapons Research Establishment, Adelaide, South Australia

Instead of storing external symbols on the system device (in .SYM), this modification allows Field 1 to be used for this purpose, reducing assembly and listing time by (typically) 50%. 20 blocks of external symbols are provided for.

Minimum Hardware: 8K PDP-8, Disk or DECTape
Other Programs Needed: PALD Assembler (DEC-D8-ASAA-LA)
Storage Requirement: Field Ø, same as PALD; Field 1, pages 1-20
Source Language: PAL

DECUS NO. 8-376B

Field 1 Symbol Table Storage for PALD (DEC-D8-ASAC-LA)

Peter F. Calder, Weapons Research Establishment, Adelaide, South Australia

This overlay is for the later version of PALD (DEC-D8-ASAC-LA). The operation of the updated version is identical to the original.

Minimum Hardware: 8K PDP-8, Disk or DECTape System
Other Programs Needed: PALD Assembler (DEC-D8-ASAC-LA)
Source Language: PAL

DECUS NO. 8-377

One Pass Assembler

Barney Hordos III, University of California, Lawrence Radiation Laboratory, Berkeley, California

This program is for on-line use with PDP-8 series computers with 4K or greater core. The assembly is made directly into the memory of the computer, and a paper tape in RIM or BIN format may be punched. The op code field length is limited to three characters with indirect addressing available. It is not Source language compatible with other PDP-8 assemblers.

Minimum Hardware: 4K PDP-8
Storage Requirement: 3000-7063
Restrictions: Can write over itself, not protected
Source Language: Not compatible with other PDP-8 assemblers

DECUS NO. 8-378

Map Directory Information on KV8/I

Elmer J. Bourque, RPC Electronics Department, New Brunswick Research and Productivity Council, Fredericton, New Brunswick, Canada

KV8Map gives the operator a complete picture of the TCØ1 DECTape Library System Directory including file name, starting block on tape, number of blocks in file, starting address of the program and a complete description of the core locations used by each file.

Minimum Hardware: Teletype, TCØ1 with at least one TU55; KV8/I Display
Other Programs Needed: TCØ1 DECTape Library System
Storage Requirement: 6ØØØ - 7577
Source Language: PAL III

DECUS NO. 8-379a

Double Precision and Floating Point Interchanger

Stephen J. Freeland and F. Jakob, Sacramento State College, Sacramento, California

This is a subroutine for conversion of double precision to floating point format and vice-versa. A routine to move the radix point in a double precision number to any location is also included as a separate subroutine. The listing for these routines is not included with the write-up, but can be generated from the source tapes. However, a small program is included which was written to prove this version of the ROTATE subroutine

Minimum Hardware: PDP-8
Other Programs Needed: DEC Floating Point Package No. 1
Storage Requirement: Location 170-175 and 5240 to 5576
Source Language: PAL III

DECUS NO. 8-380

WATSNU

P. C. Halsall
Submitted by: L. A. Cragg, Teklogix Ltd., Mississauga, Ontario, Canada

WATSNU has two purposes: to compare current core store and a binary tape without changing core; and to reload a binary tape and illustrate locations which are changed in the process. It is used during debugging to highlight differences between current program status and the last binary program tape; and also in the event that a system failure requires a program reload in order to provide a trace of conditions at the time of failure.

Minimum Hardware: 4K PDP-8, ASR33, (high speed reader optional)
Storage Requirement: 1 page
Source Language: MACRO-8

DECUS NO. 8-381

Cardreader Subroutine for Disk Editor

Herbert Steiger, Medical Institute fur Lufthygiene, Duesseldorf, Germany

The program allows for the use of a cardreader as input with the editor. The high speed reader is replaced by the cardreader. All other input and output equipment can be used without any changes.

After every card a CR is produced to end the line. The read-in is terminated by a CTRL/FORM, when 40 cards have been read. By doing this the overflow of the textbuffer is avoided and there is room for possible changes.

Minimum Hardware: 8K PDP-8/I, ASR33, DF32 RF08, TC01, TU55, CR8/I
Other Programs Needed: Disk Monitor System, Disk Editor (DEC-D8-ESAB)
Storage Requirement: 214g locations in Field 1. Subroutine will be in Field 0 on input
Miscellaneous: Can also be written for 4K
Source Language: PAL-D

DECUS NO. 8-382

Readable High Speed Punch Copier

Nigel D. Chubbb, Collins Radio Company of United Kingdom, Limited, Hounslow, Middlesex, United Kingdom

This program accepts alphanumeric characters from teletype and outputs them in a readable form on a high speed punch. On depression of ALTMODE key, a copy is made of tape placed in high speed reader.

Minimum Hardware: Basic PDP-8 with high speed reader and punch, ASR33
Storage Requirement: 3 pages +
Source Language: PAL III

DECUS NO. 8-383A

Scan and Analysis Program

A. M. Romaya, University of Oxford, Department of Nuclear Physics, Oxford, United Kingdom

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

Minimum Hardware: Basic PDP-8 with 338 Display

DECUS NO. 8-383B

Core Display Program

A. M. Romaya, University of Oxford, Department of Physics, Oxford, United Kingdom

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 one. The program does not set the push down pointer or the interrupt system and hence field 0 is absolutely free for use by other programs. It is possible to run this program concurrently with another which uses the interrupt system. (This second program should not use the display unless in special modified cases.)

Minimum Hardware: Basic PDP-8 with 338 Display

DECUS NO. 8-383C

Drawing Applications Program

A. M. Romaya, University of Oxford, Department of Physics, Oxford, United Kingdom

This program is intended to show the facilities the DEC-338 system offers when considered as a drawing board. It allows the user to: draw straight lines of "free hand" over a total of 75 X 75 inch area; include symbols which may be formed by means of the program; label the drawing in alphanumeric and other characters; delete items drawn; output the display and symbol files created and 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 and push buttons and the switch register.

The documentation gives possible core location changes for adapting the dimensions drawn to special cases if required.

Minimum Hardware: Basic PDP-8 with 338 Display

DECUS NO. 8-384

BLOK

T. D. M. Roberts, Institute of Physiology, University of Glasgow, Glasgow, Scotland

This is a two-page program used under Monitor for examining the state of the disk. Blocks are printed out on the teletype with their link words, either in Directory format with the file names decoded, or in an octal array format. The number of the block to be examined may be entered either from the SR or from the teletype using ODT.

Minimum Hardware: PDP-8, ASR33, DF32
Other Programs Needed: DEC Monitor System, ODT at 4000 (optional)
Storage Requirement: 6000-6377
Source Language: PAL-D

DECUS NO. 8-385

Mixed ASCII Formatting and Outputting Technique

Donald L. Scanlon, Romelan Industries, Santa Clara, California

This technique provides a reasonably good tradeoff between storage requirements and execution time in real-time systems when a number of fixed and variable field messages must be output. The technique uses unpacked standard ASCII code for variable data and packed, modified ASCII for fixed data. The two formats may be mixed and are easily detected and processed by an interrupt routine.

Source Language: PAL III

DECUS NO. 8-386

Multiple Field Loader

Randall S. Battat, 55 San Rafael Way, San Francisco, California

The Multiple Field Loader is used to load paper tapes punched in BIN format into more than one field of core memory. It will also change the field when program is running. It is useful when a very long program is encountered.

Minimum Hardware: 8K PDP-8
Storage Requirement: 106₈ locations
Source Language: PAL III

DECUS NO. 8-387

Grade Point Correlation

E. D. Huthnance, Newberry College, Newberry, South Carolina

This package of programs calculates correlation matrices for p samplings of a real variable (e.g. student grade point ratios) with n Boolean variables (e.g. subjects taken). The programs can also correlate combinations of the n variables taken m at a time with the real variable. Included in the package are a versatile data tape editor which can be used to prepare an input data tape for the correlator and a program which converts the output of the correlator into percentage correlation matrices.

Minimum Hardware: 4K PDP-8
Other Programs Needed: FORTRAN Compiler and Operating System (DEC-08-AFC1-PB and DEC-08-AFC3-PB)
Source Language: FORTRAN and PAL III

DECUS NO. 8-388

CALENDAR

R. Lee, University of Kent at Canterbury, Canterbury, Kent, England

This program will print the calendar for any year between 1

DECUS NO. 8-388 (Continued)

A.D. and 9999 A.D. inclusive. The Julian calendar is used before 1752 and the Gregorian calendar after 1752. Output is on the Teletype or high speed punch

Minimum Hardware: 4K PDP-8, ASR33
Storage Requirement: 20-60, 200-1537
Source Language: PAL III

DECUS NO. 8-389

Mini-Monitor, A Secondary Disk Monitor for the PDP-8

R. S. Lewis, Science Research Council, Rutherford Laboratory, Chilton, Didcot, Berkshire, England

The program allows large numbers of core images to be saved on disk by name, but independent of the DEC Monitor. The restrictions normally imposed by the limit on the number of file names available are thus avoided.

Minimum Hardware: 4K PDP-8, DF32 Disk
Other Programs Needed: DEC Monitor SYSIO Head
Storage Requirement: 3 contiguous pages of core
Restrictions: Only contiguous saves available.
No swapping-out of core
Source Language: PAL-D

DECUS NO. 8-390

PALEDCO (PAL Assembler and Editor Combined)

Paul Fingerman, Department of Psychology, State University of New York at Stony Brook, Stony Brook, New York

PALEDCO is a combined editor and assembler, based on Symbolic Editor (DEC-08-ESAB-PB) and PAL III Assembler (DEC-08-ASB1-PB). It allows the user with an 8K machine to enter PAL III language programs on-line using the editor, edit them, and then to assemble them from the text image in core, without the intervening paper tape step previously required. If an error diagnostic should occur during assembly, he has immediate access to the editor and his incorrect text, so that "instant" editing and reassembly is possible. "Instant" editing and higher assembly speed are the two primary advantages of this system over existing ones. In addition, the editor's text storage area has been expanded by 1030 (octal) locations. Finally, all editor and assembler options which were available in the DEC programs have been retained, and Bin loader in lower core is not destroyed, advantages over earlier programs of this sort.

Minimum Hardware: 8K PDP-8, ASR33 (High Speed Reader and Punch optional)
Other Programs Needed: BIN Loader
Source Language: PAL III

DECUS NO. 8-391a

7 or 9-Track MTA for PS/8 with TC58/TU-20

Roger Seeman, The Boeing Company, Seattle, Washington

This is a revision and correction of the original program

written by John Alderman. It is a single unit Magtape handler for use with the PS/8 system. Each tape must be formatted (see DECUS NO. FOCAL8-125a) before use. Tapes will have a directory and otherwise resemble DECtape in storage operations. REWIND is invoked when directory block is searched for.

Minimum Hardware: PS/8 system configuration with Magtape
Storage Requirement: 1 page
Source Language: PAL 8

DECUS NO. 8-392

Vector-8

Richard Rothman, Groton School, Groton, Massachusetts

Vector-8, a new programming language, is designed to allow the user of a PDP-8 with 8K and a DF32 Disk to take full advantage of the hardware. It offers 33 functions, 15 operators and 22 commands.

Minimum Hardware: 8K PDP-8, DF32 Disk
Source Language: PAL-10

DECUS NO. 8-393

Queing TC01/TU55 DECTape Routines

James Crapuchettes, Stanford Electronics Labs, Stanford, California

These routines, which are a much modified version of DEC-08-FUBO (previously DEC-08-31U) provide the user with the ability to read and write 128 words (one memory page) from/onto standard 129 word DECTape blocks. Successive blocks are transferred into/from successive 128 word areas of memory. The routines will transfer into/from any memory field, will begin searching in either forward or reverse direction for the block at which the transfer will begin, and will queue one read/write request to keep the DECTape in motion (and transferring data) as continuously as possible.

Minimum Hardware: PDP-8, TC01 DECTape control and TU55 DECTape transport(s)
Storage Requirement: About 1 1/4 pages of memory (240₈ locations)
Source Language: PAL III

DECUS NO. 8-394

BASIC MOO

Guy Steele, Jr., Brighton, Massachusetts

MOO is a game of deductive strategy which is complex enough to challenge expert logicians, yet simple enough for a fourth-grader to learn. MOO also improves the deductive faculties of the player, and is recommended for use in schools.

Minimum Hardware: Any standard BASIC system; computer or teletype
Other Programs Needed: BASIC
Source Language: BASIC

DECUS NO. 8-395

Space War

Evan Suits, Digital Equipment Corporation, Maynard, Massachusetts

The classic game of Intergalactic Death and Destruction on a LAB-8. Two players vie with ships in space for control of the Universe. The ships may be controlled from the Switch Register or from the AXØ8 front panel Blue Ribbon Connector.

Minimum Hardware: 4K LAB-8 or LAB-8/L, ASR33
 Storage Requirement: 25ØØ words
 Source Language: PAL

DECUS NO. 8-396

MTS-6/70 (Millisecond Time-Sharing System)

Charles W. Snyder, Department of Psychology, University of Notre Dame, Notre Dame, Indiana

A laboratory time-sharing system for data processing and control of up to 18 experiments without interaction. Experiment programs in PAL III are called at 1, 10 or 100 Hz for one millisecond per share. Inputs may be sampled at 1000 Hz. The basic system of about 1400 core words includes a scope interactive display, I/O, arithmetic, conversion, keyboard control, and service routines most useful in behavioral research.

Minimum Hardware: 4K PDP-8/1, ASR33, AXØ8 with scope, XR, XM, XC options to 16 analog channels (LAB-8 system), PCØ8 High Speed Reader and Punch
 Storage Requirement: 11₁₀ pages: Ø2ØØ-Ø377, 52ØØ-7611, plus half of Page Ø
 Restrictions: Experiment programs are not on interrupt and must return within 1 msec.
 Source Language: PAL III

DECUS NO. 8-397

8K Editor

Bill Donelson, The Choate School, Wallingford, Connecticut

This editor was designed to be used with a DF32, but can be used without it as explained in the documentation. The editor contains 30 commands, many of which can use multi-letter search strings. I/O for disk has been greatly improved (Input and Output filenames may be the same !) and Reader/Punch are always enabled. (High Speed)

Minimum Hardware: 8K PDP-8; DF32 and high speed paper tape recommended
 Other Programs Needed: "AF" version of Disk Monitor if Disk I/O is used
 Storage Requirement: [Ø-3777 1 field Ø (20₈ blocks on disk)
 Source Language: PAL-D

DECUS NO. 8-398

IMAGE

John Alderman, Applied Data Research, Atlanta, Georgia

IMAGE, a program to convert PS/8 'SAVE'd files to binary format, translates a SAVED file and produces a binary output file, which may then be reloaded using any of the binary loaders of the PDP-8 family. It is useful when the only copy of a working program is on a saved file, or for transmission via paper tape to other installations.

Minimum Hardware: PS/8 Configuration
 Other Programs Needed: PS/8 Operating System
 Storage Requirement: 2000-4400; 16600-17577; 2000-6003
 Source Language: PAL-8

DECUS NO. 8-399

8K FORTRAN Bit Manipulation Subroutines

Michael J. Allen, Lawrence Radiation Laboratory, Livermore, California

Two closed subroutines which may be used by the FORTRAN programmer for bit manipulations. One page of core and EAE are required by each subroutine.

LBYT function subroutine will load a byte of any size into the processor AC, right-adjusted.

SBYT subroutine will insert a byte of any size into a specified integer.

Minimum Hardware: 8K PDP-8, EAE
 Source Language: SABR

DECUS NO. 8-400

Execute Slow

Gary G. Barrett, General Motors Styling Staff, Warren, Michigan

Execute Slow will execute the user's program one instruction at a time. Before the instruction is executed the LINK, ACCUMULATOR, PROGRAM COUNTER and INSTRUCTION are printed on the ASR33. The program only occupies one page and differs from most trace programs in that user instructions are actually executed from the user's original location. Subroutine tracing can be turned off.

Minimum Hardware: 4K PDP-8, ASR33
 Storage Requirement: Locations 0001 and 0002 and 6600-6777 (1 page)
 Restrictions: User interrupts may not be used and the 6002 instruction not allowed
 Source Language: PAL III

DECUS NO. 8-401

Dice Game and TIC-TAC-TOE

Lyle Kline, Inglemoor High School, Bethell, Washington

Dice Game simulates a craps table and allows one player to make fictitious bets and roll the dice. Full playing instructions are given by the program when it is run on-line with the BASIC Compiler.

Tic-Tac-Toe is an excellent demonstration program. It is possible to beat the computer for once.

Other Programs Needed: BASIC Compiler
Source Language: BASIC

DECUS NO. 8-402

Resequenece

Howard Wolfington, Department of Defense Computer Institute, Washington Navy Yard, Washington, D. C.
Submitted by: W. Kieswetter, Digital Equipment Corporation, Washington, D. C.

This routine will resequence line numbers (and references) within a BASIC program on the TSS-8.

Minimum Hardware: TSS-8
Other Programs Needed: BASIC Compiler
Storage Requirement: 0-4K
Source Language: PAL-D

DECUS NO. 8-403

Stereo - A 2 Channel Music Program

Maurice Retter, University of Oxford, Oxford, England

A musical program, written for the PDP-8, which can control two loudspeakers independently. A frequency is produced by creating a square wave pulse train, where each pulse is generated by an IOT instruction, and the time delay between pulses is under program control. Two channels are made available, if required, by using two IOP pulses from one IOT instruction to activate independent loudspeakers. The program is divided into a coding section, and a decoding section and play routine.

Minimum Hardware: 4K PDP-8, two R302's, two amplifiers and speakers
Source Language: PAL III

DECUS NO. 8-404

Octal MEM Dump - Extended Memory

Andres T. Siy, Capitol Institute of Technology, Kensington, Maryland

This program's major objective is similar to Digital-8-6-U, to dump memory contents on the teletype. Included or revised are: 1) a CDF instruction; 2) heading routine; 3) ten spaces

tab routine and 4) each line begins with an absolute address followed by the first eight words. This process repeats until block is exhausted.

Minimum Hardware: 4K PDP-8, Extended Memory, ASR33
Source Language: PAL III

DECUS NO. 8-405

SOOT

S. de Vries and C. C. Westphal, Royal Dutch Blastfurnaces and Steelworks, Ymuiden, Holland

This program will execute PDP-8 programs under full operator control. SOOT is a debugger of the interpretive type. It can handle all instructions, including those for extended memory, with the exception of 2 word EAE instructions. It can also handle program interrupts.

Minimum Hardware: 4K PDP-8, ASR33
Storage Requirement: 4 pages
Source Language: PAL

DECUS NO. 8-406

STATPAC Revisions for PDP-8/I and TSS/8

Dartmouth College - Revisions by Berkshire Community College
Submitted by: Roger W. Strickland, Berkshire Community College, Pittsfield, Massachusetts

This package contains 11 programs from the original PDP-10 Dartmouth BASIC Statistical Package which have been revised for the PDP-8/I and TSS/8. The documentation consists of a description and listing of each of the programs. The DECtape which is available is a PDP-10 formatted symbolic tape.

Minimum Hardware: PDP-8/T
Other Programs Needed: BASIC
Restrictions: Array sizes very restricted for TSS/8 BASIC
Source Language: BASIC

DECUS NO. 8-407

Patch to Editor (DISK) DEC-D8-ESAD-PB

H. D. Schenk, Deutsche Forschungs-und Versuchsanstalt fur Luft und Raumfahrt, Flughafen, Germany

This patch corrects two errors found in EDIT-D Version ESAD. It allows the Editor to work with "Dn:name" as input or output device for the source file.

Minimum Hardware: 4K PDP-8, Disk or TC01
Other Programs Needed: EDIT-D DEC-D8-ESAD-PB
Source Language: PAL-D

DECUS NO. 8-408

Disk Utility Program

G. Galen Lenhart and Douglas Henry, Vanderbilt University, Nashville, Tennessee

Used for disk backups and file storage. All types of files (ASCII, USER, etc.) can be punched by entering the file name or disk block numbers. Files saved by name are restored to any free area on the disk. Program also lists the file directory and erases files. Checksums are provided. Program design and documentation should allow modification to use reader/punches and magnetic tape without great difficulty.

Minimum Hardware: 4K PDP-8, ASR33, one DF-32
Storage Requirement: Program: 0-2177; Working storage: 3000-7577
Restrictions: I/O Limited
Source Language: PAL-D

DECUS NO. 8-409

Card Loader

Peter Barnett, Dubner Computer Systems, New York, New York

With this package, programs may be loaded into the computer from punched cards rather than from paper tape. This is especially convenient for computers not having a high speed paper tape reader. Two programs are provided. The first is a loader using the CR8/I card reader. The second converts binary programs to the proper format for use with the above.

Minimum Hardware: PDP-8/I, CR8/I card reader
Storage Requirement: 80 core locations for loader, 4K for converter
Source Language: PAL

DECUS NO. 8-410

Pseudo-Random Number Generator, EAE Version

W. Madeline Webber
Submitted by: Mark F. Lewis, Federal Aviation Administration, Oklahoma City, Oklahoma

This random number subroutine generates numbers identical to those produced by DECUS programs Nos. 5-25 and L-64. Use of EAE greatly speeds execution time.

Minimum Hardware: PDP-8/12, LINC-8 with EAE
Miscellaneous: (Also L-114)
Source Language: PAL-D

DECUS NO. 8-411

Mongoose Display System

Dale Lewellyn, Digital Equipment Corporation, Ann Arbor, Michigan

Mongoose is a set of two programs: Mongoose Sort and

Mongoose Display. These programs are used in conjunction with the Lab-8 Advanced Averager and a grid of 16 analog inputs to produce an averaged, 3-D, topographical display surface corresponding to the voltages present at each of the inputs at a particular point in time. Such displays may be produced for each set of points in the signal epochs and are suitable for filming as frames in a motion picture showing the development of the averaged response present simultaneously over a wide area.

Minimum Hardware: LAB-8 with 16 channels A/D and storage scope
Other Programs Needed: Advanced Averager, Disk Monitor (optional)
Storage Requirement: SORT: 10-44 and 7200-7504; Display: 7-177 and 3000-7577
Source Language: Programs: PAL-D; Tables: MACRO-8

DECUS NO. 8-412

MRS X

F. C. Owen, General Railway Signal Company, Rochester, New York

MRS X is a debugging routine which will report on the teletype all program references to a given object address. A faulty program may be altering the content of a memory location when it is not desired. MRS X will find the instruction that is doing the altering. It is also useful to locate the users of constants, subroutines, etc.

Minimum Hardware: 4K PDP-8, ASR33
Storage Requirement: 6600-6766 Page relocatable
Source Language: PAL III

DECUS NO. 8-413

GROPE III/A and BINLOC

F. C. Owen, General Railway Signal Company, Rochester, New York

Octal machine language program editor and Binary Load-Compare. Combines the functions of several DEC utility routines plus some new features, such as sequential loading and block loading via keyboard and SEARCH. A special "HELP" Loader is furnished with the tapes.

Minimum Hardware: 4K PDP-8, ASR33
Storage Requirement: 7100-7777
Miscellaneous: When ordering tapes, please specify whether Loader is needed for HSR or LSR
Source Language: PAL III

DECUS NO. 8-414

LIST

F. S. Irani

Submitted by: Danny Harmon, Cognitronics Corporation,
Mt. Kisko, New York

Lists the program name and the block numbers it occupies on DECTape. Also lists the numbers of the free blocks.

Minimum Hardware: 4K PDP-8, TC01/TU55
Storage Requirement: 0000 → 3477 field Ø
Source Language: PAL

DECUS NO. 8-415

Multiple Unit DECTape Copier

Paul J. Bezeredi, Jr., Digital Equipment Corporation,
Maynard, Massachusetts

This program allows the user the advantage of copying more than one DECTape simultaneously while accessing the master DECTape only once, thus saving time when making multi-copies of a program DECTape.

Minimum Hardware: PDP-8, TCØ1 or TCØ8, 2 TU/55
transports or 1 TU 56 Dual transport
Storage Requirement: 0-777 Main Program; 1000-7100
Buffer Space
Restrictions: DECTape must be of standard format
Source Language: PAL

DECUS NO. 8-416a

Bibliographical Handling

J. F. Echallier, A. Laviron, F. Peronnet, P. Gerin,
I.N.S.E.R.M., Lyon-Bron, France

This program makes it possible to store and to correct bibliographical data, from ASR33 to DECTape. It allows printout of references when given required characteristics. The program should prove useful wherever a great deal of data is to be stored, updated, and easily picked up.

A new version, dated June 1972, allows building of the bibliographical tape under PS/8 system.

Minimum Hardware: 4K PDP-8, ASR33, 2 DECTapes
Other Programs Needed: Disk Monitor System (DEC-D8-SBAF)
Source Language: PAL

DECUS NO. 8-417

XCORE

James Crapuchettes, Stanford Electronics Labs., Stanford
University, Stanford, California

This program is used to help in the debugging and documentation of a program. It reads in absolute binary files and uses them to produce a memory allocation map which shows which locations were loaded (these are the locations which will be loaded by a binary loader when reading in these files). The

allocation map is output on the teletype with a label when specified by the user.

Minimum Hardware: PDP-8, TC01/TU55 DECTapes
Other Programs Needed: DECUS NO. 8-64a (XSYSTEM)
Storage Requirement: All of field Ø for program and
internal tables
Restrictions: Resides in field Ø, will map fields
Ø through 3
Source Language: PAL III with TEXT pseudo-op

DECUS NO. 8-418A & B

VEKSEL and PAPT

Ronald Zane, Institute for Astronomy, Honolulu, Hawaii

VEKSEL is a subroutine to convert ASCII code to PTTC-8 code commonly used in IBM equipment. PAPT is a program which uses VEKSEL to convert ASCII punched paper tape to PTTC-8 punched paper tape.

Minimum Hardware: 4K PDP-8, ASR33
Storage Requirement: VEKSEL 200-377; PAPT 400-451
Source Language: PAL III

DECUS NO. 8-419

Nmr - Pulse for the Lab-8/I

Dr. James W. Cooper, Digital Equipment Corporation,
Maynard, Massachusetts

Nmr-Pulse is designed for rapid data acquisition and Fourier transformation needed for pulsed nmr spectroscopy. It acquires 512 data points at rates from 34 µsec/point, and signal averages them. The Fourier transform is performed on command and a magnitude spectrum calculated.

Minimum Hardware: LAB-8/I or 8/L with 4K of core
Source Language: PAL IØ or MACRO-8

DECUS NO. 8-420

LOGSIM-8

Robert Stolarz, Princeton University, Princeton, New Jersey

LOGSIM-8 is an interactive digital logic simulation program for the simulation of combinational and sequential logic circuits at the gate level. The language is simple, and allows logical units such as flip-flops to be called as functions. The output consists of a table of the values of selected variables during each pass through the circuit description.

Minimum Hardware: 4K PDP-8, TTY

DECUS NO. 8-421

Chain Load

Claude J. Ortega, University of Chicago, Department of Medicine, Chicago, Illinois

This program supervises the loading from the systems device, of multiple field and/or multiple file system saved programs through the calling of a one page routine.

Minimum Hardware: 4K PDP-8, DECTape or disk, ASR33
Other Programs Needed: 4K Disk Monitor System, Version AF
Storage Requirement: 200-377 5600-5777
Source Language: PS/8 PAL8

DECUS NO. 8-422

Binary Punch - Extended Memory II

James Vrancik, NASA, Lewis Research Center, Cleveland, Ohio

This program is an extension of Digital 8-5-U Binary Punch and DECUS NO. 8-142. It accommodates extended memory, punches data in blocks and does not punch consecutive halts. The write-up includes a short program to load the core with halts. The produced tapes can be loaded by Digital 8-2-U Binary Loader.

Minimum Hardware: PDP-8, ASR33
Storage Requirement: 7600-7754
Source Language: PAL III

DECUS NO. 8-423

Disk Editor With View for LAB-8

K. W. Ranatunga, University of Bristol, The Medical School, Bristol, England

Disk Editor (DEC-D8-ESAB-PB, 1968) has been modified slightly so that a 'V' (view) command made via the teletype is recognized. This command is like a 'L' (list) command except that the requested line of the text buffer is displayed on a CRO screen along with the 17 succeeding lines. Further, the reference numbers of these lines as given by the Editor are also displayed.

Minimum Hardware: 4K PDP-8/1, AXØ8 with option XR, Disk File (DF32)
Other Programs Needed: Disk Editor (DEC-08-ESAB-PB)
Restrictions: For each view command the corresponding display is issued only once, and thus the display should be stored on a storage CRO screen
Source Language: PAL-D

DECUS NO. 8-424

Morse Code

C. Bumgardner and T. Bell
Submitted by: T. L. Drake, Clemson University, Clemson, South Carolina

This program accepts Morse code via a logic sense line in real-time and outputs the decoded message on the teleprinter. The pattern recognition algorithm in the program automatically adapts to the sending rate with the maximum reception rate of the computer being limited by the teleprinter to about 100 words per minute. The program classifies a key down condition as either a space in a character, a space between characters, or a space between words. These pattern classifications permit each character to be decoded via a table look up.

Minimum Hardware: 4K PDP-8, Real-time Clock, Logic Sense Line
Miscellaneous: Decoding algorithm does a better job when code is generated by an electronic keyer
Source Language: XPAL, PAL III

DECUS NO. 8-425

Block-Modify for PS/8

Rudi Stange, Digital Equipment GmbH, Munich, Germany

This program is similar to the BLOCK-MODIFY for the Disk Monitor System, but uses the PS/8 DECTape Handler. It also can be changed to use any other PS/8 handler. It allows typeout of contents of any block (DECTape or Disk) and permits changes to any location in the specified block.

Minimum Hardware: 8K PDP-8, TC01 or DF32 or other Disk
Other Programs Needed: PS/8 System
Storage Requirement: 4000-4577, page Ø as Buffer and LOC; 3000-3577 for PS/8 Handler storage
Source Language: PAL 8

DECUS NO. 8-426

Prime Number Generator

Anonymous

This is a short, simple program to output prime numbers. No write-up - tape only.

Source Language: BASIC

DECUS NO. 8-427b

MEMO III - A Text Formatting Program

Mark F. Lewis, Federal Aviation Administration, Oklahoma City, Oklahoma

MEMO III is a program written for the OS/8 system to produce paged text with margins from free form text. The intention is to permit the user to produce a readable and neatly formatted copy of text with minimal effort.

MEMO III is a descendant of Gregory Ruth's original program. This version permits output on any OS/8 compatible output device, rather than restricting output to the teletype. Files written for MEMO and MEMO II are compatible with MEMO III.

Minimum Hardware: PDP-8/12, ASR33 (or equivalent) and either DECTape or Disk
Other Programs Needed: OS/8 Programming System
Miscellaneous: Same program is available on LINCtape as DECUS NO. 12-100
Source Language: PAL-8

DECUS NO. 8-428A

EAE - Modification to DECUS NO. 8-143, FFTS-R

Urs P. Wild, Physical Chemistry Laboratory, Federal Institute of Technology, Zurich, Switzerland

This program allows the user to run the program, DECUS NO. 8-143 FFTS-R - A Fast Fourier Transform Subroutine for Real Valued Functions, on a PDP-8/I Computer which does not have the extended arithmetic element (EAE) option. All EAE instructions are replaced by equivalent JMS instructions.

Minimum Hardware: 4K PDP-8/I
Source Language: PAL III

DECUS NO. 8-428B

EAE - Modification to DECUS NO. 8-144, FFTS-C

Urs P. Wild, Physical Chemistry Laboratory, Federal Institute of Technology, Zurich, Switzerland

This program allows the user to run the program, DECUS NO. 8-144 FFTS-C - A Fast Fourier Transform Subroutine for Complex Data, on a PDP-8/I Computer which does not have the extended arithmetic element (EAE) option. All EAE instructions are replaced by equivalent JMS instructions.

Minimum Hardware: 4K PDP-8/I
Source Language: PAL III

DECUS NO. 8-429

Intercorrelation 37

Gernot D. Kleiter and Ludwig R. Krysl, Psychologisches Institut der Universitat Salzburg, Salzburg, Austria

This program computes up to 630 intercorrelations (36 variables).

Minimum hardware: PDP-8 with TTY, 4K CPU
Other Programs Needed: Floating Point Package #2 (Digital 8-5B-S)
Source Language: PAL III

DECUS NO. 8-430

DECK: A Random Deck of Cards

Alan Weiner, Needham High School, Needham, Massachusetts

DECK is a routine for getting an entire 52 card deck on a computer. As it is currently written it merely prints the deck out on the teletype. The algorithm used is simple; most of the program is used for typing the deck out in words.

Minimum Hardware: TSS/8, TTY
Source Language: BASIC8

DECUS NO. 8-431

8/I LAB Data System

Dr. D. J. Fader, Research Engineer, University of Western Ontario, London, Ontario, Canada

A system of programs for data acquisition and processing is described. A PDP-8 with special A/D and D/A hardware is used to produce mean, rms, histograms, covariances, correlations and other properties of analog input signals. Routines are available for processing results using FOCAL and a Compu-corder tape cassette unit, and using a PDP-10 with a digital plotter.

Due to the sheer size of the documentation for this program we have broken it into two parts. The first, a "teaser" is supplied under the same circumstances as in normal documentation. The second, a set of five thick manuals, is subject to an extra charge. Contact the DECUS office for more information.

Minimum Hardware: 8K PDP-8, TTY, PDP-10 plus other devices noted in manuals
Storage Requirement: 8K PDP-8, 20K PDP-10
Restrictions: Use of all features requires special hardware
Source Language: PAL III, FORTRAN, FOCAL

DECUS NO. 8-432

Triple Precision Integer Package

M. T. Franklin, The Plessey Company, Limited, Fareham, Hampshire, England

This is a collection of useful subroutines for handling triple precision binary integers which are assumed to be positive numbers. They were developed for data processing type work and accounting where it was not desirable to use the floating point system.

Minimum Hardware: PDP-8, HSR/P, TTY

DECUS NO. 8-433

Extensions to "LIBRA-FOCAL"

B. Taylor, R. Helwig, A. Coston, L. L. Thurstone Psychometric Laboratory, University of North Carolina, Chapel Hill, North Carolina

Certain changes have been made to the LIBRA 7-user FOCAL system (DEC-08-AJ5E) and also to FOCAL 1969 (DEC-08-AJAE). They include: FOCAL - Random number generator, power routine, symbol table checkpoint; LIBRA - Disk Data files, file protection, expanded FCOM function, correct user number on called programs; LIBRA - (optionally) - 680 teletype support, EAE support, DECTape save-restore (Reference Disk utility program).

Minimum Hardware: 8K PDP-8, optionally DF32 or RF08 Disk, EAE, DECTape, PT08 Teletypes or 680 Teletypes
Other Programs Needed: FOCAL 1969, LIBRA.DF32 or LIBRA.RF08
Storage Requirement: All of fields 0 and 1
Source Language: PAL-8 with conditional assemblies

DECUS NO. 8-434.1 through 8-434.7

Data System for Magnetic Scanning Mass Spectrometers

James Plattner, University of Colorado Medical Center, Denver, Colorado

There are seven programs included in this system. The programs and their functions are:

- 8-434.1 SCAN - Acquires data from mass spectrometer and stores it on disk in Disk Monitor System format.
- 8-434.2 STD - Automatically identifies and converts times of peak emergence to masses for a scan of perfluoroalkane that has been acquired with the SCAN program. These results are stored on the disk for future use.
- 8-434.3 CONV - Effects a time to mass conversion by interpolation of a file of unknown compound spectra acquired with the SCAN program vs. a file of perfluoroalkane that has been acquired by the SCAN program and identified with the STD program.
- 8-434.4 TIC - Plots total ion current for a series of scans acquired by SCAN and time to mass converted by CONV.
- 8-434.5 TAB - Prints listings of spectra that have been converted to mass intensity files by the CONV program.
- 8-434.6 HIST - Plots spectra that have been acquired by SCAN and time to mass converted by CONV.
- 8-434.7 TUNE - Allows mass spectrometer interface to be optimized. Accumulator displays bias, oscilloscope displays timing pulses (sample rate).

Some of these programs can be implemented to work with other systems and therefore the tapes for each program may be ordered separately.

Minimum Hardware: 4K PDP-8, DF32 disk, ASR33, ADC1 A/D Converter, ms Computer interface
Other Programs Needed: Disk Monitor System
Miscellaneous: Incremental Plotter Optional
Source Language: PAL-D

DECUS NO. 8-435

RECOVER

Kenneth H. Kolley
Submitted by: Michael Schatzberg, Singer-Kearfott Division, Fairfield, New Jersey

This is a program to read or write 32K words between disk and DECTape. This utility provides for saving a disk image on DECTape, restoring the disk from an image on tape and verifying a disk image against a DECTape. It is a disk to-and-from DECTape program.

Minimum Hardware: 8K PDP-8/I, DF32 disk, 1 DECTape
Storage Requirement: 0-1577 field \emptyset
Source Language: MACRO-8, PAL-8

DECUS NO. 8-436

EAE - Simulator

Tuan VoDinh and Urs P. Wild, Physical Chemistry Laboratory, Federal Institute of Technology, Zurich, Switzerland

This software simulates all the Extended Arithmetic Element (EAE) hardware instructions and allows the user to run any program which was originally written for a PDP-8/I having the EAE option on a PDP-8/I without it. All EAE instructions have to be replaced by corresponding JMS instructions.

Minimum Hardware: PDP-8/I
Storage Requirement: 20₈ locations on page \emptyset plus 2 pages
Source Language: PAL III

DECUS NO. 8-437

Computer Dating Game

Miller S. Lessell, William Diamond Junior High School, Lexington, Massachusetts

The purpose of this program is to measure the compatibility of two people by the similarity of their answers to questions on a broad variety of subjects.

Minimum Hardware: 4K PDP-8, ASR33, TTY
Source Language: BASIC

DECUS NO. 8-438

DF-32/Sykes Swap

R. Dell and D. Branda, University of Illinois at Chicago
Circle, Chicago, Illinois

This pair of programs transfers the entire contents of the DF-32 disk to or from a Sykes Compu-Corder model 1000 Tape Unit. It is useful for saving additional or special versions of the Disk Monitor System.

Minimum Hardware: PDP-8/1, DF-32, EAE, Sykes Compu-Corder Cassette
Other Programs Needed: "BASIC" routine supplied by Sykes
Storage Requirement: Buffer: 0-6001; Coding: 6002-6777
Source Language: PAL-D

DECUS NO. 8-439

MOVE

John Alderman, Applied Data Research, Atlanta, Georgia

This is a program to copy images of directory devices, including the system portion of SYS:.

The program will be obsoleted by DEC supplied version of PIP eventually.

Minimum Hardware: PS/8 Configuration
Other Programs Needed: PS/8 System
Storage Requirement: 2000-5000
Source Language: PAL-8

DECUS NO. 8-440

PIPL

John Alderman, Applied Data Research, Atlanta, Georgia

This is a version of PS/8 PIP, modified to add two options, in order to be able to label paper tapes with legible symbols punched into the tapes.

These new options are /M (mark) and /W (write). They are used with either ASCII or Binary mode file transfers under PS/8, and usually are intended for direct output onto a paper tape punch, although any output device is legal.

Minimum Hardware: PS/8 Configuration
Other Programs Needed: PS/8
Source Language: PAL-8

DECUS NO. 8-441

DELETE

David M. Kristol, 2401 Pennsylvania Avenue, Wilmington, Delaware

DELETE is a small PS/8 utility program which will delete up to nine files specified in a Command Decoder input string. If the terminating character is ALT MODE, DELETE will re-

turn to the monitor when deletion is complete. Otherwise it will request another input string.

Minimum Hardware: 8K PDP-8 with a mass storage device
Other Programs Needed: PS/8 Operating System
Storage Requirement: 12000-12577; 12600-13177 (buffer); 03200-03377 (I/O handler)
Source Language: PAL-8

DECUS NO. 8-442

"The BYU Boob Tube"

Associated Computer and Electronic Technologists
Submitted by: James A. Williams, Brigham Young University, Provo, Utah

When loaded and run under COLPAC 1970 (DECUS NO. 8-335) this program will, by presentation on a CRT, show the capabilities of a PDP-8 to make movies. It is a short cartoon demonstration program which uses most locations in a typical 8K PDP-8 (field 0 & 1). The program was written by students in the Electronics Technology department at BYU; comments may be directed to James A. Williams.

Minimum Hardware: 8K PDP-8, HSR, ASR33/35, KV-8 CRT or equivalent
Other Programs Needed: COLPAC, 1970 (DECUS NO. 8-335)
Source Language: COLPAC 1970

DECUS NO. 8-443

Keyboard Test Tape for Hot Metal Linecasters with TTS

Lance O. McCartney, Ambassador College Press, Pasadena, California

The purpose of this program is to test linecaster TTS units with tape to operate in keyboard order with slight pause between characters. Quad center cade is not included but could easily be added.

Minimum Hardware: 4K PDP-8/1, High-speed 6 level paper tape punch
Storage Requirement: 0-500
Source Language: PAL III

DECUS NO. 8-444

COREMAP

Joel Troster, Institute of Bio-Medical Electronics and Engineering, University of Toronto, Toronto, Ontario, Canada

This is a one page relocatable program to type a map of any field of core by searching for a number set in the S.R. (e.g. HLT or Zero).

Minimum Hardware: PDP-8, ASR
Storage Requirement: 7600-7611, 7617-7623 plus 1 page anywhere
Source Language: PAL III

DECUS NO. 8-445

FYLHLP - PS/8 File Utility Program

David M. Kristol, 2401 Pennsylvania Avenue, Wilmington, Delaware

FYLHLP is a utility program designed to help the PS/8 systems programmer maintain the file system and debug file handling programs. It allows the user to list specific directory entries plus all "empty" entries on a file-structured device and to examine, modify and search blocks on the same device.

Minimum Hardware: 8K PDP-8; a mass storage device
Other Programs Needed: PS/8 Operating System
Storage Requirement: 12000-12577; 12600-13177 (buffer);
03200-03377 (I/O Handler)
Source Language: PAL-8

DECUS NO. 8-446

A Patch to FFTS-R for Use Without the EAE

Gregory R. Ruth, MIT Charles Stark Draper Laboratory, Cambridge, Massachusetts

This patch permits the use of the Fast Fourier Transform sub-routine for real valued functions (DECUS NO. 8-143) on machines without an EAE. Except for the speed of execution, the subroutine is in no way affected. Execution times for the subroutine with the patch are about three times longer.

Minimum Hardware: 4K PDP-8
Other Programs Needed: FFTS-R (DECUS NO. 8-143)
Storage Requirement: 136₈ locations
Source Language: PAL-8

DECUS NO. 8-447

Roots of a Polynomial by Muller's Method

Arthur L. Pike, Tufts University, Medford, Massachusetts

This program implements Muller's root-finding method for users of BASIC. The program guides the user through entering the necessary data. Then the data are echoed in easily-readable format. After a delay until all roots are evaluated, the program types out the roots in tabular form.

Minimum Hardware: 8K PDP-8/1, ASR33
Other Programs Needed: Edusystem 20 BASIC
Restrictions: Execution time may be long
Source Language: BASIC (Edusystem 20 implementation)

DECUS NO. 8-448

CORDMP - Formatted Octal Dump

Arthur L. Pike, Tufts University, Medford, Massachusetts

This program punches an octal core dump into tape for off-line listing. The dump arranges the contents of 8 core locations on a line, with the starting address at the left, and with column headers for easy reading. Markers are provided for

cutting the listings into 11-inch lengths. The accumulator lights display each address being punched.

Minimum Hardware: 4K PDP-8/1, ASR33, HSP
Storage Requirement: One page page-relocatable in any field
Restrictions: Dumps only one field or portion at a time
Source Language: PAL-8/PAL III

DECUS NO. 8-449A

A Magtape Handler for the PDP-8/TU20

Howard Shapiro and Peter Lemkin, National Institutes of Health, Bethesda, Maryland

An I/O device handler is given for the TU20/TC58 Magtape. It enables reading, writing, read compare, advance and backspace records and writing end of files. It can also sense the tape's condition.

Minimum Hardware: 4K PDP-8, TU20/TC58 Magtape
Other Programs Needed: Interrupt handler to dispatch to the magtape interrupt service routine
Storage Requirement: Magtape is 1 page, buffer may be up to 4K in any field
Restrictions: Set up for running on interrupt
Source Language: PAL-10, PAL-D

DECUS NO. 8-449B

LPTQUE - A PT08 to A. B. Dick Line Printer Utility Program

Peter Lemkin, National Institutes of Health, Bethesda, Maryland

LPTQUE is a PDP-8 utility program which is used to buffer ASCII characters input from a PT08 to an A. B. Dick 940 Line Printer using the Eclectic Computer Company interface. The PDP-8 teletype may be used to send data out of the PT08.

Minimum Hardware: 4K PDP-8, A. B. Dick 940 Line Printer with Eclectic Computer Company Interface, PT08
Storage Requirement: <200,577>, <600,4577>
Restrictions: Form feeds and tabs not implemented
Source Language: PAL-10, PAL-D

DECUS NO. 8-449C

TALK10 - A PDP-8/PDP-10 Utility-Loader

Peter Lemkin, National Institutes of Health, Bethesda, Maryland

The assembly of large programs for small machines such as a PDP-8 is apt to be laborious, time consuming and almost impossible if done on the small machine itself. In addition, the ability for many users to assemble PDP-8 programs on a PDP-10 computer using PAL-10 or PAL-12 lightens the load of software development on the smaller machine. TALK10 is

DECUS NO. 8-449C (Continued)

a PDP-8 utility/loader program. It decodes and loads ASCII coded binary files (encoded by TALK8F, DECUS NO. 10-139) sent from the PDP-10. It can transmit information to or from the PDP-10, appearing to it as a regular teletype.

Minimum Hardware: 4K or more PDP-8 with PT08 Interface to Dataphone or directly to PDP-10
Other Programs Needed: TALK8F (DECUS NO. 10-139), PAL10 or PAL 12, all on PDP-10
Storage Requirement: Currently <7000-7577> for program, <3200-6777> for the buffer
Restrictions: If the PT08 data rate is 10 char/sec, large TTY buffers will overflow
Source Language: PAL-10

DECUS NO. 8-449D

Buffered I/O Subroutines for the PDP-8

Peter Lemkin, National Institutes of Health, Bethesda, Maryland

BUF10 is a collection of three PDP-8 PAL subroutines which can be used for doing asynchronous character input/output. They are also useful for doing any word asynchronous queuing in other types of programs.

Minimum Hardware: 4K PDP-8
Storage Requirement: 1 page for the program and QUEUE size
Restrictions: QUEUE size must be <4000> locations
Source Language: PAL

EDITOR'S NOTE: The above 4 programs (8-449A, B, C, D) are available on one PDP-10 formatted DECTape together with DECUS NO. 10-139.

DECUS NO. 8-450

PS/8 Editor With Display for KV8/1 (Overlay)

Floor Anthoni, Biomedical Lab. TNO, Rijswijk, The Netherlands

This overlay provides the user with a welcome expansion of the PS/8 EDITOR. It provides: 1) Variable-size character generator, 2) Display of line numbers in scope-mode, 3) Too long lines cause automatic CRLF, 4) Permanent incorporation of HSR for "APPEND," "INSERT" from high speed reader.

Minimum Hardware: PDP-8 with KV/8 Display and/or HSR
Other Programs Needed: PS/8 Monitor System, PS/8 Editor
Storage Requirement: 15600-16577
Source Language: PAL III, PAL-8

DECUS NO. 8-451

PS/8 Handler for KV/8 Vector Display

Floor Anthoni, Biomedical Lab. TNO, Rijswijk, The Netherlands

This character generator is primarily intended to be incorporated as a device-handler in a PS/8 oriented system. It was especially designed to fit in a very small space (2-page handler). Upon entry it computes cross-page references and indirect pointers from a JMS. instruction, and is therefore completely page-relocatable. It detects CTRL/FORMs and full picture condition and then waits for the ERASE-button to be pushed.

Minimum Hardware: PDP-8 with KV/8 Display System
Other Programs Needed: PS/8 Programming System
Storage Requirement: 2 pages, Run-time Relocatable
Restrictions: No tabulation incorporated
Source Language: PAL III, PAL-8

DECUS NO. 8-452

ANSAM (Analog Sampling)

Edward Longhi, VEECO Instruments, Inc., Plainview, Long Island, New York

It is often desirable to set the level of an external device connected to the AX08. This program allows the user to have typed out the voltage level appearing at analog channel 0, 1, 2 or 3 of the AX08. The channel to be sampled is entered via the TTY and continuous sampling ensues until halted by striking a random key. A new channel may then be selected. Typeout is directly in millivolts, including sign.

Minimum Hardware: PDP-8, AX08, ASR33
Storage Requirement: 1 page
Source Language: PAL III

DECUS NO. 8-453

Rapid Alert Program (RAP)

Richard Bachman, U. S. Naval Undersea Research and Development Center, San Diego, California

RAP, used to predict Naval Navigation Satellite rise times, is approximately 100 times faster than previous alert programs. Degradation of alert accuracy is insignificant.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: FORTRAN Compiler and Operating System (DEC-08-AFC1-PB and DEC-08-AFC3-PB)
Storage Requirement: 0-6066, 7267-7777
Source Language: FORTRAN

DECUS NO. 8-454

Radio Teletype to ASCII

Carl Kishline, University of Wisconsin, Parkside Instructional Computing Center, Kenosha, Wisconsin

This program reads 5-channel tape as generated by a model 15 or 19 teletype and prints (and optionally punches) the corresponding characters in ASCII code. It thus allows computer operators to enjoy the beautiful art work which amateur radio operators produce.

Minimum Hardware: 4K PDP-8, ASR33
Storage Requirement: 2 pages
Source Language: PAL-D

DECUS NO. 8-455

CRTPAC

B. K. Moritz and M. E. VanHoosier, Naval Research Laboratory, Washington, D. C.

CRTPAC is a flexible high speed character generator and display package. It features a full ASCII character set, sub and superscripting and variable character size under program control. It makes use of a column representation algorithm resulting in average character display time well under 600µs.

Minimum Hardware: 4K PDP-8/1, VC81 or equivalent, EAE recommended
Miscellaneous: Tapes available require EAE
Source Language: PAL-8

DECUS NO. 8-456A

PIP "AH"

L. H. Nichols, III and K. M. Bowyer, E. I. DuPont de Nemours and Company, Wilmington, Delaware

PIP "AH" is a modification of PIP "AF" (DEC-D8-PDAD) for use with the RK08 cartridge disk file and BUILD "AH" (DECUS NO. 8-456B). The LP08 line printer has been implemented to list ASCII files and device directories. Other changes to PIP have corrected tab control for ASCII files, provided paging for the ASR33 teletype, eliminated problems in combining ASCII files, and removed the S: , SØ: restriction for the RF08 and DECTape. Versions of PIP "AH" are also available for DF32, RF08 and DECTape systems.

Minimum Hardware: Disk Monitor Environment
Other Programs Needed: BUILD "AH" (DECUS NO. 8-456B)
Storage Requirement: 25 octal blocks
Source Language: PAL

DECUS NO. 8-456B

BUILD "AH"

L. H. Nichols, III and K. M. Bowyer, E. I. DuPont de Nemours and Company, Wilmington, Delaware

BUILD "AH" is an extension of the "AF" Disk System Builder (DEC-D8-SBAF) and will build the Disk/DECTape Monitor System on the RK08 cartridge disk file. The RK08 system structure is similar to the RF08, with each cartridge containing two pseudo devices. Each pseudo device has a storage capacity of 3,000 octal blocks and its own directory. BUILD "AH" also permits the LP08 line printer to be defined as a system output device recognized by the command decoder. All functions of the "AF" builder are retained. BUILD "AH" eliminates required conversion of programs currently operating under the Disk Monitor System when the RK08 is obtained for use with PS/8.

Minimum Hardware: Disk Monitor Environment
Other Programs Needed: PIP "AH" (DECUS NO. 8-456A)
Source Language: PAL

DECUS NO. 8-457

DTFIX

P. T. Hodgin, Jr., Research Computation Center, Indianapolis, Indiana

This is a TSS/8 program to handle DECTapes, including ZEROing, COPYing, LISTing and DEPOSITing. A method is available to return to "OPTION?" at any time during the running of the program.

Minimum Hardware: PDP-8/1 with TS/8 Monitor (or equivalent), DECTapes
Other Programs Needed: TS/8 Monitor
Storage Requirement: 6 Disk Segments (12 DECTape segments)
Source Language: PAL-D

DECUS NO 8-458

VW - Field Independent I/O Handler for Disk and TTY

R. A. Seeman, The Boeing Company, Renton, Washington

This program provides field independent disk transfers and TTY message typeout. It can reside in any core field and can be called from core field without restriction, except that the program cannot reside in Page 0. It is a user called subroutine and requires no program other than the user program.

Minimum Hardware: 4K PDP-8, ASR33 or 35, DF32
Storage Requirement: 200₈ (one page)
Source Language: PAL-D

DECUS NO. 8-459

TAYEX - Taylor Expansion Equation Solver

David G. Pitts and James Westgard, Indiana State University, Terre Haute, Indiana

TAYEX is a program to solve differential equations by use of the Taylor series and an iteration procedure for the coefficients. It can solve any number of simultaneous nonlinear differential equations. One pass of the program is needed to type a table of values for each variable.

Minimum Hardware: PDP-8, ASR33
Other Programs Needed: Basic Floating Point Package (DEC-08-YQ1A-PB) or 4 word Floating Point Package (DEC-08-FMHA-PB)
Storage Requirement: 0-577, 5600-7577
Source Language: PAL III

DECUS NO. 8-460

TT89 - Tape Transfer PDP-8 to PDP-9

Frank J. Nagy, Carnegie Mellon University, Pittsburgh, Pennsylvania

This program writes ASCII files from PDP-8 devices onto a PDP-9 DECTape. The PDP-9 DECTape directory can also be listed or zeroed, and files can be deleted.

Minimum Hardware: 8K PDP-8, TC01 DECTape control with 2 DECTape drives
Other Programs Needed: Disk/DECTape Monitor System
Source Language: PAL-D

DECUS NO. 8-461

COPY10 - PDP-10 DECTape Program for the PDP-8

Frank J. Nagy, Carnegie Mellon University, Pittsburgh, Pennsylvania

COPY10 reads and writes files between PDP-8 devices (disk, DECTape, paper tape) and a PDP-10 DECTape. ASCII files can be read from or written to the PDP-10 DECTape. BIN files (generated by PAL-10) can also be read. Program also reads PDP-10 ASCII paper tapes.

Minimum Hardware: 8K PDP-8, TC01 DECTape Control with 2 DECTape drives
Other Programs Needed: Disk/DECTape Monitor System
Source Language: PAL-10

DECUS NO. 8-462

INSTIN

Paul Kinzelman, Carnegie Mellon University, Pittsburgh, Pennsylvania

INSTIN is a program which will solve instant insanity. The puzzle consists of four cubes, each side of which is colored

white, red, green or blue. To solve the puzzle, one must stack the cubes in a line so that each color appears only once along a side which is four cubes long. The program will find and print out all the basic solutions. The program allows the user to change the puzzle by switching colored sides or by changing the color of sides. The user may inhibit the printing of the solutions to determine the number of basic solutions quickly.

Minimum Hardware: Any configuration which will run BASIC
Miscellaneous: Owing the puzzle "Instant Insanity" seems to be a prerequisite
Source Language: BASIC

DECUS NO. 8-463

Perpetual Calendar (BASIC Version)

Daniel Gutierrez, Granada Hills High School, Granada Hills, California

This program is similar to DECUS NO. 8-71 but is written in BASIC. It will provide the day of the week for any date entered. It is particularly useful for demonstrating the computer's ability to perform simple problems as well as more complex ones.

Minimum Hardware: 4K PDP-8 with Teletype
Source Language: BASIC

DECUS NO. 8-464

TR02 Magnetic Tape Device Handler for PS/8

Lawrence E. Holboke, Environmental Protection Agency, Cincinnati, Ohio

This is a two page TR02 magnetic tape handler operating in a manner similar to DECTape. Some PS/8 functions (GET, SAVE, RUN, etc.) will not work in the present version. Each block of data (2 pages) is contained within one tape block along with parity and block number identification.

Minimum Hardware: PS/8 Operating System, 7 track TR02 tape unit
Other Programs Needed: MTAMRK and INIT (Included)
Storage Requirement: 2 pages (256 words)
Source Language: PAL

DECUS NO. 8-465

The SKED Software System

Dr. A. G. Snapper, Psychology Research Lab., Franklin D. Roosevelt V. A. Hospital, Montrose, New York

Contribution and submittal by: Andrew Walker, Digital Equipment Corporation, Maynard, Massachusetts

SKED is a process control software system that has been developed for use in the behavioral research laboratory. The software system consists of:

DECUS NO. 8-465 (Continued)

A. The Two-Pass SKED Compiler, B. The Run Time System (R.T.S.), C. The Debug System, D. The System Builder.

Minimum Hardware: 4K PDP-8, ASR33, real-time 100 cycle clock, hardware interface between processor and the experimental stations. High speed reader and punch and extra 4K useful and desirable

Note: Because of the excessive size of the listing and ASCII tapes the service charges will be \$10.00 for each.

DECUS NO. 8-466A

RL Monitor System (WCFMPG Version)
P?S-08-1.1A

Richard Lary, et al
Submitted by: Stanley Rabinowitz, Polytechnic Question Society, Brooklyn, New York

This system is a general purpose monitor, editor, file handler, etc. It is specifically designed to run on a near minimal configuration (4K and one DECTape drive). It allows the user to save both source and binary files on the DECTape. The line number editor permits resequencing, editing, deleting lines, auto-sequence mode.

Minimum Hardware: 4K PDP-8, ASR33, TU55 DECTape drive, TC01 controller
Storage Requirement: 0-7777
Source Language: PAL III

DECUS NO. 8-466B

RL Monitor Subsystems
P?S-08-1.1B

Richard Lary
Submitted by: Stanley Rabinowitz, Polytechnic Question Society, Brooklyn, New York

Two subsystems are given: BIN - A Binary Loader- Allows loading from binary DECTape files. EDIT - A Batch Facility - Allows executing monitor commands from DECTape source files.

Minimum Hardware: 4K PDP-8, ASR33, TU55 DECTape drive, TC01 controller
Other Programs Needed: RL Monitor System
Source Language: PAL III

DECUS NO. 8-466C

Listing Utility Programs
P?S-08-1.1C

Mario DeNobili
Submitted by: Stanley Rabinowitz, Polytechnic Question Society, Brooklyn, New York

There are three listing routines described in this package:
TIDY - Makes neat listings of PAL III source programs.
LISTER - A SNOBOL program which is slower than TIDY

but gives page numbering, headings and storage locations.
SNOLST - A SNOBOL program similar to LISTER, which makes neat listings of POLY SNOBOL source programs.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: SNOLST and LISTER require POLY SNOBOL, TIDY requires PAL III, RL Monitor
Source Language: POLY SNOBOL and PAL III

DECUS NO. 8-466D

RL Monitor System Utilities
P?S-08-1.1D

Mario DeNobili, et al
Submitted by: Stanley Rabinowitz, Polytechnic Question Society, Brooklyn, New York

PACK, UNPACK - allows reshuffling of RL Monitor source files. SYLIST, UPDATE - allows dumping and creating sub-systems. *BPTTMT - allows conversion of DEC binary paper tapes to RL DECTape format. *PUNTAP, PUNSYS RLOADR - allows quick conversion between paper tape and DECTape information.

*NOTE - Although these routines are listed here and are on the RL Monitor System DECTape there are no write-ups currently available for them.

Minimum Hardware: 4K PDP-8, ASR33, TU55, TC01
Other Programs Needed: RL Monitor System
Source Language: PAL III

DECUS NO. 8-466E

DECTape Utility Programs
P?S-08-1.1E

Mario DeNobili
Submitted by: Stanley Rabinowitz, Polytechnic Question Society, Brooklyn, New York

DUMP: General purpose system to dump blocks from DECTape in both octal and packed ASCII, to transfer blocks from one tape to another, and to change specific words in a given block.
DECTAP (and FASTAP): One-page subroutines which allow you to easily read and write blocks of information on DECTapes.
4MAT: This routine is used to format new DECTapes. It is contained on the RL Monitor System DECTape (DECUS NO. 8-466U0) but not on the paper tape offered for this program.

Minimum Hardware: 4K PDP-8, ASR33, TC01, TU55
Storage Requirement: DUMP: 4 pages; DECTAP: 1 page
Source Language: PAL III

DECUS NO. 8-466F

PAL III Modified for RL Monitor

Mario DeNobili

Submitted by: Stanley Rabinowitz, Polytechnic Question Society, Brooklyn, New York

This is a modified version of DEC's PAL III assembler which takes source from TTY or DECTape files and produces binary on TTY or DECTape files.

Minimum Hardware: 4K PDP-8, ASR33, TCØ1, TU55
Other Programs Needed: RL Monitor System
Restrictions: Only assembles 4K programs, cannot use high speed punch
Source Language: PAL III

DECUS NO. 8-466G

POLY SNOBOL
P?S-08-1.1G

Hank Maurer

Submitted by: Stanley Rabinowitz, Polytechnic Question Society, Brooklyn, New York

This is a string manipulation language which is a weak form of SNOBOL I, originally developed by Griswold, Farber and Polonsky of Bell Telephone Laboratories. It bears only faint resemblance to SNOBOL IV.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: Runs stand alone or under RL Monitor (requires EAE in latter case)
Source Language: PAL III

DECUS NO. 8-466H

POLY LISP
P?S-08-1.1H

Submitted by: Stanley Rabinowitz, Polytechnic Question Society, Brooklyn, New York

This is a weak, but useful, LISP interpreter. Source files can come from DECTape.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: Runs stand alone or under RL Monitor System
Source Language: PAL III

DECUS NO. 8-466I

FOCAL Modified for RL Monitor

Mario DeNobili

Submitted by: Stanley Rabinowitz, Polytechnic Question Society, Brooklyn, New York

This is a modified version of DEC's FOCAL compiler. Source can come from DECTape files.

Minimum Hardware: 4K PDP-8, ASR33, TU55, TCØ1
Other Programs Needed: RL Monitor System
Source Language: PAL III

DECUS NO. 8-466UØ

The sources and systems for all the above programs, on an RL Monitor System DECTape, may be ordered under this number.

DECUS NO. 8-467a

BINREAD (Revised Version)

Geoffrey Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

Disassembles binary object tapes, giving an octal listing of all field and address codes, and of the data/instructions which follow them. Data are arranged in 8-line paragraphs, facilitating address counting. The format is familiar and legible; the execution is rapid. In addition, certain errors are checked for; if found, the computer halts after typing ?. The tape checksum is read and printed out; it is followed by a computed checksum which should agree with it.

Minimum Hardware: 4K PDP-8, ASR33
Storage Requirement: 8/E: 4000-4310; 8/I etc: 4000-4321
Source Language: PAL III

DECUS NO. 8-468

DIPDUB, A Dual-Independent Parameter, Double-Precision Pulse-Height Analysis Code

W. H. Wilkie, Ph.D., University of Pittsburgh, Pittsburgh, Pennsylvania

DIPDUB is a powerful, general-purpose, pulse-height analysis code designed for radiation physics applications where 255-channel energy resolution is adequate. Some features are: independent operation of 2 ADC's; 7 data regions in core; 369 DECTape storage blocks; spectrum stripping; very flexible display capability.

Minimum Hardware: PDP-8 series with 8K core and EAE; Fast Paper Tape Unit; DECTape, PHA interface NKO4-A; 2 Nuclear ADC's; Oscilloscope
Source Language: PAL-10

DECUS NO. 8-469

Top Secret

Geoffrey Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

This routine accepts characters from the keyboard of an ASR33 and responds by typing a ciphered version of the input text. It has three uses: (a) pure amusement, (b) as a demonstration of the fact that an on-line teletype is not a typewriter; it will

DECUS NO. 8-469 (Continued)

print what the computer tells it to print, which may or may not be what the user types. (c) as a simple example of input-output programming and of program branching, for students of machine language.

Minimum Hardware: 4K PDP-8, ASR33
Source Language: PAL III

DECUS NO. 8-470

ODT-11 (High) Modified

J. Shanahan
Submitted by: J. H. McClure, E. I. duPont de Nemours and Co., Wilmington, Delaware

Since it is sometimes necessary to work on programs longer than can be accommodated by ODT-11 (e.g. program occupying locations 0-7576₈), the ODT-11 program was modified to enable transfer to another bank of core memory. ODT-11, modified, resides in data field 0, program being debugged resides in data field 1. All the operations and instructions given in Manual Digital 8-12-5, ODT-11, August 26, 1965, apply and are used as indicated.

Since there is a slight variation when using a KSR35, please specify when ordering tape whether for ASR33 (Tape A) of KSR35 (Tape B).

Minimum Hardware: 8K PDP-8
Storage Requirement: 745 (octal) locations, resides between 6632 and 7577, also uses loc 0005
Restrictions: Differs from ODT-11 in that it operates outside the core memory module in which it resides

DECUS NO. 8-471

Verify Paper Tape (12K)

J. Shanahan
Submitted by: J. H. McClure, E. I. duPont de Nemours and Co., Wilmington, Delaware

This is a program to verify that a tape is the same as the one from which it was copied, or that two copies of a tape are the same. It is applicable to a PDP-8 system having at least 12K core.

Minimum Hardware: 12K PDP-8 with EAE

DECUS NO. 8-472

PS8IN, PS8OUT

Hans Mees and Floor Anthoni, Medical Biological Laboratory, T.N.O., Rijswijk, The Netherlands

Designed to make PS/8 input-output programming much easier, the two modules perform automatic actions like calling the COMMAND DECODER, opening and closing files, etc. A JMS to PS8IN simply returns the next character, a JMS to

PS8OUT writes it away. The routines relieve the programmer from the cumbersome PS/8 I/O programming, and they can be used separately. (These two modules make PS/8 input-output programming as easy as teletype input-output.

Minimum Hardware: PS/8 configuration
Other Programs Needed: PS/8 software
Restrictions: Designed for 8 bit ASCII on Binary, resides in Field 1 only, not restartable
Source Language: PAL-8

DECUS NO. 8-473

Three Utility Routines for PS/8

1. DTA and DECLAB
2. CHANGE and REMOVE
3. LIST

John R. Covert, Georgia Institute of Technology, Atlanta, Georgia

1. DTA and DECLAB provide an automatic assignment of user device names to DECTapes from an internally recorded label. It reduces errors from specifying the wrong DECTape on multi-drive systems.

2. CHANGE and REMOVE pseudo-commands provide the ability to change names in the directory of a PS/8 device with a simple "command," and the ability to remove up to 32 files with one command. It provides more comprehensive error messages than PIP.

3. LIST is a program to list PS/8 directions on KV8/I scope.

Minimum Hardware: PDP-8 with DECTape
Other Programs Needed: PS/8 software
Source Language: PAL-8

DECUS NO. 8-474

EXIT PS/8

Edward Steinfeld
Submitted by: Karen Seefeldt, Digital Equipment Corporation, Pittsburgh, Pennsylvania

The EXIT program is used to exit from the PS/8 programming system. EXIT will determine what the system device is and load in the proper bootstrap. The program will also load a binary loader into Field 1 and rewind all DECTapes.

Minimum Hardware: PDP-8 DECTape, Disk
Other Programs Needed: PS/8 software
Source Language: PAL-8

DECUS NO. 8-475

PIPQ

John C. Alderman, Jr., Applied Data Research, Inc., Atlanta, Georgia

PIPQ is an extension of PIPL (DECUS NO. 8-440). This version adds the /Q option which is a facility similar to the

DECUS NO. 8-475 (Continued)

PDP-12 DIAL QL (quicklist) assembler command. The /W and /M options are retained from PIPL and work the same as in DECUS NO. 8-440.

Minimum Hardware: PS/8 configuration
Storage Requirement: 12000-17577
Source Language: PAL-8

DECUS NO. 8-476 (OBSOLETE)

PS/8 LOG Command

For users who previously ordered this program the following patches are suggested.

To eliminate LOGON feature: During system generation, after loading the modified PS/8 tape and CONFIG, change location 00271 from 4052 to 7000 using ODT.

On DECTape based system: The LOGON, OFF, and KJOB commands use location 07777 for a flag to indicate LOG ON or OFF status.

For CONFIG with DECTape system handler at 07777 change the line reading "SBLKCT=7777" to "SBLKCT=7753." This assumes that the disk that would use location 7753 for data break is not present in a configuration where DECTape is the system device.

DECUS NO. 8-477

RIBIER - A Program for the PDP-8/I Enabling the Transition from the PS/8 System to the Paper Tape System

Rene P. Loretan, University of Essex, Colchester, Essex, England

Loads the RIM and BIN loaders in the original position in both fields by first calling them in a lower core region and execution of a relocation program. Afterwards, the memory locations up to 7477 are cleared and control is given to the binary loader with IF=1, DF=0.

Minimum Hardware: 8K PDP-8, One DECTape transport
Storage Requirement: 7600-7777 and 17600-17777 (like PS/8 monitor)
Source Language: PAL-8

DECUS NO. 8-478

Monitor Command Extensions in PS/8

John R. Covert, Georgia Institute of Technology, Atlanta, Georgia

This package expands the monitor ('.' mode) command set. It adds LOGON, KJOB, CREATE, EDIT, COMPILE, DELETE, RENAME, DIRECT and FILE commands in PDP-10 compatible syntax.

See also DECUS NOS. 8-334, 8-473 and 8-476.

Minimum Hardware: PS/8 configuration
Other Programs Needed: PS/8 software
Restrictions: Uses slightly more disk than 6 Nov. 70 release of PS/8; some monitor level operations will be slower for DECTape only configuration.
Source Language: PAL-8, FORTRAN

DECUS NO. 8-479

PDP-8/E Instruction Simulators for Other PDP-8's

Guy L. Steele, Jr., Brighton, Massachusetts

These subroutines allow the user of a PDP-8 other than an 8/E to write programs or use programs intended for an 8/E. They simulate the operation of the 8/E instructions BSW and the standard MQ microinstruction combination, using one-word JMS's. Thus, with JMS's substituted for micro instructions an 8/E program can run on any PDP-8.

Minimum Hardware: PDP-8 (any model)
Storage Requirement: 7 locations on page 0 and 43₁₀ on any other page(s)
Restrictions: No provision is made for crossing instruction fields or for EAE
Source Language: PAL III

DECUS NO. 8-480a

Two Subroutines for 8K FORTRAN

- 1. INPUT
- 2. RANDU and GAUSS

Lars Palmer, A. B. Hassle, Goteborg, Sweden

1. INPUT is a relocatable input routine for input in free format to 8K FORTRAN programs.

2. RANDU and GAUSS are random number generators for 8K FORTRAN.

Minimum Hardware: 8K PDP-8 with TTY or HSR
Other Programs Needed: 8K FORTRAN System
Storage Requirement: 1. 4 pages; 2. 3 pages
Source Language: SABR

DECUS NO. 8-481a

MERGE

Geoffrey Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

MERGE reads any number of binary paper tapes and combines their contents into a single binary output tape with a single checksum. Field pseudo-ops are correctly copied; ASCII diagnostics enclosed between rubouts are ignored.

DECUS NO. 8-481a (Continued)

Minimum Hardware: 4K PDP-8, ASR33 (HSR/P optional)
Source Language: PAL III

DECUS NO. 8-482

Patch to High ODT (DEC-08-COC2-PB)

Geoffrey Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

This short patch prevents the occasional punching of channel 8 at the beginning address of a binary tape produced by the "P" command in ODT. It allows a restart after "T" or "E" commands simply by pressing "CONTINUE." Trailer halts when S. R. bit \emptyset is cleared.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: ODT-8
Miscellaneous: Patch is for HIGH ODT but could easily be modified (3 places) for LOW ODT
Source Language: PAL III

DECUS NO. 8-483

GRFIT, A Simple Least Squares Routine

R. C. Gross, Eastman Kodak Company, Rochester, New York

This program accepts data for the arrays x and y where there is scatter in the y array. It calculates the best least squares straight line and gives standard error estimates. A subroutine version that is essentially the same is also included.

Minimum Hardware: 8K PDP-8, 1 DECTape
Other Programs Needed: PS/8 Operating System and FORTRAN
Miscellaneous: See also FOCAL8-209
Source Language: PS/8 FORTRAN

DECUS NO. 8-484

RESTore for the RK \emptyset 8

Lee H. Nichols III, E. I. duPont de Nemours and Co., Inc., Wilmington, Delaware

RESTore is a sequel to REST (DEC-08-RWDA) for the Disk Monitor System built on a RK \emptyset 8 cartridge disk file. RESTore allows the user to create a protected area for regularly used programs or data files and leave the remainder of the disk pseudo-device as a working scratch area. Whenever the scratch area is filled or no longer needed, it can be quickly erased without disturbing the protected programs.

Minimum Hardware: RK \emptyset 8 Cartridge Disk File
Other Programs Needed: BUILD "AH" (DECUS NO. 8-456B)
Storage Requirement: 2 octal blocks
Restrictions: For use with RK \emptyset 8 only
Source Language: PAL

DECUS NO. 8-485

Geometric Data Truncation for Fourier Transform Programs

E. A. Bamhardt, Southwestern at Memphis, Memphis, Tennessee

This program is intended for use as a truncating-weighting subroutine. The application of a weighting function to the data record before the application of a Fourier transform program reduces the spread in frequencies which results from the transformation of a finite record.

Minimum Hardware: 4K PDP-8
Other Programs Needed: FFT
Storage Requirement: 115₈
Source Language: PAL III

DECUS NO. 8-486

SEGAR 7: A Seven Segment Array for Alphanumeric Character Generation

David J. Dowsett, Atkinson Morley's Hospital, Wimbledon, England

This program is designed as a 1 1/2 page (with pointers on page \emptyset) subroutine for displaying easily observed labels on an oscilloscope screen.

A seven segment display allows all numerical and some useful alphabetical characters to be generated. Spacing is automatic and can be altered.

Minimum Hardware: PDP-8; 34 D Scope
Source Language: PAL III

DECUS NO. 8-487

Revised Octal Memory Dump

Masashi Kamii
Submitted by: Tomoji Yanagita, The Central Institute of Experimental Animals, Nogawa Kawasaki, Japan

This routine will output on the teletype an absolute address plus octal contents of 8 memory locations per one line and a blank line at every 8 lines. Except for the first address the leftmost address is always a multiple of 8, making it easy to search addresses.

Minimum Hardware: PDP-8, ASR33
Source Language: PAL III

DECUS NO. 8-488

NEWPAGE

Geoffrey Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

This program reads a binary tape on the low speed reader and punches out a relocated copy on the low speed punch. Address instructions are augmented by an integer number of

DECUS NO. 8-488 (Continued)

pages selected by the user.

Warning: It will not augment address pointers; main use will be with routines one page or less in length.

Minimum Hardware: 4K PDP-8; (HSR/P optional)
Restrictions: Field pseudo-ops will not be copied; field instructions will
Source Language: PAL III

DECUS NO. 8-489

SUBSET, Interger Compiler and Operating System

R. F. LaFontaine, CSIRO, Highett, Victoria, Australia

SUBSET has been developed for the 4000 word PDP-8 computers. It comprises a one-pass compiler which interprets FORTRAN/FOCAL-like source programs, and a double precision integer operating system. Its features are the ease which the system can be expanded by relocatable binary subroutines, and a reasonable amount of free memory available for the user's program (5600 octal words).

Minimum Hardware: PDP-8/S, Teletype keyboard/Reader-Printer/Punch
Other Programs Needed: DECUS NO. 8-130A and 130B
Storage Requirement: 0-7577
Source Language: MACRO-8

DECUS NO. 8-490

Tape Alteration Program

C. N. Goode, University of Edinburgh, Edinburgh, Scotland

The purpose of this program is to examine and change the contents of any location on a DECTape. One block of a DECTape is called down into core and its contents examined and changed if required. The block is then written back onto the tape.

Minimum Hardware: 4K PDP-8, TU56 DECTape
Storage Requirement: ~~0000~~-1641
Source Language: PAL-8

DECUS NO. 8-491

Indexed Floating Point Math Subroutines for PDP-8/E

Jacques Ricard, National Film Board of Canada, Montreal, Canada

This package of subroutines, which may be assembled in any order and anywhere in 4K, contains subroutines to perform floating point add, subtract, multiply, divide, input and formatted output, as well as logical operations and house-keeping routines. The subroutines fall into three general categories: 1. Index addressing, 2. Direct addressing, 3. Non-addressing.

Minimum Hardware: 4K PDP-8/E with EAE and TTY
Source Language: PAL III

DECUS NO. 8-492

BINLOAD, BINTAPE, and SEARCH

William B. Wright
Submitted by: John W. Taylor, Bucks County Community College, Newtown, Pennsylvania

This program replaces the binary loader , DEC-08-LBAA-PM, and binary puncher, DEC-08-YX1A-PB. It can punch any or all of core and also contains a search routine for finding all occurrences of any 12-bit word in memory. A 12-instruction toggle-in bootstrap loader for the PDP-8/E for loading this routine is also offered.

Minimum Hardware: 4K PDP-8/E, TTY
Storage Requirement: 7600-7777
Restrictions: For PDP-8/E only, but can be modified
Source Language: PAL III

DECUS NO. 8-493

Line to Block Conversion

Ralf Beyer, DFVLR, Institut fuer Flugfuehrung, Flughafen, Germany

The program assumes k variables with n samples stored in k blocks of DECTape each containing n lines. Particular lines of one block correspond with the appropriate lines of other blocks. For data manipulation in particular in connection with DECUS NO. 8-137 "Program for Storage, Manipulation and Calculation of Data Using DECTape" the program converts the array of k blocks with n lines to an array of n blocks with k lines. Floating-point number representation is used and the size of the array may be k = 23 and n = 42 at maximum.

Minimum Hardware: 4K PDP-8, ASR33, TC01/TU55
Other Programs Needed: DECUS NO. 8-137
Storage Requirement: 20-43; 200-1657; 1600-7577 (Data Buffer)
Source Language: PAL-D

DECUS NO. 8-494

Translate Arabic Into Roman Numerals

A. Moses, Computer Applications Engineering Company, El Paso, Texas

This program translates Arabic numbers into Roman numerals. The number must be greater than 0 and less than 4000, otherwise the program will print "ENTER ARABIC NUMBER >0 & <4000" and start over.

The user enters an Arabic number followed by a terminator, such as SPACE. The program types the Roman numeral followed by a carriage return and line feed. The program is then ready to accept the next Arabic number.

Minimum Hardware: 4K PDP-8
Other Programs Needed: 4K FORTRAN Compiler and Operating System (DEC-08-AFC1 and DEC-08-AFC3)
Source Language: 4K FORTRAN

DECUS NO. 8-495

CORRELATION ANALYSIS

Ralf Beyer, DFVLR, Institut fuer Flugfuehrung, Flughafen, Germany

This program is a patch to be used with the analysis of variance routine of DECUS NO. 8-137. After printing of the AOV-table it computes and prints F-ratios to determine the statistical significance of first and higher order correlations of the data samples.

Minimum Hardware: 4K PDP-8, ASR33, TC01/TU55
Other Programs Needed: DECUS NO. 8-137
Restrictions: Maximum number of blocks and lines on input reduced to 100₈ each
Source Language: PAL-D

DECUS NO. 8-496

UTR7: A 7-track Magnetic Tape Reading Utility

Gregory Ruth, M.I.T. Charles Stark Draper Laboratory, Cambridge, Massachusetts

UTR7 is a utility program designed to read and print selected records from 7-track magnetic tape, via the TC-58. Program inputs are: record length, parity, recording density, and data format. Available data format output options are: 6-bit ASCII (2 characters to a word), 8-bit ASCII, unsigned octal, unsigned decimal, unsigned hexadecimal, signed octal, signed decimal, binary and IBM 7-track tape BCDIC. The program is designed so that new options may be added easily.

Minimum Hardware: PDP-8, ASR33, TC-58
Storage Requirement: 2343₈ locations plus tape record buffer storage
Source Language: PAL-8

DECUS NO. 8-497A

8BAL - PDP-8 Macro Language, Version 4

David M. Kristol, Wilmington Delaware

8BAL is intended to be a general macro processor, suitable for use with PAL-8, FORTRAN, or any other language available in PS/8 which uses the system I/O structure. The program acts as a one pass "front end" to the "host" language processor, generating source code for the host language. Because 8BAL uses a special signal character ("@") that is illegal in the host language, 8BAL source code can be mixed with host language statements.

Minimum Hardware: 8K PDP-8 with mass storage device
Other Programs Needed: PS/8-OS/8 Operating System
Miscellaneous: Will use available memory up to 16K for table storage
Source Language: PAL-8

DECUS NO. 8-497B

8BAL Source Documentation

David M. Kristol, Wilmington, Delaware

This document describes the internal workings of 8BAL from a programming standpoint.

The author wishes to point out that, while helpful, this documentation may not be absolutely accurate because it was written for an earlier version of 8BAL, not for the version currently distributed by DECUS.

DECUS NO. 8-498

Unencoded Incremental Plotter Subroutine

L. Papazian, CETIM, Senlis, France

This subroutine moves the pen of an unencoded plotter (Benson 110) to a new position along the best straight line. The pen can be raised or lowered during the motion.

All operations are controlled by JMS instructions. The accumulator does not specify the operation as in the Digital 8-12-U subroutine.

Minimum Hardware: PDP-8/E, ASR33, Incremental Benson Plotter (model 110)
Restrictions: Must be assembled with the main program
Source Language: PAL III

DECUS NO. 8-499

High Speed Reader Patch for Lo Speed Macro-8

Michael K. Loukides, Hamden High School, Hamden, Connecticut

This patch changes MACRO-8's input subroutine for high speed input with all output on the ASR33. MACRO must be reloaded for low speed input.

Minimum Hardware: PDP-8, ASR33, High speed reader
Other Programs Needed: MACRO-8, low speed
Source Language: PAL III

DECUS NO. 8-500

DUMP8

Charles R. Wardrop, Digital Equipment Corporation, Sunnyvale, California

This program provides an octal dump of one or more 256 word PS/8 blocks. It is device independent on both input and output by interaction with the PS/8 system. The command decoder is called for I/O specification.

Minimum Hardware: Any PS/8 configuration
Other Programs Needed: PS/8
Storage Requirement: 8K
Source Language: PAL-8

DECUS NO. 8-501

Galactic Coordinates

A. Moses, Computer Applications Engineering Company,
El Paso, Texas

This program consists of two parts: the first converts star positions from astronomical coordinates (right ascension and declination) to galactic coordinates (latitude and longitude); the other converts in the reverse direction.

Minimum Hardware: 4K PDP-8L, TTY
Other Programs Needed: 4K FORTRAN Compiler and Operating System (DEC-08-AFCO)
Source Language: 4K FORTRAN

DECUS NO. 8-502

Interrupt Duplicator for Binary Object Tapes

G. Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

The program copies absolute binary tapes (produced by PAL, MACRO, ODT, etc.) from any of three readers onto any one of three punches.

This routine will not copy SABR or other relocatable binaries.

Minimum Hardware: 4K PDP-8, one or more on-line TTYs; HSR/P optional
Source Language: PAL III

DECUS NO. 8-503

MACRO-8X: 8K Extended MACRO-8 Assembler

David J. Waks
Submitted by: Robert M. Supnik, Applied Data Research, Cambridge, Massachusetts

MACRO-8X is an improved and expanded version of MACRO-8. It is also a two-pass MACRO assembler which runs on any 8K (or larger) PDP-8 family computer equipped with a high speed reader punch. Its enhancements include a large symbol table, improved literal and off-page link processing, paginated output, a formatted memory allocation table, and a number of pseudo-operations, including VFD (variable field definitions), BANK, LIST UNLIST, LIT, LITBAS, LGM and NOLGM.

Minimum Hardware: 8K PDP-8, HSR/P, TTY
Miscellaneous: No sources available

DECUS NO. 8-504A

ESI (Engineering and Scientific Interpreter)

David J. Waks
Submitted by: Robert M. Supnik, Applied Data Research, Cambridge, Massachusetts

ESI is an interactive scientific language modeled on JOSS. Its features include: decimal arithmetic, two dimensional arrays, direct and indirect statements, free format I/O,

extensive English language diagnostics, straightforward statement syntax (every statement is a complete English sentence), several built in functions. Overlays are included to add and remove three extended functions - SIN, COS, SQRT. —

Minimum Hardware: 4K PDP-8
Source Language: MACRO-8X

DECUS NO. 8-504B

ESIX - Extended ESI

Robert Supnik, Applied Data Research, Cambridge, Massachusetts

ESIX is an extended and improved version of ESI which runs on any 8K or larger family computer. It offers all the features of regular ESI, plus the following additional features: five times more program and array storage, automatic pagination of output, built in extended functions (SIN, COS, EXP, SQRT, LOG, LN, ARCTAN), generalized exponentiation, compound statements and comment statements.

Minimum Hardware: 8K PDP-8
Source Language: MACRO-8X

DECUS NO. 8-504C

ESI Demonstration Programs

David J. Waks, Applied Data Research, Cambridge, Massachusetts

This package consists of several sample programs for the ESI system (DECUS NO. 8-504A) which demonstrate its use. These programs are: 1. Single Load Matrix Inversion, 2. Complex Multiplication, 3. Octal Sum, 4. Statistics, and 5a-b. Multi-load Matrix Inversion. A sixth example, Zero Sum Game Solver, can be found at the back of the ESIX Guide (DECUS NO. 8-504B).

Minimum Hardware: 4K PDP-8
Other Programs Needed: ESI (DECUS NO. 8-504A) or ESIX (DECUS NO. 8-504B)
Source Language: ESI

DECUS NO. 8-505

BIN-CBL Extended Memory Loader

Jan J. Mader, Brandeis University, Waltham, Massachusetts

This loader maintains all features of DECUS NO. 8-338 (automatic selection of either BIN or CBL format, etc.). In addition it recognizes the field designation characters on binary or CBL tape so that it allows one to load a program to any memory field.

Minimum Hardware: 4K PDP-8/E, TTY
Storage Requirement: One memory page (200 octal locations)
Restrictions: Low speed I/O devices only. PDP-8/E only
Source Language: PAL III

DECUS NO. 8-506

Load Areas

J. Fraser, University of Liverpool, Liverpool, England

Load Areas is a keyboard-oriented program for PDP-8 family computers. It produces a list of the core areas which a binary or read-in mode paper tape will occupy when loaded.

Minimum Hardware: 4K PDP-8, TTY
Storage Requirement: 0-1143, any field
Source Language: Subset MACRO-8, Compatible with PAL-D

DECUS NO. 8-507

EEPP (Editor Even Parity Punch)

E. D. Shepherd, Plessey Company Limited, Ilford, Essex, England

This program is a modification to Editor to punch even parity ASCII on teletype and high speed punch. Non parity tapes read into editor can be punched out with even parity.

Minimum Hardware: 4K PDP-8, TTY
Other Programs Needed: Symbolic Editor (DEC-08-ESAC-PB)
Storage Requirement: 39₈ locations
Source Language: PAL III

DECUS NO. 8-508

TSUTIL - A Utility-Diagnostic Program for TSS-8

Paul M. Kinzelman, Carnegie-Mellon University, Washington, D. C.

TSUTIL is a utility-diagnostic program for an RF08 disk TSS-8 system and should be especially useful in installations where the monitor has been modified, or where the system is operated by persons unfamiliar with how TSS-8 works.

Minimum Hardware: TSS-8
Storage Requirement: 6324-7777 and a buffer 200-6200 maximum
Source Language: PAL-D

DECUS NO. 8-509

INTERRUPT-TEST

Floor Anthoni, Medical Biological Laboratory TNO, Rijswijk, The Netherlands

The program was developed to detect and report spurious interrupts. If an interrupt occurs, the program tries to identify it according to a list of SKIP instructions, and to clear the interrupting flag with the appropriate CLEAR instruction.

The program restores page 0 after use, in order that MAINDECS in core remain unaltered.

Minimum Hardware: 4K PDP-8
Storage Requirement: 07000-07577
Restrictions: Runs in Field 0 only
Source Language: PAL III, PAL-8

DECUS NO. 8-510

P8COR - Overlay for 8K PAL-D Assembler for 4K Disk Monitor System (DECUS NO. 8-333)

Arthur L. Pike, Tufts University, Medford, Massachusetts

P8COR is an overlay that permits most of the features of DECUS NO. 8-333 to work as a stand-alone program for 8K users when disk or DECTape are not available.

Minimum Hardware: 8K PDP-8/I with ASR33 (Can use HSR/P if available)
Other Programs Needed: DECUS NO. 8-333
Source Language: PAL III (Assembled with DECUS NO. 8-333)

DECUS NO. 8-511

FPAK-4 Interrupting Floating Point Package

Robert A. Belshe, University of California, Lawrence Radiation Laboratory, Berkeley, California

This is the DEC extended floating point package plus output controller with a number of useful modifications and additions. Memory required is one page greater than the standard DEC version, plus interrupt handler.

Only the binary tape and listing are distributed by DECUS. Users who wish to obtain a source card deck may send a blank magnetic tape to the author which he will return to them with the card images of FPAK-4 and the assembler, if needed.

Minimum Hardware: 4K PDP-5 or PDP-8 family, PDP-12
Miscellaneous: EAE Not required
Source Language: ASSM (An LRL assembly language similar to PAL)

DECUS NO. 8-512

Modified Binary Loader

G. Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

This loader is adapted from the standard DEC binary loader, occupies the same core area, and is used in the same fashion. It differs in that this version checks for four possible illegalities as it reads a binary tape. *Odd frames: 1. codes from 201 to 277 inclusive, 2. codes greater than 300 not ending in octal 0; Even frames: 3. codes greater than 77; Address words: 4. overflow address counted up from 777 to 0000. A separate tape is available for the PDP-8/E because it involves a different way of getting the loader into core. Additional material concerning the 8/E loader can be found in the write-up.

*The second frame of an address or data word is considered even by this program. All other frames are odd.

Minimum Hardware: 4K PDP-8 with TTY and/or HSR
Source Language: PAL III

DECUS NO. 8-513

DEBUG 8

Michael S. Cole and C. W. Richardson
Submitted by: W. R. Myers, Aerojet Nuclear Company,
Idaho Falls, Idaho

DEBUG 8 allows for opening and loading locations in core,
execution of subroutines, insertion of breakpoints, restoring
breakpoint instructions and beginning execution at a given
location.

Minimum Hardware: PDP-8, TTY
Other Programs Needed: User Print - Input - Carriage
Return - Line Feed Routines
Storage Requirement: 1 page (plus user routines)
Source Language: PAL III

DECUS NO. 8-514

Alpha-Numeric Display Program

Ralph Norman Haber, University of Rochester, Rochester,
New York

A program to display characters, along with a driver program
written in FORTRAN, and a subroutine program for listening
for button presses and recording reaction time in psychological
experiments.

Minimum Hardware: 4K PDP-8, 34D Display or
equivalent
Source Language: PAL and FORTRAN

DECUS NO. 8-515

Program to Mate PAL III With Symbolic Editor

G. Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

This program enables PAL III (in field 0 or 1) to read Symbolic
Editor's text buffer directly (field 1 or 0) without paper tape
input to PAL. Editor and its storage areas are unmodified.
PAL loses its low speed input routine but retains all other
options.

Minimum Hardware: 8K PDP-8, TTY
Other Programs Needed: PAL III; Symbolic Editor
Source Language: PAL III

DECUS NO. 8-516

Self-Starting PS/8 Loader

F. J. Meijer, University of Amsterdam, Amsterdam,
The Netherlands

This program produces on paper tape a self-starting PS/8
loader for the PDP-8/E with TD8-E DECTape

Minimum Hardware: PDP-8/E with TD8-EM
Other Programs Needed: PAL Assembler

Storage Requirement: One Page
Source Language: PAL

DECUS NO. 8-517

Bowling League Results, Standings and Averages Program

Robert H. Tedford, Digital Equipment Corporation, Maynard,
Massachusetts

This program can be used to automate the weekly task of
preparing bowling league results. It demonstrates the following
OS/8 FORTRAN features: device independent I/O chaining
and in-line SABR coding. Historical data is maintained for
128 bowlers and 16 teams.

Minimum Hardware: 8K PDP-8 with TC01 DECTape,
HSR/P, LP08 Line Printer
Storage Requirement: 264 OS/8 blocks
Source Language: OS/8 FORTRAN

DECUS NO. 8-518

PS/8 FORTRAN Alphabetical Sort

Edward Steinfeld
Submitted by: Karen Seefeldt, Digital Equipment Corporation,
Pittsburgh, Pennsylvania

This is an alphabetical sort of any number of fields of any
width. The array to be sorted must be an integer array of
ASCII characters stored in A2 format. The program is a sub-
routine and is called from the main program.

Minimum Hardware: PS/8 System
Other Programs Needed: PS/8
Source Language: PS/8 FORTRAN

DECUS NO. 8-519

MACRO-8 Pass 3 Output Format Patch

Richard J. LaBella, Airborne Instruments Laboratory,
Deer Park, New York

This patch will format the Pass 3 output on the teletype into
page size blocks of either single sheets or fanfold paper.

Minimum Hardware: 4K PDP-8
Other Programs Needed: MACRO-8 (DEC-08-CMAB-
PB)

Restrictions: Reduces zero page literal buffer
by approximately 25%
Source Language: Machine Language

DECUS NO. 8-520

PEST/WALD/PINIT: Adaptive Psychophysics Testing Package

H. L. Kaplan, M. M. Taylor, C. D. Creelman, University
of Toronto, Toronto, Canada

Three subroutines to run adaptive psychophysical testing using
procedures developed by M. M. Taylor and C. D. Creelman

DECUS NO. 8-520 (Continued)

(PEST: Efficient Estimates On Psychophysical Functions, Journal of the Acoustical Society of America, 1967, 41, 782-787) for rapid location of "threshold" stimulus values. Included is an extensive demonstration and testing package and some examples of using PEST.

Minimum Hardware: 4K PDP-8, TTY
Storage Requirement: 200_g for main subroutines; 1000_g
for demonstration packages
Source Language: PAL III

DECUS NO. 8-521

A CLOCK

Klaus Lickteig, Technische Universitaet Berlin, Berlin, Germany

This demonstration program will display a clock on the oscilloscope of an AXØ8 A/D converter. After setting the clock, the running clock will be displayed on the oscilloscope. There are possibilities to regulate the clock during running.

Minimum Hardware: 4K PDP-8, AXØ8 A/D Converter, ASR33
Storage Requirement: Locations 0-2, 10, 20-57, 200-4347
Source Language: PAL III

DECUS NO. 8-522

'PAGEIT'

William R. Anderson, Jr., Portsmouth Abbey School, Portsmouth, Rhode Island

'PAGEIT' is an overlay to PAL III which gives the user the option (Bit 8) to incorporate formatted listings in his first and third pass. Each listing is paged in unified length with page numbers (1-99). The user has control of an eject command which feeds to a new page. The user can also set the size of each page to his needs.

Minimum Hardware: 4K PDP-8, TTY
Other Programs Needed: PAL III
Storage Requirement: 200_g locations
Restrictions: Reduces PAL III Symbol Table from 576 to 544
Source Language: PAL III

DECUS NO. 8-523

MDT - A Mini Debugging Technique

M. Zerkowitz, W. Christensen, L. Bourne, J. Dalton, W. Besore, Computer Science Center, University of Maryland, College Park, Maryland

MDT is a small debugging system that resides in the top page of core. It includes a binary loader, and routines that can dump core onto the teletype, modify core from the teletype

and punch core in BIN format. It is designed to be quickly loaded at installations with no high speed I/O device.

Minimum Hardware: 4K PDP-8, ASR33
Storage Requirement: 7600-7777
Restrictions: Uses slow speed I/O devices only
Source Language: PAL III

DECUS NO. 8-524

GRNDYE 1970 - A Program to Estimate Cardiac Output Off-Line from an Indicator Dilution Curve

Jens G. Rosenkrantz, M. D. and John G. Parnevelas, M. S., Children's Hospital of Los Angeles, Los Angeles, California

An off-line program is presented which calculates cardiac output on a PDP-8 computer. It is usable in a paper tape or disk-monitor system. The program is sufficiently accurate, compared with hand calculations, to be useful to the laboratory measuring cardiac output by indicator dilution methods. It suffers from the limitations of the Stewart-Hamilton method itself.

Minimum Hardware: 4K PDP-8, HSR
Other Programs Needed: Editor (DEC-Ø-ESAB); Floating Point Interpreter #4 (Digital-8-25-F)
Source Language: PAL-8 (or PAL III)

DECUS NO. 8-525

DAFFT/PAFFT/DAQUAN (EAE)

Gerry Dulaney
Submitted by: Charles Romeo, Digital Equipment Corporation, Maynard, Massachusetts

DAFFT/PAFFT are overlays to DAQUAN (EAE) which support signal averaging in the time domain (up to 1024 double precision points), and FFT into frequency domain giving up to 1024 real and 1024 complex coefficients.

Minimum Hardware: LAB 8/E (Advanced) with EAE
Source Language: PAL-8

DECUS NO. 8-526

PROCAL 10/71

Peter G. Kretzman, Cold Spring Harbor High School, Huntington, New York

PROCAL 10/71 is a conversational symbolic logic programming system that uses the Lukasiewiczian notation and is especially oriented towards solving logical problems. Using the Special notation, the user may input his assumed premises and then see if his proposed conclusion is valid or invalid, based on those premises.

Minimum Hardware: 4K PDP-8, 8/I, 8/L or 8/E; ASR33

DECUS NO. 8-526 (Continued)

Storage Requirement: 0-1777, rest of core space if buffer and pushdown
Restrictions: Six variables limit in logical expression
Source Language: PAL-D

DECUS NO. 8-527

XDDT8E

Kincade N. Webb, Xenex Corporation, Waltham, Massachusetts

XDDT8E is an octal symbolic debugging program for the PDP-8E with Extended Memory which preserve the status of the program interrupt system at breakpoints. It is the result of updating XDDT (DECUS NO. 8-127) to make it operate correctly on the PDP-8E. It adds BIN and RIM punching and improves mnemonic typeouts.

Minimum Hardware: PDP-8/E, TTY
Storage Requirement: 2K
Restrictions: Not 8/1, 8/L compatible
Source Language: PAL-10

DECUS NO. 8-528

TIC-TAC-TOE: Modifications to TIC 5/8, DECUS NO. 8-173

Klaus Lickteig, Technische Universitaet Berlin, Berlin, Germany

This modification to TIC 5/8 makes it possible to run TIC 5/8 on a LAB-8 System and to play TIC-TAC-TOE.

Minimum Hardware: 4K PDP-8/1 or 8/E with AXØØ A/D Converter and ASR33
Other Programs Needed: TIC 5/8 (DECUS NO. 8-173)
Storage Requirement: With TIC 5/8: 1-3, 33-3053
Source Language: PAL III

DECUS NO. 8-529

OSCAR: An Operating System for Computerized Animal Research

Dennis Kuch and John Platt, McMaster University, Hamilton, Ontario, Canada

OSCAR is designed to control subject-environment interactions and to accumulate data in behavioral experimentation. Any number of experimental stations may be used, depending upon the user's application. Two to five pages of PAL programming are required from the user to determine particular experimental procedures and data manipulation while OSCAR handles all general functions of servicing the stations and interacting with the operator.

Minimum Hardware: 4K PDP-8, ASR33, experimental station interfaces, clock
Other Programs Needed: Some program required from user for specific paradigms.

Storage Requirement: 4K (14 pages for system, the rest for storage as needed)
Miscellaneous: RLYOUT, READ, and clock routines must be modified for different systems
Source Language: PAL III

DECUS NO. 8-530

8BALIB - 8BAL Macro Library Generator

David M. Kristol, Wilmington, Delaware

8BALIB processes 8BAL (DECUS NO. 8-497A) source files and generates a macro library. The library may later be used by 8BAL to supply otherwise undefined macros to a source program.

Minimum Hardware: PS/8 Configuration
Source Language: PAL-8

DECUS NO. 8-531A&B

'TRIPLE' - 36 Bit PDP-8/E Simulator and 'TRIPLE' 8BAL Macros

David M. Kristol, Wilmington, Delaware

A) 'TRIPLE' gives the PDP-8 user a simple-to-use multiple precision capability. The triple precision routines are entered by a subroutine call, after which each computer word is interpreted as an instruction for a PDP-8/E with 36-bit operands. Most op codes (all memory references) are interpreted. Escape back to normal execution occurs via a HLT.

B) The 'TRIPLE' 8BAL Macros permit the coding of 36-bit constants and literals in a convenient way when using the 'TRIPLE' precision package. Included are numerical, symbolic and character literals.

Minimum Hardware: PDP-8, 8/1, 8E, 8/L
Other Programs Needed: None for A; PS/8 and DECUS NO. 8-497A for B.
Storage Requirement: 64ØØ - 7577
Source Language: PAL-8

DECUS NO. 8-532

OPDDT (One Page DDT)

W. Friedman, Rockefeller University, New York, New York

This octal debugger may be run on any one page except zero. Like OPT it is controlled from the teletype. It sets a breakpoint, proceeds from one point to the next, examines and changes memory.

Minimum Hardware: 4K PDP-8, TTY
Storage Requirement: One page of core plus location 5
Restrictions: Cannot run on page zero
Source Language: MACRO-8

DECUS NO. 8-533

"WHERE"

G. Chase, Portsmouth Abbey School, Portsmouth,
Rhode Island

Reads a binary tape and prints out the field and core areas
which that tape will occupy when loaded.

Minimum Hardware: 4K PDP-8/E with console, TTY,
Optional HSR
 Other Programs Needed: Binary Loader
 Storage Requirement: 4400-4566 in any core field
 Restrictions: Will not run on 8/I or 8/L
 Source Language: PAL III

DECUS NO. 8-534

DUAL BINARY LOADER

G. Chase, Portsmouth Abbey School, Portsmouth,
Rhode Island

Used to load two binary tapes simultaneously into core.

Minimum Hardware: 8K PDP-8 with 2 TTY readers,
device codes 03 and 40
 Other Programs Needed: Binary Loader
 Storage Requirement: 4245-4575 in field 1. Start-14370
 Restrictions: Written for PDP-8/E; one patch
needed for 8/I or 8/L
 Source Language: PAL III

DECUS NO. 8-535

BINARY PUNCH FOR PDP-8/E WITH 2 TTY's (or with high
speed punch)

G. Chase, Portsmouth Abbey School, Portsmouth,
Rhode Island

Punches any number of blocks (the user need not count them)
from any core fields of memory, with or without field pseudo-
op codes. User and punch communicate via console key-
board. (no switch register settings).

Minimum Hardware: 4K PDP-8/E, Console keyboard
and a punch not part of console
keyboard
 Other Programs Needed: Binary Loader
 Storage Requirement: 4000-4376, any core field
 Restrictions: 8/E only
 Miscellaneous: Written for TTY punch, device
code 41; patches (3) are given
for High Speed Punch
 Source Language: PAL III

DECUS NO. 8-536

Advanced Averager Improvement

Dr. J. L. Blom, Laboratory Ergonomic Psychology, TNO,
Amsterdam, The Netherlands

This is a series of listings for five overlays to use the Advanced
Averager program under the PS/8 monitor system on the LAB-
8/I. Added is a sixth part (on paper tape) which writes the
calculated data to any of the output devices under the PS/8
system.

Minimum Hardware: LAB-8/I with 8K core; 2
DECtapes
 Other Programs Needed: PS/8 Monitor System, Advanced
Averager (DEC-LB-U17C-PB)
 Restrictions: Runs only on 8K
 Source Language: PAL-D

DECUS NO. 8-537

Talking Eights

Louise Gerhart, Digital Equipment Corporation, Maynard,
Massachusetts

This program transmits and receives synchronous messages
between two PDP-8/Es. Messages are entered via teletype so
that operators at remote points may hold a "conversation."

Minimum Hardware: 2 PDP-8/Es equipped with 4K
core, DP8E Synchronous
Interface Modems and Lines
 Storage Requirement: 4K
 Source Language: PAL-8

DECUS NO. 8-538

Integer IOH for FORTRAN Library

Ronald C. Barrett, Northwestern University, Evanston,
Illinois

INTIOH is for use with FORTRAN programs having only integer
arithmetic, and is a substitute for the format interpreting
routine of the PS/8 FORTRAN library. Eight pages of core
are saved. A new format is defined for input of file names
used in device independent input/output and chaining.

Minimum Hardware: 8K PDP-8 or PDP-12, Disk or
DECtape
 Other Programs Needed: PS/8 Operating System
 Storage Requirement: 6 pages - 1400₈ words
 Source Language: SABR

DECUS NO. 8-539

TD8E 4K Loader

Mark G. Roberts, Digital Equipment Corporation,
Albuquerque, New Mexico

This package contains a one-page handler to load from TD8E

DECUS NO. 8-539 (Continued)

DECTape and a program to load paper tape onto DECTape. It will load everything except last page of memory; requires two passes of paper tape.

Minimum Hardware: 4K PDP-8/E, TD8E DECTapes
Other Programs Needed: Binary Loader; TD8E DECTape Subroutine
Restrictions: Only works in 4K of memory
Source Language: PAL III

DECUS NO. 8-540A

BRaille-8

Richard Rubinstein, University of California, Irvine, California

BRaille-8 enables a blind time-sharing user to use a remote computer interactively with output in Braille. Connection to the remote machine is via an EIA-compatible line which may be hardwired or used with an acoustic coupler. BRaille-8 translates characters and buffers output to the (easily modified) console teletype.

A complete one-cell Braille representation of the standard teletype character set is used, and Braille output codes may be modified easily by the table changes if the user so desires. Available switch options: Full/half duplex; Hold output; Flush buffer.

Minimum Hardware: PDP-8/E, 4K, Bootstrap loader, ASR33 (with Braille modification), KL8EX EIA interface
Restrictions: Uses core occupied by bootstrap loader
Miscellaneous: Contact DEC PDP-8 Marketing for teletype modification information
Source Language: PAL-8

DECUS NO. 8-540B

BPRINT

Richard Rubinstein, University of California, Irvine, California

BPRINT is a subroutine which enables a user's main program to emboss Braille on a modified ASR33 teletype. A complete one-cell Braille representation of the standard teletype character set is used, and Braille output codes may be modified easily if the user so desires.

Minimum Hardware: 4K PDP-8, ASR33 (with Braille modification)
Other Programs Needed: Main user program
Storage Requirement: One page
Restrictions: User's program must initialize teleprinter flag
Miscellaneous: Contact DEC PDP-8 Marketing for teletype modification information
Source Language: PAL-8

DECUS NO. 8-541

Cassette Utility Program and PALC

E. Della Torre and J. Roitman, McMaster University, Hamilton, Ontario, Canada

The Cassette Utility Programs are a group of programs designed to help in the preparation of programs for the PDP-8 computer. They consist of an Editor program, two tabulator programs, a page format program, a binary duplicator and a binary tape assembler and disassembler which are described in full in the write-up, PALC is a version of PAL III using cassette recorders.

Source listings and binary tapes in tape and cassette format are available from the author.

Minimum Hardware: PDP-8, 4K, TTY, Two (Computer) Cassette recorders; High Speed Reader and/or Punch are desirable.

DECUS NO. 8-542

Radioactive Decay

A. L. Al-Nuaimi, Ontario Hydro, Pickering G. S., Pickering, Ontario, Canada

This program solves the radioactive decay equation:

$$A = A_0 e^{-\lambda t}, \quad A = (A_0) * \text{EXP}(-DT)$$

for any one of the four variables:

A= activity after decay
A₀=activity before decay=original activity
TH=half-life of the radioisotope
T=time of decay, where:
D= the decay constant (λ)= .69315/TH.

Minimum Hardware: PDP-8/I, 4K, Disk
Other Programs Needed: Disk Monitor and FORTRAN-D Operating Systems
Restrictions: Teletype Input-Output only
Miscellaneous: After completing a set of computations, program restarts itself
Source Language: FORTRAN-D

DECUS NO. 8-543

TS8REV - Reverse Assembler for TSS/8

William Harts, Dix Hills, New York

This program is an adaptation of DECUS NO. 8-178, Reverse Assembler, which has been modified to run on a standard TSS/8 computer. It will provide PAL mnemonics from any RIM, BINARY or SAVE format tape. This can be very useful in debugging a program when the user does not have a symbolic listing.

DECUS NO. 8-543 (Continued)

Minimum Hardware: TSS/8
Storage Requirement: 15 TSS/8 Disk Segments
Restrictions: HSR input and TTY output only
Miscellaneous: Tape offered is TSS/8 SAVE format
Source Language: PAL-D

DECUS NO. 8-544

CHECK and CHANGE-D

Benjamin C. Woodbury, Holden, Massachusetts

CHECK and CHANGE-D is an octal debugging program. Its advantage over DEC's DDT is that it loses no locations of core. It takes advantage of Monitor's scratch blocks, and automatic input-output block reading into core. CHECK and CHANGE-D stores its master controller in this place, reads specific blocks over itself, and uses 7200-7377 for a scratch page. When finished it restores block 2.

Minimum Hardware: 4K PDP-8, at least one disk unit, ASR33
Other Programs Needed: DEC's Monitor System
Source Language: PAL-D

DECUS NO. 8-545

PIF (Program Interrupt Facility for 3 TTY's)

Gary R. Garber, Laurence High School North, Trenton, New Jersey

This is a one page utility or demonstration program that recognizes CR/LF and CTRL/TAB on an interrupt basis. It was originally designed to facilitate easier typing of programs, but can be expanded to almost any use on an interrupt basis.

Minimum Hardware: 4K PDP-8, 1 to 3 TTY's
Source Language: PAL III

DECUS NO. 8-546

DETEF - DEctape File-Handling System

Dr. Carl Reutersward, Research Institute of National Defense, Sundbyberg, Sweden

The DETEF system comprises:

1. A keyboard monitor similar to the Disk/DEctape Monitor, but better suited to tape operation. Programs are loaded, saved and recalled as named files made up of sequences of contiguous blocks. Files of many type-designations may be allocated and deleted by monitor commands. The resident DEctape handler operates in the continuous mode (core locations, not pages, are specified).

2. Utility programs for reading file directory, for packing and copying files, etc.

3. A modification of FOCAL W: Segmented program and data files accessed by programmed saving and loading operations; variables not erased by loading of programs; two data buffers for economic storage of floating point numbers and 12-bit integers.

4. An adaption of EDIT: DEctape files for input and output; multiple inputs; input used for output; listing of line numbers.

5. An adaption of PALD: control of extent of assembly listing; symbol table expansion through storage on DEctape.

Minimum Hardware: 4K PDP-8/1, EAE, TC01, one TU55; Optional: HSR/P, 32K, eight TU55's, AX08
Storage Requirement: 7600 to 7777 (Monitor loader and DEctape handler)

DECUS NO. 8-547

Advanced Averager Program (Rotterdam Version)

L.T.M.E. Hillegers and S. Miller, Medical Faculty, Department of Anatomy, Rotterdam, The Netherlands

This is a modification of the LAB-8 Advanced Averager Program (Paper Tape Version C. DEC-LB-U17/18C-LA) for one-pass loading of Sections III, IV and V, including additional functions used in neurophysiological research (oscilloscope display of reflex conditioning curves).

Minimum Hardware: 4K PDP-8/L, AX08 Laboratory Peripheral, TTY, Oscilloscope
Other Programs Needed: RIM and BIN Loaders

DECUS NO. 8-548

Links to Page Routine

Leendert Paul Geffen, Data Research Associates, Wayland, Massachusetts

Provides convenient numbered pages in Pass 3 listing of assemblers, and for output of Reverse Assembler, without the necessity of punching tape and reading it again through the Page Routine. With MACRO-8, output will halt after body of the listing, and "Continue" must be pressed to get symbol table. Assembler links are furnished in two versions each, with main program in either field 1 or field 0.

Minimum Hardware: 8K PDP-8, ASR33 (4K for Reverse Assembler)
Other Programs Needed: DECUS NO. 8-184 reassembled @ *6000 (BIN tape of this is included with BIN tape offered); Either DECUS NO. 8-178, Reverse Assembler DEC-08-ASCI-PB, PAL III, or DEC-08-CMAB-PB MACRO-8, High and Low speed combined as the case may be
Source Language: PAL

DECUS NO. 8-549

Polynomial Least Squares Fit

Guy R. Sherwood, Edward Hines, Jr. V. A. Hospital, Hines, Illinois

This program works on the least squares principle and calculates the coefficients for a polynomial equation. It allows for up to 12 different degree equations. It also allows for up to 12 values of X, F(X), and the weight of each value to be entered. The program permits up to 3 values of F(X) for each X to be entered. The maximum degree this program can fit depends on the data.

Minimum Hardware: 8K PDP-8/1, TTY
Source Language: PS/8 FORTRAN

DECUS NO. 8-550

Modified Matrix Inversion -Real Numbers

John W. Horm, University of Pittsburgh, Pittsburgh, Pennsylvania

This is similar to "Matrix Inversion - Real Numbers" (DECUS NO. 8-72) by Professor A. E. Sapega. It has been modified to run under PS/8. Input is from the high speed paper tape reader and the output is routed to the DECwriter with the option of having a paper tape made of the inverse.

Minimum Hardware: PS/8 System, High Speed Paper Tape Reader, Punch (optional)
Storage Requirement: 8K Minimum
Source Language: PS/8 FORTRAN

DECUS NO. 8-551

COMBO

William R. Anderson, Jr. 2700 Virginia Avenue, N. W., Washington, D. C.

COMBO was developed to give the 8K user of PAL III the ability to call up PAL from the Editor. The user can lock the panel, and with the Switch Register and keyboard, call up PAL and transfer Editor's buffer to PAL without the use of lengthy paper tape operations.

Minimum Hardware: 8K PDP-8
Other Programs Needed: BIN Loader, PAL III, Symbol Editor
Source Language: PAL III

DECUS NO. 8-552

Storage Display Device Handler

Robert Moore, TROPEL, Inc., Fairport, New York

This program permits use of the Storage Scope as a line printer. A TTY key is hit to display the next page. (Pages are de-limited by Form Feeds.) TABS are not expanded.

Program runs in PS/8 or OS/8 wherever 2 page handlers are permitted.

Minimum Hardware: PDP-8/1 or 8/E with EAE, or PDP-8/E, 8/M or 8/E, Point plot display controller VC8E, 340, or VC8I; Storage Oscilloscope
Other Programs Needed: PS/8 System
Source Language: PAL-8

DECUS NO. 8-553

Big Brother II

Gary Garber, Laurence High School, Trenton, New Jersey

Big Brother II allows a program written in modified assembler language to be assembled in one pass and checked for errors. The program is then loaded automatically into the allotted section of core where it is executed automatically. Upon completion of the program control is transferred to Big Brother for debugging, editing or tape punching. The language is very similar to PAL III with a few formatting changes. It is at least 10 times faster than the normal assembly procedures. This program is essentially the first step toward a totally complete compiler and is very important when time is a factor. Big Brother is self-starting once the RIM has been loaded and has options for high or low speed input of ASCII tapes.

Minimum Hardware: 8K PDP-8, ASR33, High or Low Speed Reader, Memory Quotient Register
Restrictions: Program length is limited to some extent. Program can destroy itself if format is not followed.
Source Language: PAL III

DECUS NO. 8-554

ANOVA and DUNCAN

Marjorie H. Kleinman, Center for Community Research, New York, New York

ANOVA - Analysis of variance on up to 64 treatment groups. Missing data is permitted. Will compute and print out for each group the number of subjects, mean, standard deviation. T tests are performed between all possible pairs. Also, there is an option for calling DUNCAN multiple range program.

Minimum Hardware: 8K PDP-8/1, TTY, printer, disk or DECtape
Other Programs Needed: PS/8 Operating System
Source Language: FORTRAN

DECUS NO. 8-555

MULTC Multiple Correlation Program

Marjorie H. Kleinman, Center for Community Research, New York, New York

Based upon Doolittle's method for solving simultaneous equa-

DECUS NO. 8-555 (Continued)

tions for the unknown B's. The maximum number of variables, including the dependent variable, is 8.

Minimum Hardware: 8K PDP-8 with TTY, printer and 1 DECTape or disk
Other Programs Needed: PS/8 Operating System
Source Language: FORTRAN

DECUS NO. 8-556

CHISQ Chi Square Program

Marjorie H. Kleinman, Center for Community Research, New York, New York

Will compute up to 20 chi squares at a time on tables as large as 8 X 9. Missing data is permitted. Tables need not all be the same size for the same run. Items may have different ranges. There is an option for computing the contingency coefficient for each table.

Minimum Hardware: 8K PDP-8/1 with TTY, printer and disk or DECTape
Other Programs Needed: PS/8 Operating System
Source Language: FORTRAN

DECUS NO. 8-557

CLUSTR Cluster Analysis Program

Marjorie H. Kleinman, Center for Community Research, New York, New York

This program is based on hierarchical grouping, as described in FORTRAN PROGRAMMING FOR THE BEHAVIORAL SCIENCES, by Donald J. Veldman, and is adapted from the program provided in that book.

Minimum Hardware: 8K PDP-8, TTY, printer, 1 DECTape or disk
Other Programs Needed: PS/8 Operating System
Source Language: FORTRAN

DECUS NO. 8-558

CORREL Correlation Program and PCOMP-VARMAX Factor Analysis Program

Marjorie H. Kleinman, Center for Community Research, New York, New York

CORREL will compute Pearson product moment correlations on a matrix of variables as large as 80 X 80. Missing data is permitted. Before computing correlation coefficients, the appropriate means are substituted for any missing values.

PCOMP-VARMAX uses the principal components method of extracting roots and vectors, and then performs varimax rotation on the factor loading matrix. Input is in the form of a square correlation matrix, and can be read from any input device. Output from CORREL may be used directly as input.

Minimum Hardware: 8K PDP-8/1 with teletype, printer, 1 DF 32 disk, and 1 DECTape
Other Programs Needed: PS/8 Operating System
Miscellaneous: Intermediate data are stored on 2 devices, which are ASSIGNED
Source Language: FORTRAN

DECUS NO. 8-559

CUBIC - A Digital Program for On-Line Differentiation of Sample Analog Signals

John H. J. Allum, Man-Vehicle Laboratory, Massachusetts Institute of Technology, Cambridge, Massachusetts

A digital computer program CUBIC has been developed for on-line differentiation of analog voltage signals. The program accepts voltage records of a time function and yields its derivative after one program cycle time of 4.2 msec. The velocity is obtained by employing a least mean squares cubic fit technique.

The routine is intended for experimental work either as a data reduction tool or as a control signal for a closed loop experiment. The program can be implemented on a PDP-8 digital computer with one digital to analog converter channel and one analog to digital converter channel.

Minimum Hardware: PDP-8, 1 A/D and 1 D/A channel
Storage Requirement: 2K
Miscellaneous: This work was supported in part by NASA Grant NGR-22-009-025
Source Language: PAL

DECUS NO. 8-560

SAM-1

Robert L. T. Cronin, Belmont Hill School, Belmont, Massachusetts

SAM-1 is a Morse Code sending program designed to operate without D/A hardware. It utilizes the electromagnetic force emitted by core to interfere with a radio transmitter located up to 20 feet from the computer. Sending rate is variable via a SR setting. The higher the setting, the faster the rate.

Source Language: PAL III

DECUS NO. 8-561

Revised HELP Loader for High Speed Reader and New BIN Loader

Frank Palmisano, 7 Brentwood Road, Hazlet, New Jersey

Through the use of auto-indexing, interrupt, and a minimum of other commands, the HELP loader has been shortened to seven steps, making it quicker to initialize the system.

The BIN loader has been reduced from 143₈ locations to 100₈ locations, allowing room for the TCO1 bootstrap and leaving the data break locations open.

DECUS NO. 8-561 (Continued)

Minimum Hardware: 4K PDP-8, HSR
Other Programs Needed: RIM Loader
Restrictions: Must be loaded in field zero.
Uses Interrupt
Source Language: PAL

DECUS NO. 8-562

DISORT

John Alderman, Digital Communications Associates, Inc.,
Atlanta, Georgia

This is a program to produce alphabetically ordered directory listings for PS/8. With minor patches it can be used to sort any ASCII file under PS/8.

Minimum Hardware: PS/8 Configuration
Other Programs Needed: PS/8 or OS/8 Operating System
Source Language: PAL-8

DECUS NO. 8-563

TAPE

Russell Lyons, 8 Gould Road, Lexington, Massachusetts

Punches readable characters on paper tape using the low speed punch. It can punch all characters from 240 to 337 (ASCII).

Minimum Hardware: TSS/8, ASR33
Source Language: PAL-D

DECUS NO. 8-564

A Statistical System in PS/8

Jens G. Rosenkrantz, M. D., Childrens Hospital of
Los Angeles, Los Angeles, California

A system, built upon DEC's PS/8, which runs a number of programs to do statistical analyses of data. The following programs are provided: (1) Mean-Variance; (2) Student's t Test; (3) Rank Analysis; (4) Analysis of Variance; (5) Correlation; and (6) Chi Square. Additional programs can be easily added to the system.

Data may be given from a variety of input devices. Answers may be written, on the teletype, high speed punch or line printer, and are formatted on 11 inch "pages." A large number of data files may be chained together by the user, in order to permit batching of data, each file calling a particular statistical test. Thus the system can function as a desk calculator (with teletype input) or can process large batches of data unattended.

Minimum Hardware: 8K PDP-8, Disk or DEctape
Other Programs Needed: 8K FORTRAN System
Restrictions: Output limited on most programs
Source Language: PS/8 FORTRAN (FORTRAN II)

DECUS NO. 8-565

RENUM - Renumbering Program for BASIC Tapes

Dom Geoffrey Chase, O.S.B., Portsmouth Abbey School,
Portsmouth, Rhode Island

Designed to resequence an Edu-20 BASIC tape so that all line numbers are multiples of (decimal) 10. The first line number in the new version is line 100. Commands which reference line numbers (THEN, GOTO, GOSUB) are readdressed to conform to the new numbering.

Minimum Hardware: 8K PDP-8E, F or M, ASR33 or
PT8E high speed reader/punch
Source Language: PAL III

DECUS NO. 8-566

PARTL

Andres T. Siy, Capitol Institute of Technology, Kensington,
Maryland

Program to evaluate the partial fraction expansion of a rational function $N(s)/D(s)$, that has real coefficients and $D(s)$ are written in linear or quadratic factors. Samples of control system reduction to its "Foster Form" canonical form, and network synthesis are given.

Minimum Hardware: 8K PDP-8/I, ASR33, HSR/P
Other Programs Needed: 8K FORTRAN Compiler, 8K Assembler,
8K Linking Loader, User's Program
Source Language: 8K FORTRAN

DECUS NO. 8-567

EXPO

Andres T. Siy, Capitol Institute of Technology, Kensington,
Maryland

Evaluates the approximate exponential expansion of the transition matrix or its augmented matrix, $\exp(AT)$ where A is a square matrix and T is a sampling period, which usually appear in the state variable approach to engineering problems, $\dot{x}(nT)=x(0)$.

Minimum Hardware: 8K PDP-8/I, ASR33, HSR/P
Other Programs Needed: 8K FORTRAN Compiler, 8K SABR
Assembler, 8K Linking Loader, User's
Program
Source Language: 8K FORTRAN

DECUS NO. 8-568

CFI - Continued Fraction Inversion

Andres T. Siy, Capitol Institute of Technology, Kensington,
Maryland

Program to convert a real continued fraction into a rational function.

DECUS NO. 8-568 (Continued)

A sample of evaluating electric network transfer function is given.

Minimum Hardware: 8K PDP-8/I, ASR33, HSR/P
Other Programs Needed: 8K FORTRAN Compiler, 8K SABR Assembler, 8K Linking Loader, User's Program
Source Language: 8K FORTRAN

DECUS NO. 8-569

FLIT Assembler

Gary R. Smith
Submitted by: George E. Ott, University of Wisconsin, Madison, Wisconsin

The FLIT Assembler produces a binary object tape on a high speed paper tape punch and a listing on a 33 ASR teletype from PDP-8 assembly language source tape read on a high speed reader.

FLIT has the following major advantages over other assemblers:
1. Literals and off-page linkages are automatically generated.
2. The source tape is read rapidly and reliably, reducing assembly time.
3. Line numbers appear on the listing, simplifying use of the Symbolic Editor.
4. Tabulations become 8-space fields in the listing just as with the Symbolic Editor.
5. The symbol table has room for at least 348₁₀ user symbols.

FLIT does not recognize macros, floating point or double precision numbers, or Boolean operators. A few other minor source language differences exist between FLIT and other assemblers.

Minimum Hardware: 4K PDP-8, ASR33, HSR/P
Source Language: MACRO

DECUS NO. 8-570

BIN4SV

Roger Kuykendall, Electro Scientific Industries, Portland, Oregon

This program converts PS/8 - OS/8 saved files into binary files which may be stored in PS/8 - OS/8 binary format or output as binary on non-file-oriented devices (especially the paper tape punch).

Minimum Hardware: 8K PDP-8 mass storage device
Other Programs Needed: PS/8 or OS/8
Source Language: PAL-8

DECUS NO. 8-571

INPUT, OS/8 Version

Lars Palmer, Ph.D., AB Hassle, Molndal 1, Sweden

This is INPUT (DECUS NO. 8-480a) rewritten to function better under OS/8. All OS/8 devices can be read. This

version will not function with paper tape FORTRAN II. A data file can be constructed with EDIT and read by FORTRAN.

Minimum Hardware: OS/8 Configuration
Other Programs Needed: 8K FORTRAN
Source Language: SABR

DECUS NO. 8-572

Combination Lettering and Duplicator-Coder Program

Ronald A. Wong, Edmund Wong Co., San Francisco, California

This program enables labeling and duplication of paper tapes in BIN or RIM format. The label is punched directly onto the copy tape and duplication can begin immediately. The input and output devices are selected automatically. Input and output can be from either high or low speed devices.

This program was written by modifying DECUS NO. 8-366 (by A. T. Siy) and DECUS NO. 8-181 (by M. A. Robinton).

Minimum Hardware: 4K PDP-8 with TTY, HSR/P optional
Restrictions: Cannot duplicate ASCII tapes on line
Source Language: PAL III

DECUS NO. 8-573

EDITS - A PS/8 Editor for Non-storage Scope Display

Ray Smith, M.I.T. Laboratory for Nuclear Science, Cambridge, Massachusetts

EDITS is a modified version of the PS/8 editor. EDITS displays a portion of the text buffer surrounding the current line. A couple of command changes have been made to facilitate its use with the display. The source can easily be reassembled to allow for different character generator hardware or software. EDITS displays line numbers if desired.

The tape includes a variety of display based software. Among the routines included is ZIP8 which: (a) Allows the PDP-8/I system to function as a remote PDP-10 terminal through the teletype console; (b) Runs with DECTAP/PA and TYPEDT.PA; (c) Allows PS/8 DECTape/PDP-10 text transmission in both directions; (d) Displays PDP-10 output on the CRT scope, if activated.

Minimum Hardware: PS/8 System, EAE, VC8/I
Other Programs Needed: PS/8 (will probably work with OS/8)
Storage Requirement: 8K
Restrictions: This program was intended for, and is used with, a hardware character generator. With the supplied software generation, the flicker is much worse
Source Language: PAL-8

DECUS NO. 8-574

TD8E System Handler for 8K PS/8

Harold T. Salive and Kim D. Ng, University of Auckland, Auckland, New Zealand

The programs permit running of PS/8 with the TD8E control and only 8K of core. ROM is not necessary with this program! A load-and-go system handler is included which makes restarting easy while preserving the user region of core. A second program included patches the system to remove the AS and DE commands and some device names. A listing is provided for a single-drive DEtape copy routine.

Minimum Hardware: 8K PDP-8, TD8E
Other Programs Needed: PS/8
Restrictions: Shouldn't use AS, De, or unit DTA1. Vulnerable to ODT. No checksum
Source Language: PAL-8

DECUS NO. 8-575

EAE Overlay for Four-Word Floating Point Package Multiply

Gregory Ruth, M.I.T. Charles Stark Draper Laboratory, Cambridge, Massachusetts

This overlay allows the Four-Word Floating Point Package (DEC-08-FMHA-D) to use an EAE in multiplication, thus decreasing the time to interpret an FMPY by a factor of 5.

Minimum Hardware: PDP-8, EAE
Other Programs Needed: DEC-08-FMHA-D
Source Language: PAL-8

DECUS NO. 8-576

LOCAL PAL8: LPAL8.SV

Harold T. Salive and Kim D. Ng, University of Auckland, Auckland, New Zealand

This program allows simple construction of a local PAL-8 having a permanent symbol table tailor-made for a local installation. A program changing symbol table is run through pass 1 of PAL-8. Then the constructor program is run. The constructor program uses the just completed pass 1 symbol table to replace the standard PAL-8 symbol table. The new local version is then saved by the program on SYS as LPAL8.SV.

Minimum Hardware: PDP-8, HSR
Other Programs Needed: PS/8, PAL-8
Source Language: PAL-8

DECUS NO. 8-577

Tape Duplicator (P.D.T.)

Geoffrey Chase, O.S.B., Portsmouth Abbey School, Portsmouth, Rhode Island

A simpler (modified) version of the Master Tape Duplicator

which does not use the interrupt facility. Buffered I/O allows asynchronous copying.

Minimum Hardware: PDP-8/E (F, M), HSR/P; can be modified for low speed punch
Other Programs Needed: Binary loader
Source Language: PAL III

DECUS NO. 8-578

Chromaticity Diagram

R. Jacot, Integra A. G., Wallisellen, Switzerland

From 40 measured data of the spectral transmittance of a material, the program computes and prints the coordinates in the chromaticity diagram and the transmittance for the colour temperatures 2854°K (C.I.E. standard source A) and for 2360°K.

Minimum Hardware: 4K PDP-8, TTY
Other Programs Needed: Floating Point Package 1 (DEC-08-YQ1B-PB) 4/17/70
Source Language: PAL III

DECUS NO. 8-579

LISTIT

Geoffrey Chase, O.S.B., Portsmouth Abbey School, Portsmouth, Rhode Island

LISTIT reads an ASCII paper tape, either 7 or 8-level code, and prints its contents on the console TTY or DECwriter, restoring tabs and ejecting pages in uniform length.

Minimum Hardware: PDP-8/E (F, M), TTY or DECwriter, paper tape reader
Source Language: PAL III

DECUS NO. 8-580

Decimal to Floating Point Conversion

R. Jacot, Integra A. G., Wallisellen, Switzerland

If a lot of data in floating point format are required, this program can be used to generate a complete source tape of the data in floating point format after they have been typed in decimal form. The generated tape can be assembled independent of the main program.

Minimum Hardware: 4K PDP-8, TTY
Other Programs Needed: Floating Point Package 1 or 2 (DEC-08-YQ1B-PB or DEC-08-YQ2B) 4/17/70
Restrictions: Runs only on low speed punch
Source Language: PAL III

DECUS NO. 8-581

Obsolete

DECUS NO. 8-582

Random Number Generator Adapted for 8K FORTRAN/SABR

Adapted by: W. F. Haygood, Jr., 3953 Starbrook Road, Chesapeake, Virginia

This program adapts P. T. Brody's Random Number Generator (DECUS NO. 5-25) for use with 8K FORTRAN or 8K SABR. It can be called directly by any 8K FORTRAN program or by a SABR program. When loaded with the 8K Linking Loader, it will couple directly with its CALL statement in the object program.

Minimum Hardware: 8K PDP-8, ASR33
Other Programs Needed: 8K Linking Loader
Storage Requirement: One relocatable memory page
Restrictions: Output consists of F. P. numbers in range $-1 < X < 1$
Source Language: 8K SABR

DECUS NO. 8-583

BASOVR - 8K BASIC Overlay for PDP-8/S

Alexis Bayart, Digital Equipment, Paris, France

This overlay allows 8K BASIC (DEC-08-LBASA-A-PB) to run on a PDP-8/S.

Minimum Hardware: 8K PDP-8/S, ASR33
Other Programs Needed: 8K BASIC (DEC-08-LBASA-A-PB)
Source Language: PAL III

DECUS NO. 8-584

PRECIS, A Program to Scan a Binary Tape

David Rosenthal, Research Triangle Institute, Research Triangle Park, North Carolina

This program reads a 4K binary tape and prints out all starting and final addresses of blocks, number of blocks and checksum indication.

The program includes a stand-alone subroutine for printing octal numbers.

Minimum Hardware: 4K PDP-8, ASR33, HSR
Source Language: PAL III

DECUS NO. 8-585

FAC HANDLER

Lars Palmer, Ph.D., A B Hassle, Molndal 1, Sweden

FAC, a page relocatable, 3 page handler, is a major revision of the PTR handler to do certain editing of the input tape as it is read. It contains logic to respond to error codes from punch. Among other features, it will convert small letter codes to capital letter codes.

Minimum Hardware: PDP-8/E (only), paper tape reader
Other Programs Needed: OS/8 or PS/8
Storage Requirement: Uses one page + 2 pages
Restrictions: Relocations might be difficult in 8K; should be assembled to user's requirement
Source Language: PAL-8

DECUS NO. 8-586

XDIREC, OS/8 - PS/8 Selective Directory Listing

A. Windram
Submitted by: L. C. Chapus, The Grassland Research Institute, Hurley, Maidenhead, Berkshire, United Kingdom

It is often useful to know whether a file or a set of files is present on a directory device. This program enables a search to be made, producing only relevant output. Its main use is in searching for a group of files with the same file name.

Minimum Hardware: Any OS/8 or PS/8 Configuration
Restrictions: Uses most of core as buffer space. One table must be configured to suit the user's system
Source Language: PAL-8

DECUS NO. 8-587

FORTRAN-D 4K Overlayings to Chain Programs

Leopoldo Bertacche
Submitted by: Alessandro Zanon, Istituto Nazionale Fisica Nuclear (INFN), Legnaro (Padova), Italy

The overlayings add five new statements to FORTRAN-D 4K supplied by Digital Equipment Corporation. This new version of FORTRAN is designed to segment large programs and/or use a large amount of data.

The new statements are "CALL N," "RETURN," "CHAIN NAME," "REWIND," and "BLOCK OUT."

Minimum Hardware: 4K PDP-8
Other Programs Needed: FORTRAN-D
Source Language: PAL-D

DECUS NO. 8-588

PEEK, A User Program to Look at the TSS/8 Monitor

Paul Kinzelman, Carnegie-Mellon University, Pittsburgh, Pennsylvania

PEEK is a diagnostic program for TSS-8 which enables a user to look at any location or set of contiguous locations (maximum of 8) in the resident monitor. The program is useful to watch the monitor without disturbing the operation of the monitor. PEEK may be run under any account number.

Minimum Hardware: TSS/8
Restrictions: Source tape has parity; should be run through EDIT to remove parity
Source Language: PAL-D

DECUS NO. 8-589

BOOTST, Universal OS/8 (PS/8) Bootstrap

G. Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

This program communicates with the user via the console type-writer. The use names the system device; the program responds by finding the bootstrap for that device, loading it into core and starting it.

Minimum Hardware: OS/8 or PS/8 System
Restrictions: Needs modification to run on PDP-8/S
Source Language: PAL III

DECUS NO. 8-590

Matrix Inversion

Jean-Francois Echallier and Jacques Pernier, I.N.S.E.R.M., Bron, France

This subroutine inverts a matrix of real numbers residing in core in floating format (three words). The Gauss-Jordan method of elimination is used to perform the inversion.

Calling program, routine and data are in the same field.

Minimum Hardware: PDP-8/I with EAE
Other Programs Needed: Floating Point Package (DEC-08- YQYA-PB)
Source Language: PAL

DECUS NO. 8-591

Pulmonary Resistance

Jens G. Rosenkrantz, M. D., Childrens Hospital of Los Angeles, Los Angeles, California

A system of programs which, adapted from DEC's Advanced Signal Averager, allows accurate measurement of mean pulmonary arterial flow and pressure, left atrial pressure and intrapleural pressure. From these data, obtained by use of appropriate electromagnetic flow and suitable pressure transducers, the system calculates total and arteriolar resistances and right ventricular work. This information, together with the digitized average wave forms, is written on DECtape.

In addition, a program is included with the system, which measures cardiac output on-line from an indicator dilution curve by the Stewart-Hamilton method.

The system is capable of interfacing with the Advanced Averager, so that the options available in the signal averager system are retained.

NOTE: The binary tapes available with this program are those of the LAB-8 Advanced Averager

Minimum Hardware: 8K PDP-8/I; EAE; Disk or DECtape; a second DECtape (for DECtape systems) and LAB-8 peripherals
Other Programs Needed: OS/8 or PS/8 Operating System
Source Language: PAL-8

DECUS NO. 8-592

Printer Test Program

Derek J. Gardiner, Nortec Computer Devices, Southboro, Massachusetts

This is a diagnostic program written for the lomec line printer interfaced to the PDP 8/E. The printer is program compatible with the DEC LE8 line printer but has expanded capability with respect to paper format commands. The program ensures the hardware is functioning as well as compatibility with LE8.

Minimum Hardware: 4K PDP-8/E, Line Printer - LE8 or equivalent
Source Language: MACRO-8

DECUS NO. 8-593

Tri-Data Paper Tape PAL III Assembler

Jack R. Ellis, Tri-Data Corporation, Mountain View, California

This program is a revision of the PDP-8 basic PAL III assembler. Additional features include card reader and line printer I/O, a symbol table capacity of up to 3550 symbols (16K system), paginated and formatted listings with line numbers, and the availability of a compacted source tape.

Minimum Hardware: 4K to 16K PDP-8, ASR teletype, Reader/Punch, Line Printer, card reader optional
Restrictions: Cannot be debugged with DDT; will not re-alphabetize new memory-reference or micro-op symbols added to permanent symbol table
Source Language: PAL III

DECUS NO. 8-594

FP8 - Floating Point Arithmetic Software for DEC PDP-8 Series Computers

William R. Myers, Aerojet Nuclear Company, Idaho Falls, Idaho

FP8 is a floating point arithmetic interpretive program for use in any DEC PDP-8 series computer. It is somewhat smaller and much more versatile than the standard arithmetic package supplied by DEC. The full program requires 1249 locations in one memory field (plus from five to 34 locations in remote fields, for linkage) compared to the 1408 locations required by the DEC software. FP8 implements access across memory field boundaries for both instruction sequences and operand reference. A four-bit operation code is used to obtain an expanded set of floating-mode instructions including: add, subtract, multiply, divide, inverse divide, load, store, three-way compare, and jump and jump-to-subroutine. Operate-class instructions include: immediate load, absolute value, clear, change sign, set data field, and set output format. FP8 includes single- and double-precision fix and float operations, and square, square root, exponential, logarithm, sine, cosine, and arctangent functions, and free-format input

DECUS NO. 8-594 (Continued)

and variable format output routines. The program size may be reduced to 663 locations by deletion of the function and input/output routines.

Source Language: PAL

DECUS NO. 8-595

UPDATE, A Program to Make Corrections to a File Containing Records of Variable Length

Floor Anthoni and Hans Mees, Medical Biological Laboratory TNO, Rijswijk, The Netherlands

Designed to facilitate the management of data such as card-indexes on computer mass-storage media. UPDATE provides the user a simple yet powerful means to correct such files by the method of string-replacement. The 4K program, expanded with the capability of doing PS/8 input/output, can easily be adapted to other operating environments.

Minimum Hardware: 8K PDP-8
Other Programs Needed: OS/8 or PS/8
Storage Requirement: 4K in Field 0 and 10 pages in Field 1
Restrictions: Limited to PS/8 OS/8. Maximum size of records is 700₁₀ characters
Source Language: PAL-8

DECUS NO. 8-596

Multilength Routines

H. J. Godwin, Royal Holloway College, Englefield Green, Surrey, England

This program enables various arithmetic operations to be performed on numbers of up to 57 decimal digits.

Minimum Hardware: 4K PDP-8 with TTY
Source Language: Machine Language

DECUS NO. 8-597

N.I.H. OS/8 Package

Peter Lemkin, National Institutes of Health, Bethesda, Maryland

This package consists of various programs written at N.I.H. for use with the OS/8 Operating System. There are two OS/8 tapes offered; one contains source files for each program and includes the necessary documentation, the other tape contains object or SAV files. The write-up which is offered consists of program abstracts and directories for both tapes. The listings have been compiled and are offered as one volume.

Abstracts for all programs in the package are listed below.

1. LIST - A Batch Processing Utility for OS/8
October 12, 1971 - Revised: December 4, 1972

Program LIST is an OS/8 program which lists a maximum of 150 ".DA" files on the lineprinter. The listings include the file name, date and listing line and page sequence numbers. The set of files to be listed may be specified individually on the teletype or by using an indirect file. Five edit codes are available to insert in the text to modify the listing.

Minimum Hardware: A.B. Dick 960 lineprinter or equivalent
Storage Requirement: 12K
Restrictions: Current version uses A.B. Dick 960 as the FORTRAN device 3 lineprinter, but set up to use general I/O LPT: . Only .DA files may be listed
Source Language: OS/8 FORTRAN II/SABR

2. UTIL2.SB - A Modified UTILITY.SB for PS/8 (OS/8)
FORTRAN II
September 2, 1971 - Revised: December 4, 1972

UTIL2.SB is the modified version of the PS/8 FORTRAN II library program UTILITY.SB. There are changes in some of the I/O devices to allow the use of a PT08 or DC02G as device 2 (as a teletype), an A.B. Dick 960 videojet as device 3, and a non-echo PT08/DC02G as device 3 input. CONTROL/Z on device 4 input can be detected by a new subroutine "EOF." UTIL2.SB may be conditionally assembled with SABR as a PT08 or DC02G or A.B. Dick 960 videojet subroutine. UTIL28.RL is a version for PT08 and A.B. Dick videojet. UTIL2G.RL is a version for DC02G.

Minimum Hardware: PS/8 or OS/8, ASR33, PT08, DC02G and/or A.B. Dick 960 Lineprinter
Source Language: SABR

3. MAGTAP - A TC58 Magtape Handler for OS/8 FORTRAN II
October 11, 1972 - Revised: December 4, 1972

"MAGTAP" is an OS/8 FORTRAN II subroutine which enables the user to control either a TUI0 or a TU20 9 track magtape drive utilizing the TC58 controller. This magtape device handler allows the user to read, write, read-compare, space backwards, space forward, write end of file, check for beginning or end of tape, check for end of file mark, and rewind the tape. MAGTAP runs with interrupts off.

Minimum Hardware: TC58 and TUI0 or TU 20
Restrictions: No double buffering possible in current version
Source Language: OS/8 FORTRAN II/SABR

4. MAGDMP - An OS/8 TC58 Magtape File Storage and Retrieval System
April 4, 1972, Version 1.2 - Revised: December 7, 1972
Version 1.3

MAGDMP is an OS/8 program used to selectively save, restore append and copy OS/8 files between the system device and one or more TU20 magtapes (on a TC58). Files may be manipulated by their file names, extensions, creation dates or access dates. Wild card (i.e. *) naming conventions are also allowed.

Minimum Hardware: TC58 and TU20 or TUI0 Magtape
Storage Requirement: 12K
Restrictions: The restoration by time and date is not yet implemented
Source Language: OS/8 FORTRAN II, SABR

5. SNDFIL.FT, RECVR.FT, SEND.FT - An Inter - PDP-8 Batch File Transmission Program
July 9, 1972 - Revised: November 29, 1972

SNDFIL stacks a list of up to 240 file names of files on device DSK: (which is assignable). This set of files residing on PDP-8#1 is then transferred to a second computer, a PDP-8#2 via a PT08 or DC02G link. The PDP-8#2 has a program called "RECVR" running to put the files which it receives from PDP-8#1 onto its (assignable) DSK:. Core images for PDP-8's with PT08's (SNDFL8.SV, RECVR8.SV) and with DC02G's (SNDFLG.SV RECVRG.SV are also given.

Minimum Hardware: 2 PDP-8's with either DC02 or PT08 to communicate with each other
Storage Requirement: 12K for sender, 8K for receiver
Source Language: OS/8 FORTRAN II, SABR

6. FAILSAFE - A Disk/Magtape Utility for Use with OS/8
January 22, 1971 - Revised: December 4, 1972

There is a need in a disk based operating system to do periodic dumps of the disk in order to easily recover from system crashes which destroy the disk files. FAILSAFE is a PDP-8 utility program which can be used to save (or restore) one or more RF08 disk platters onto (or from) a TU20 magtape. The FAILSAFE program is currently being used with a PS/8 system running on a LINC8 with a 4 platter RF08 and TC58/TU20 magtape, but it should be completely compatible with OS/8.

Minimum Hardware: TC58/TU20 and RF08 or RK8 or DC32 disk (optional PT08)
Other Programs Needed: OS/8 disk system
Restrictions: Modifications must be made for other disk and/or magtape systems
Source Language: PAL-8

7. SENDIT/SENDME - A PDP-10 to PDP-8 File Transmission Utility Program
September 22, 1972 - Revised: December 4, 1972

Two programs "SENDIT" (on a PDP-10) and "SENDME" (on a PDP-8 with OS/8) allow the specification, synchronization and transmission of a PDP-10 ASCII ".DAT" file to the PDP-8 using a PT08 hardware interface.

Minimum Hardware: PT08 connection between the PDP-8 and PDP-10
Other Programs Needed: OS/8 and TOPS-10
Storage Requirement: 8K on the PDP-8
Source Language: PDP-10 FORTRAN and PDP-8 FORTRAN II/SABR

8. DELETE - A Program to Delete Illegal OS/8 Files
March 6, 1972 - Revised: December 4, 1972

DELETE is an OS/8 program which deletes files with illegal "PIP" file names from device SYS:. Such file names can be created in the system under FORTRAN. For example the file

"%!... Y,,DA"

could be created by FORTRAN. This file name will not be accepted by PIP since the command decoder will trap it as illegal since it has a space in the middle of the name and "%", ".", and ",", are illegal characters. When DELETE starts it will give instructions as to its usage.

Storage Requirement: 8K
Restrictions: Can only delete files from device SYS
Source Language: OS/8 FORTRAN II, SABR

9. PS/8 "EDIT" Modified for High Speed PT08 and DC02G Serial Interface
December 4, 1972

The PS/8 editor, EDIT.SV, has been patched with ODT to allow operation from a datapoint 3300 over either a PT08 or DC02G serial interface. The operation is exactly the same as for the PS/8 EDIT.SV. The PT08 version is called PT08ED.SV and the DC02G version is called DC02ED.SV. The PT08 version uses device codes (40/41) while the DC02G version uses the currently selected station/group.

Minimum Hardware: PT08 or DC02G serial interface
Other Programs Needed: PS/8 or OS/8
Restrictions: "Escape" has been used instead of "altmode" and the input parity is now ignored for use with DATA-POINT 3300 videoterminal
Source Language: ODT patches to PS/8, EDIT.SV

10. OS/8 FORTRAN II Logical Arithmetic Subroutines
November 8, 1972 - Revised: December 4, 1972

The OS/8 FORTRAN II subroutines "OCTL", "SHIFT" and "ANDB" let the FORTRAN user perform bit manipulation from FORTRAN without using SABR code.

Other Programs Needed: OS/8 FORTRAN II
Source Language: OS/8 FORTRAN II

11. GTCHR - An OS/8 FORTRAN II Subroutine to Analyze a Character Input Stream from a SYS:.. Data File
September 17, 1971 - Revised: December 4, 1972

GTCHR gets sequential characters, in 6 Bit ASCII right justified, from the specified ".DA" file. Switch IRSTSW is used to reopen a file at the start of the file or to get the next character in the file. The file EOF is detected by the EOF (IFLAG) routine which detects CONTROL/Z characters. A line may be up to 127 characters long. Any legal 6-Bit character is allowed.

Restrictions: Will only read ".DA" files from device SYS:
Source Language: OS/8 FORTRAN II/SABR

12. Double Precision Arithmetic Package for OS/8
FORTRAN II
March 13, 1972 - Revised: December 4, 1972

DPARITH.FT is a fast double precision integer arithmetic internal SABR type code subroutine package for use in OS/8 FORTRAN II. This package will work on any PDP-8 with or without EAE. DPCVT.FT is a FORTRAN II subroutine using DPARITH.FT to convert double precision integers to and from floating point numbers.

Other Programs Needed: OS/8 FORTRAN II/SABR
Restrictions: All calls to DPARITH.FT must be inside of a subroutine or main with which it is compiled
Source Language: OS/8 FORTRAN II/SABR

13. An OS/8 FORTRAN II Function to do BCD/Decimal
Number Conversion
July 6, 1972 - Revised: December 4, 1972

IBCD packs or unpacks a BCD word (3 4-bit bytes) from or to a FORTRAN integer. The word to be packed or unpacked is given in argument "I" while the result is returned in "IBCD."

Restrictions: Converts BCD numbers in the range of 0 to 999
Source Language: OS/8 FORTRAN II/SABR

14. DICOMED 31 Image Display Device Handler
December 5, 1972

OS/8 subroutine "DIOMED" is a FORTRAN/SABR subroutine. It displays the point, 256X256, or 1024X1024 raster image on the DICOMED model 31 image display as well as doing other DICOMED commands such as ERASE, CHANGE GAMMA, TURN ON VIEW LIGHT, etc.

Minimum Hardware: DICOMED 31 display and interface, EAE
Other Programs Needed: OS/8 FORTRAN MAIN program
Restrictions: Arrays are passed to DIOMED through COMMON
Source Language: FORTRAN II/SABR

15. Program to Put a LINC8 Block 0 Bootstrap to Bring in
the OS/8 System Disk
January 16, 1971 - Revised: December 5, 1972

TAPBOT writes a bootstrap block on block 0 of a unit 0 LINC8 128 word/block LINCtape which is being used as an OS/8 DECTape. The LINC load switch may then be used to bootstrap in the system device which in this case is an RF08 disk. It should also work with minor modification for other types of disks such as the DF32 or RK8.

Minimum Hardware: LINC8 with at least one LINCtape drive and a disk
Restrictions: OS/8 running on a LINC8 uses some device other than LINCtape as device SYS:
Source Language: PAL-8

16. DATE - FORTRAN II OS/8 Subroutine to Return the
OS/8 Date
November 8, 1971 - Revised: December 5, 1972

"DATE" returns the OS/8 date word in integer format. The algorithm for this FORTRAN callable subroutine was borrowed from the PS/8 system support manual.

Restrictions: Requires OS/8 date word to be previously entered
Source Language: OS/8 FORTRAN II/SABR

17. PT08/Datapoint 3300 PS/8 Build Programs
December 5, 1972

Five core images modified from the original version of November 1969 PS/8 software let the user build and run a PS/8 system with a PT08 as the system teletype. Used at 1200 or 2400 baud with a datapoint or similar terminal, PS/8 can be run with a much greater throughput.

Minimum Hardware: PT08 serial interface (device codes 40/41)
Other Programs Needed: Existing PS/8 or OS/8 system
Restrictions: The PS/8 core image has CONFIG set for a 4 platter RF08. To change this, another configuration .BN image from CONFIG must be used
Source Language: ODT patched core images

DECUS NO. 8-598

CRT: An OS/8 Handler for Tektronix 611 Storage Scope

Donald C. Uber, Bio-Medical Division, Lawrence Livermore Laboratory, Livermore, California

CRT: is a two-page, write only, non file-structured device handler for the Tektronix 611 storage scope under the OS/8 operating system. The handler is listed in BUILD format for easy addition to an OS/8 system.

Minimum Hardware: Tektronix 611 Storage Scope and PDP-8 Interface
Restrictions: Non-standard interface required - is described in write-up
Source Language: PAL-8

DECUS NO. 8-599

DIBILD.; Directory Rebuilder for PS/8 or OS/8

John Alderman, Digital Communications Associates, Inc., Atlanta, Georgia

DIBILD is a PS/8 or OS/8 utility program to restore directories that have been overwritten. It processes an ASCII file that is produced by PIP in the /E format (or a file that looks like this), and constructs a directory on the specified output device. The user supplies the program with the device code for the directory that is to be constructed, and the input file name (.DI is assumed). The "systems area" of the output specified device is protected since files will start at block 70(8). This feature can be changed by a simple patch to the source and reassembly.

DECUS NO. 8-599 (Continued)

Please note that this program is offered with no promise that it is foolproof. Support for the program is not offered, and you use it at your own risk.

Minimum Hardware: PS/8 directory device and at least one other device

DECUS NO. 8-600

EXPIP (Extensions PIP)

Lars Palmer, A B Hassle, Molndal I, Sweden

EXPIP performs file transfers between devices based on extensions, not on file names.

Minimum Hardware: 8K PDP-8 or PDP-12 with PS/8, OS/8 or OS/12
Restrictions: Both input and output devices must be file-structured
Source Language: PAL-8

DECUS NO. 8-601

OASIS

Robert Cronin, Belmont Hill School, Belmont, Massachusetts

OASIS is yet another one of the many programs that has PAL III coupled with EDITOR in an 8K machine. It too reads the text image from core, rather than from paper tape. Yet, there are several differences over other versions:

1. Tape punched in XCBL format (See DECUS NO. 8-26C)
2. Virtually no operator intervention at the console is required.
3. It contains a built in "operating system" that performs many minor functions that one does not normally want to bother about when testing out sections of a large program.
4. A provision for immediate testing of small sections of a program.
5. A pseudo CONTROL/C feature is now built in that allows the user to terminate virtually all output without intervention at the console.
6. The system is loaded with RIM only.

Minimum Hardware: 8K PDP-8, ASR33

DECUS NO. 8-602

The PDP-8 Cookbook, Volume 1

Editor: Floor Anthoni, Medical Biological Laboratory TNO, Rijswijk, The Netherlands

The PDP-8 cookbook is a collection of subroutines at the assembly level for the purpose of instant use.

Minimum Hardware: PDP-8 family
Source Language: PAL

DECUS NO. 8-602B

PDP-8 Cookbook, Volume 2

Editor: Floor Anthoni, Medical Biological Laboratory TNO, Rijswijk, The Netherlands

This volume adds 44 new subroutines to the gradually increasing PDP-8 subroutine library.

Source Language: PAL III, PAL-D, PAL-8

DECUS NO. 8-603

PATPST: Patch for DEC-LAB-8/E Post-Stimulus-Time-Histogram Program

Priv. Doz. Dr. med. Juergen B. Vieth, Universitaets-Nervenklinik, Erlangen, W. Germany

This is a patch for the DEC-LB-U4OB Post-Stimulus-Time-Histogram-Program. It allows to write or read data on DEC-tape unit 3 while the program is called from the system device (unit 0). Questions about the functions "write" or "read" as well as the desired file number will be asked on the display. During function "write" all TTY commands of the main program are active. During "read" function commands to reask parameters or to clear the data buffer are not available.

Minimum Hardware: PDP-8/E with 4K memory, ASR33 teletype, AD8-EA 10 bit A/D converter, AM8-EA 8 channel multiplexer, VC8-E Point plot display control with display oscilloscope VR03A or VR 14 or RM 503, DK8-EP Programmable real time clock, KE8-E Extended arithmetic element, TC08 DECTape control, TU 56 Dual DECTape transport

Other Programs Needed: Main program (DEC-LB-U4OB)
Storage Requirement: Core locations: 0-4177, 7420-7577 (For further information: DEC-LB-U4OB-D); this patch runs in the data area: 4200-6177

Restrictions: The name of the program must be: PST

Source Language: PAL-D

DECUS NO. 8-604

'GET' Command for the Disk/DECTape Monitor System

Craig B. Phyfe, The Hill School, Pottstown, Pennsylvania

This is a program developed for use with the Disk Monitor System. It has been used successfully on the 'AF' version of the monitor, but it should run on the '8E' version as well. The program is an extension of the Disk Monitor System, allowing the user to read a specified file from the disk into core without executing it. It is patterned after the OS/8 system 'GET' command, with the restriction that this program will only manipulate programs saved on the system device, whether it be DF/DS-32 disk, RF/RS-08 disk, or DECTape. This program

DECUS NO. 8-604 (Continued)

is useful when the user wants to toggle a patch into a system program before executing that program.

Minimum Hardware: 4K PDP-8, DF32 Disk or RF08 Disk or TC01 DECTape
Other Programs Needed: Disk Monitor System (DEC-08-SBAF-PB)
Restrictions: Actual system will recognize both Disk and DECTape but GETSYS will only operate on the system device.
Source Language: PAL-D

DECUS NO. 8-605

ADUMP8

Bruno Nicoletta and G. Franco Ruffini, Digital Electronic Automation, Moncalieri, Italy

This program provides a means of punching information contained in selected blocks of any core memory field, as binary coded paper tape using the high speed or TTY punch.

Minimum Hardware: 4K PDP-8, TTY or high speed punch
Source Language: PAL III

DECUS NO. 8-606

PIPII

Steven Williamson, Carleton College, Northfield, Minnesota

PIPII allows a PS/8 user to read and write on DECTapes formatted and initialized for either DOS or RSTS, the two most commonly used systems on the PDP-11. Additional options allowing the output of data from an 11 DECTape to a DECTape that can be used by TSS/8 BASIC are also available.

Minimum Hardware: 8K PDP-8, EAE, 1 DECTape drive (2 preferable)
Other Programs Needed: PS/8 system
Source Language: PAL-8

DECUS NO. 8-607

CALCUI

J. V. Hopson, Bureau of Customs, 2100 K Street N. W. , Washington, D. C.

Makes the PDP-8 perform like a printing calculator, with addition, subtraction, multiplication, division, and exponentiation. Prints out subtotals and totals on command. Recognizes control/C for return to monitor. Utilizes one of the DEC floating point packages (EAE--if so equipped, NON-EAE, or 27-BIT). Introductory dialog gives essential operating instructions.

Minimum Hardware: PDP-8, TTY
Other Programs Needed: Floating Point Package (EAE, NON-EAE or 27- BIT)
Source Language: PAL-8

DECUS NO. 8-608

FUTIL - OS/8 File Utility

Jim Crapuchettes, Department of Anesthesia, Stanford Medical Center, and Frelan Associates, Menlo Park, California

This program allows examination and modification of OS/8 (PS/8) mass storage devices from the teletype. A wide variety of commands allows this to occur along with searching, file look-up, and 24-bit integer expression evaluation.

Minimum Hardware: OS/8 Configuration, 8K
Other Programs Needed: OS/8
Source Language: PAL-8

DECUS NO. 8-609

OCOMP - Octal Compare and Dump

Dennis McGhie and Jim Crapuchettes, Frelan Associates, Menlo Park, California

An OS/8 utility program to compare or dump OS/8 files. Masking for compares and searching for dumps are included. The output file contains the contents in octal from the first input file, of all (dump) or part of the words (compare, search) from the file. This program is useful for comparing two versions of a ".SV " file.

Minimum Hardware: OS/8 Configuration (Source file is supplied on DECTape)
Other Programs Needed: OS/8
Source Language: PAL-8

DECUS NO. 8-610

INVENT-8

Charles Moeder, Digital Equipment Corporation, Maynard, Massachusetts

INVENT-8 is a series of subroutines for manipulating binary unformatted data running under the OS/8 Monitor (OS/8 FORTRAN II). It allows the user to open input and output files as well as read and write binary unformatted, fixed length records of up to 125 12-bit word per record.

Also included is a generalized sort generator for sorting these core image records.

Minimum Hardware: OS/8 Configuration, 8K, 64K Mass storage peripheral
Other Programs Needed: OS/8 FORTRAN
Source Language: SABR

DECUS NO. 8-611

SLED - Source and Listing Editor

W. D. Gilmour, Coxbridge House, Coxbridge,
Glastonbury, Somerset, England

Programs written in condensed format (with lines separated by semicolons and extended as required) do not give neat listings, suitable for publication, when passed through the standard MACRO or PAL III assemblers. SLED secures a neat listing from the raw listing tape produced from the assembler, with one blank line before each label, except labels used to define zero constants, and two blank lines before every break in program counter sequence. Along each line, non-significant spaces are eliminated to give a nicely justified format, and the obtrusive semicolons are removed. The number of lines to a page are controlled and new pages automatically started at suitable points in the listing. Pagination and titling are automatic. The program can be used to lay out source tapes in a similar manner.

Minimum Hardware: PDP-8, TTY, HSR and/or HSP optional
Restrictions: Program written for non-standard high speed paper tape reader - use standard DEC reader with caution. One delay needs adjustment for computer other than 8/S
Source Language: MACRO

DECUS NO. 8-612

ELAN - Elementary Linguistic Analysis

W. D. Gilmour, Coxbridge House, Coxbridge, Glastonbury,
Somerset, England

ELAN is a simple program for educational demonstrations of the use of a computer in language studies. From an input of arbitrary length it counts the occurrence of every letter, punctuation mark, and other symbol in the sample, and also can be set to count the occurrences of up to 64 nominated words, or the beginnings or endings of words, each with a maximum length of 7 characters, and to present all these counts in a convenient format at the end of the sample, together with a word length analysis and a count of the number of paragraphs in the sample. Input can be by paper tape, using either a teletype of HSR, or directly from the keyboard.

Minimum Hardware: PDP-8, TTY, HSR optional
Restrictions: Developed for non-standard HSR; use DEC HSR with caution
Source Language: MACRO

DECUS NO. 8-613

Interconversion Between A/D Floating Point and D/A Formats

Brian C. Hodgkin, Ph.D., Maine Medical Center, Portland
Maine

A collection of subroutines is provided which makes possible the conversion of data in one format to either of the other two formats. Complex calculations can be performed on A/D inputted information using floating point arithmetic, with results outputted in any of the three formats. Machine language and floating point programs can be intermingled by appropriate initialization and use of the subroutines.

Minimum Hardware: PDP-8, A/D and/or D/A converter
Other Programs Needed: 23-bit Floating Point Package (DEC-08-NFPPA-A-PB)
Restrictions: Can be used in single field as is; can be modified for multi-field operation. A/D and D/A formats must be the same as ADØ1A and AA50
Source Language: PAL III

DECUS NO. 8-614

Clock Calibration

Masashi Kamii, The Central Institute for Experimental
Animals, Nogawa, Kowasaki, Japan

Using CRT (RM503) and X'TAL-clock in an AX08 configuration this program allows visible calibration of the RC-clock.

Minimum Hardware: LAB 8/I (PDP-8/I and AX08 without XR, XC, XM option)
Source Language: PAL III

DECUS NO. 8-615

EAE Multiplication for 8K FORTRAN

Donald C. Parker, Clarkson College of Technology,
Potsdam, New York

This FORTRAN callable subroutine performs 27 bit floating point multiplication using the 24 bit KE 8/I or KE 8/E EAE option. Execution time has been substantially reduced in comparison with the software version included in LIB8.RL. Core space, however, has been sacrificed for this additional speed.

Other Programs Needed: 8K FORTRAN
Source Language: SABR

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FOCAL8-205	Random Walk/Array	FOCAL8-238	Millikan Oil Drop Experiment
FOCAL8-206	FOCAL Generates Binary Patches	FOCAL8-239	DIV - Program for Division
FOCAL8-207	EAI/ASCII Converter and 'SLO-SYN' NC Program and Tape Generator	FOCAL8-240	Science Fiction Quiz
FOCAL8-208	A Normally Distributed Random Number Generator in FOCAL	FOCAL8-241	Satellite Orbital Parameters
FOCAL8-209	GRFIT, A Simple Least Squares Routine	FOCAL8-242	Solution of Linear Equation Systems with Symmetrically Matrix
FOCAL8-210	CHAIN and FCOM	FOCAL8-243	Analysis of Variance for One- Two- and Three-Treatment Designs for a PDP-8
FOCAL8-211	WEST-KY Four-User FOCAL	FOCAL8-244	HANGMAN IV
FOCAL8-212	Automated Terminal Usage Accounting for Four-User FOCAL	FOCAL8-245	Executive and Utility Routines for FOCLX, 1972
FOCAL8-213	FOCAL Random Number Generator	FOCAL8-246	Undefeatable FOCAL TIC-TAC-TOE
FOCAL8-214	FDSK, An Overlay for FOCAL to Read Data - Or Program - Files from the PS/8 Systems Device	FOCAL8-247	FNEWS Overlay to Use High Speed Punch with FOCAL Program
FOCAL8-215	FOCAL1969 Octyl Loader	FOCAL8-248	FOCTXT - Text Input-Output Patch to FOCAL-1969
FOCAL8-216	FARRAY, A FOCAL FNEW for Two Dimensional Arrays in 8K FOCAL	FOCAL8-249	Payroll Listings and Totals
FOCAL8-217	Hamming Algorithm to Solve Two Coupled Ordinary First Order Differential Equations with Given Initial Conditions	FOCAL8-250	Six Curves - GMS037
FOCAL8-218	FOCAL Overlay CHAIN	FOCAL8-251	"WORD" - Character Generation Using FOCAL's FDIS Function
FOCAL8-219	Keyboard Controlled High Speed Punch Routine for FOCAL 1969	FOCAL8-252	12K Overlay for FOCAL
FOCAL8-220	Individual Tablet Assay	FOCAL8-253	Solution to Any Equation Involving One Variable
FOCAL8-221	LSQ Stern-Volmer: Least Squares Treatment of the General Stern-Volmer Equation	FOCAL8-254	Patch to Allow Computed Line Numbers in FOCAL, 1969
FOCAL8-222	Center of Gravity Calculations	FOCAL8-255	Repeating Decimal
FOCAL8-223	FOCLX, 1972	FOCAL8-256	OPTION \$
FOCAL8-224	SPASTIC - A System for Programming Angles, Scaler and Timer by Internal Counting	FOCAL8-257	LIMERICK GENERATOR; RANDOM SENTENCE GENERATOR; LIFE SPAN SIMULATION PROGRAM
FOCAL8-225	Loan Amortization Schedule	FOCAL8-258	Hearing Loss Simulation
FOCAL8-226	Frequency Transformation Program		
FOCAL8-227	FOCL/F - An extended version of 8K FOCAL 69		

<u>DECUS NO.</u>	<u>TITLE</u>
FOCAL8-259	High Speed Punch, High Speed Write, and FRAN Overlays to FOCAL 69
FOCAL8-260	Arithmetic and Geometric Progressions
FOCAL8-261	Chi Square Utility Package, CHISQR
FOCAL8-262	Protein Binding: PROBON 1 - Fraction Bound, PROBON 2 - Total Drug
FOCAL8-263	ROOTS, A Polynomial Root Finder
FOCAL8-264	MEMORY, A Children's Game
FOCAL8-265	LISTAL
FOCAL8-266	STATPACK, An Interactive Statistical Package
FOCAL8-267	BLACKJACK for FOCAL 1969
FOCAL8-268	FX Function for Random Access Files
FOCAL8-269	4K FOCAL '69 Speed-Up Patches
FOCAL8-270	MONOPOLY
FOCAL8-271	Modifications of FOCL/F for Data Acquisition and Control



DECUS SERVICE CHARGES

DECUS NO.	WRITE-UP	PAPER TAPE		LISTING	DECTAPE		LINCTAPE		MAGTAPE		OTHER INFORMATION
		BIN	ASCII		U/S	D/S	U/S	D/S	U/S	D/S	
FOCAL8-1	NC	\$	\$	\$ NC	\$	\$	\$	\$	\$	\$	
FOCAL8-2	NC	1.		NA							
FOCAL8-3	NC			NC							
FOCAL8-4	NC			NC							
FOCAL8-5	NC		1.	NC							
FOCAL8-6	NC	1.		NA							
FOCAL8-7	NC	1.		NC							
FOCAL8-8	NC	1.	5.	NC							
FOCAL8-9	NC		5.	NC							
FOCAL8-10	NC			NC							
FOCAL8-11	NC	1.	5.	NC							
FOCAL8-12	NC			NC							
FOCAL8-13	NC			NC							
FOCAL8-14	NC			NC							
FOCAL8-15	NC			NC							
FOCAL8-16	NC	1.	5.	NC							
FOCAL8-17	NC			NA							
FOCAL8-18	NC			NC							
FOCAL8-19	NC		1.	NA							
FOCAL8-20	NC		1.	NC							
FOCAL8-21	NC			NC							
FOCAL8-22	NC			NC							
FOCAL8-23	NC			NC							
FOCAL8-24	NC			NC							
FOCAL8-25	NC			NC							
FOCAL8-26	NC		1.	NA							
FOCAL8-27	NC			NC							
FOCAL8-28	NC			NC							
FOCAL8-29	NC			NC							

N/C - No Charge
 N/A - Not Available

U/S - User Supplied Tape
 D/S - DECUS Supplied Tape

For information not contained on this sheet see General Information at end of this section

DECUS SERVICE CHARGES

DECUS NO.	WRITE-UP	PAPER TAPE		LISTING	DECTAPE		LINCTAPE		MAGTAPE		OTHER INFORMATION
		BIN	ASCII		U/S	D/S	U/S	D/S	U/S	D/S	
FOCAL8-30	NC	\$	\$	\$ NC	\$	\$	\$	\$	\$	\$	
FOCAL8-31	NC			NC							
FOCAL8-32	NC			NA							
FOCAL8-33	NC			NC							
FOCAL8-34	NC			NC							
FOCAL8-35	NC			NC							
FOCAL8-36	NC			NC							
FOCAL8-37	NC			NC							
FOCAL8-38	NC			NC							
FOCAL8-39	NC			NC							
FOCAL8-40	NC		3.	NA							
FOCAL8-41	NC		1.	NC							
FOCAL8-42	NC		1.	NC							
FOCAL8-43	NC			NC							
FOCAL8-44	NC			NC							
FOCAL8-45	NC			NC							
FOCAL8-46	NC			NC							
FOCAL8-47	NC			NC							
FOCAL8-48	NC		1.	NC							
FOCAL8-49	NC		1.	NC							
FOCAL8-50	NC		2.	NC							
FOCAL8-51	NC	1.		NA							
FOCAL8-52a	NC	1.	5.	5.							
FOCAL8-53	NC			NA			5.	15.			On 1 LINCTape
FOCAL8-54	NC		1.	NA							
FOCAL8-55	NC		2.	NC							
FOCAL8-56	NC		1.	NC							
FOCAL8-57	NC	1.	5.	NC							
FOCAL8-58	NC			NC							

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DECUS SERVICE CHARGES

DECUS NO.	WRITE-UP	PAPER TAPE		LISTING	DECTAPE		LINCTAPE		MAGTAPE		OTHER INFORMATION
		BIN	ASCII		U/S	D/S	U/S	D/S	U/S	D/S	
FOCAL8-59	NC	\$ 1.	\$	\$ NC	\$	\$	\$	\$	\$	\$	
FOCAL8-60	NC		1.	NC							
FOCAL8-61	NC		1.	NC							
FOCAL8-62	NC			NC							
FOCAL8-63	NC		1.	NC							
FOCAL8-64	NC		1.	NC							
FOCAL8-65	NC		1.	NC							
FOCAL8-66	NC		1.	NC							
FOCAL8-67	NC		1.	NC							
FOCAL8-68	NC		5.	NC							
FOCAL8-69	NC		2.	NC							
FOCAL8-70	NC		1.	NC							
FOCAL8-71	NC		2.	NC							
FOCAL8-72	NC		1.	NC							
FOCAL8-73	NC		1.	NC							
FOCAL8-74	NC		1.	NC							
FOCAL8-75	NC		1.	NC							
FOCAL8-76	NC		1.	NC							
FOCAL8-77	NC		1.	NC							
FOCAL8-78	NC		2.	NC							
FOCAL8-79	NC		1.	NC							
FOCAL8-80	NC	1.	5.	NC							
FOCAL8-81	NC		1.	NC							
FOCAL8-82	NC		5.	NC							
FOCAL8-83	NC		5.	NC							
FOCAL8-84	NC		1.	NC							
FOCAL8-85	NC		1.	NC							
FOCAL8-86	NC		1.	NC							
FOCAL8-87	NC		1.	NA							

N/C - No Charge
 N/A - Not Available

U/S - User Supplied Tape
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DECUS SERVICE CHARGES

DECUS NO.	WRITE-UP	PAPER TAPE		LISTING	DECTAPE		LINCTAPE		MAGTAPE		OTHER INFORMATION
		BIN	ASCII		U/S	D/S	U/S	D/S	U/S	D/S	
FOCAL8-88	NC	\$	\$ 1.	\$ NC	\$	\$	\$	\$	\$	\$	
FOCAL8-89	NC		1.	NC							
FOCAL8-90	NC	1.		NC							
FOCAL8-91	NC		1.	NC							
FOCAL8-92	NC		1.	NC							
FOCAL8-93	NC	1.		NC							
FOCAL8-94	NC		1.	NC							
FOCAL8-95	NC		1.	NC							
FOCAL8-96	NC			NC							
FOCAL8-97	NC		1.	NC							
FOCAL8-98	NC	1.	5.	NC							
FOCAL8-99	NC		1.	NC							
FOCAL8-100	NC	1.	5.	NC							
FOCAL8-101	NC		1.	NC							
FOCAL8-102	NC		1.	NC							
FOCAL8-103	NC		1.	NC							
FOCAL8-104	NC		1.	NC							
FOCAL8-105A	NC	1.	5.	NC							
FOCAL8-105B	NC	1.	5.	5.							
FOCAL8-106	NC		1.	NC							
FOCAL8-107	NC		1.	NC							
FOCAL8-108	NC		2.	NC							
FOCAL8-109	NC		1.	NC							
FOCAL8-110a	NC	1.	5.	NC							
FOCAL8-111	NC		1.	NC							
FOCAL8-112	NC		2.	NC							
FOCAL8-113	NC		1.	NC							
FOCAL8-114	NC		1.	NC							
FOCAL8-115	NC		1.	NC							

N/C - No Charge
 N/A - Not Available

U/S - User Supplied Tape
 D/S - DECUS Supplied Tape

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DECUS SERVICE CHARGES

DECUS NO.	WRITE-UP	PAPER TAPE		LISTING	DECTAPE		LINCTAPE		MAGTAPE		OTHER INFORMATION
		BIN	ASCII		U/S	D/S	U/S	D/S	U/S	D/S	
FOCAL8-116	NC	\$ 1.	\$	\$ NC	\$	\$	\$	\$	\$	\$	
FOCAL8-117	NC		1.	NC							
FOCAL8-118	NC		3.	NC							
FOCAL8-119	NC		2.	NC							
FOCAL8-120	NC		1.	NC							
FOCAL8-121	NC		1.	NC							
FOCAL8-122	NC		1.	NC							
FOCAL8-123	NC	1.	5.	NC							
FOCAL8-124	NC		2.	NC							
FOCAL8-125a	NC		1.	NC							
FOCAL8-126	NC		1.	NC							
FOCAL8-127	NC		1.	NC							
FOCAL8-128	NC		1.	NC							
FOCAL8-129	NC		1.	NA							
JCAL8-130	NC		1.	NC							
FOCAL8-131	NC		1.	NC							
FOCAL8-132	NC		5.	NC							
FOCAL8-134	NC		1.	NC							
FOCAL8-135	NC	1.		NC							
FOCAL8-136	NC	1.		NA							
FOCAL8-137	NC		1.	NA							
FOCAL8-138	NC		1.	NC							
FOCAL8-139	NC	1.		NC							
FOCAL8-141	NC	1.	5.	NC							
FOCAL8-142	NC		1.	NC							
FOCAL8-143	NC		1.	NC							
FOCAL8-144	NC			NA	5.	17.					On 1 DEctape
FOCAL8-145	NC			5.	5.	17.					On 1 DEctape
FOCAL8-146	NC		1.	NC							

N/C - No Charge
N/A - Not Available

U/S - User Supplied Tape
D/S - DECUS Supplied Tape

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DECUS SERVICE CHARGES

DECUS NO.	WRITE-UP	PAPER TAPE		LISTING	DECTAPE		LINCTAPE		MAGTAPE		OTHER INFORMATION
		BIN	ASCII		U/S	D/S	U/S	D/S	U/S	D/S	
FOCAL8-147	NC	\$	\$ 1.	\$ NA	\$	\$	\$	\$	\$	\$	
FOCAL8-148A	NC	1.		NA							4K
FOCAL8-148B	NC	1.		NA							8K
FOCAL8-149	NC		1.	NA							
FOCAL8-150	NC	1.	1.	NC							
FOCAL8-151	NC		2.	NC							
FOCAL8-152	NC		1.	NC							
FOCAL8-153	NC	1.		NC							
FOCAL8-154	NC	1.	5.	5.							
FOCAL8-155	NC		1.	NA							
FOCAL8-156	NC		1.	NC							
FOCAL8-157	NC	1.		NC							
FOCAL8-158	NC		1.	NC							
FOCAL8-159A	NC			NC							
FOCAL8-159B	NC			NC							
FOCAL8-159C	NC			NC							
FOCAL8-160	NC		2.	NC							
FOCAL8-161	NC		1.	NC							
FOCAL8-162	NC	1.	5.	NC							
FOCAL8-163	NC		3.	NA							
FOCAL8-164	NC	1.		NC							
FOCAL8-165	NC		1.	NC							
FOCAL8-166A	NC		1.	NC							
FOCAL8-166B	NC		1.	NC							
FOCAL8-167	NC		5.	NC							
FOCAL8-168	NC		1.	NC							
FOCAL8-169	NC		1.	NC							
FOCAL8-170	NC		5.	NA							(COMPLETE SET) OR
FOCAL8-170.1	NC		1.	NA							

N/C - No Charge
N/A - Not Available

U/S - User Supplied Tape
D/S - DECUS Supplied Tape

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DECUS SERVICE CHARGES

DECUS NO.	WRITE-UP	PAPER TAPE		LISTING	DECTAPE		LINCTAPE		MAGTAPE		OTHER INFORMATION
		BIN	ASCII		U/S	D/S	U/S	D/S	U/S	D/S	
FOCAL8-170.2	NC	\$	\$ 1.	\$ NA	\$	\$	\$	\$	\$	\$	
FOCAL8-170.3	NC		1.	NA							
FOCAL8-170.4	NC		1.	NA							
FOCAL8-170.5	NC		1.	NA							
FOCAL8-170.6	NC		1.	NA							
FOCAL8-170.7	NC		1.	NA							
FOCAL8-170.8	NC		1.	NA							
FOCAL8-171	NC		5.	NA							
FOCAL8-172	NC		1.	NA							
FOCAL8-173	NC		1.	NA							
FOCAL8-174	NC		1.	NA							
FOCAL8-175	NC		3.	NA							
FOCAL8-176	NC	1.	5.	NC							
FOCAL8-177	NC	1.		5.	5.	17.	5.	15.			LINCTape for PDP-12 users
FOCAL8-178	NC		5.	NA							
FOCAL8-179	NC		1.	NA							
FOCAL8-180	NC		1.	NC							
FOCAL8-181	NC		1.	NC							
FOCAL8-182	NC		1.	NC							
FOCAL8-183	NC			NC							
FOCAL8-184	NC		1.	NC							
FOCAL8-185	NC		1.	NC							
FOCAL8-186	NC		1.	NC			5.	15.			See 12-60
FOCAL8-187	NC	1.	5.	NC							
FOCAL8-188	NC			NC							
FOCAL8-189	NC	1.	5.	NC							
FOCAL8-190	NC	1.	5.	NC							
FOCAL8-191	NC	1.		NC							
FOCAL8-192	NC	1.		NC							

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N/A - Not Available

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DECUS SERVICE CHARGES

DECUS NO.	WRITE-UP	PAPER TAPE		LISTING	DECTAPE		LINCTAPE		MAGTAPE		OTHER INFORMATION
		BIN	ASCII		U/S	D/S	U/S	D/S	U/S	D/S	
FOCAL8-193	NC	\$	\$ 1.	\$ NA	\$	\$	\$	\$	\$	\$	
FOCAL8-194	NC		1.	NC							
FOCAL8-195	NC		1.	NC							
FOCAL8-196	NC		1.	NC							
FOCAL8-197	NC		4.	NC							
FOCAL8-198	NC		1.	NC							
FOCAL8-199	NC		1.	NC							
FOCAL8-200	NC		1.	NC							
FOCAL8-201	NC	1.	5.	NC							
FOCAL8-202	NC		1.	NC							
FOCAL8-203	NC		1.	NC							
FOCAL8-204	NC		1.	NC							
FOCAL8-205	NC		1.	NA							
FOCAL8-206	NC		1.	NC							
FOCAL8-207	NC		1.	NC							
FOCAL8-208	NC		2.	NC							
FOCAL8-209	NC		1.	NC							
FOCAL8-210	NC	1.	5.	5.							
FOCAL8-211	NC			NA	5.	17.					On 1 DECTape With FOCAL8-211
FOCAL8-212	NC			NA	5.	17.					
FOCAL8-213	NC			NC							
FOCAL8-214	NC	1.	5.	NA							
FOCAL8-215	NC		1.	NC							
FOCAL8-216	NC	1.	5.	NA							
FOCAL8-217	NC		1.	NC							
FOCAL8-218	NC	1.		NC							
FOCAL8-219	NC	1.	5.	NC							
FOCAL8-220	NC		1.	NC							
FOCAL8-221	NC		5.	NC							

N/C - No Charge
N/A - Not Available

U/S - User Supplied Tape
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DECUS SERVICE CHARGES

DECUS NO.	WRITE-UP	PAPER TAPE		LISTING	DECTAPE		LINCTAPE		MAGTAPE		OTHER INFORMATION
		BIN	ASCII		U/S	D/S	U/S	D/S	U/S	D/S	
FOCAL8-222	NC	\$ 1.	\$	\$ NC	\$	\$	\$	\$	\$	\$	
FOCAL8-223	NC	1.		NA							
FOCAL8-224	NC	1.	5.	NC							
FOCAL8-225	NC			NC							
FOCAL8-226	NC	1.	5.	NC							
FOCAL8-227a	NC	1.		NA	5.	17.					
FOCAL8-228	NC		1.	NC							
FOCAL8-229	NC		2.	NC							
FOCAL8-230	NC			NC							
FOCAL8-231	NC	1.	5.	NC							
FOCAL8-232	NC		1.	NC							
FOCAL8-233	NC	1.	5.	NC							
FOCAL8-234	NC		1.	NC							
FOCAL8-235	NC		1.	NC							
FOCAL8-236	NC		3.	NC							
FOCAL8-237	NC		1.	NC							
FOCAL8-238	NC		1.	NC							
FOCAL8-239	NC		1.	NC							
FOCAL8-240	NC		1.	NC							
FOCAL8-241	NC		1.	NC							
FOCAL8-242	NC		3.	NC							
FOCAL8-243	NC		5.	NC							
FOCAL8-244	NC		1.	NC							
FOCAL8-245	NC		1.	NC							
FOCAL8-246	NC		1.	NC							
FOCAL8-247	NC	1.	5.	NC							
FOCAL8-248	NC		5.	NC							
FOCAL8-249a	NC		1.	NC							
FOCAL8-250	NC		1.	NC							

N/C - No Charge
N/A - Not Available

U/S - User Supplied Tape
D/S - DECUS Supplied Tape

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Payment for DECUS Coupons must be made in advance. Purchase Orders for coupons must be paid before coupons can be issued.

All charges are in U. S. dollars, and are subject to change without notice.

European Users - Payment may be made, in your currency, to: Martha Ries, Digital Equipment Co., Int'l-Europe, 81 Route de L'Aire, 1227 Carouge/Geneva, Switzerland. Please refer to currency exchange charts available from that office.

Service charge for DECUS Proceedings are:

Attendees - First copy free, additional copies \$5.00 each

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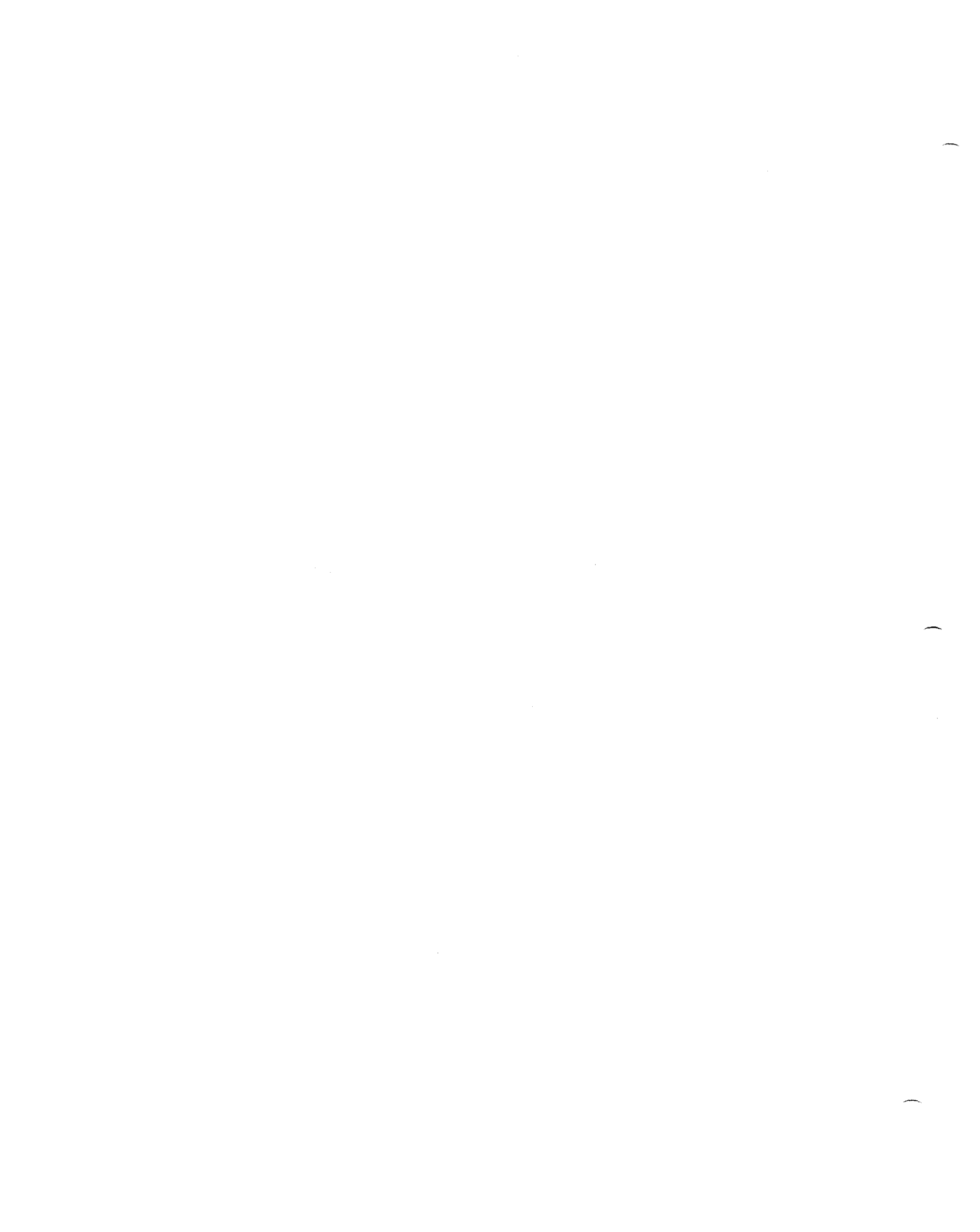
Charges for DECUS three-ring binders are:

One inch (1") Black Program Library Catalog Binder - \$2.50

Two inch (2") Blue general DECUS binder - \$3.50

When a large number of write-ups is ordered, but does not constitute a complete library, a service charge of 10¢ per write-up will apply.

A complete set of all current FOCAL8 write-ups is available for a service charge of \$25.00



FOCAL8 PROGRAM ABSTRACTS

DECUS NO. FOCAL8-1

A Pseudo Random Number Generator for the PDP-8 for use with FOCAL

Gary A. Griffith, Georgia Institute of Technology, Atlanta, Georgia

A pseudo random number generator adapted to the PDP-8 computer has been tested for randomness and uniformity. The test for randomness shows a definite bias. However, this generation algorithm compares favorably with others presently being used. It was written to replace the random number generator of the 4K FOCAL language.

Minimum Hardware: 4K PDP-8
Source Language: 4K FOCAL

DECUS NO. FOCAL8-2

XOD Modification for use with FOCAL

Georgia Institute of Technology
Submitted by: John Alderman, Applied Data Research, Atlanta, Georgia

This program contains modifications to XOD (DECUS NO. 8-89) which allow it to be used to debug FOCAL. It also contains certain changes for the command character set which make them more like ODT-2, which is desirable for installations with many inexperienced users.

DECUS NO. FOCAL8-3

DISK FOCAL

D. E. Wrege and J. C. Alderman, Georgia Institute of Technology, Atlanta, Georgia

A dialect has been developed utilizing the disk (DF32 or RF08) for both text and variable storage in a 4K PDP-8. Variable storage is via the arrayed function FNEW, while text is stored via the LIBRARY command which has been pre-empted for the purpose. Limitations of programming complexity in the current version limit the user to about 6 complete FOCAL program images and 1320 DISK FNEW variables (8K of the disk). A trivial modification to the coding will allow the user to expand the disk area. The package was written for the DF32, but changes required for the RF08 are easily made by a user of such. The Disk/DECTape Monitor does not protect the user's files generated by the use of the package, but a program to implement the protection is under development.

DECUS NO. FOCAL8-4

PRIME PLOTS

Richard Merrill, Digital Equipment Corporation, Maynard, Massachusetts

This program plots successive primes while cycling over a specified prime interval. The interpretation of the results are left to the user.

DECUS NO. FOCAL8-5

The Sumer Game

Doug Dymont, Digital Equipment of Canada, Ltd., Carleton Place, Canada

This is a simulation program/game which will run on a minimal PDP-8 system. The economy of a Sumerian city in the year 3000 B. C. is simulated in the fashion of a modern-day "business game."

DECUS NO. FOCAL8-6

FOCAL-8 Patch for LINC-8 Display

Peter Goldstern, Digital Equipment Corporation

This patch causes FDXS and FDYS commands in FOCAL to be displayed on the LINC-8 Display. This patch applies only to DEC-08-AJAD-PB, FOCAL.

Minimum Hardware: LINC-8
Other Programs Needed: FOCAL DEC-08-AJAD-PB

DECUS NO. FOCAL8-7

STRIP FOCAL: Storage of Data Arrays in FOCAL

D. E. Wrege, Georgia Institute of Technology, Atlanta, Georgia

This program, written for FOCAL W on an 8K machine, accepts data from paper tape on the high speed reader, and displays it on the Type 34 display unit. The data is stored in upper core, or on the disk, using the FNEW array. An ERASE or ERASE ALL command will not wipe out the stored data. Several sets of data may be stored in different sections of the array with the user keeping track of the indices.

Other Programs Needed: FOCAL W

DECUS NO. FOCAL8-8

Magtape FOCAL

J. C. Alderman, Applied Data Research, Atlanta, Georgia

A sophisticated handler package for the TC58 IBM compatible magtape controller in the FOCAL language. Data is transmitted to/from the FNEW arrayed storage in FIELD 1. The features of I/O overlap with program execution, defeatable error diagnostics, and programmable tape density and unit selection have been incorporated into the coding. Syntax is via the LIBRARY command, and there is extensive error checking of user calls.

The FIELD 1 resident portion of the magtape handler is removable by other users, and the result is a general purpose LIBRARY command handler package, capable of being linked to any device using the interrupt. A functional argument is transmitted to the FIELD 1 coding, and any number of numerical arguments may be evaluated.

DECUS NO. FOCAL8-9

Hexapawn

Ralph Mayer

Submitted by: Walter Koetke, Lexington High School, Lexington, Massachusetts

The object of this program is to have the computer "learn" to play a game, called Hexapawn.

Hexapawn is played on a square board and each player has three pawns. A pawn can move forward to an empty space or diagonally forward to capture an opponent's pawn. One wins by having any one of his pawns reach the opponent's side of the board, by making it impossible for the opponent's pawn to move, or by capturing all of the opponent's pawns.

The computer "learns" to play this game by remembering each of the possible board configurations when it is encountered during a game, and then determining and remembering all of the possible moves applicable to each board configuration.

Storage Requirement: 8K

DECUS NO. FOCAL8-10

Patch to FOCAL W for LINC-8 A-D Converter

Dr. T. Nichols, Department of the Army, U. S. Army Natick Laboratory, Natick, Massachusetts

This patch allows FOCAL W programs to use the LINC-8 analog to digital converter.

Execution of each function call requires approximately 10 milliseconds, limiting the maximum sampling rate to 100 SPS.

Minor changes to the patch will allow the execution of any single LINC instruction (stored at LINSTR) by FOCAL programs.

DECUS NO. FOCAL8-11

EAE Routines for FOCAL

J. Dwight Aplevich, University of Chicago, Committee on Mathematical Biology, Chicago, Illinois

This patch replaces the floating point system in FOCAL with one nearly identical to the standard EAE Floating Point package. A new floating integer subroutine is included, as well as a multiplicative-congruential pseudo random number generator. New FITR and FRAN routines are included.

Minimum Hardware: PDP-8 with type 182 EAE
Other Programs Needed: FOCAL DEC-08-AJAB (4/29/68)
Storage Requirement: 6400-7577; 5753-5777
Restrictions: Will NOT fit other versions of FOCAL

Source Language: PAL

DECUS NO. FOCAL8-12

QUIPI - Quick Plot in Quadrant 1

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

The implementation of an additional extended function named "FLOT" in FOCAL to generate a straight line plot on a Cal-Comp 563 incremental plotter considerably increases the usefulness of FOCAL for simple plotting applications. QUIP is a program in FOCAL language which demonstrates one use of the FLOT function: to generate a general XY plot in the first quadrant. The user simply types the control parameters and (x,y) values on the keyboard. An infinite set of plotting symbols of continuously variable size, width-to-height ratio, symbol order (number of strokes), and positive (counter-clockwise) or negative (clockwise) rotation is available by simply typing the appropriate parameters on the keyboard.

Minimum Hardware: PDP-8, ASR33, CalComp 563 Incremental Plotter

DECUS NO. FOCAL8-13

3D PLOTTER

John M. Jamieson, Georgia Institute of Technology, Atlanta, Georgia

This program, written in FOCAL, plots a function, Z, of two other variables, X and Y, on the memoscope or X-Y plotter. The function must be written in Cartesian space.

Minimum Hardware: 8K PDP-8, storage scope and/or X-Y plotter, ASR33, HSR
Other Programs Needed: FNEW array, Extended FOCAL for some functions
Storage Requirement: 8000 words

DECUS NO. FOCAL8-14

Least Squares Fit to a Straight Line

Edward T. Chow, Georgia Institute of Technology, Atlanta, Georgia

This is a program using the principle of least squares to fit a straight line to a set of up to 35 experimental data points.

The program requires one pass of the data. At the end of the pass the output gives the values of the slope and the intercept of the straight line equation. In addition, the calculated values of the experimental data based on the straight line equation are pointed out. Finally, the program gives the value of R which is a criterion of fitness of equation to the input data.

Other Programs Needed: FOCAL DEC-08-AJAB

DECUS NO. FOCAL8-15

Least Squares Fit to a Cubic Polynomial

Edward T. Chow, Georgia Institute of Technology, Atlanta, Georgia

This is a program using the method of least squares to fit a cubic polynomial to a set of experimental data. The program demands two passes of the data for its completion; however, the coefficients of the polynomial are outputted after the first pass, and at the end of the second pass the output gives the value of R which is a criterion of fitness and gives the calculated values of the experimental data based on the cubic polynomial.

In addition, a section of the program can be used as a self-contained program for solution of a set of N by N linear equations.

Other Programs Needed: FOCAL DEC-08-AJAB

DECUS NO. FOCAL8-16

One-Sample Statistics; Two-Sample Statistics; Welch Procedure; One-Way Analysis of Variance; Sheffe's Contrast Between Means

M. J. McKeown, University of Chicago, Department of Obstetrics and Gynecology, Chicago, Illinois

A three part program used to perform one-sample and two-sample statistics, Welch Procedure; One-Way Analysis of Variance; and Sheffe's Contrast between Means, which allows one to investigate more thoroughly the source of the difference between group means.

DECUS NO. FOCAL8-17

FOCAL: How to Write New Subroutines and Use Internal Routines

Doug Wrege, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, Georgia

This document is an attempt to explain how user-developed software can be interfaced to the basic FOCAL package, without requiring the user to spend valuable time trying to understand all of its detailed workings. Section II deals with a general discussion of how FOCAL works, in a descriptive fashion. Section III is concerned with the philosophy of the language, and the last few sections are technically oriented toward helping the user actually code his additions. Several examples and ready-coded routines, which may be used to simplify the user's problems are included.

An extension of this document, which includes most of the discussions contained in this volume, is offered as DECUS NO. FOCAL8-271. (See abstract)

DECUS NO. FOCAL8-18

T-ASK

J. Alderman, Applied Data Research, Atlanta, Georgia

This subroutine, available in two versions, Standard FOCAL Version and FNEW Array FOCAL Version, allows the user to enter an input unit, as well as a number, and converts the number to a common unit before returning to the calling program. It is particularly useful for programs utilizing TIME as an input parameter, since the program will convert the following units to seconds: YEARS, DAYS, HOURS, MINUTES, SECONDS, AND FORTNIGHT.

DECUS NO. FOCAL8-19

Least Squares Fit to an Exponential

Submitted by: J. W. Lynn, Georgia Institute of Technology, Nuclear Research Center, Atlanta, Georgia

This program is used in conjunction with "FOCAL" to make the best two parameter least squares fit of

$$Y = A * EXP (ALPHA * X)$$

to the user's data.

DECUS NO. FOCAL8-20

MULTIPULSE

Chris Hamilton, Georgia Institute of Technology, Atlanta, Georgia

A FOCAL program for use on PDP-8 to check the differential linearity of a multichannel pulse height analyzer.

DECUS NO. FOCAL8-21

MULTIPULSE-2

Chris Hamilton, Georgia Institute of Technology, Atlanta, Georgia

MULTIPULSE-2 (M-2) will calculate the differential non-linearity of a multichannel pulse height analyzer using as data a Compton spectrum on paper tape which has been expanded through all channels whose channel width deviation is under study.

DECUS NO. FOCAL8-22

Monte Carlo Solution to Neutron Penetration Problem

Bryan W. McGhee, Georgia Institute of Technology, Atlanta, Georgia

This display is a one axis display (Z coordinate only) of each scattering event - though scattering is calculated in 3-dimensions. The axis shifts upward for each new neutron to facilitate ease of following collisions.

DECUS NO. FOCAL8-23

Seismic Refraction Sloping Layer Program

David D. Prentiss, Atlantic Oceanographic Laboratory, Bedford Institute, Dartmouth, Nova Scotia, Canada

This program, developed for a PDP-8 4K machine, requires the full library of functions. It calculates a seismic refraction model using the slope-intercept method of M. Ewing, G. P. Woollard and A. C. Vine proposed in 1939 and the notation of J. I. Ewing's article on marine seismic refraction and reflective methods appearing in Volume III of "The Sea."

Source Language: FOCAL, 8/68

DECUS NO. FOCAL8-24

GRADE: A Grade Averaging and Display Program

D. E. Wrege, Georgia Institute of Technology, Atlanta, Georgia

This program will average grades from a number of quizzes, taking into account weighting factors of relative importance between quizzes, and plot a histogram of the number of grades in a given percentile.

Minimum Hardware: PDP-8 with extended memory (4K if no display required), Type 34 Display

Source Language: FOCAL W

DECUS NO. FOCAL8-25

Payroll Calculations (California, 1968)

G. L. Helgeson, Helgeson Nuclear Services, Inc., Pleasanton, California

This routine is used to calculate payrolls. It is based on the California State Unemployment Insurance rate, FICA rate and withholding tax.

This program could be modified easily to fit the rules of any particular state. If some of the pay ranges would not be used, they could be omitted from the two tables, making more room for other routines, such as providing running totals on gross pay, deductions, and net pay.

Source Language: FOCAL, 1968

DECUS NO. FOCAL8-26

Curve Fitting

Richard Rothman, Groton School, Groton, Connecticut

This program finds the best curve of a set of points. There are three types of curves involved: 1) Exponential Curve,

$Y = Ae^{BX}$; 2) Power Curve $Y = AX^N$; 3) Linear Line $Y = MX + B$.

DECUS NO. FOCAL8-27

Δ - Y Complex; Y - Δ Complex; Series Resonant Circuit Analysis

David H. Tyrrell, Middlesex County College, Edison, New Jersey

Δ - Y Complex - This program does a DELTA-WYE transformation for A-C circuits.

Y - Δ Complex - This program does a WYE-DELTA transformation for A-C circuits

Series Resonant Circuit Analysis - This program computes resonant frequency, bandwidth, Q, and values of inductive and capacitive reactance of resonance for a given R-L-C series circuits. It also produces, upon request, a table of impedance and phase angle for 10 points each side of the resonant frequency. Distance between points is determined by a user inputted DELTA-F.

Source Language: FOCAL 1968

DECUS NO. FOCAL8-28

Column Width; Traverse; Least Square "Linear Fit;" Nozzle Weight Flow; Filter Design; Ohm's Law

Submitted by: Digital Equipment Corporation, Maynard, Massachusetts

Column Width - Used for typesetting calculations

DECUS NO. FOCAL8-28 (Continued)

Traverse - A civil engineering and surveying application to compute a closed traverse given bearings and distances.

Least Square "Linear Fit" - Finds slope and Y-intercepts for the equation $Y=MX+B$ given a set of data observations.

Nozzle Weight Flow - Checks inlet pressure ratio and calculates the weight flow through the nozzle (from Hamilton Standard).

Filter Design - Plots filter output as well as numerical answers to a digital filter design problem.

Ohm's Law - Computes Ohm's Law.

DECUS NO. FOCAL8-29

Second Order Differential Equation

Submitted by: Digital Equipment Corporation, Maynard, Massachusetts

This is a routine to solve $\frac{D^2X}{DT^2} - K1 \cdot \frac{DX}{DT} + K2 \cdot X = \emptyset$

given $K1$, $K2$, and initial values for X , $\frac{DX}{DT}$, and $\frac{D^2X}{DT^2}$. The

user also selects the time interval DT . The result is plotted on the TTY from time zero until interrupted.

A check is made for off-scale values.

DECUS NO. FOCAL8-30

One Line Routines; X^3 and Circle; Superposition; Circle

Submitted by: Digital Equipment Corporation, Maynard, Massachusetts

One Line Routines - Demonstrates ability to create a one line program loop to plot using library functions of the FOCAL language.

X^3 and Circle - Use of subroutines if function plotting.

Superposition - The ability to superimpose multiple functions with different print characters in one output plot.

Circle - A circle of radius 10 plotted by residuals.

Source Language: FOCAL 1968

DECUS NO. FOCAL8-31

Sines; Factors; Figure Eight; Right Triangle Solutions

Submitted by: Digital Equipment Corporation, Maynard, Massachusetts

Sines - Plotting several variables using sine functions.

Factors - Determines whether a number is prime or gives its factors.

Figure Eight - Will plot various sizes of figure eights by means or residuals. This is represented by a simple fourth order equation.

Right Triangle Solutions - Applies trigonometry relations and the Pythagorean theorem for a right triangle.

DECUS NO. FOCAL8-32

Translation Table - French

Submitted by: Iroquois Falls and Calvert District High School, Iroquois Falls, Ontario, Canada

FOCAL commands translated into French.

DECUS NO. FOCAL8-33

Square Matrix Multiply; Prime Number Generator; Least Common Multiple; Base to Base Integer Conversion; Repeating Decimal

Submitted by: Digital Equipment Corporation, Maynard, Massachusetts

Square Matrix Multiply - The arduous task of multiplying two square matrices is quickly done by this FOCAL Matrix Multiplication routine.

Prime Number Generator - The Prime Number Generator is a program which will accept a number, N , and type out all primes less than that value. As soon as the program is finished it loops back and starts over again by asking for N .

Least Common Multiple (LCM) - The LCM routine is a neat, short program which will compute the LCM of any number of positive integers.

Base to Base Integer Conversion - The FOCAL Base to Base Conversion routine will convert any positive integer less than 2048 from one base system to another.

Repeating Decimal Program - This routine computes the decimal equivalent to any rational number whose absolute value is less than 1.

DECUS NO. FOCAL8-34

Simultaneous Equations; Abbreviated Simultaneous Equations; Curve Fittings

Submitted by: Digital Equipment Corporation, Maynard, Massachusetts

Simultaneous Equations - A familiar multi-variable problem is solved for 1st - 6th order equation sets (9th order if extended functions are gone).

Abbreviated Simultaneous Equations

Curve Fittings - Plot of exponential equation.

DECUS NO. FOCAL8-35

Rootfinder Program

Ron Dorman, Georgia Institute of Technology, Nuclear Research Center, Atlanta, Georgia

The Rootfinder program is a simple procedure, for use in determining the real roots of any suitable function. The program uses a conventional search to find root-containing intervals followed by a binary search (successive approximation method) to converge on the root value.

Source Language: FOCAL 1968

DECUS NO. FOCAL8-36

Determinot Program

Ron Dorman, Georgia Institute of Technology, Nuclear Research Center, Atlanta, Georgia

The Determinot program is a simple program which may be used to find the determinant of a square matrix of dimension 2 x 2 to 6 x 6. The method used in finding the determinant is based on the definition of the determinant and involves an N summation of products of N matrix terms with the proper inversion sign.

Minimum Hardware: PDP-8, ASR33
Source Language: FOCAL 1968

DECUS NO. FOCAL8-37

N-th Degree Polynomial Data Point Fitting Routine; N-th Degree Polynomial Data Point Fitting Routine with RMS Error

R. E. McCullough, University of Colorado, Denver, Colorado

N-th Degree Polynomial Data Point Fitting Routine - This program accepts the x- and y- coordinates for an unlimited number of data points and calculates for the equation

$$Y = A_0 + A_1X + A_2X^2 + \dots + A_NX^N,$$

the coefficients A_N which best fit the equation to the data points. The fitting criterion is "least squares." The program allows the user to select the degree, N, of the fitting equation. N may be as large as 7.

N-th Degree Polynomial Data Point Fitting Routine with RMS Error - This program is the same as N-th Degree Polynomial Fitting Routine except that it calculates the RMS error between the y-coordinates of the data points and the evaluated fitting equation. It will accept only a limited number of data points and the maximum equation degree allowed is inversely related to this number.

Source Language: FOCAL 1968

DECUS NO. FOCAL8-38

Magic Square Generator

Doug Dymont, Digital Equipment of Canada, Ltd., Carleton Place, Canada

The magic square generator will generate an odd order magic square of the indicated size (11 x 11 is the largest that will fit unless the format specification in line 2.8 is altered), using a set of sequential integers, beginning with the number specified.

Source Language: FOCAL 8/68

DECUS NO. FOCAL8-39

Rectangular to Polar Conversion; Polar to Rectangular Conversion

David H. Tyrrell, Middlesex County College, Edison, New Jersey

Rectangular to Polar Conversion - Converts complex numbers in rectangular form to polar form.

Polar to Rectangular Conversion - Converts complex numbers in polar form to rectangular form.

Source Language: FOCAL 1968

DECUS NO. FOCAL8-40

Simple Chi-Square Test

Michael J. McKeown, University of Chicago, Chicago, Illinois

The program will type out the data matrix and cell contents. Each cell will contain two values; O = xxx.xxx and E = xxx.xxx. The "O=" number is the "OBSERVED" value which was typed in by the user. The "E=" value is the expected value calculated by the program. The program will also type out row sums (RS=) and column sums (CS=), and the grand total (T=). The last line of output will be "X2=" and "DR=". These are the CHI-SQUARE and degrees of freedom.

Restrictions: Number of columns in matrix is limited to size of teletype paper
Source Language: FOCAL 1968

DECUS NO. FOCAL8-41

FRAN THE BARMAID

Dr. Murray Vernon King, Massachusetts General Hospital, Boston, Massachusetts

A demonstration program which uses the random number generator to choose cocktail ingredients and their quantities.

Source Language: FOCAL 1968

DECUS NO. FOCAL8-42

The Hangman Game

Dan Miller, Glastonbury, Connecticut

The program allows the user to play the game of Hangman with the computer, that is, a word guessing game using a limited number of trials at the letters in the word. Will run in 4K if extended functions are removed.

Source Language: FOCAL8/68

DECUS NO. FOCAL8-43

A Collection of FOCAL Patches

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

A collection of assembly-language patches designed to correct some errors and deficiencies in the FOCAL interpreter and to add some welcome FORTRAN-like versatility to the input and output.

These patches will operate properly with FOCAL, 8/68 (DEC-08-AJAC-PB) and with its 8K extension. It will also work in Field 0 of 2-user FOCAL, though not Field 1.

DECUS NO. FOCAL8-44

Magtape Analyser Using Universal I/O FOCAL

John C. Alderman, Jr., Applied Data Research, Atlanta, Georgia

This program sets up the tape unit to read one record 1000 decimal words (2000 characters) long into Field 1. After the record is read, the status register contents are printed in octal, and the number of characters computed from the remainder in the word-count address location. The number of characters is then printed in decimal. A routine is also available to print the contents of the record, two-characters-per-word in octal.

Minimum Hardware: 8K PDP-8 with TC-58/TU-20 (or TU-20A)

Other Programs Needed: Universal I/O Handler for FOCAL (DECUS NO. FOCAL8-45)

Source Language: FOCAL W

DECUS NO. FOCAL8-45

Universal I/O Handler for FOCAL

John C. Alderman, Jr., Applied Data Research, Atlanta, Georgia

The Universal I/O Handler for FOCAL makes it possible to write the hardware MAINDEC in a high-level language, and with the possibility that maintenance people can change, or write specific test routines in FOCAL as required.

Source Language: FOCAL W

DECUS NO. FOCAL8-46

4-Digit, 12-Bit Word Practice

Thomas Ford, White Mountains Regional High School, Whitefield, New Hampshire

This program will drill the student in interpreting lamp patterns on console of PDP-8 computer. Lamp patterns are presented, and then the user types in the correct octal notation. A tally is kept of the users' responses.

Minimum Hardware: 8K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-47

Fourier Synthesis of a Square Wave

Thomas Ford, White Mountains Regional High School, Whitefield, New Hampshire

Fourier Synthesis of a Square Wave will give the plot of a wave form for a variable number of terms.

Source Language: FOCAL-69

DECUS NO. FOCAL8-48

A FOCAL Program to Determine Low-Frequency Loudspeaker Parameters Experimentally

Richard Merrill and Stephen A. Kallis, Jr., Digital Equipment Corporation, Maynard, Massachusetts

This program is a FOCAL translation of a program devised by J. P. Ashley and M. D. Swan used in determining the low-frequency characteristics of loudspeakers for use in speaker system and enclosure design. The method allows determination of speaker parameters using a minimum of testing equipment.

Minimum Hardware: 4K PDP-8, LINC-8 or PDP-12
Source Language: FOCAL-69

DECUS NO. FOCAL8-49

Constantine's Function

Richard May, Digital Equipment Corporation, Maynard, Massachusetts

This routine is the solution and graphical output of the function:

$$M(\sigma, \gamma) = \frac{4}{\pi} * \sum_{n=0}^{\infty (N=6)} (-1)^N * e^{-\frac{(N^2+1)}{2}} * \left(\frac{2\sigma}{\gamma}\right)^2 * \pi^2$$

as $\frac{2\sigma}{\gamma}$ varies from 0 to 1.

Source Language: FOCAL-69

DECUS NO. FOCAL8-50

FOCAL Version of RC Active Filter

Bean and Roman, University of Texas, Southwestern Medical School, Dallas, Texas

This program is a FOCAL version of a program by Kincaid and Shirley as published in Electronic Design Volume 13. Derived from two fundamental equations, it can be used to design Butterworth or Chebyshev filters in either low-pass or high-pass versions of each.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-51

FOCAL "WRITE" Patch

John Larkin, Technical Associates, Inc., Metairie, Louisiana

This patch changes the FOCAL "WRITE" routine to add blanks to paper tape generated by "WRITE," which corrects the "INPUT BUFFER OVERFLOW" error generated by loading long paper tapes into FOCAL-69

Other Programs Needed: FOCAL-69
Restrictions: Will not run with 8K FOCAL

DECUS NO. FOCAL8-52a

FOCAL, 5/69
Edward A. Taft, III, Manchester, Massachusetts

This is a new version of FOCAL, based on FOCAL W, 8/69, which has been expanded and rewritten to remove numerous bugs and restrictions and to provide a large number of new commands and extended capabilities. Some of the new features are:

- 1) Better control over I/O devices, including high speed punch;
- 2) New I/O formats, including buffered input that accepts expressions as well as numbers, input and output of single ASCII characters, and a tabulation controller;
- 3) A group of "OPTION" commands that perform minor functions such as suppressing or restoring keyboard echo and changing I/O modes;
- 4) A more compact extended function package, resulting in an enlarged user area; also a command for deleting the extended functions;
- 5) Extended command formats, also a provision for using calculated line numbers.

DECUS NO. FOCAL8-53

JMPFOCAL: FOCAL as a LINC-8 Subroutine

James E. Randall, Indiana University, Bloomington, Indiana

This system uses FOCAL W programs as LINC-mode subroutines on an 8K LINC-8. It allows FOCAL W to be used to process data stored on LINCtape.

The FOCAL programs are limited to 585 core locations and

are slower than LINC floating point routines, but they are easy to write and to format.

Minimum Hardware: LINC-8 with 8K of memory
Other Programs Needed: User written LINC and FOCAL programs
Source Language: LAP6

DECUS NO. FOCAL8-54

Channel Information and Inverted Histogram Plot

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

This program will accept up to 36 channels of information stored as A (I) during 'T' passes. It will then plot an inverted histogram using the symbol ' [],' spacing through vacant channels, and subtracting one count till all channels are vacant.

Source Language: FOCAL-69

DECUS NO. FOCAL8-55

Multichannel Analyzer

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

This general program, Multichannel Analyzer, also includes a specialized version for the reduction of raw grades from the teacher's rank book to the letter grades specified for report cards. The method of visualizing scores is entirely the work of Kenneth L. Russell of Sam Houston State Teachers College, and quite adequately described in his publication 'Visual Grading' available from Educational Filmstrips, also of Huntsville, Texas.

The program will operate in 4K with the extended functions retained (they are not used) for at least 32 sets of data.

Source Language: FOCAL-69

DECUS NO. FOCAL8-56

Merchandise Price Tags

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

This program represents a preliminary effort to use the FOCAL language for the solution of a business oriented problem. With minimum input, the program will generate merchandise price tags, including the merchant's per-package-cost in a convenient code.

Source Language: FOCAL -69

DECUS NO. FOCAL8-57

FOCAL Display on a 338

David Whitely, International Computers Limited, Kidsgrove, Stoke-on-Trent, England

This program enables a vector display to be generated on a 338 using the instructions already available in FOCAL. It is also possible to draw blank vectors and to erase the display file under program control.

Minimum Hardware: 8K PDP-8, 338 Display
Source Language: FOCAL

DECUS NO. FOCAL8-58

A Patch to FOCAL W to use the LINC-8 Display

Peter Lemkin, NINDS PRB, National Institute of Health, Bethesda, Maryland

This program is a patch for FOCAL W (8/68) which lets users with LINC-8's use the LINC point display in FOCAL programs. The user sets up and intensifies the X and Y coordinates the same way as for the PDP-8 display except for the following differences:

A. X and Y coordinates are reversed so that for example:

SET H = FDXS(X)+FDIS(Y)
should be rewritten as
SET H = FDXS(Y)+FDIS(X)

B. The range of X is from 0 to 512₁₀
and the range of Y is from -256₁₀ to +256₁₀

The patch clobbers the ARCTAN FOCAL function. If the ARCTAN function is needed, it can be computed from the FEXP function.

Source Language: FOCAL W

DECUS NO. FOCAL8-59

FOCAL Overlay Common Area for 4K Core Memory

Herbert Zimmermann, Digital Equipment GmbH, Koln, Germany

This program is an overlay which implements the common area with the function FNEW. Two versions of the overlay tape are available, one for FOCAL without extended functions, and one for FOCAL with extended functions. The overlay "common area" is read in in a normal way.

Minimum Hardware: 4K PDP-8
Other Programs Needed: Binary loader; FOCAL (DEC-08-AJAE-PB)
Source Language: FOCAL

DECUS NO. FOCAL8-60 (See DECUS NO. 8-251)

A System for Production of Problem Sets with Individualized Data

H. Bradford Thompson, Department of Chemistry, University of Toledo, Toledo, Ohio

This system produces problem sets for use in science and mathematics instruction, in which input data are changed for each student. Two programs are involved, (1) a FOCAL program into which the instructor inserts the algebra required to perform the calculations, and (2) a program which accepts a text with data positions marked, and then inserts individualized data from the FOCAL program (without the answers) and prints the copies.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: FOCAL (Any version)
Source Language: FOCAL, PAL III

DECUS NO. FOCAL8-61

Least Square Fit to a Polynomial

Adrian Demayo, Department of Energy, Mines and Resources, Inland Water Branch, Water Quality Division, Ontario, Canada

Given L1 pairs of points X_i(obs), Y_i(obs) (i=1...L1) this program finds the coefficients B_i expression:

$$Y_i(\text{calc}) = \sum_{j=1}^{L1} B_j X_i^{j-1}(\text{obs}) \quad L = \text{NA} \dots \text{NB}$$

Minimum Hardware: 4K PDP-8, ASR33
Source Language: FOCAL-69

DECUS NO. FOCAL8-62

The FOCAL TGH Clinical Package

H. Dominic Covvey, Toronto General Hospital, Toronto, Canada

This is a package of biomedical programs used for a variety of purposes, such as: calculation of gas concentration in the blood; volume measurements of the left ventricle; intake analog data; statistical analysis on pairs of data; washout studies; respiratory physiology; and a demonstration program which gives the first four or so components of the fourier series for a square wave.

Source Language: FOCAL

DECUS NO. FOCAL8-63

CURFIT

Donald L. Shirer, Valparaiso University, Valparaiso, Indiana

CURFIT is a program written in the FOCAL language which fits weighted or unweighted data to a straight line on a Cartesian, log-log or semilog graph. It calculates the slope

DECUS NO. FOCAL8-63 (Continued)

and intercept of the line, the standard error in these values, plus other measures of the "goodness" of fit. Values may be added or deleted from the data list easily, and there is no limit to the number of sample data pairs.

Minimum Hardware: PDP-8, ASR33
Source Language: FOCAL

DECUS NO. FOCAL8-64

Newton-Raphson Method for Determination of Polynomial Roots

Dan C. Stanzione, Electrical Engineering, Clemson University, Clemson, South Carolina

This program is used to determine the 'n' zeroes of a polynomial, $f(x)$, where

$$f(x) = a_0 + a_1x + \dots + a_nx^n$$

where a_0 and a_n are not equal to zero and a_0, a_1, \dots, a_n are in general complex.

Minimum Hardware: Basic PDP-8 configuration
Restrictions: Delete extended functions when running on 4K machine
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-65

Kruskal-Wallis One Way Analysis of Variance by Ranks

Gene Sylwesiuk and Elliot N. Gale, SUNYAB, Department of Behavioral Science, Buffalo, New York

This is a statistical program which allows the user to test the difference between the means of k groups when the data are not parametric and are independent.

Minimum Hardware: PDP-8/S, ASR33
Restrictions: Delete extended functions
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-66

"QUICK SCAN" Using Scheffe's Calculation

W. P. Ronald, Canada Department of Agriculture, Research Station, Vancouver, British Columbia, Canada

This program is a modification of "Sheffe's Contrast Between Means" (FOCAL8-16), and is designed to be used in conjunction with FOCAL8-16, or with DECUS 5/8-9. Using the output from an analysis of variance calculation, it quickly supplies the user with a general picture of the significance of group mean differences, at any selected F level.

Storage Requirement: 41Ø locations
Restrictions: A large number of samples requires deletion of extended symbols
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-67

T-Test

Jerry D. Burns, Exotic Environments Laboratory, Arizona State University, Tempe, Arizona

This program is designed to calculate students' T- ratio for independent samples. The output format gives sample means and variances, standard error of the mean difference, the value of t , and the number of degrees of freedom upon which t is distributed.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-68

Determination of Roots of a Polynomial

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

This program will find all roots, real and complex, of a polynomial. The 4K version consists of four programs. Program I finds a real root. Program II divides the polynomial by the real root, so reducing the order of the polynomial by one. Program III finds complex roots after all real roots have been extracted. Program IV divides the polynomial by a pair of roots to reduce the order of the polynomial by two. An 8K version contains all the above parts in one program.

Minimum Hardware: 4K PDP-8
Restrictions: Delete extended functions for 4K version
Source Language: FOCAL-69

NOTE: When ordering please state whether 4K or 8K version is required.

DECUS NO. FOCAL8-69

Analysis of Variance

Jerry D. Burns, Exotic Environments Laboratory, Arizona State University, Tempe, Arizona

This program is designed to solve the analysis of variance problem for the two-factor completely randomized design, and to table the results of the analysis in a form acceptable for publication in many scientific journals. Both the input and output formats are designed for simplicity and ease of operation.

An alternate form of the program makes possible the evaluation of either one-factor or two-factor designs.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-70

Analysis of Variance Randomized Block "F" Test

C. T. Lund, Canada Department of Agriculture, Vineland Station, Ontario, Canada

The purpose of this program is to isolate variation in an experiment attributable to treatments and replicates, and test this variation for significance.

Minimum Hardware: PDP-8/L, ASR33
Restrictions: The block design must be complete
Source Language: FOCAL 1968

DECUS NO. FOCAL8-71

FOCAL Golf Program for the PDP-8 (8K) Computer

Gilbert S. Fair, Digital Equipment Corporation, Northbrook, Illinois

This program simulates the playing of golf, including the shot selection options of club, power and direction together with numerous variations of these selections, to more closely resemble the actual experience of a golfer "on the links."

Minimum Hardware: 8K PDP-8, ASR33
Storage Requirement: 7000-8000 words (including FOCAL)
Miscellaneous: Takes about one hour for 9 holes (dependent on user reaction)
Source Language: FOCAL -69

DECUS NO. FOCAL8-72

General Least Squares Fit

Harold Metcalf, SUNY Stony Brook, Stony Brook, New York

Can be used to fit data to any arbitrary curve (line, exponential, polynomial, Gaussian, Lorentzian, etc.). Curve is specified by the calculation in group 3, so any curve that can be calculated can be fitted to data.

Minimum Hardware: 8K PDP-8
Source Language: FOCAL

DECUS NO. FOCAL8-73

Real Matrix Inversion

Harold Metcalf, SUNY Stony Brook, Stony Brook, New York

Inverts a real, square matrix using FOCAL. This is essentially a translation of the IBM MINV.

Minimum Hardware: PDP-8
Restrictions: 6 x 6 matrix is the largest that can be done with 4K
Source Language: FOCAL

DECUS NO. FOCAL8-74

Linear Least Squares Fit

Harold Metcalf, SUNY Stony Brook, Stony Brook, New York

A short, fast simple linear least squares fit (linear regression).

Source Language: FOCAL

DECUS NO. FOCAL8-75

Blackjack

Jerry D. Burns, Exotic Environments Laboratory, Arizona State University, Tempe, Arizona

A modified Blackjack game, written in FOCAL. The game contains standard Blackjack payoffs as well as a "double down" option on hands of 10 or 11.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-76

Screening Regression

Dr. Robert G. Miller, 30 Juniper Lane, Glastonbury, Connecticut

This program performs a stepwise multiple linear regression analysis. For a dependent variable Y the program selects or screens from among a number of independent variables a subset (7 or less) of the total number of variables which contains most of the information of the entire set. There is no limit to the number of independent variables used.

Minimum Hardware: PDP-8/L, ASR33
Storage Requirement: 4096 words
Restrictions: The cross product matrix is required as input
Source Language: FOCAL - 69

DECUS NO. FOCAL8-77

MARX: A Grading Program

Peter Smith, Noble and Greenough School, Dedham, Massachusetts

This program accepts marks for a class of a given number, for a given number of weighted quizzes and tests, and outputs in tabular form, the students' respective ranks, averages, and relation to the class average (plus or minus, as the case may be). In addition, it gives the class average, and a table showing the distribution of averages along a scale from flunk (below 60) to 100.

Minimum Hardware: PDP-8, ASR33
Source Language: FOCAL

DECUS NO. FOCAL8-78

RACK-O

Daniel Miller, 30 Juniper Lane, Glastonbury, Connecticut

A computerized version of the Milton Bradley Company game RACK-O. The object is to try to put a "set" of numbers in numerical order (limitations are put on your changes) before the machine does.

Minimum Hardware: PDP-8, ASR33
Other Programs Needed: Pseudo random number generator (special binary tape for this program)
Source Language: FOCAL - 69

DECUS NO. FOCAL8-79

The Carnival Game

Evan Suits, Digital Equipment Corporation, Maynard, Massachusetts

The Carnival Game allows the user to play a gambling game involving three dice. Once started, the program produces a monolog explaining the principle and operation of the game.

Minimum Hardware: PDP-8
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-80

Using the High Speed Punch with FOCAL

Harold Metcalf, Physics Department, SUNY Stony Brook, Stony Brook, New York

This program enables the use of the high speed punch in FOCAL by direct or indirect command, in much the same way that the asterisk enables the optical reader.

Minimum Hardware: PDP-8, high speed punch
Other Programs Needed: FOCAL - 69
Source Language: PAL III

DECUS NO. FOCAL8-81

FOCAL Lunar Landing Simulation (APOLLO)

James A. Storer
Submitted by: Walter Koetke, Lexington High School, Lexington, Massachusetts

This program realistically simulates an Apollo moon landing using NASA figures. It begins with module at 0 seconds, 120 miles above the moon, carrying 1600 pounds of fuel, with a velocity of 2600 miles per hour. Upon radar checks of velocity, altitude, remaining fuel, and time each 10 seconds, you may decide upon fuel rate for next time arrival. The object is to land safely on the moon.

Minimum Hardware: 4K PDP-8
Restrictions: Cannot retain FOCAL's extended functions
Source Language: FOCAL-69

DECUS NO. FOCAL8-82

Physical Sine Curve Programs

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

Consists of:

- 1) Simple Sine Man; 2) Damped Sine on Axis; 3) Sum Shaded Sines; 4) Plot and two physical sine curves; 5) Fourier Synthesis of a Square Wave.

Minimum Hardware: 4K PDP-8, ASR33
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-83

Gas Law Programs

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

Consists of:

- 1) Ideal Gas Plot P/V; 2) Ideal Gas Volume vs. Temperature; 3) Real Gas Volume vs. Temperature.

Source Language: FOCAL

DECUS NO. FOCAL8-84

2D Plotter for Serial Experimental Data

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

This program will accept and plot on TTY up to 40 sets of data (in 4K). The printout is organized to display the Cartesian Space by spacing through values of "Y" and line feeding through values of "X" where these may represent any physical quantities. Following the plotting of data, the display scale factor and the adjusted values for the plotter parameter are typed out by calling for the whole symbol table.

The program was designed to serve as a universal plotting routine in its own right, but is group numbered to facilitate incorporation into some other program as a dedicated display routine.

Source Language: FOCAL 8/68

DECUS NO. FOCAL8-85

Program Replication

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

This is intended as a vehicle for the essential single line 06. which specifies the immediate-mode command.

The FOR command will cause the program presently in core to be typed out the specified number of times with the specified number of lines between each copy of the program.

DECUS NO. FOCAL8-85 (Continued)

The search feature was employed to facilitate cutting the TTY paper into individual pages.

The program as provided will make ten copies of itself as soon as it has loaded and the G followed by a CARRIAGE RETURN are read from the tape.

Source Language: FOCAL 8/68

DECUS NO. FOCAL8-86

KCF Temperature Conversion Table

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

This program expands the usefulness of the sample program listed in Introduction to Programming (DEC). Temperature conversion and table printout is available from any starting temperature (6 digit limit), in any size increment, to any higher temperature. The program may be used to generate tables of any range and subdivision for use in the field, or the range of immediate interest may be run as needed in the laboratory.

Source Language: FOCAL 8/68

DECUS NO. FOCAL8-87

Keyboard Readable Punch

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

This program should prove useful to users of paper tape who also have limited core storage. The routine operates manually from the TTY keyboard (LOCAL) to punch readable characters. Using this procedure, the leader portion of the paper tape can be perforated in a meaningful way for tape identification.

Minimum Hardware: PDP-8, ASR33
Source Language: FOCAL 5/69 (DECUS NO. FOCAL8-52)

DECUS NO. FOCAL8-88

Atomic and Molecular Transition Probabilities in FOCAL

Harold Metcalf, Physics Department, SUNY Stony Brook, Stony Brook, New York

This constitutes part of a series of programs for evaluating 3-J and 6-J symbols in the calculation of quantum mechanical matrix elements which was developed at the State University of New York at Stony Brook.

Source Language: FOCAL

DECUS NO. FOCAL8-89

The Recursive Evaluation of Functions

A. K. Head, C.S.I.R.O. Division of Tribophysics, Melbourne, Australia

The evaluation of functions by recursion is a technique which is not often used in computing, but it has proved to be the solution to two different problems in FOCAL. The first was the need for circular functions which were more accurate than the internal functions when using 4-word arithmetic (when the internal functions have only 3-word accuracy). The second was the need for functions which occupy less memory than the corresponding internal functions. A selection of some of the circular and hyperbolic functions which have been used are included in this program.

Source Language: FOCAL - 69

DECUS NO. FOCAL8-90

X-Y Plotter Patch for FOCAL '69

Roy H. Swatzell, Jr., University of Alabama, School of Medicine, Birmingham, Alabama

This routine is designed to give the user point or line plotting capability through the FOCAL Interpreter.

Minimum Hardware: PDP-8, ASR33, X-Y Plotter (Digital)
Other Programs Needed: FOCAL - 69, BIN Loader
Storage Requirement: 111₈ locations (in FOCAL)
Restrictions: This routine replaces the arctangent and log routines in FOCAL PAL III
Source Language: PAL III

DECUS NO. FOCAL8-91

Multiplication of Rectangular Matrices

Carl Bryant
Submitted by: Brother John F. O'Connell, St. John's Preparatory School, Danvers, Massachusetts

This is the author's answer to the suggestion made in DECUS NO. FOCAL8-33 that someone generalize the program to include multiplication of rectangular matrices.

Source Language: FOCAL - 69

DECUS NO. FOCAL8-92

FOCAL Horserace for the PDP-8 (8K) Computer

Gilbert S. Fair, Digital Equipment Corporation, Northbrook, Illinois

This program simulates a horserace with 9 horses, using a random number generator to produce different results for each race run, and permitting 20 or so bets to be placed on each race.

DECUS NO. FOCAL8-92 (Continued)

Minimum Hardware: 8K PDP-8, ASR33
Storage Requirement: 7000-8000 words (including FOCAL)
Source Language: FOCAL - 69

DECUS NO. FOCAL8-93

Dose-Response Routine

Rudolph H. deJong and Roger A. Nace, University of Washington School of Medicine, Seattle, Washington

The S-shaped log dose-response curve, widely encountered in biomedical analysis, is transformed to a straight line by probit conversion. This program outputs log dose and probit values for subsequent plotting on linear graph paper. The expanded program for 8K systems adds a plotting routine that outputs a scattergram on automatically scaled coordinates.

Minimum Hardware: 4K or 8K PDP-8
Restrictions: 4K FOCAL has no plot
Source Language: FOCAL - 69

DECUS NO. FOCAL8-94

Multidimensional Integration by Gaussian Quadrature

H. Bradford Thompson, University of Toledo, Department of Chemistry, Toledo, Ohio

A subprogram provides multidimensional integration of a known function by Gaussian quadrature. The user may define the function, integration limits, and number of points used. Gaussian quadrature is valuable within FOCAL because of its low error for a limited number of calculated points.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL - 69

DECUS NO. FOCAL8-95

One-Armed Bandit

James J. Ward and Larry A. Owens, Digital Equipment Corporation, Maynard, Massachusetts

This is a demonstration of the PDP-8 as a slot machine.

Minimum Hardware: 4K PDP-8, ASR33
Source Language: FOCAL - 69

DECUS NO. FOCAL8-96

Statistics - Standard Deviation

E. W. Coleman, Picker X-Ray Manufacturing
Submitted by: E. F. Steinfeld, Digital Equipment Corporation, Pittsburgh, Pennsylvania

Accepts any number of data values from the keyboard or from paper tape, computes and prints out mean, variance, standard deviation, coefficient of variation, maximum data value,

minimum data value, and number of data points.

Minimum Hardware: PDP-8, ASR33 (high speed reader optional)
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-97

Multiple Equation Graphing on a Teletype

R. Bradford Malt, Wellesley High School, Wellesley, Massachusetts

This program graphs up to 9 equations simultaneously on an ASR33 or similar teletype. It requires only one type head pass per line, providing considerable speed. Provisions are made for error condition checks, and correction of specification overflow is automatic.

Minimum Hardware: PDP-8, ASR33
Source Language: FOCAL

DECUS NO. FOCAL8-98

FOCAL PUNCH OVERLAY

James J. Chang, Department of Chemistry, University of California at Berkeley, Berkeley, California

FOCAL PUNCH OVERLAY permits the FOCAL user to use the FOCAL "Write" command to punch out indirect programs on the high speed punch. The overlay self-destructs after use and must be reloaded to be used again.

Minimum Hardware: PDP-8, ASR33, high speed punch
Other Programs Needed: FOCAL-69
Source Language: PAL III

DECUS NO. FOCAL8-99

3 Dimensional TIC TAC TOE (3X3X3)

Leonard Fertuck, Saskatoon Research Council, Saskatoon, Saskatchewan, Canada

This program plays a game of 3 dimensional Tic Tac Toe in which the object is to maximize the total number of lines when all cells in the 3X3X3 cube have been filled. Game rules and operating instructions are provided as comments in this program.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-100

Additions to FOCAL W

Alan S. Fields, Naval Ship Research and Development Laboratory, Annapolis, Maryland

These are additions to FOCAL W, of 8/68, for both 4 and 8K systems. Assembly language listings are included as Appendices.

DECUS NO. FOCAL8-100 (Continued)

Appendix 1 gives the simple patch required to permit group numbers to go up to 31.99 rather than 15.99. This may be useful only with 8K. Included in Appendix 1 is the symbol table used by PAL-3 for all the additions.

Appendix 2 gives a simple routine which on repeated calls turns the echo on and off. This simplifies "read-in" of data tapes if only a low speed reader is available. The routine uses the DXS function slots in the tables. Systems with scopes will have to provide a change. The routine occupies unused locations in the floating point package.

Source Language: FOCAL 8/68

DECUS NO. FOCAL8-101

"HORSERACE"

William Garcia, Jr., Dow Badische, Freeport, Texas

Simple, but a very exciting horserace, based on the frequency of numbers generated. Ten decimal numbers, 0-9, are used for a better distribution. The highest frequency at which a number appears is paired with that of the lowest frequency.

Minimum Hardware: 4K PDP-8, ASR33
Source Language: FOCAL 1968

DECUS NO. FOCAL8-102

Solution of Quadratic Equations with Complex Coefficients

Forrest Howard
Submitted by: Brother John F. O'Connell, C.F.X., St. John's Preparatory School, Danvers, Massachusetts

The principle basis of this program is from the discussion of quadratic equation with complex coefficients in INTERMEDIATE MATHEMATICS, PART II (MSG, Yale University Press, 1961), Section 12-5, pp. 707-710. To get around the difficulty of working with the definition of

$$i = \sqrt{-1}$$

since the computer will reject the square root of a negative number, the rectangular form of $z = a + bi$ is converted to the polar form for the operations upon z and then back to the rectangular form for the output. The theorem included in the reference mentioned above indicates that some problems will have two solutions, while others will have only one. The example problems included with this program indicate that this is quite so.

Minimum Hardware: 4K PDP-8/S
Source Language: FOCAL-69

DECUS NO. FOCAL8-103

TEACH

Edward Steinfeld, Digital Equipment Corporation, Pittsburgh, Pennsylvania

This is an example of what could be accomplished in the computer aided instruction realm. TEACH is only a sample and does not carry the student beyond the first hour of instruction. The program is divided into three sections: First, the instruction segment; Second, six problems with answers but no explanation; the third section is comprised of an explanation and six problems, with the option to continue or stop.

Minimum Hardware: 4K PDP-8
Restrictions: No functions
Source Language: FOCAL-69

DECUS NO. FOCAL8-104

The Towers of Hanoi

Dr. Roger H. Abbott, Department of Zoology, Parks Road, Oxford, England

This program uses a recursive routine to solve the Towers of Hanoi problem. Either the total number of moves and the time required, or the actual moves, will be typed on the teletype. It is intended as a demonstration of the way in which recursion may be used in FOCAL.

Minimum Hardware: 4K PDP-8, ASR33
Source Language: FOCAL-69

DECUS NO. FOCAL8-105A

LAB-8 Extended Functions for FOCAL (4K)

Richard Rothman, Digital Equipment Corporation, Maynard, Massachusetts

These replace the standard extended functions, to give the LAB-8 user greater flexibility in interacting with the AXØ8 through FOCAL, thereby simplifying the programming of certain applications which otherwise would only be possible in assembly language.

Minimum Hardware: 4K PDP-8
Other Programs Needed: FOCAL-69
Source Language: PAL 1Ø Version 141

DECUS NO. FOCAL8-105B

LAB-8 Extended Functions for FOCAL (8K)

Richard Rothman, Digital Equipment Corporation, Maynard, Massachusetts

This adds many more functions of general usefulness to those already implemented in the 4K version. The write-ups for both versions are combined in one document, but the tapes may be ordered separately.

DECUS NO. FOCAL8-105B (Continued)

Minimum Hardware: 8K PDP-8
Other Programs Needed: FOCAL-69
Source Language: PAL III Version 141

DECUS NO. FOCAL8-106

FOCAL Traveling-Wave Sketches

Arthur L. Pike, Tufts University, Department of Electrical Engineering, Medford, Massachusetts

This program sketches graphs of the following wave expressions:

$$i(y, t) = A e^{a y} \sin(10 \pi t - \beta y) = \text{Im}(A e^{(a + i \beta) y} e^{i 10 \pi t})$$

In this equation, angular frequency $\omega = 10 \pi$ radians per second, and propagation constant $\underline{r} = a + i \beta$; the components of \underline{r} are positive for an incident wave, with negative values for a reflected wave. Phase constant β is fixed by the program at $\pi/2$, thereby fixing the phase wavelength at:

$$L = \frac{2\pi}{\beta} = 4 \text{ units}$$

Thus, a value of $t = 0.1$ corresponds to π radians in the phase angle. Hence, with $t = 0.05$, the corresponding angle is 90° . Amplitude A is scaled by the program so that the maximum amplitude of any wave will tie in the sketch space.

Source Language: FOCAL-69

DECUS NO. FOCAL8-107

NIM

Kenneth McCord, Highland Park High School, Highland Park, Illinois

The game of NIM consists of three columns of coins where the number of coins in each column is different. The object of the game is, by alternating turns with the computer, to remove all the coins from the playing board. The one who removes the last coin or coins is declared the winner.

Minimum Hardware: 4K PDP-8
Other Programs Needed: FOCAL with extended functions deleted. Also delete "=" sign
Source Language: FOCAL-69

DECUS NO. FOCAL8-108

Analysis of Variance for Two-Dimensional Material

Lars Palmer, AB Håssle, Pharmacological Laboratory, Goteborg, Sweden

This program calculates the standard analysis of variance table for a two-dimensional analysis of variance with the same number of replications per group.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-109

Newton's Method of Approximating Real Roots of $P(x)=0$, Where the Degree of $P(x)$ is 4 or Less

Jeff Gelpy

Submitted by: Brother John F. O'Connell, St. John's Preparatory School, Danvers, Massachusetts

With Newton's Method the first approximation is usually found by $-f(0)/f'(0)$. In the program listing this is $-G/M$. However, if $f(0) = 0$, this cannot be used, so the program allows the user to make his own approximation and carry on from there. Since no provision is made for complex roots the user should examine the polynomial to determine the possible number of real roots (by Descartes Rule of Signs). He should also try to locate possible roots between integers so that he can arrive at the approximations more quickly. The synthetic substitution option allows this to be done. Using the synthetic substitution, the upper and lower bounds can be established, while the changes in sign of $F(x)$ will locate possible real roots between consecutive integers. When the output BETTER APP. repeats its numerical value, a root has been found correct to three decimal places. The other real roots can be found in a similar manner.

Minimum Hardware: 4K PDP-8/S
Source Language: FOCAL-69

DECUS NO. FOCAL8-110a

SWAP - FOCAL Disk Data Overlay

James J. Chang, University of California at Berkeley, Chemistry Department, Berkeley, California

This overlay causes the 8K FOCAL interpreter to use the last two tracks of a DF32 disk for the storage of variables. The number of variables which may be used in an 8K system is changed from over 100 to well over 600 variables. Program execution time is, however, severely increased.

Minimum Hardware: 8K PDP-8/1, DF32 disk
Other Programs Needed: FOCAL, 1969 (DEC-08-AJAE-PB) and utility overlays (DEC-08-AJIE-PB)

Restrictions: Only works with this version of FOCAL and overlay
Source Language: PAL, MACRO

DECUS NO. FOCAL8-111

Battle of Numbers Game (Newberry College Version)

Edward D. Huthnance, Newberry College, Newberry, South Carolina

The program allows the user to play Battle of Numbers against the computer. The computer usually wins.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-112

TIC-TAC-TOE (FOCAL)

Doug Wilson and Mark Linehan
Submitted by: Mr. C. Hamblet, Governor Dummer Academy,
Byfield, Massachusetts

Two versions of this program are supplied. The first may be used with or without extended functions in core. It provides only the basic game logic, with minimal teletype messages. The second must be used without the extended functions in core. It has the following features: 1) Each move is shown in the form of a matrix; 2) Operator cheating is detected; 3) A running score is maintained.

Minimum Hardware: 4K PDP-8, ASR33
Miscellaneous: In both versions, the computer always makes the first move
Source Language: FOCAL-69

DECUS NO. FOCAL8-113

Acid-Base Titration Curves

Edgar H. Nagel, Valparaiso University, Valparaiso, Indiana

This program is designed to construct a titration curve for the titration of a weak acid (0.1M initial concentration) with 0.1M strong base. The acid may have any number of replaceable hydrogens and the successive pKa values are entered to initiate the plot. The only simplifying approximation is to substitute concentrations for activities.

Minimum Hardware: PDP-8, ASR33
Source Language: FOCAL-69, with extended functions

DECUS NO. FOCAL8-114

Liquid Scintillation Data Processing Program

Arnold Fish, Digital Equipment Corporation, Princeton, New Jersey

Routine for calculating DPM, largest DPM value and plotting DPM data given data as a list of values in the format:

SAMPLE No.	TIME	COUNTS A	COUNTS B	COUNTS SUM
SN	T	CA	CB	CS

Source Language: FOCAL-69

DECUS NO. FOCAL8-115

Short Programs for Statistical Analysis Using FOCAL

D. J. Dowsett and R. Priest, Atkinson Morley's Hospital, Wimbledon, England

The package includes: 1) Plotting the Normal Curve for instruction purposes; 2) Calculation of the mean and standard deviation values for a single sample; 3) Student's 't' Analysis; 4) 2 x 2 Chi-squared analysis together with an open ended

chi-squared program for testing goodness of fit; 5) Least squares correlation program together with a Spearman-rho correlation by rank; 6) Analysis of Variance for two samples with one criterion of classification.

Although designed for medical purposes there is no reason why these routines cannot be used in other faculties.

Source Language: FOCAL-69

DECUS NO. FOCAL8-116

KV8FT

Arthur L. Pike, Tufts University, Medford, Massachusetts

This patch incorporates a slightly shortened version of the Variable Stroke Character Generator in such a way that FOCAL can branch to VSCG for writing on the 611 scope instead of to XOUTL for writing on the teletype. With this patch, FOCAL can use the scope and high speed punch for writing FOCAL programs and for producing rapid punched output of tables or other lengthy data. With appropriate attention to format this patch allows FOCAL programs to add text labels to graphical constructions that are drawn with the aid of the GRAPH overlay.

Minimum Hardware: 8K PDP-8, KV8/1 Display unit
Other Programs Needed: 8K FOCAL patch, FOCAL, GRAPH patch
Source Language: FOCAL-69

DECUS NO. FOCAL8-117

ED-50

Lars Palmer, AB Hässle, Pharmacological Laboratory, Goteborg, Sweden

This is an iterative procedure for a least square fit to the function :

$$Y = \frac{A}{1+B \frac{X}{X}}$$
 ; i.e. the dose-response curve.

Minimum Hardware: 4K PDP-8
Restrictions: Maximum data points c: a 30
Source Language: FOCAL-69

DECUS NO. FOCAL8-118

Three Mathematical Routines

1. To Raise A+B*I to the N Power
2. Complex Roots of Real Interpreters
3. Cube Root Finder

Forrest Howard

Submitted by: Brother John F. O'Connell, C.F.X., St. John's Preparatory School, Danvers, Massachusetts

1. To Raise a + bi to the Nth Power - This program is based on De Moivre's Theorem for raising complex numbers to a given power N. It works with all integral values of A and B and for A and/or B equal to zero. It seems reasonable to

DECUS NO. FOCAL8-118 (Continued)

assume that it would also work with decimal fractions for A or B. In the illustrative examples the = sign has been deleted to improve the printout of the answers which appear in rectangular coordinate form rather than the trigonometric form.

2. To Find the P Complex Routes of a Real Number N - This program was planned around the geometrical method of finding the cube roots of unity. The printout gives the roots in rectangular coordinate form of the complex number.

3. Cube Root Finder - This program gives a very good approximation of the cube root of real numbers.

Minimum Hardware: 4K PDP-8/S
Source Language: FOCAL-69

DECUS NO. FOCAL8-119

CHEMS LAB 5

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

Among the "new breed" chemistry courses designed for secondary application, the 'chemical materials study' (CHEMS) is a favorite which continues to be adopted, adapted, revised, and rewritten. CHEMS LAB 5 is designed to contrast the energy involved in a phase change with that of a chemical change using very simple materials and equipment. It also provides early experience in quantitative investigation by dealing with the uncertainty of measurement, and the ideas of accuracy and precision.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: FOCAL 5/69 (DECUS NO. FOCAL8-52)
Source Language: FOCAL 5/69

DECUS NO. FOCAL8-120

PFI - Product Form of the Inverse

James H. Christensen, University of Oklahoma, Norman, Oklahoma

Matrix inversion using the product form useful for parametric studies and linear programming, as well as matrix inversion which is economical in terms of time and storage requirements.

Minimum Hardware: Any configuration with FOCAL
Source Language: FOCAL

DECUS NO. FOCAL8-121

Play Golf With Arnold Palmer

David A. Cutler, Lake Michigan College, Benton Harbor, Michigan

Simulates a golf game in which the user acts as caddy for Arnold Palmer and has control over what club he uses after his drive. It makes provisions for trees, water and sand traps. The program tallies the score for easy reference.

Minimum Hardware: 8K PDP-8/1
Other Programs Needed: LIBRA Overlay
Source Language: Multi-user FOCAL

DECUS NO. FOCAL8-122

Charge Account

Frederick W. Holzwarth, George Washington High School, Philadelphia, Pennsylvania

This program is useful in teaching high school students manipulation of subscripted arrays. It also gives academic students an introduction to business application. The data included was taken from one of the types of charge accounts offered by a local department store.

Minimum Hardware: 4K PDP-8/S, ASR33
Source Language: FOCAL-69

DECUS NO. FOCAL8-123

LOAD Command for FOCAL-1969

Edward Steinfeld, Digital Equipment Corporation

LOAD; new command for FOCAL-1969. If you have found that FOCAL is impossible to bomb-out, try this overlay. This command deletes the LOCATIONS command that is used to return control to the DISK Monitor. With LOAD you may change any core location in field Ø by simply typing LOAD LOCATION/CONTENTS using two four digit octal numbers.

Minimum Hardware: PDP-8
Other Programs Needed: FOCAL-69
Restrictions: Deletes use of LOCATIONS command
Source Language: PAL-D

DECUS NO. FOCAL8-124

Analysis of Variance Package

W. P. Ronald, Canada Department of Agriculture, Vancouver, British Columbia, Canada

This package contains two programs, a one-way analysis and a two-way analysis with block effects. In both cases, the initial output consists of single sample statistics. These are followed by an analysis of variance table and an F ratio. The analysis of variance tables produced by these programs may be used with an F test, such as Scheffe's or Duncan's to deter-

DECUS NO. FOCAL8-124 (Continued)

mine whether any significant differences exist between group means.

Restrictions: Requires deletion of extended functions
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-125a

Magtape Formatter for MTA Handler

John Alderman, Applied Data Research, Atlanta, Georgia

This creates the formatted magtape required for use with DECUS NO. 8-391, MTA Handler for PS-8. The program is started by a 'GO' and the tape length is entered by the operator. A formatted tape is then created, complete with zeroed directory, ready for use with the handler.

Minimum Hardware: 8K PS-8 System configuration, TC-58/TU-20 (7 track) IBM Compatible tape unit
Other Programs Needed: FOCL.S (DECUS NO. FOCAL8-148)
Source Language: FOCL.S (DECUS NO. FOCAL8-148)

DECUS NO. FOCAL8-126

PLOTTER

John W. Smith, Indiana University, Department of Anatomy and Physiology, Bloomington, Indiana

Allows one to utilize the teletype to plot a wide variety of equations ($Y=F(X)$). The equation is entered as a FOCAL 'SET' command. The program asks the limits of X and generates scaling information to place all data on the graph with maximum resolution. F(X) may include all the FOCAL functions.

Minimum Hardware: 4K PDP-8
Storage Requirement: 145 locations left (QUAD with extended functions)
Source Language: FOCAL-69

DECUS NO. FOCAL8-127

FOCAL-SLOT

F. R. Johnson, Dow Badische Company, Freeport, Texas

FOCAL-SLOT is a demonstration program which allows the operator to simulate playing a slot machine.

By repeated use of FRAN () a three digit number is generated. Each digit is evaluated and the proper special character is printed. Operation is continuous until break out by a CTRL/C.

Minimum Hardware: 4K PDP-5/8
Source Language: FOCAL 1968

DECUS NO. FOCAL8-128

Probability (2P); From t ("Student") Distribution

Milton Landowne, M. D., U. S. Army Institute of Environmental Medicine, Natick, Massachusetts

Calculates probability that a difference between means is due to chance, when given the number of degrees of freedom and the ratio (t) of the difference between means and the standard error of this difference.

Minimum Hardware: 4K PDP-8, ASR33
Source Language: FOCAL-69

DECUS NO. FOCAL8-129

FOCAL Readable Punch

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

The operating program consisting of groups 1 and 2 will punch tape-high readable characters using the low speed punch. Groups 3, 4, 5 constitute the fundamental program which was used to build group 2, and which may be used to change or completely rebuild it.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: FOCAL 5/69
Source Language: FOCAL 5/69 (DECUS NO. FOCAL8-52)

DECUS NO. FOCAL8-130

FLHSTO

R. W. Carter, St. Peter's College, Jersey City, New Jersey

FLHSTO is a focal program which first provides a "tight" loop which gathers and counts data values while storing only unique entries. A frequency table and display follow second, and a histogram follows third and last. If storage permits, these sections may be used as subroutines.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-131

ZAREA

R. W. Carter and Friedrich A. Graeper, St. Peter's College, Jersey City, New Jersey

After input of two Z segment boundaries and a segment width (tolerance), ZAREA computes by numerical (summation) integration the area of the above segment under the Gaussian curve. Execution time can be decreased by tolerance increases at the expense of accuracy. Tolerance of ± 0.001 or better produce highly accurate results.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-132

CIG-8 MARK II

J. J. Matthews, University of Exeter, Exeter, United Kingdom

CIG-8 is an overlay to FOCAL 1969 for interactive graphics on a non-storage scope. A reasonable refresh rate is obtained through a display file assembled by an integer storage function. Selective modification of the file by FOCAL programs gives interaction. The HSR routine is sacrificed but the rest of FOCAL plus a shortened FCOM, FIN and the F.F.T. function are added.

Minimum Hardware: 8K PDP-8 with VC8/1 or equivalent; optional: Disk/Tape Monitor and AD08
Storage Requirement: All of both fields
Source Language: PAL-D

DECUS NO. FOCAL8-133

Withdrawn

DECUS NO. FOCAL8-134

1-20 Counting Game

John Ernst, Mary Holmes College, West Point, Mississippi

The program enables the user to play the 1 to 20 counting game with the computer. The game is played by counting from 1-20 using these rules: Players alternate, and each may say one or two numbers in succession, starting where the other player left off. The one who says 20 wins.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-135

MODV - Choice

Arnold V. Fish, Digital Equipment Corporation, Parsippany, New Jersey

This overlay provides a modified version of 8K FOCAL-69 in terms of variable storage. It enables FOCAL to automatically store variables in field 1 along with the text which is normally stored there via 8K FOCAL. It gives the user more room in field for user created functions. It provides for software protection of the last page of field 1 if desired.

Minimum Hardware: 8K PDP-8
Other Programs Needed: FOCAL-69, 8K overlay
Source Language: PAL-D and FOCAL-69

DECUS NO. FOCAL8-136

FOCAL - Amity

Robert W. Tuttle, Amity Regional Senior High School, Woodbridge, Connecticut

Gives FOCAL user: logical "if", double-subscripted variables, function sub-programs, computed line numbers, decrementing for-loop control, character string functions, linefeed without carriage return, true scientific notation output format, "load-and-go" starting.

Minimum Hardware: 4K PDP-8
Other Programs Needed: Special binary loader (included)
Restrictions: May not be used with Disk or Tape Monitor
Source Language: PAL III

DECUS NO. FOCAL8-137

General Nth Order Regression

Richard W. Ralston, Jr., Olin Corporation, Charlestown, Tennessee

This program does a general Nth order multiple regression on data stored in an FNEW data array. Maximum is 9th order (without logs). Typeout gives coefficients, variances and "F" ratio on each variable, plus total variance and residual variance. The method is Forward Dolittle (see Hunter-Response Surface Methodology).

Minimum Hardware: 4K PDP-8 plus Disk
Other Programs Needed: Any FNEW array FOCAL for storage of data
Source Language: FOCAL

DECUS NO. FOCAL8-138

WCXT: The Wilcoxon Matched-Pairs Signed-Ranks Test for Non Parametric Data

G. C. Ongley, Graylingwell Hospital, Chichester, Sussex, England

A "T" test for non parametric data. It compares differences between two samples of paired data for magnitude and direction, large differences being given more weight than small differences.

Source Language: FOCAL

DECUS NO. FOCAL8-139

Universal Input/Output for FOCAL

John Alderman, Applied Data Research, Atlanta, Georgia

A universal input/output handler for FOCAL has been developed. Of primary interest to those with "odd-ball" hardware configurations, it allows the FOCAL user to execute I/O commands, load external registers, and read them, and test for "skip" conditions, without requiring other assembly language

DECUS NO. FOCAL8-139 (Continued)

patches. The system has many potential uses, and as a teaching/debugging aid for hardware, relieves the unsophisticated user from much of the tedium in I/O testing. Since the PDP-8 and 9/15 have similar I/O command structures, a version for the 9/15 is undoubtedly possible.

Minimum Hardware: 4K PDP-8
Other Programs Needed: FOCAL W (8/68)
Restrictions: Works only with FOCAL W
Source Language: PAL III

DECUS NO. FOCAL8-140

Withdrawn

DECUS NO. FOCAL8-141

Spanish Language FOCAL

Max M. Burnet, Digital Equipment Corporation, Maynard, Massachusetts

This patch is used to convert all the commands, functions and initial dialogue of FOCAL-69 to the Spanish language. It is provided as a binary tape which is loaded after the first two sections of FOCAL-69 (DEC-08-AJAE-PB).

Minimum Hardware: 4K PDP-8
Other Programs Needed: FOCAL-69 and INIT
Restrictions: Applicable only to FOCAL-69
Source Language: PAL III

DECUS NO. FOCAL8-142

Successive Powers of a Matrix

J. A. Peperstraete, Katholieke Universiteit Leuven, Heverlee, Belgium

This program calculates the successive powers of a matrix, up to the highest power the user wants. The program takes never more than three matrices in core, so there is no technical limitation to the highest power the user asks for - however one has to take into account the FOCAL precision of 6 digits and the cumulative effect of rounding-off errors. The order of the matrix is limited to 6 x 6; for matrices up to 9 x 9, the user has to change the output handling command 01.23.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: FOCAL-69 without extended functions
Source Language: FOCAL-69

DECUS NO. FOCAL8-143

Repeated Matrix Multiplication

J. A. Peperstraete, Katholieke Universiteit Leuven, Heverlee, Belgium

The repeated matrix multiplication program multiplies an unlimited number of matrices. The intermediary results are

typed out only on user's request, so that a considerable amount of time is saved. The user types the input data of all subsequent matrices to be multiplied, at the end he asks the resulting product matrix which is typed out in matrix-like format.

The program detects itself if a new matrix conforms with the result of previous multiplications. The reduced storage volume is the program's major advantage; there are never more than three matrices in core, so, at each moment the total amount of available space (about 85 signed values) has to be divided among these three; e.g. when the previous result is a 3 x 3 matrix, the new matrix may be of order 12 x 3 etc.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: FOCAL-69 without extended functions
Storage Requirement: 30 lines of FOCAL script
Source Language: FOCAL-69

DECUS NO. FOCAL8-144

FOCALJ -- DECTape FOCAL-69

James Crapuchettes, Stanford Electronic Labs, Stanford University, Stanford, California

A modified version of FOCAL-69 (8K version) which includes DECTape I/O through the library command. This I/O is for non-file structured data. Also includes a FNEW command to access the data, a modified FADC command for the AF01-A A/D and a clock and an FPUP command to raise and lower the pen on an X-Y recorder connected in parallel to the display.

DECUS NO. FOCAL8-145

FOCAL for Disk and DECTape with Program Chaining

Lloyd B. Robinson, Lick Observatory, University of California, Santa Cruz, California

This version of FOCAL is useful for control of special devices. Special FOCAL commands can call FOCAL language sub-routines from DECTape, store integers and variables on disk, and control block by block transfers between disk and DECTape. Up to 16 more special purpose commands can be added to the system in a convenient manner.

Minimum Hardware: 8K PDP-8, KE 8/1 Arithmetic, One DECTape and/or DF32 Disk
Other Programs Needed: Overlays 8K FOCAL-69
Storage Requirement: 0-3177, 4600-7577, 10000-10777, 16600-17777
Restrictions: DECTape and disk storage ignores the Monitor
Source Language: PAL

DECUS NO. FOCAL8-146

Zeller's Congruence/Day of the Week

Thomas J. Ford, White Mountains Regional High School,
Whitefield, New Hampshire

A demonstration program in which Zeller's Congruence is applied to calculate the day of the week following input of month, day and year. Input is self-terminating.

Minimum Hardware: PDP-8
Source Language: FOCAL 5/69 (DECUS NO. FOCAL8-52)

DECUS NO. FOCAL8-147

Interaction Analysis

Thomas J. Ford, White Mountains Regional High School,
Whitefield, New Hampshire

This program is designed to accept the numerical input of verbal categories and then output all of the computed dimensions in the literature for interaction analysis by Flanders, Amidon, et al. The skilled user may then compare these dimensions for his own purposes.

Minimum Hardware: 4K PDP-8, ASR33
Storage Requirement: 4K or more
Restrictions: Limited to FOCAL 5/69
Source Language: FOCAL 5/69 (DECUS NO. FOCAL8-52)

DECUS NO. FOCAL8-148A (4K)

FOCAL S, An Expanded Language for Small Computers, Based on FOCAL

D. E. Wrege, Georgia Institute of Technology, Atlanta, Georgia
Submitted by: John Alderman

This dialect of FOCAL-69 is intended to be a more powerful superset of FOCAL-69 and is syntactically compatible with it. Additional features include: multiple subscripted arrays; line continuation character; conditional "DO;" computed line numbers; expanded access to internal and external processor environment.

Minimum Hardware: 4K PDP-8 with ASR33
Source Language: PAL-8

DECUS NO. FOCAL8-148B (8K)

See FOCAL8-148A above

Minimum Hardware: 8K PDP-8 with ASR33
Source Language: PAL-8

DECUS NO. FOCAL8-149

Checkers

Paul M. Klinkman, North Smithfield Jr. Sr. High School,
Woonsocket, Rhode Island

The computer plays a slightly modified version of checkers

using this program. The checkers never land on 32 spaces. This saves 32 variables. Because of the strange nature of the board, checkers can't go off one side of the board to the other side.

Restrictions: Unable to handle multiple jumps
Source Language: FOCAL-69

DECUS NO. FOCAL8-150

FRAN8

Paul Fingerman, Department of Psychology, State University of New York, Stony Brook, New York

This overlay is a modified version of DECUS NO. FOCAL8-1 which was an adaptation of Brady's random number generator for FOCAL W. It does not replace it. This version was re-written for FOCAL-69 without extended functions. It is relocatable, and can easily be adapted for use with extended functions.

Minimum Hardware: PDP-8, ASR33
Other Programs Needed: FOCAL-69
Storage Requirement: 66₈ locations, relocatable
Source Language: PAL III

DECUS NO. FOCAL8-151

Fast Matrix Inversion for Real Numbers

Richard Merrill, Digital Equipment Corporation, Maynard, Massachusetts

This program will invert a matrix up to size 17 x 17 of real numbers using modified Gauss-Jordan methods. It is translated from DECUS NO. 8-72.

Minimum Hardware: 8K PDP-8, ASR33
Other Programs Needed: FOCAL-11 or FOCAL-8 with 8K overlay
Restrictions: If the error check is omitted, sizable errors will occur
Source Language: FOCAL-11 (DECUS NO. 11-24)

DECUS NO. FOCAL8-152

Surface Plate Auto-Collimation

E. Welsh and R. Sinwell, Westinghouse Electric Corporation, Cheswick, Pennsylvania

This program is designed to calculate linear deviations of points along various tracks of a surface plate against a reference plane through 3 arbitrary points or linear deviations of points on a machine tool way against a reference line through 2 arbitrary points.

Input data consist of angular deviations in seconds measured by means of an auto-collimator in combination with a plane reflector. Output data consist of linear deviations in micro-inches.

Minimum Hardware: 4K PDP-8/I or 8/L
Restrictions: Delete extended functions
Source Language: FOCAL-69

DECUS NO. FOCAL8-153

Two Overlays for FOCAL '69, FEXP-X-P and FLOG

C. Ediss, University of Alberta, Edmonton, Alberta, Canada

This program relocates the FOCAL 69 exponential function into an area of core usually assigned to the high speed reader. Two new commands are also added to this area. The P command allows direct programming of full echo-non echo; the X command allows the removal and replacement of the = and sign in the output format. About 1100 locations are free to the FOCAL user. The log function may be added as an option, and uses 91 locations of FOCAL programming space. Sine, Cos and arctangent functions are not available.

Minimum Hardware: PDP-8, ASR33
Other Programs Needed: RIM, BIN, FOCAL-69 (DEC-08-AJAE-PB)
Source Language: Binary

DECUS NO. FOCAL8-154

8K FOCAL Display

Floor Anthoni, Medical Biological Laboratory, National Defence Research Council TNO, The Netherlands

In computer-graphics it is necessary to be able to display both lines and characters for a good picture. This program will provide these possibilities for the experienced FOCAL user. Two new functions (FX and FDIS) transform information from the FOCAL program to the display routine.

Minimum Hardware: 8K PDP-8, KV 8/1 interface

DECUS NO. FOCAL8-155

FACTORS

Peter DeWolf, 1244 Oak Trail Drive, Libertyville, Illinois

This program will calculate the prime factorization of a number, x, and print it, print related prime factor information, give square root of x in a perfect square and give other related information.

Minimum Hardware: 4K PDP-8, ASR33
Restrictions: Extended functions removed;
Tested numbers limited to 6 digits
Source Language: FOCAL-69

DECUS NO. FOCAL8-156

Blackjack for FOCAL

Vincent Perriello, Taft School, Watertown, Connecticut

This program was written to emphasize the versatility of the PDP-8 FOCAL while serving as an amusement to new or inexperienced users. It occupies nearly all of the buffer space, with the subscripted "card" variables.

Minimum Hardware: 4K PDP-8
Other Programs Needed: FOCAL 5/69 (DECUS NO. FOCAL8-52)
Source Language: FOCAL 5/69

DECUS NO. FOCAL8-157

Modifications to TSS/8 FOCAL

Allan B. Wilson, Computer Applications Associates, Houston, Texas

TSS/8 FOCAL modified to provide two new capabilities: Use of arithmetic expressions as targets in branching statements, and disk storage of FOCAL programs. The patches occupy the core areas assigned to the high speed paper tape reader routines, the library command, and the binary loader in standard 4K FOCAL-69, hence, no text or pushdown space in TSS/8 FOCAL is sacrificed with the inclusion of these features.

Minimum Hardware: TSS/8
Source Language: FOCAL-69

DECUS NO. FOCAL8-158

Mileage Program

Carl Kishline, University of Wisconsin, Kenosha, Wisconsin

Computes the average gas mileage from the fuel consumption and distance, after which it will estimate the cost of fuel for a trip of a given length.

Minimum Hardware: 4K PDP-8, ASR33
Miscellaneous: This program will operate on a 7-user FOCAL system and should work on any FOCAL system including 4K with the extended functions

DECUS NO. FOCAL8-159A

Computer Programs in Use in the Water Qualities Division, Vol. 1

Dr. Adrian Demayo, Water Quality Division, Department of Fisheries and Forestry, Ottawa, Ontario, Canada

This is a booklet containing programs AD0001 through AD0008. The first four programs are for Least Square Fit to Various Types of Polynomial Expressions; three programs are for Least Square Fit to a Linear Expression with Two or Three Variables and the last program is for Solutions of a Polynomial Equation.

DECUS NO. FOCAL8-159B

Computer Programs in Use in the Water Qualities Division, Vol. 2

Dr. Adrian Demayo, Water Qualities Division, Department of Fisheries and Forestry, Ottawa, Ontario, Canada

This booklet contains programs AD0009 through AD0014. The first two are for Balance Calculation; one program is for Calculation of Concentration from Auto Analyzer Charts and the last three are Report on Analysis.

DECUS NO. FOCAL8-159C

Computer Programs in Use in the Water Quality Division,
Vol. 3

A. Demayo and P. Goulden, Department of the Environment,
Ottawa, Canada

These programs, AD0015 and AD0016, are used to calculate
the standard curves and the analytical results obtained with
a Technicon CSM-6 Auto Analyzer.

Miscellaneous: These booklets may also be
ordered free of charge directly from
Dr. Demayo
Source Language: FOCAL-69

DECUS NO. FOCAL8-160

Non-Parametrics: The Mann-Whitney U Test and the
Wilcoxon Matched-Pairs Sign-Ranks Test

Elliott Gale and Gene Sylwesuk, SUNYAB Department of
Behavioral Science, Buffalo, New York

These are statistical programs which allow the user to test the
difference between two independent groups (Mann-Whitney)
or between two related groups (Wilcoxon) when the data do
not meet the criteria for parametric t tests.

Minimum Hardware: PDP-8/S
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-161

Wilmot Grading Program

William W. Wilmot, Central Michigan University, Mt.
Pleasant, Michigan

The purpose of this program is to average students' grades. It
can be used for any number of grades per student. It calcu-
lates the average grade for each student, the overall class
average, and the class standard deviation.

Minimum Hardware: 4K PDP-8
Restrictions: Letter grades must be converted
to numbers
Source Language: FOCAL-69

DECUS NO. FOCAL8-162

Transistor H-Parameter Conversions

James A. Williams and Robert E. Werner, Brigham Young
University, Provo, Utah

This program will allow the user to convert from one H-
parameter to another under control of FOCAL. When the user
types "GO" the program will introduce itself and ask ques-
tions concerning the type of parameter data one has and the
parameter he requires. After the new data is typed out the
program will ask questions concerning circuit gain. The

value obtained from this calculation is theoretical since all
the program requests is a value for RL (load resistance). The
program was written under TSS/8 control, but the ASCII tape
available may be loaded in the teletype under control of
FOCAL. A binary tape is available for users with a high spee
reader and the PIP option.

Minimum Hardware: 4K PDP-8 with teletype, high speed
reader optional
Restrictions: Delete all extended functions in
FOCAL
Source Language: FOCAL-69

DECUS NO. FOCAL8-163

Erlang C Blocking Probability Programs

Richard R. Plum, Traffic Systems Engineering Department,
Bell Telephone Labs, Inc., Holmdel, New Jersey

Three programs are offered: The first computes the Erlang C
Blocking Probability; the second computes the Erlang C
Blocking Probability and the average delay in seconds; the
third computes the Probability of a delay greater than 10
seconds in addition to the above.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-164

Four New Functions for FOCAL 5/69

Vincent E. Perriello, Taft School, Watertown, Connecticut

This patch to FOCAL 5/69 (DECUS NO. FOCAL8-52) enables
four new functions that make FOCAL more user-oriented than
ever. With the aid of these additions the user can tailor
FOCAL to his own needs. They give the ability to write or
call subroutines in core, read the switch register and read from
any core location, an aid in debugging. This patch wipes out
FADC, FDIS, FDXS and FNEW.

Other Programs Needed: FOCAL 5/69 (DECUS NO.
FOCAL8-52)
Storage Requirement: 31₈ locations
Source Language: PAL-D

DECUS NO. FOCAL8-165

F- (Variance Ratio) Distribution Probability

Alan S. Fields, U. S. Naval Ship Research and Development
Laboratory, Annapolis, Maryland

For X_1^2 and X_2^2 . independent random variables following chi-
square distributions, with V_1 and V_2 degrees of freedom, the

distribution of $F = \frac{X_1^2/V_1}{X_2^2/V_2}$ follows the variance ration dis-
tribution. The probability that F occurred by chance, a

DECUS NO. FOCAL8-165 (Continued)

measure of effectiveness of the experiment, is calculated.

Minimum Hardware: PDP-8
Source Language: FOCAL 8/68

DECUS NO. FOCAL8-166A & B

First and Second Order Partial Correlations

Dr. William Wilmot, Central Michigan University, Mt. Pleasant, Michigan

Program A computes the three first order partial correlations for three variables. User supplies the zero-order correlations between the three variables. In program B the user supplies the correlations between the four variables and the program calculates the second order partial correlations between the four variables.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-167

Five Statistical Programs for the PDP-8 or PDP-12

Stephen J. Mayor, Medical College of Ohio at Toledo, Toledo, Ohio

This package consists of five statistical programs. Since there is insufficient storage space for data if the programs are chained together and fed into a machine with only 4K of core, each tape may be ordered separately. However, if sufficient core is available, these programs may easily be chained together using FOCAL since none of the instructions in any of the programs occupy the same line number. The programs are: 1) Student's t Test; 2) Dunnett's t Test; 3) Normalized Plot Routine; 4) Mean and Standard Deviation; 5) Analysis of Variance for Single Variable of Classification.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-168

One-Armed Bandit - PDP-8 Style

Frank R. Borger, Michael Reese Hospital, Chicago, Illinois

One-Armed Bandit lets the player operate the computer as a slot machine. The computer "spins the wheels," checks for wins, and keeps a total of the player's wins or losses. This is similar to DECUS NO. FOCAL8-95 and FOCAL8-127. DECUS would be interested in user feed-back as to which program is superior.

Minimum Hardware: 4K PDP-8, ASR33
Source Language: FOCAL

DECUS NO. FOCAL8-169

FOCAL Version of the GE Basic Artillery Game

Ronald A. Wong, Edmund Wong, 660-44th Avenue, San Francisco, California

In most computer games the situation is the player versus the computer. However, in this game, the computer is just measuring the skill of the player -- by testing his ability with an artillery piece in coming within 100 yards of a target, whose distance was randomly selected.

Minimum Hardware: 4K PDP-8
Other Programs Needed: FOCAL-69 with extended functions
Source Language: FOCAL-69

DECUS NO. FOCAL8-170

Saint Peter's College Statistical Package

Professor Robert W. Carter, Saint Peter's College, Jersey City, New Jersey

This package contains 8 programs for statistical analysis with FOCAL. The tape for each application may be ordered separately or the complete package may be ordered as one unit. All write-ups are included in one document. The programs and their applications are as follows:

- FOCAL8-170.1 FLGPLT - Plots scaled frequency distributions
- " .2 FLBIND - Computes binomial probability Distributions
- " .3 FLPCTL - Computes percentile scores
- " .4 FLSDEV - Computes means and related measures
- " .5 FLHMES - Computes "H," the information measure of noise
- " .6 FLTMES - Computes "T," the information measure of relationship
- " .7 FLPEAR - Computes a Pearson linear correlation and regression analysis
- " .8 FLSPER - Computes Spearman's rank-order correlation coefficient

Minimum Hardware: 4K PDP-8
Source Language: FOCAL-69

DECUS NO. FOCAL8-171

Minnesota Sociology Statistics Programs

Philip M. Voxland, Department of Sociology, University of Minnesota, Minneapolis, Minnesota

The program package consists of a series of small statistical analysis programs of interest to behavioral science researchers. Various parametric and non-parametric statistics are calculated for nominal, ordinal, interval, and ratio level measurements, for discrete and continuous data and for raw data, grouped data and tabular data.

Minimum Hardware: 4K PDP-8
Other Programs Needed: FOCAL-69
Source Language: FOCAL 69

DECUS NO. FOCAL8-172

XPON

David A. Moon, Wayland High School, Wayland, Massachusetts

The purpose of XPON is to calculate integer powers of positive integers with more than the usual seven digits of precision in FOCAL. As the result is computed, it is divided into groups of five digits. Each group occupies a FOCAL variable. The method of exponentiation is repeated multiplication.

Restrictions: The base and the exponent must both be integers
Source Language: FOCAL

DECUS NO. FOCAL8-173

APOLLO II

David A. Moon, Wayland High School, Wayland, Massachusetts

This is a greatly improved version of the Apollo simulation game which has been running on almost every timesharing system in the country. The user is pilot of a lunar module, which he can steer in two axes. It is free to move up and down, and parallel to the lunar surface. The user must control attitude thrusters and the descent engine by typing in numbers. The program reports time, range to landing site, attitude, velocity components, fuel reserves, etc. every 5 seconds of simulated time. A small random error is introduced into these figures to simulate real conditions. After the module reaches the lunar surface, the program reports on its condition and makes remarks about the pilot's skill. This version of Apollo has been found to be considerably more challenging than the version which permits only vertical motion, since there are far more variables to control.

Minimum Hardware: PDP-8 with Disk (must be able to run LIBRA)
Other Programs Needed: FOCAL-69 (DEC-08-AJAE), LIBRA (DEC-08-AJ5E or DEC-08-AJ6E)
Storage Requirement: Two library blocks (1400 words)
Source Language: FOCAL-69, LIBRA

DECUS NO. FOCAL8-174

SYNDIV 5

David A. Moon, Wayland High School, Wayland, Massachusetts

SYNDIV 5 permits synthetic division of m-polynomial by n-polynomial. The user is requested to type in the coefficients of two polynomials. The first is divided by the second, and the coefficients of the quotient and remainder are printed. On input or output the "X^n" associated with the coefficient is supplied by the program. The degrees of both the dividend and the divisor may be from 1 to 9 with the extended functions still in core. A translation into a dialect of APL is included.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL

DECUS NO. FOCAL8-175

Modifications and Supplement to FOCAL8-50
RC Filter Design and Plot and 3-Pole Butterworth Filters

G. Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

As in FOCAL8-50, the filter design and plot portion of this program are separate parts - a computation program and a graphing program. The computation program allows: a) speedier execution, b) format, c) self reinitialization, which allows several passes at a design. The modifications to the graph program consist of: a) removal of a bug, b) format, c) simplification of coding. These two parts cannot both fit into FOCAL's user area and hence must be used one at a time. The 3-Pole Butterworth Filters portion of the program scales the normalized designs by Kerwin in Huelsman's Active Filters (McGraw-Hill, 1970) to meet the parameters of the user.

Minimum Hardware: 4K PDP-8 and TTY
Other Programs Needed: FOCAL, 1969 with extended functions
Source Language: FOCAL, 1969

DECUS NO. FOCAL8-176

Program for Producing Histograms from Clinical Data on Teletype

Eddy Emons, Royal Postgraduate Medical School, Hammersmit Hospital, London, England

This program uses data from the Hypertension Clinic, which are blood pressure measurements taken from patients in the lying and upright positions respectively. Both the systolic (upper) and the diastolic (lower) pressures are recorded for each position.

FOCAL is used with all the extended functions erased. The data are recorded with the high speed reader and stored in a two dimensional array in field one via the integer overlay FNEW. For each pressure measurement, the mean and standard deviation are computed.

From the two dimensional array stored in field one another two dimensional array is computed and stored in field zero, representing the histogram data. FOCAL then scans through each array and types the histogram on the teletype.

Minimum Hardware: 8K PDP-8/1, high speed reader
Other Programs Needed: FNEW integer overlay
Storage Requirement: Program: 515 locations; data field one: 3900; field 0: 566 locations
Restrictions: Extended functions are deleted
Source Language: FOCAL-69

DECUS NO. FOCAL8-177

PS/8 FOCAL, 1971

David Schneider and Barry Smith

Submitted by: Hartwell H. Whitney, Jr., Oregon Museum of Science and Industry, Portland, Oregon

PS/8 FOCAL, 1971 is a modified version of FOCAL, 1969 for use with PS/8. It provides device-independent library commands, data file manipulations, recursive subroutine calls and chaining to other programs, character manipulations, computed line numbers, and other features.

A LINCtape version is available for PDP-12 users.

Minimum Hardware: PS/8, 8K and mass storage device, 64K disk or DECtape

Other Programs Needed: PS/8

Source Language: PAL-8

DECUS NO. FOCAL8-178

Motion Picture Package

Stephen A. Kallis, Jr., Digital Equipment Corporation, Maynard, Massachusetts

This is a package of six short FOCAL routines which should prove useful to those in the motion picture industry. It consists of: 1) 16 mm Motion Picture Theater Optimization, 2) Motion Picture Scaling Program for Special Effects, 3) Running Time Program for Professional Motion Picture Films, 4) Movie Theater Lens Selection Program, 5) Cine Lens Depth of Field and Hyperfocal Calculations, 6) Footage-to-Time Conversion Program for 16 mm, 35 mm and 65/70 mm Cine Films.

Minimum Hardware: 4K PDP-8 with TTY, or any configuration equipped for FOCAL

Storage Requirement: 4K

Source Language: FOCAL, 1969

DECUS NO. FOCAL8-179

Depth of Field Program for Still Camera Lenses

Stephen A. Kallis, Jr., Digital Equipment Corporation, Maynard, Massachusetts

In order to insure sharp focus in their photographs, amateur and professional photographers need to determine the depth of field of their lenses for particular settings. This program is based upon the assumption that an acceptable circle of confusion has a constant relation to the lens EFL.

Minimum Hardware: 4K PDP-8 with TTY

Source Language: FOCAL, 1969

DECUS NO. FOCAL8-180

FOCAL-SORT

F. R. Johnson, Dow Badische Company, Freeport, Texas

This is a short routine to sort subscripted arrays by pair interchange. If duplication is found in array(x), then corresponding two elements in array (y) are sorted into ascending order.

Minimum Hardware: 4K PDP-5/8

Other Programs Needed: FOCAL-1968

Restrictions: Inefficient for arrays of greater than 20 elements

Source Language: FOCAL-1968

DECUS NO. FOCAL8-181

Filter Design

Ronald Zane, Institute for Astronomy, University of Hawaii, Honolulu, Hawaii

Filter Design is a program for the design of five passive filters:

1. Constant K High Pass Filter
2. Constant K Low Pass Filter
3. Bridged T Notch Filter
4. Parallel T Notch Filter
5. Lumped Parameter Constant K Delay Line

On line interaction with the program facilitates a compromise between operational parameters and available components.

Minimum Hardware: 4K PDP-8, ASR33

Source Language: FOCAL, 1969

DECUS NO. FOCAL8-182

First Order Differential Equation: Initial Value Problem

Algorithm by Runge-Kutta

Submitted by: U. K. Shivadev, Harvard University, Cambridge, Massachusetts

This program, which offers the 4th order Runge-Kutta method of solving a first order non-linear differential equation, is self-explanatory. Initial value, step size and termination point are to be specified. Results are typed at specified intervals.

Minimum Hardware: 8K PDP-8/E, ASR33

Source Language: 8K FOCAL '69

DECUS NO. FOCAL8-183

DARTS

D. W. Robert, COMPRIE, LTD., Boreham Mill, Warminster, Wilts., England

This game allows a number of players to play 301 DARTS according to English rules. The darts never fall out of the board.

DECUS NO. FOCAL8-183 (Continued)

Minimum Hardware: 4K PDP-8, ASR33
Source Language: FOCAL

DECUS NO. FOCAL8-184

Manpower

C. C. Wilton-Davies, Royal Naval Physiological Laboratory,
Alverstoke, Gosport, Hants, England

This is an interactive program for allocating manpower between a number of jobs with different deadlines. The costs of different solutions may be compared, and options of overtime, hiring and firing are available.

Minimum Hardware: 8K PDP-8
Other Programs Needed: 8K FOCAL
Source Language: 8K FOCAL '69

DECUS NO. FOCAL8-185

LIFE

C. C. Wilton-Davies, RNPL, Alverstoke, Gosport, Hants, England

This program is a FOCAL version of the game LIFE, attributed to John Horton Conway of the Cavendish Laboratory in Cambridge, England. The computer plays with a matrix of locations, each of which may start as full or empty. Full locations are said to contain "cells" which survive, die or reproduce according to simple laws.

Minimum Hardware: 4K PDP-8 for very limited 4 x 4 matrix, 8K for reasonable size matrix
Source Language: FOCAL

DECUS NO. FOCAL8-186

SUMER (French)

J. F. Champarnaud and F. H. Bostem, Liege, Belgium

This French language version of HAMURABI (the Sumer Game) is available on both paper tape and PDP-12 LINCtape. On the LINCtape, both FOCAL, 8K and FOCAL SUMER lists are included.

Minimum Hardware: 8K PDP-8 or PDP-12
Source Language: 8K FOCAL '69

DECUS NO. FOCAL8-187

Display FOCAL

E. Seliak and W. Martin, University of Melbourne, Parkville, Australia

This program enables FOCAL to plot on the storage tube, in vector mode, under interrupt.

Minimum Hardware: 4K PDP-8, VTØ1 storage tube with KV8/I controller, TTY
Other Programs Needed: FOCAL, 1969
Storage Requirement: 0-7577
Source Language: PAL

DECUS NO. FOCAL8-188

Generating Random Numbers with FOCAL

W. Siegel, K. Whittle and J. Siegel, University of Western Ontario, London, Canada

This program provides a patch to correct the problem with FOCAL's random number generator. This routine uses an algorithm developed by Green, Smith and Klem (1959) which has several advantages for use with minicomputers. First, unlike most such generators, it uses an additive rather than a multiplicative process; addition is much faster than multiplication with most machines. Second, the routine is relatively short and third, it has been documented and tested and its characteristics are known. A listing for the patch for FOCAL-12 is provided, but other versions of FOCAL may be modified with similar changes. Three short general programs are included which type out sequences of random integers.

Minimum Hardware: PDP-8 or PDP-12
Other Programs Needed: FOCAL, FOCAL-12
Source Language: Assembly Language

DECUS NO. FOCAL8-189

8K Overlay Patch for FOCAL5/69 (DECUS NO. FOCAL8-52)

Magnus Lundin

Submitted by: Lars Palmer, AB Hassle, Goteborg, Sweden

This patch corrects some bugs in FOCAL 5/69. The changes include: 1. No line feed generated when printing a CR in character mode. 2. CTRL/C given during high speed punching no longer causes FOCAL 52a to hang in the interrupt routine. 3. CTRL/L is ignored during data input. 4. 8K patch corresponding to 8K patch for FOCAL '69. 5. Hello command corresponding to: OT, I, E, : S; E; EA;. 6. A visual indicator in line Ø if extended functions are in core. 7. Space is created in the library lists for additional library commands. 8. ADC and display routines are removed.

Minimum Hardware: 8K PDP-8/E, HSP (Can easily be rewritten for other PDP-8 computers)
Other Programs Needed: FOCAL 5/69 (DECUS NO. FOCAL8-52a)
Source Language: PAL

DECUS NO. FOCAL8-190

Patch to Add LABEL Feature to FOCAL 5/69 (DECUS NO. FOCAL8-52a)

Magnus Lundin

Submitted by: Lars Palmer, AB Hassle, Goteborg, Sweden

This patch adds LABEL (DECUS NO. 8-68a) in a slightly modified version to FOCAL 5/69 in such a way that it can be reached from keyboard by a new library command. The program is stored in field 1, beginning at 7100 and can be removed by another library command if all of field 1 is required for large programs.

Other Programs Needed: DECUS NOs. FOCAL8-52a and FOCAL8-189

Source Language: PAL

DECUS NO. FOCAL8-191

Reverse Overlay for FOCAL, 1969

G. Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

This overlay can be used to convert 4-word (10 decimal place) FOCAL back to normal 3-word (6 place) FOCAL.

DECUS NO. FOCAL8-192

Echo Change for FOCAL, 1969

G. Chase, Portsmouth Abbey School, Portsmouth, Rhode Island

This is a patch for one-user FOCAL, 4K or 8K, to allow killing (and restoration) of echo by typing an asterisk (*) followed by a carriage return. The High Speed Reader routine in FOCAL is sacrificed when this patch is used. No user or function storage is taken.

DECUS NO. FOCAL8-193

Anova, 2-way, Unsymmetrical

Lars Palmer, AB Hassle, Goteborg, Sweden

This is an analysis of variance program for the two-way classification table. It is a general method to analyze two-way classifications which gives the analysis of variance table and calculated row and column factors for unequal groups and for missing groups.

Minimum Hardware: 8K PDP-8, HSR helpful
Source Language: FOCAL '69

DECUS NO. FOCAL8-194

Rectangular to Polar Coordination (German)

Frank Dieter Lehmann, Hauni-Werke, Hamburg, Germany

In the original Rectangular to Polar Conversion program

(DECUS NO. FOCAL8-39) the polar to rectangular program works very well, but the rectangular to polar conversion works only if $-90^\circ < \text{angle} < +90^\circ$ which restricts it, this program works for $0^\circ \leq \text{angle} < 360^\circ$. The short listing is commented in German.

Minimum Hardware: 4K PDP-8, TTY
Source Language: FOCAL '69

DECUS NO. FOCAL8-195

All Purpose Graphing Program

Mike Viola

Submitted by: Robert T. Cronin, Belmont Hill School, Belmont, Massachusetts

This program can plot almost any type of equation through the three options afforded the user in the program. All graphs are inverted and scaled down so that the entire graph fits on the dimensions given the program. This makes selective enlarging of any graph possible.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: FOCAL-QUAD
Storage Requirement: At least 800 FOCAL locations
Source Language: FOCAL '69

DECUS NO. FOCAL8-196

Fisher's Exact Test

Robert M. Smith, University of Alabama Medical Center, Birmingham, Alabama

This non-parametric technique is used with 2 X 2 bivariate tables when cell frequencies are insufficient for Chi-square tests. The program prints a table with labels and marginal frequencies and an exact probability of occurrence of the frequency distribution.

Minimum Hardware: 4K PDP-8/I, ASR/KSR33
Source Language: FOCAL

DECUS NO. FOCAL8-197

Self-Teaching Program for FOCAL

Henry R. Bungay, III

Submitted by: T. L. Drake, Clemson University, Clemson, South Carolina

This program teaches elementary features of FOCAL. The concept is to leave the program to try to use the commands. A guide sheet lists statement numbers for convenient reentry into the teaching program. Although the program is used routinely on a PDP-15 it has been tested by the author on a PDP-8. For use with a PDP-8, with a small memory, earlier portions of the program must be erased to provide room for subsequent portions. It would be very easy to modify the program or to use parts of it in other programs.

Minimum Hardware: 4K PDP-8 or PDP-15
Source Language: FOCAL

DECUS NO. FOCAL8-198

Michaelis-Menten Kinetics

Stan Vivian, University of Manitoba, Faculty of Medicine, Winnipeg, Canada

This is a FOCAL program to provide maximum likelihood estimates of the parameters VMAX and K of the Michaelis-Menten equation. Standard errors and both 95 and 99% confidence limits of the parameters are also provided. Fitted data points and the reciprocals of the estimates are printed out for graphical purposes.

Minimum Hardware: 8K PDP-8, TTY
Storage Requirement: FOCAL Text: Locations 100-4705 Field 1
Restrictions: Maximum of 30 data points
Source Language: FOCAL '69

DECUS NO. FOCAL8-199

Stock Market Game

Ronald Papa, Hamden High School, Hamden, Connecticut

This game simulates buying and selling of stocks based on the exchange's most basic principles. The operator has a choice of three different stocks to deal with. Each is preset and rises and falls randomly within a range of ± 3.5 . Starting with \$10,000 the player continues until all his money and stocks are lost or until he chooses to stop with whatever 'profit' or 'loss' he has taken.

Restrictions: No extended functions on PDP-8 series
Source Language: FOCAL '69

DECUS NO. FOCAL8-200

SIMEQR - 20 Simultaneous Equations in 8K FOCAL

Arthur L. Pike, Tufts University, Medford, Massachusetts

This program provides solutions of as many as 20 linear simultaneous algebraic equations with real-number coefficients. The program also tabulates the input data with row-column labels for efficient verification.

Minimum Hardware: 8K PDP-8/1, ASR33 (Should have high speed reader for paper tape data entry)
Other Programs Needed: 8K FOCAL '69 and DECUS NO. FOCAL8-201
Source Language: FOCAL8

DECUS NO. FOCAL8-201

FOCAL Patch for Function FP, Mod 4B

Arthur L. Pike, Tufts University, Medford, Massachusetts

This patch provides facility in 8K FOCAL for 3-word floating point data storage in Field 1, permitting 596₁₀ items to be

filed or retrieved under function FP. This put and get operation is an adaptation of DECUS NO. FOCAL8-7 for use with 8K FOCAL, 1969.

Minimum Hardware: 8K PDP-8, ASR33
Other Programs Needed: FOCAL '69 with 8K overlay DEC-08-AJIE
Restrictions: FOCAL statements must be below 4000, Field 1 (See write-up)
Source Language: PAL III

DECUS NO. FOCAL8-202

Code Generator

Peter DeWolf, 1244 Oak Trail Drive, Libertyville, Illinois

This program will type out a complete Vigenere cipher table, with random first line, for polyalphabetical substitution. It will also type out the corresponding decoding table for ease in use. Both tables, or either one alone, can be typed as many times as desired.

Minimum Hardware: PDP-8/S, ASR33
Other Programs Needed: DECUS NO. FOCAL8-52a
Restrictions: Extended functions out
Source Language: FOCAL 5/69

DECUS NO. FOCAL8-203

Graph Sketching

Peter Cornish, Trinity Grammar School, Melbourne, Australia

This program should prove useful in the study of probability, statistics, areas under curve, etc. After the program is started, the computer asks a number of questions needed to sketch the graph. After the necessary input it then sketches the graph and types the X and Y values for the points plotted.

Minimum Hardware: PDP-8/L or equivalent
Restrictions: Can only plot one Y value for any X value
Miscellaneous: Can be used with FOCAL's extended functions IN
Source Language: FOCAL '69

DECUS NO. FOCAL8-204

Acid-Base Equilibria

F. R. Johnson, Dow Badische Company, Freeport, Texas

Acid-Base Equilibria will calculate hydrogen ion concentration, hydroxyl ion concentration, pH, and pOH based on a variety of inputs.

Minimum Hardware: 4K PDP-5/8
Other Programs Needed: FOCAL 1968
Source Language: FOCAL, 1968 extended

DECUS NO. FOCAL8-205

Random Walk/Array

Thomas J. Ford, White Mountains Regional High School,
Whitefield, New Hampshire

This program generates and plots a random two dimensional array.

Minimum Hardware: 4K PDP-8, ASR
Other Programs Needed: DECUS NO. FOCAL8-52a
Source Language: FOCAL 5/69

DECUS NO. FOCAL8-206

FOCAL Generates Binary Patches

Thomas J. Ford, White Mountains Regional High School,
Whitefield, New Hampshire

The educational uses of a minimum 4K system dedicated to FOCAL needs a convenient way to punch binary format tape, especially if this is usually in the form of short patches from well documented machine language listings. This program makes use of the convenient special options of FOCAL 5/69 (DECUS NO. FOCAL8-52a) to format and punch leader, trailer, origin and instruction codes, as well as a checksum using the ASR punch.

Minimum Hardware: 4K PDP-8, ASR33
Source Language: FOCAL 5/69

DECUS NO. FOCAL8-207

EAI/ASCII Converter and 'SLO-SYN' NC Program and Tape Generator

Thomas J. Ford, White Mountains Regional High School,
Whitefield, New Hampshire

The single character handling of FOCAL 5/69 is used to output EIA on the low speed punch of an ASCII teletype. A second program formats and lists the NC program for a two-axis 'SLO-SYN' machine controller. It stores the required characters and outputs a finished tape.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: FOCAL 5/69 (DECUS NO. FOCAL8-52a)
Restrictions: Works with 5/69 version of FOCAL only
Source Language: FOCAL 5/69

DECUS NO. FOCAL8-208

A Normally Distributed Random Number Generator in FOCAL

Stan Vivian, University of Manitoba, Winnipeg, Canada

This two line program will provide a normally distributed random number from a population of mean zero and specified standard deviation S. Besides the input standard deviation S, the subroutine uses two variables X and Y. The normally

distributed number is returned as X. Another version is provided for use with DECUS NO. FOCAL8-150; it is a single line of FOCAL and executes faster. A demonstration program is also included.

Source Language: FOCAL '69

DECUS NO. FOCAL8-209

GRFIT, A Simple Least Squares Routine

R. C. Gross, Eastman Kodak Company, Rochester, New York

The program accepts data for x and y, where x is known and y has some degree of scatter in the data, calculates the best straight line, gives a correlation coefficient as well as standard errors for the calculated slope and intercept.

Minimum Hardware: 4K PDP-8
Other Programs Needed: FOCAL 1969 or similar
Restrictions: Best used without extended functions
Miscellaneous: See also DECUS NO. 8-483
Source Language: FOCAL

DECUS NO. FOCAL8-210

CHAIN and FCOM

Alessandro Zanon, Istituto Nazionale di Fisica Nuclear,
Legnaro (padova) Italy

CHAIN - A virtual no-core memory FOCAL overlay chaining FOCAL programs.

FCOM - A new function to store data on common area or on DECTape.

These two complementary programs are written for the use of FOCAL on 4K PDP-8 family computers with the DECTape Monitor System. They are used whenever a series of programs and/or a large amount of data are necessary.

Minimum Hardware: 4K PDP-8, TC01 and two TU55 DECTapes
Other Programs Needed: FOCAL (DEC-08-AJAE-PB) and DECTape Monitor System
Storage Requirement: 4200-4777
Restrictions: No Extended Functions, FADC() and FRAN ()
Source Language: PAL-D

DECUS NO. FOCAL8-211

WEST-KY Four-User FOCAL

C. Davis, L. McGimsey and G. Moore, Western Kentucky University, Bowling Green, Kentucky

This modified version of four-user FOCAL '69 provides a DECTape library facility accessible to all users. A library of approximately 100 FOCAL programs including some FOCAL tutorials, drills, and a variety of programs which are intended for the support of undergraduate science and mathematics

DECUS NO. FOCAL8-211 (Continued)

instruction is included. Machine accounting of terminal usage is optional.

Minimum Hardware: 8K PDP-8/1, DECtape, a machine readable clock such as KW81 or the RC clock in the AXØ8 is highly desirable
Other Programs Needed: Single user and four-user FOCAL '69 are included
Source Language: PAL-D and FOCAL

DECUS NO. FOCAL8-212

Automated Terminal Usage Accounting for Four-User FOCAL

G. E. Moore, L. S. McGimsey, C. L. Davis
Submitted by: Chester L. Davis, Western Kentucky University, Bowling Green, Kentucky

Machine accounting of the usage of eight terminals connected to two PDP-8/1 computer systems at the Instructional Computer Laboratory of the University of Kentucky has been implemented. Programs for emulating a programmable clock, recording usage data, sorting, storing transaction records on DECtape and summarizing usage are presented.

Minimum Hardware: 8K PDP-8/1, DECtape, machine readable clock such as KW81 or the RC clock in the AXØ8
Other Programs Needed: Single-user and four-user FOCAL 69 are included in the system
Source Language: PAL-D and FOCAL

DECUS NO. FOCAL8-213

FOCAL Random Number Generator

Dr. Ronald S. Remmel, Princeton University, Princeton, New Jersey

A short, 6 line routine for generation of random numbers in FOCAL.

Minimum Hardware: Any machine capable of handling FOCAL
Source Language: FOCAL

DECUS NO. FOCAL8-214

FDSK, An Overlay for FOCAL to Read Data - Or Program - Files from the PS/8 Systems Device

Hans Mees and Floor Anthoni, Medical Biological Laboratory, T.N.O., Rijswijk, The Netherlands

FDSK provides 8K FOCAL with a minimum-core access to a mass-storage device: the PS/8 system-device. It enables the user to process data files (on the system-device) preprocessed by other programs. It can be used to run FOCAL batch-wise.

As FOCAL was used to perform the last step in the processing

of data, only a READ on the system-device was implemented. The data transfer is in ASCII format.

Minimum Hardware: 8K PDP-8; 64K Disk or DECtape
Other Programs Needed: FOCAL '69 8K Overlay; PS/8 Programming System
Storage Requirement: 45₈ locations in Field Ø; 645₈ locations in Field 1
Source Language: PAL-8, PAL III

DECUS NO. FOCAL8-215

FOCAL 1969 Octyl Loader

F. R. Johnson, Dow Badische Company, Freeport, Texas

This octyl loader will allow the user of FOCAL 1969 to load a tape in octyl format. Using this loader FNEW(X) commands can be loaded without resorting to a binary load and can be used by terminals remote from the computer itself.

Minimum Hardware: 4K PDP-5/8
Other Programs Needed: FOCAL 1969
Storage Requirement: 63 core locations and a pointer
Source Language: PAL III

DECUS NO. FOCAL8-216

FARRAY, A FOCAL FNEW for Two Dimensional Arrays in 8K FOCAL

Hans Mees and Floor Anthoni, Medical Biological Laboratory, T.N.O., Rijswijk, The Netherlands

FARRAY uses Field 1 from top to bottom (competitively with the text area) for the storage of one - or two - dimensional arrays. Arrays can be defined in integer or 3- or 4- word floating point format. Arrays can be created or deleted dynamically during program execution.

Minimum Hardware: 8K PDP-8
Other Programs Needed: FOCAL '69; 8K overlay; 4 word overlay
Storage Requirement: 106₈ locations Field Ø; 514₈ locations Field 1
Restrictions: A FARRAY function cannot be called within itself
Source Language: PAL-8, PAL III

DECUS NO. FOCAL8-217

Hamming Algorithm to Solve Two Coupled Ordinary First Order Differential Equations with Given Initial Conditions

U. K. Shivadev, Harvard University, Cambridge, Massachusetts

This program solves any two first order ordinary differential equations simultaneously using Hamming's fourth order algorithm.

Minimum Hardware: 8K PDP-8/E; Paper tape reader

DECUS NO. FOCAL8-217 (Continued)

Other Programs Needed: DEC-08-LBAA-PM Binary Loader and DECUS NO. FOCAL8-148 FOCL.S 8K
Source Language: FOCL.S (DECUS NO. FOCAL8-148)

DECUS NO. FOCAL8-218

FOCAL Overlay CHAIN

Herbert Zimmerman, Digital Equipment GmbH, Cologne, Germany

The overlay CHAIN was written to minimize the amount of hardware for the sophisticated usage of FOCAL. Two basic programs are included - a program to build a system tape and to call the various FOCAL-Interpreter configurations, and the overlay CHAIN. The functions of the overlay CHAIN are: a common area in core for integers, 3 word and 4 word floating point numbers; store and fetch of common area on/from DECTape; a "computed GOTO" function; storage of FOCAL programs on DECTape and chaining of several programs.

Minimum Hardware: 4K PDP-8/E; Single or dual transport TD 8/E
Other Programs Needed: Binary Loader, FOCAL DEC-08-AJAE-PB, FOCAL 4 word overlay
Storage Requirement: Approximately 4 pages
Restrictions: For 4K only, RIM and BIN will be destroyed
Source Language: PAL-8

DECUS NO. FOCAL8-219

Keyboard Controlled High Speed Punch Routine for FOCAL 1969

Eddy Emmons, Royal Postgraduate Medical School, Hammersmith Hospital, London, England

A new function call has been implemented for FOCAL 1969 to allow the high speed punch to output all FOCAL commands and can be used under program control.

A new command, which is ignored by FOCAL, changes the printer IOT's for Punch IOT's. The Punch will exit to the keyboard when errors occur. These routines can be used with or without the extended functions and do not require extra user space. Either argument or command can be extended to activate other high speed output devices as KV8/1, line printer, etc. (when 8K is available).

Minimum Hardware: 4K PDP-8, 8/1, 8/L
Other Programs Needed: FOCAL 1969
Storage Requirement: 50₈ locations
Restrictions: FDIS and FADC are pre-empted
Source Language: PAL-8

DECUS NO. FOCAL8-220

Individual Tablet Assay

L. L. Alber and M. W. Overton, U. S. Food and Drug Administration, Chicago, Illinois

This program was written to process spectrophotometric readings from the laboratory auto-analyzer system. The experimenter performs the analysis in the usual manner and types in the instrumental reading at the computer station. The amount of drug per tablet and percent of declared is calculated and printed out before proceeding to the next entry. Upon completion, the average found per tablet and the average percent of declared is listed.

Minimum Hardware: 8K PDP-8
Source Language: 8K FOCAL 1969

DECUS NO. FOCAL8-221

LSQ Stern-Volmer: Least Squares Treatment of the General Stern-Volmer Equation

Dr. James E. Gano and Dr. H. Bradford Thompson, University of Toledo, Toledo, Ohio

The Stern-Volmer Equation, often utilized by photochemists to treat data, in its most general form (reactive and quenchable triplet and singlet states) is processed by an iterative least squares approach applicable to such nonlinear equations.

Minimum Hardware: 8K PDP-8; To employ plotting option AXØ8 and XY recorder must be included
Storage Requirement: 5114₈
Source Language: 8K FOCAL

DECUS NO. FOCAL8-222

Center of Gravity Calculations

Joel D. Scheraga, Stamford High School, Stamford, Connecticut

This program, written especially for students of Model Rocketry, enables the user to determine the center of gravity of the rocket and the weight of the rocket 1. minus the engine; 2. including the engine; 3. at the time of burnout.

Minimum Hardware: 4K PDP-8, TTY
Other Programs Needed: DECUS NO. FOCAL8-52a
Source Language: FOCAL 5/69

DECUS NO. FOCAL8-223

FOCLX, 1972

Bob Cronin, Belmont Hill School, Belmont, Massachusetts

This is a 4-user, expanded version of FOCAL 1969, similar to FOCAL, AMITY (DECUS NO. FOCAL8-136). Added features are change core function and examine core function.

DECUS NO. FOCAL8-223 (Continued)

Suggestions for application of these functions are included in the write-up.

Minimum Hardware: 8K PDP-8, 1-4 ASR33 with associated interfaces
Restrictions: No high speed reader routine
Miscellaneous: Tape is punched in XCBL format (See DECUS NO. 8-26D)
Source Language: PAL III

DECUS NO. FOCAL8-224

SPASTIC - A System for Programming Angles, Scaler and Timer, by Internal Counting

C. Richard Desper, Army Materials and Mechanics Research Center, Watertown, Massachusetts

The FOCAL interpreter has been modified to control a simple PDP-8/L interface for X-ray diffraction experiments. Control operations are accessed through a set of FOCAL functions which control four stepping motors, an internal data break scaler, a timer based on crystal clock interrupt, and the X-ray shutter solenoid.

Minimum Hardware: 4K PDP-8, ASR33, Special X-ray interface DECSPEC 08 0239 D (300Hz clock, data break scaler, solenoid driver, 4 stepping motor drivers)
Other Programs Needed: FOCAL 1969
Restrictions: Not for PDP-8/S
Source Language: PAL III

DECUS NO. FOCAL8-225

Loan Amortization Schedule

Adrian Demayo, Department of the Environment, Ottawa, Ontario, Canada

Three computer programs to calculate a loan (mortgage) amortization schedule under various circumstances.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL '69

DECUS NO. FOCAL8-226

Frequency Transformation Program

Klaus Lickteig, Institut Fuer Kerntechnik, Technische Universitaet Berlin, Berlin, Germany

Various Fourier transformation methods can be applied when using the Frequency Transformation Program. The following methods are applied:

1. Different integration methods: Simpson and trapezoidal integration; 2. Using a lag window: "hanning" and "hamming;" and 3. Fast Fourier Transformation.

By means of an example, a Critical Comparison of the methods is made.

Minimum Hardware: 8K PDP-8/I or 8/E, ASR33, HSR (optional)
Other Programs Needed: FOCAL 1969 (DEC-08-AJAE-PB); 8K Overlay (DEC-08-AJIE-PB); MODV-Choice (FOCAL8-135)
Source Language: FOCAL 1969, PAL III

DECUS NO. FOCAL8-227a

FOCL/F - An Extended Version of 8K FOCAL/69

D. E. Wrege, Georgia Institute of Technology, Atlanta, Georgia

FOCL/F is a version of FOCAL language which implements several extensions for increased power and versatility. Among these are: user defined functions, user defined interrupt service, execution of machine language instructions from FOCAL, arrayed variables, PS/8 compatibility, line number computation, extended commands, ASCII character commands, links for ease of addition of user assembly-code subroutines, new TTY-high speed reader control commands, A PS/8 overlay is available for file handling from FOCAL, which permits device independent program calling/saving, variable files, and ASCII files. FOCL/F version 12/1/72 is closely compatible with FOCAL-10, the newly released implementation of FOCL/F on the DECsystem-10 by Rob Warnock III at the chemistry department of Emory University. This document includes additions to the earlier version dated 6/1/72.

Minimum Hardware: 8K PDP-8
Other Programs Needed: PS/8 or OS/8 for PS/8 overlay
Source Language: PAL

DECUS NO. FOCAL8-228

Great Circle Distance Between 2 Points

A. Moses, Computer Applications Engineering Company, El Paso, Texas

Given the degrees and minutes of latitude and longitude of any 2 points on the surface of the earth, this program calculates the angle at the center of the earth between the 2 points and the great circle distance. Uses a spherical earth with 3960 mile radius.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL

DECUS NO. FOCAL8-229

H-800 Wiring Diagrams

Thomas J. Ford, White Mountains Regional High School, Whitefield, New Hampshire

A DEC H-800-W connector is diagrammed and wire lists, pin diagrams and change orders randomly prepared for it. A second program handles real cases for one connector.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: FOCAL 5/69 (DECUS NO. FOCAL8-52a)
Restrictions: Will cause trouble if used with other versions of FOCAL
Source Language: FOCAL 5/69

DECUS NO. FOCAL8-230

CALCOMP Plotter FNEW PLOTX

P. R. Bell and M. G. Roberts, Digital Equipment Corporation, Albuquerque, New Mexico

This FNEW function uses a modified PLOTX to draw lines and reset the current position to any coordinate rather than just the origin.

Minimum Hardware: 4K PDP-8 with CALCOMP plotter
Other Programs Needed: FOCAL - 69
Source Language: PAL-8

DECUS NO. FOCAL8-231

Extended Precision Sine and Cosine for 4-word FOCAL

Dr. H. B. Thompson, University of Toledo, Toledo, Ohio

This patch provides sine and cosine routines commensurate with the extended precision of 4-word FOCAL. Absolute error for arguments less than 2π is less than 3×10^{-10} . The routine occupies slightly less memory than the original.

Other Programs Needed: 4-word version FOCAL-69
Storage Requirement: Overlay on original FOCAL 69:
LOC 5200-5344
Source Language: PAL III

DECUS NO. FOCAL8-232

Roots by Inverse Interpolation

H. Bradford Thompson, University of Toledo, Toledo, Ohio

This subprogram uses a modified inverse interpolation (regula falsi) method to find roots of any continuous function. The user may write a master program, plus subprograms to calculate the function and to store, print, or employ roots, to fit his individual needs.

Other Programs Needed: FOCAL (any version)
Source Language: FOCAL

DECUS NO. FOCAL8-233

A FOCAL-Correlation Program for the LAB-8 System

1. Auto- and Cross-Correlation Program
2. Auto-Correlation Program

Klaus Lickteig, Institut Fuer Kerntechnik, Technische Universitaet Berlin, Berlin, Germany

If there are analog measurement signals of low frequencies, a correlation analysis can be made with a FOCAL program.
1) Program 1: An auto- and cross-correlation operated simultaneously. 2) An auto-correlation program with output of data on the teletype should be an example of the possibility of developing out of the above program.

Minimum Hardware: 4K PDP-8/I or PDP-8/E with AXØ8, A/D converter, ASR33

Other Programs Needed: FOCAL 1969 (DEC-08-AJAE-PB)
Source Language: FOCAL, PAL III

DECUS NO. FOCAL8-234

Action Indicator Calculator

Roger Geffen, Data Research Associates, Wayland, Massachusetts

A parameter dependent on price and volume is calculated for a succession of days or weeks, and a cumulative total of this parameter is printed out along with the current value and a line number, which may be the day of the month. Some ability to recover from errors, and the ability to terminate the program at will are incorporated.

Minimum Hardware: PDP-8E, 8K
Other Programs Needed: FOCAL 1969 (DEC-08-AJAE-PB);
DECUS NO. FOCAL8-153
Source Language: FOCAL 1969

DECUS NO. FOCAL8-235

MPS Radiation Pattern Program

John G. Morey, Marvelwood School, Cornwall, Connecticut

The program will tabulate the radiation pattern shape (in millivolts per meter at one mile) of any vertical element directional antenna array. Extent of tabulation, number of towers and operating values of each tower (based with reference to one common point) are determined by user input.

Minimum Hardware: 4K PDP-8, ASR33, low speed reader
Restrictions: Sine and cosine functions necessary.
Handles maximum of 10 towers
Source Language: FOCAL 1969

DECUS NO. FOCAL8-236

Polynomial Curve Fitting (Streamlined Programs)

Dr. J. H. Battocletti, Medical College of Wisconsin, Milwaukee, Wisconsin

Near-ultimate streamlined programs to allow the greatest number of data points and the largest order as possible, are presented. Two are for the normal polynomial; one forces the fit to go through zero. The third uses the Chebyshev polynomial. Point-by-point error and total RMS error are calculated.

Minimum Hardware: 4K PDP-8 with teletype
Source Language: FOCAL 1969

DECUS NO. FOCAL8-237

Bond Computations

Robert Zuch, White Plains High School, White Plains, New York

The Bond Computations program provides for the valuation of

DECUS NO. FOCAL8-237 (Continued)

coupon bonds. Given the settlement date, maturity date, par value, coupon rate, and either the yield rate or dollar price of the bond, the program will find the yield rate or dollar price, the principal, accrued interest, and the final money. The program will evaluate bonds called before maturity, and will provide for a commission on the dollar price of the bond.

Minimum Hardware: 4K PDP-8, TTY, Tape Reader
Other Programs Needed: FOCAL 4-word overlay
Source Language: FOCAL 1969

DECUS NO. FOCAL8-238

Millikan Oil Drop Experiment

Advanced Topics Class WMRHS
Submitted by: D. Baird, W. McGee, L. Pierce, White Mountains Regional High School, Whitefield New Hampshire

FOCAL simulation of the classical Millikan experiment based on the BASIC simulation "CHARGE" produced by D. Scarl, A. Caggiano, and programmed by C. Lasik for the Huntington Two project.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: FOCAL 5/69 (DECUS NO. FOCAL8-52a)
Source Language: FOCAL 5/69

DECUS NO. FOCAL8-239

FOCAL 8/77

DIV - Program for Division

Helmut Doepner, Institut fur Physikalische Chemie, Kiel, Germany

Computes and types the repeating decimals that appear in a fraction. Many of the limitations that appear in the program on pages 11-57 and 11-58 of the Programming Languages Manual, 1970, which is useful only for fraction < 1, have been removed.

Minimum Hardware: 8K PDP-8
Source Language: 8K FOCAL 1969

DECUS NO. FOCAL8-240

Science Fiction Quiz

Stephen A. Kallis, Jr., Digital Equipment Corporation, Maynard, Massachusetts

This is a short, multiply choice literary quiz designed expressly for science-fiction readers.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL

DECUS NO. FOCAL8-241

Satellite Orbital Parameters

Stephen A. Kallis, Jr., Digital Equipment Corporation, Maynard, Massachusetts

A short program to determine the parameters of orbiting satellites. Inputs of the radius of the planet and the acceleration of gravity at the planet's surface result in information concerning the orbital velocity and period for any stated altitude above 90 miles.

Minimum Hardware: 4K PDP-8
Source Language: FOCAL

DECUS NO. FOCAL8-242

Solution of Linear Equation Systems with Symmetrically Matrix

K. Wagner, Technische Universitat Berlin, Berlin, Germany

The program gives the solution-vector, an approximate error-vector and the condition number of a linear equation system with symmetrically matrix.

Minimum Hardware: 8K PDP-8E
Other Programs Needed: 8K overlay
Source Language: FOCAL

DECUS NO. FOCAL8-243

Analysis of Variance for One-Two- and Three-Treatment Designs for a PDP-8

Robert Breaux, Texas Tech University, Lubbock, Texas

These programs provide a quick and easy analysis of variance. Modification of error terms to fit particular needs in biology, agriculture, medicine, etc., can be done easily. Output includes terms for pooling error terms, mean comparisons and trend analysis.

Minimum Hardware: 8K PDP-8
Source Language: FOCAL

DECUS NO. FOCAL8-244

HANGMAN IV

Andrew Layman, Stamford High School, Stamford, Connecticut

This program will allow user to play Hangman with only 4K. It is virtually idiot-proof and simulates non-computer game in playing style almost perfectly.

Minimum Hardware: 4K PDP-8, ASR33
Other Programs Needed: FOCAL 5/69 (DECUS NO. FOCAL8-52a)
Restrictions: Delete Functions
Source Language: FOCAL 5/69

DECUS NO. FOCAL8-245

Executive and Utility Routines for FOCLX, 1972

Robert Cronin, Belmont Hill School, Belmont, Massachusetts

These routines contain a header change for Quad FOCLX which will change the normal header message to any 12 character string typed by the user; a program to unpack and print a Quad FOCLX user buffer; a binary punch routine, and a tape label program.

Minimum Hardware: 8K PDP-8/1 with 4 ASR33's and associated PT08's
Other Programs Needed: FOCLX System (DECUS NO. FOCAL8-223)
Source Language: FOCLX, 1972 (DECUS NO. FOCAL8-223)

DECUS NO. FOCAL8-246

Undefeatable FOCAL TIC-TAC-TOE

Henry K. Portner
Submitted by: Robert Cronin, Belmont Hill School, Belmont, Massachusetts

An undefeatable TIC-TAC-TOE program based upon a "Magic Square Algorithm."

Minimum Hardware: 4K PDP-8 series with console keyboard
Other Programs Needed: Any FOCAL dialect
Source Language: FOCAL '69

DECUS NO. FOCAL8-247

FNEWS Overlay to Use High Speed Punch with FOCAL Program

Alessandro Zanon, Istituto Nazionale di Fisica Nucleare, Legnaro (Padova), Italy

This overlay adds three new functions to FOCAL-1969 and modifies the scope routine. One of these functions may be used to write a very short routine enabling the high speed punch

Minimum Hardware: 4K PDP-8
Other Programs Needed: FOCAL-1969 (DEC-08-AJAE-PB)
Source Language: PAL-D

DECUS NO. FOCAL8-248

FOCTXT - Text Input-Output Patch to FOCAL-1969

F. R. Johnson, Dow Badische Company, Freeport, Texas

FOCAL was developed to be used as a problem solving language. As such, input to a user program is restricted to numeric entries. This patch allows two new functions, FRSC(X) (Read String of Characters) and FTSC(X) (Type String of Characters). These functions allow the user of FOCAL to input and output text that is not included in the body of the

user program.

Minimum Hardware: Any configuration which supports FOCAL
Other Programs Needed: FOCAL-1969
Storage Requirement: One page
Miscellaneous: This program was developed on a PDP-5
Source Language: PAL III

DECUS NO. FOCAL8-249

Payroll Listings and Totals

John A. Villano, CAM-A-TON, Waterbury, Connecticut

This routine uses all 72 characters of the teletype to print payroll information for each employee on one line and also outputs totals at the end of the payroll. A data tape, with leader-trailer between employees, prepunched with the initial ASK information of name, marital status, number of dependents and a one or zero depending upon whether an insurance payment is to be deducted, allows the operator to merely enter the number of hours worked. The routine will handle specified amounts of withholding and will skip FICA when the limit is reached.

Minimum Hardware: 4K PDP-8
Restrictions: Employees' names limited to 7 characters and must not end in "E". Deleting insurance deduction column would permit 11 characters
Miscellaneous: Object computer - PDP-8/F
Source Language: FOCAL 1969

DECUS NO. FOCAL8-250

Six Curves - GMS037

Joseph P. DiBella, General Management Systems, Miami Springs, Florida

Used to calculate six regression equations for a set of bivariate data. Regression coefficients and the index of determination are computed for a linear equation and five common non-linear equations. The six curve types used are:

- 1. $Y=A+B*X$
- 2. $Y=A*B \uparrow X$
- 3. $Y=A*X \uparrow B$
- 4. $Y=A+B/X$
- 5. $Y=1/(A+B*X)$
- 6. $Y=X/(B+A*X)$

There is no input limit for the total number of observations.

Minimum Hardware: 4K PDP-8/E, ASR33
Source Language: FOCAL 1969

DECUS NO. FOCAL8-251

"WORD" - Character Generation Using FOCAL's FDIS Function

Willard L. Craft and Michael H. Jacobitz, Adrian College, Adrian, Michigan

"WORD" is intended as a demonstration of a modification to

DECUS NO. FOCAL8-251 (Continued)

FOCAL's FDIS function. The game is similar to "Hangman," with both the computer and the operator thinking of a word and then trying to guess the other's word, letter by letter. A patch to extend the program's vocabulary is included. Information concerning the modification is also included.

Minimum Hardware: 4K PDP-8, ASR33
Source Language: FOCAL 1969

DECUS NO. FOCAL8-252

12K Overlay for FOCAL

Andrew F. Bauer, Standard Telephone & Cables Ltd., Basildon, Essex, England

This program overlays 4 word 8K FOCAL to give FOCAL the use of 661 variables stored in Field 2 (excluding the last page). No special functions or definitions are necessary - the overlay in no way affects the normal operation of FOCAL.

It should be particularly useful to PS/8 users with TD8E DEC-tape who require a minimum of 12K to make better use of the core available.

Minimum Hardware: 12K PDP-8
Other Programs Needed: FOCAL '69 (DEC-08-AJAE-PB), INIT, 4-word, 8K Overlays
Source Language: PAL

DECUS NO. FOCAL8-253

Solution to Any Equation Involving One Variable

Peter Cornish, Trinity Grammar School, Kew, Melbourne, Victoria, Australia

This program solves the equation $F(X)=0$ through Newton's method of iteration. The computer asks for $F(X)$, $F'(X)$, and an approximation to X . The computer then works out a better solution, accurate to 6 or 10 significant figures, depending on the sort of FOCAL being used. When there is more than one value for X , the value closest to the approximation will be found out.

This program can be used with FOCAL's extended functions IN.

Minimum Hardware: PDP-8 with TTY
Restrictions: User must be able to differentiate $F(X)$
Source Language: FOCAL 1969

DECUS NO. FOCAL8-254

Patch to Allow Computed Line Numbers in FOCAL, 1969

Eben F. Ostby, RR#1, Box 10, Hampton, Connecticut

This patch loads over the routine XGETLN in FOCAL, modifies that routine to allow for computed line numbers, returns the correct value for LINENO with evaluable arguments. In addition it still allows the use of the argument ALL.

Minimum Hardware: PDP-8
Restrictions: Disables ADC function; not usable with 8K and 4 word overlays. Argument for evaluable line numbers must not start with letter "A"
Source Language: PAL

DECUS NO. FOCAL8-255

Repeating Decimal

Glen Larson
Submitted by: Kevin Willoughby, Attleboro High School, Attleboro, Massachusetts

A short, simple program to type the decimal equivalent of two numbers as a repeating decimal. This routine is fancier than the one in DECUS NO. FOCAL8-33, as it can handle fractions greater than one, and the output is self-terminating.

Minimum Hardware: PDP-8
Other Programs Needed: FOCAL, 1969
Source Language: FOCAL, 1969

DECUS NO. FOCAL8-256

OPTION \$

Horace D. Stephens, Waynflete School, Portland, Maine

This patch to FOCAL 5/69 (DECUS NO. FOCAL8-52a) enables two OPTIONS, OPTION \$ and OPTION F. OPTION \$ makes F a legal variable identifier and makes \$ the function label. (FSQT(4) becomes \$\$SQ(4).) OPTION F restores F as the function label and makes F an illegal variable identifier. The patch will work with FOCAL 5/69 with or without the extended functions and with or without DECUS NO. FOCAL8-189. Two of FOCAL's OPTIONS must be replaced with this patch. Information is included to permit the user to select which OPTIONS to trade.

Minimum Hardware: 4K PDP-8
Restrictions: Replaces two of FOCAL's OPTIONS
Source Language: Machine Language

DECUS NO. FOCAL8-257

LIMERICK GENERATOR; RANDOM SENTENCE GENERATOR; LIFE SPAN SIMULATION PROGRAM

William Murray, 4164 Shady Valley Drive, Arlington, Texas
Submitted by: Sally Richards, Digital Equipment Corporation, Maynard, Massachusetts

Three short routines demonstrating the random generation function of FOCAL 5/69 (DECUS NO. FOCAL8-52a).

Minimum Hardware: PDP-8
Source Language: FOCAL 5/69

DECUS NO. FOCAL8-258

Hearing Loss Simulator

Thomas H. Townsend, Area of Communication Disorders, Dept. of Speech, Central Michigan University, Mt. Pleasant, Michigan

The "Hearing Loss Simulator" program enables the Audiology student to follow clinical testing procedures to obtain thresholds on a hearing loss simulated by the computer. The student has all the options which are available on the clinic audiometer. These include the choice of six (6) frequencies, the ear to be tested, the pure-tone presentation mode, the masking level in the non-test ear, and the hearing threshold level of the pure-tone.

Minimum Hardware: 4K PDP-8/L and ASR33
Other Programs Needed: FOCAL, 1969
Source Language: FOCAL, 1969

DECUS NO. FOCAL8-259

High Speed Punch, High Speed Write, and FRAN Overlays to FOCAL 69

Jonathan Grobe, State University of New York at Stony Brook, Stony Brook, New York

Three modifications have been made to FOCAL 69. Punch is the new Type command for the high speed punch (Type operates low speed punch only; Punch operates high speed punch only). CTRL/W sets up the high speed punch for the Write command. FRAN is replaced by an improved random number generator, FRAN8 (DECUS NO. FOCAL8-150), but modified so it will also work with MODV (DECUS NO. FOCAL8-135). No user storage areas are affected, since these overlays occupy locations formerly used by FRAN, the Library command, and the Interrupt Processor.

Minimum Hardware: PDP-8, High Speed Punch, ASR33
Other Programs Needed: FOCAL, 1969 (DEC-08-AJAE)
Restrictions: Library command and Interrupt Facility are unavailable; CTRL/C doesn't work
Source Language: PAL III

DECUS NO. FOCAL8-260

Arithmetic and Geometric Progressions

J. Pressley, 33 Belvedere Avenue, Glen Waverly, Victoria 3150, Australia

This program will find any number in an arithmetic or geometric progression and will add the first n terms of that progression.

Minimum Hardware: 4K PDP-8, ASR33
Source Language: FOCAL, 1969

DECUS NO. FOCAL8-261

Chi Square Utility Package, CHISQR

H. A. Taylor, Rutgers University, New Brunswick, New Jersey

Computes X^2 for a) 1xL frequency table, testing uniformity of frequencies; b) KxL frequency table, as a test of independence; c) 2x2 correlated contingency table, as a test for the significance of change or other related responses from the same individuals. For any 2x2 table, automatically applies Yates' correction for continuity if any expected value lies between 5 and 10; for a 2x2 test of independence, automatically applies Fisher's exact probabilities method if any expected value is less than 5.

Minimum Hardware: 4K PDP-8, TTY
Source Language: FOCAL, 1969

DECUS NO. FOCAL8-262

Protein Binding: PROBON 1 - Fraction Bound, PROBON 2 - Total Drug

R. F. Mais, R. D. McCook, Y. T. Oester, Research Service, Hines V. A. Hospital, Hines, Illinois

The two programs "Fraction Bound" and "Total Drug" provide for the calculation of fraction drug bound or /total drug concentration for a given total drug concentration or / fraction drug bound calculated from the usual protein binding constants of number of sites N(1) and N(2) and the corresponding association constants K(1) and K(2) and the protein concentration P. The programs are written in FOCAL for the PDP-Lab 8E with 4K core. The output is fraction bound (FB) or total drug (CO), free drug concentration (C), bound drug to protein ratio (R), R to free drug ratio (R/C), and fraction of protein sites occupied (FP).

Source Language: FOCAL 1969

DECUS NO. FOCAL8-263

ROOTS, A Polynomial Root Finder

Gregory Ruth, M.I.T. Charles Stark Draper Laboratory, Cambridge, Massachusetts

ROOTS solves second, third and fourth order polynomial equations whose coefficients are real. It finds all real and complex roots. It calculates the roots directly, from closed form solutions, so the results (which are exact solutions, not approximations) are obtained virtually instantaneously.

Minimum Hardware: PDP-8
Source Language: PS/8 FOCAL 1971

DECUS NO. FOCAL8-264

MEMORY, A Children's Game

Floor Anthoni, Medical Biological Laboratory TNO,
Rijswijk, The Netherlands

MEMORY is a children's game with paired cards, programmed for the KV8 display system in FOCAL. It relies on the player's capability to remember which cards lie on a table and where. The game is played with the cursor and interrupt-bar, and displayed on the KV8 display system.

Minimum Hardware: 8K PDP-8, KV8 display system with VT01 storage display and Joystick-interrupt-bar
Other Programs Needed: 8K FOCAL and 8K FOCAL Display for KV8 (DECUS NO. FOCAL8-154)
Source Language: PAL-8, PAL-D

DECUS NO. FOCAL8-265

LISTAL

Lawrence Moss, University of Vermont, College of Medicine, Burlington, Vermont

LISTAL is a PS/8 FOCAL utility program that will dramatically determine the FOCAL programs on a given device and then individually lists each program on the teletype (or line-printer if available). No operator interview is required and listing proceeds until all .FC files have been listed.

Minimum Hardware: 8K PDP-8, PDP-12 or LINC-8
Other Programs Needed: PS/8 or OS/8, PS/8 FOCAL 1971 (DECUS NO. FOCAL8-177)
Source Language: PS/8 FOCAL, 1971

DECUS NO. FOCAL8-266

STATPACK, An Interactive Statistical Package

Lars Palmer, A B Hassle, Molndal 1, Sweden

STATPACK is a statistical package written in FOCAL with a main aim being to give an interactive program with a high degree of convenience for the user. A large number of different statistical analysis are included in the program and can be reached from the keyboard with the material in core. The material has only to be entered once and is kept in core or written into a data file as requested by the user. The programs also contain accessory routines for calculating percentages and other functions of the input material and for changing, correcting and listing the material.

Minimum Hardware: OS/8 System
Other Programs Needed: PS/8 FOCAL (DECUS NO. FOCAL8-177)
Source Language: FOCAL

DECUS NO. FOCAL8-267

BLACKJACK for FOCAL, 1969

Jeffrey Scott, 8604 Bunnell Drive, Potomac, Maryland

This program plays Blackjack with a user. The computer acts as dealer and computes all winnings and losses. After a full deck of 52 different cards is dealt by the dealer, the teletype bell rings to show that a new deck has been started. The computer usually wins, but it is not a perfect player.

Minimum Hardware: PDP-8
Other Programs Needed: FOCAL, 1969 (DEC-08-AJAE-PB)
Source Language: FOCAL, 1969

DECUS NO. FOCAL8-268

FX Function for Random Access Files

Lawrence Moss, Cardiopulmonary Lab., University of Vermont, Burlington, Vermont

The function FX is a random access data function for use with PS/8 FOCAL. It allows the user to build and handle data files in a random fashion, rather than in the sequential pattern which is standard with PS/8 FOCAL. The maximum array size is 2047 floating point variables, of either six or ten digit precision.

Minimum Hardware: 8K PDP-8 or PDP-12 with mass storage device
Other Programs Needed: PS/8-12 or OS/8-12, OMSI PS/8 FOCAL (DECUS NO. FOCAL8-177)
Source Language: PAL-8

DECUS NO. FOCAL8-269

4K FOCAL '69 Speed-Up Patches

Jim Crapuchettes, Frelan Associates, Menlo Park, California

These changes are to a number of the internal routines for FOCAL '69, but they could be adapted to FOCAL8. In most cases, no changes to the functions of the routines have been made. These patches were developed after an extensive program of timing the execution of FOCAL.

Minimum Hardware: 4K PDP-8 (Source file is on OS/8 DEctape)
Other Programs Needed: FOCAL '69
Source Language: PAL-8

DECUS NO. FOCAL8-270

MONOPOLY

C. C. Wilton-Davies, R. N. Physiological Laboratory, Alverstoke, Hants, United Kingdom

The computer acts as "Banker" in the English version of the well-known board game. Storage limitations are overcome by

DECUS NO. FOCAL8-270 (Continued)

using eight of the programs as subroutines of the ninth, master program. Up to eight players are allowed, who may buy and sell properties with each other as well as from the bank, raise and settle mortgages, and buy houses to raise the rents on their properties. "Chance," "Community Chest" and dice throws are determined by random numbers, and jail awaits those who throw three doubles in a turn, or who are otherwise sent there.

Minimum Hardware: 8K OS/8 System
Other Programs Needed: PS/8 FOCAL (DECUS NO.
FOCAL8-177)
Source Language: PS/8 FOCAL

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Modification of FOCL/F for Data Acquisition and Control

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It is the aim of this paper to help the user to code specific routines in FOCALTM so that his dialect of FOCAL can be applied to his application (without being forced to understand in detail all the workings of FOCAL). Included are descriptive discussions of how FOCAL works, the philosophy of the language, and sections technically oriented toward helping the user actually code his additions. This paper is an extension of DECUS NO. FOCAL8-17 and includes most of the discussions contained therein. The particular versions of FOCAL described will be FOCAL/69 and FOCL/F, the latter being a version of 8K FOCAL/69 with modifications by the author allowing assembler patches to be more easily added. (DECUS NO. FOCAL8-227a.)

Miscellaneous: Documentation only

