



# DECUS

## PROGRAM LIBRARY

DECUS NO.	FOCAL8-157
TITLE	MODIFICATIONS TO TSS/8 FOCAL
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SOURCE LANGUAGE	PALD-TSS/8 SAVE FORMAT TAPE



## MODIFICATIONS TO TSS/8 FOCAL

DECUS Program Library Write-up

DECUS NO. FOCAL8-157

In the spring of 1970, TSS/8 FOCAL was modified to provide two new capabilities:

- 1) Use of arithmetic expressions as targets in branching statements\* and
- 2) 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 additional features.

The form of the program storage command is:

\*LIBRARY SAVE progname

or

\*L S progname

where "progname" can be up to six characters long. It may include special characters.

The form of the program retrieval command is:

\*LIBRARY RETRIEVE progname

or

\*L R progname

Needless to say, program "progname" should be a file created by use of the LIBRARY SAVE command, or unpredictable results will occur. Use of the LIBRARY RETRIEVE command destroys previous text and variables.

Listings of the required patches and a sample program follow. A TSS/8 "SAVE" format tape is included.

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\*"A Computed Line Number Capability for FOCAL," Wilcon, A. E., Sias, F. R., Spring DECUS Symposium, May, 1970.

.R FOCAL

CONGRATULATIONS!!  
YOU HAVE SUCCESSFULLY LOADED 'FOCAL,1969" ON A TSS-8/I COMPUTER.

SHALL I RETAIN LOG, EXP, ATN ? :YES

PROCEED.

\*E A  
\*1.1 A X  
\*1.2 D X  
\*1.3 Q  
\*2.1 T "A",!  
\*2.2 T "B",!  
\*2.3 T "C",!  
\*W  
C-FOCAL,1969

~~01.10 A X~~  
~~01.20 D X~~  
~~01.30 Q~~

~~02.10 T "A",!~~  
~~02.20 T "B",!~~  
~~02.30 T "C",!~~

\*G  
:2.1  
A  
\*G  
:2.2  
B  
\*G  
:2.3  
C  
\*G  
:2  
A  
B  
C  
\*L S LINENO  
\*G  
:2.3  
C  
\*E A  
\*W  
C-FOCAL,1969

\*L R LIE\NENO

\*W

C-FOCAL, 1969

Ø1.1Ø A X

Ø1.2Ø D X

Ø1.3Ø Q

Ø2.1Ø T "A", !

Ø2.2Ø T "B", !

Ø2.3Ø T "C", !

\*G

:2.2

B

\* ↑ BS

/

/

/MODIFICATIONS TO 'FOCAL,1969' FOR TSS/8 TO ALLOW  
/USE OF THE "LIBRARY" COMMAND AND THE COMPUTED  
/LINE NUMBER CAPABILITY.

/

/

/ALLAN B. WILSON

/

/22 JANUARY 1970

/

/

/DEFINITIONS FROM 'FOCAL,1969'

/

BUFR=60  
CFRS=133  
CHAR=66  
ERROR2=4566  
ERROR3=4566  
EVAL=1613  
FADD=1000  
FINT=4407  
FEXT=0000  
FMPY=4000  
FNOR=7000  
FPUT=6000  
GETC=4545  
GLIST=1377  
INTEGER=53  
LASTV=31  
LINENO=67  
M2=111  
MCR=116  
MINSKI=51  
MINUSA=112  
P77=122  
POPA=1413  
PROC=611  
PUSHA=4542  
PUSHJ=4540  
RTL6=4557  
SORTC=4550  
SORTJ=4547  
SPNOT=4560  
STARTV=60  
TESTN=4561

/

/

\*167

```

TEMP1,  Ø
TEMP2,  Ø
        Ø
IPATCH, COMPUT
*3Ø4
        TESTN      /CHECK CHAR FOR TYPE
        SKP        /CHAR = PERIOD -- CONTINUE
        JMP I IPATCH /NOT PERIOD OR NUMBER
        CLA        /NUMBER -- SET "INSUB"

/
/
/"LIBRARY"COMMAND PROCESSOR
/
/
*75Ø3

LIBRA,  SPNOR      /IGNORE SPACES
        TAD CHAR   /GET COMMAND CHAR
        PUSHA     /SAVE IT
        GETC      /GET NEXT
        SORTC    /MOVE TO TERMINATOR
        GLIST-1
        SKP
        JMP .-4
        SPNOR    /IGNORE SPACES
        POPA     /GET COMMAND CHAR
        SORTJ
        CLIST-1
        GOLIST-CLIST
        ERROR2   /ILLEGAL COMMAND

/
/
/COMPUTED LINE NUMBER PROCESSOR
/
/
COMPUT, TAD CHAR   /"ALL" IS SPECIAL ARGUMENT
        TAD MINUSA
        SNA CLA
        JMP I RTNI /RETURN FOR SPECIAL HANDLING
        PUSHJ     /GET FLOATING VALUE FOR LINE NO.
                EVAL
        FINT      /ENTER FL INTERPRETER
        FPUT TEMP1 /SAVE FLOATING VALUE
        FEXT
        JMS I INTEGER /CONVERT VALUE TO INTEGER
        RTL6
        RAL
        DCA LINENO
        JMS I MINSKI /NEGATE FLOATING GROUP NUMBER

```

```

FINT
FADD TEMPI          /FLAC = .LINE OF GROUP.LINE
FMPY FL100          /FLAC = 100*(.LINE)
FADD FLP5           /ROUNDOFF -- ADD +0.5
FEXT
JMS I INTEGER       /CONVERT VALUE TO INTEGER
TAD LINENO          /FINISH BUILDING LINE NO.
DCA LINENO
JMP I RTN2          /RETURN TO "GETLN"

RTN1, 322
RTN2, 346
FL100, 0007
      3100
FLP5, 0000
      2000
      0000

/
/
/Routine TO BUILD TSS/8 FORMAT FILENAME
/
/*6321

FILNAM, 0
TAD CHAR            /CHAR = CR ?
TAD MCR
SNA CLA
ERROR3             /YES - NO FILENAME PRESENT
DCA I .+6          /ZERO WORDS 2 AND 3 OF FILENAME
DCA I .+10
JMS SIXBIT         /GO FORM SIXBIT FILENAME
NAME               /RESULT STORED INDIRECT THIS LOCATION
JMS MORE           /SEE IF MORE CHAR IN FILENAME
JMS SIXBIT
NAME+1
JMS MORE
JMS SIXBIT
NAME+2
JMP I FILNAM

MORE, 0
GETC
SORTC
GLIST-1
JMP I FILNAM
JMP I MORE

SIXBIT, 0
TAD I SIXBIT       /GET LOCATION TO STORE RESULT IN
ISZ SIXBIT         /INCREMENT FOR RETURN
DCA TEMPI
TAD CHAR

```



```

TAD C40          /FORM SIXBIT
AND P77
RTL6
DCA TEMP2
TAD TEMP2       /SAVE IT IN CASE THAT'S ALL
DCA I TEMP1
JMS MORE
TAD CHAR
TAD C40
AND P77
TAD TEMP2
DCA I TEMP1
JMP I SIXBIT
C40,            40

CLIST=.

323            /SAVE
322            /RESTORE

GOLIST=.

SAVE
RESTOR

/
/
/DISK I/O ROUTINES FOR "LIBRARY" COMMAND
/
/
*7600

SAVE,          JMS I FLNMI          /GO BUILD UP FILENAME
               TAD FNADDR
               CRF                  /CREATE FILE
               SZA
               JMP FILERR          /SOMETHING WRONG
               TAD OPENFI
               OPEN                 /OPEN AS INTERNAL FILE # 0
               SZA
               JMP FILERR          /SOMETHING WRONG
               SIZE                /HOW MANY WORDS PER SEGMENT?
               CIA
               DCA TEMP1
               DCA NOSEG          /NO. OF SEGMENTS = 0
               TAD CFRS
               CIA
               TAD BUFR
               TAD C2              /INCLUDE 'CFRS' AND 'BUFR'
               DCA TEMP2
               ISZ NOSEG          /ADD A SEGMENT

```

	TAD TEMP1	/SEGMENT SIZE > NO.
	TAD TEMP2	/OF WORDS TO SAVE?
	SPA SNA	
	JMP .+3	
	DCA TEMP2	
	JMP .-6	
	CLA CMA	
	TAD NOSEG	/NEED TO EXTEND FILE?
	SNA CLA	
	JMP .+5	/NO
	TAD EXTFI	/YES - DO SO
	EXT	
	SZA	
	JMP FILERR	/SOMETHING WRONG
	TAD CFRS	/SET UP BUFFER FOR TRANSFER
	DCA DISKIO+7	
	TAD BUFR	
	DCA DISKIO+1∅	
	TAD M2	/SET UP TO TRANSFER TWO WORDS
	DCA DISKIO+3	
	TAD ADDRIO	/DISKIO+6
	DCA DISKIO+4	/SET CA-1
	JMS WRITE	/DO DISK OUTPUT
	TAD CFRS	/COMPUTE NO. OF WORDS TO TRANSFER
	CIA	
	TAD BUFR	
	CIA	
	DCA DISKIO+3	
	CMA	/SET CA-1
	TAD CFRS	
	DCA DISKIO+4	
	TAD C2	/LOW ORDER DISK 2
	JMS WRITE	/DO DISK OUTPUT
	CLA CMA	/THROUGH - CLOSE ALL INT. FILES
	CLOS	
	SKP	
	GETC	/GET NEXT CHAR
MOVE,	SORTC	/SORT FOR ; OR CR
	GLIST-1	
	JMP I PROC1	/FOUND ONE
	JMP .-4	
WRITE,	∅	
	DCA DISKIO+5	
	DCA DISKIO+6	
	TAD DISKIO	
	WFILE	
	SZA	
	JMP FILERR	
	JMP I WRITE	

C2,	2	
PROCI,	PROC	
FLNMI,	FILNAM	
FILERR,	ERROR2	
RESTOR,	JMS I FLNMI	/GO BUILD UP FILENAME
	TAD OPENFI	
	OPEN	/OPEN ON INT. FILE # Ø
	SZA	
	JMP FILERR	/SOMETHING WRONG
	TAD M2	/SET UP TO TRANSFER TWO WORDS
	DCA DISKIO+3	
	TAD ADDRIO	/SET CA-1
	DCA DISKIO+4	
	JMS READ	/DO DISK INPUT
	TAD DISKIO+7	/SET 'CFRS' AND 'BUFR'
	DCA CFRS	
	TAD DISKIO+1Ø	
	DCA BUFR	
	TAD CFRS	/COMPUTE - WC
	CIA	
	TAD BUFR	
	CIA	
	DCA DISKIO+3	
	CMA	/SET CA-1
	TAD CFRS	
	DCA DISKIO+4	
	TAD C2	/COMING FROM LOW ORDER DISK 2
	JMS READ	/DO DISK INPUT
	TAD STARTV	/RESET VARIABLE POINTER
	DCA LASTV	
	JMP MOVE-4	/GO CLOSE FILE
READ,	Ø	
	DCA DISKIO+5	
	DCA DISKIO+6	
	TAD DISKIO	
	RFILE	
	SZA	
	JMP FILERR	
	JMP I READ	
ADDRIO,	DISKIO+6	
FNADDR,	NAME	
OPENFI,	NAME-2	
EXTFI,	NOSEG-1	
	Ø	/INT. FILE # Ø FOR 'OPEN'
	Ø	/THIS USER'S FILE AREA
NAME,	Ø	/3 WORDS FOR SIXBIT FILENAME
	Ø	
	Ø	
	Ø	
	Ø	/INT. FILE # Ø FOR 'EXT'

NOSEG, Ø  
DISKIO, .+1  
Ø  
Ø  
Ø  
Ø  
Ø  
Ø  
Ø  
Ø

/NO. OF SEGMENTS  
  
/DISK ADDR  
/INT. FILE # Ø  
/-WC  
/CA-1  
/DISK ADDR  
/ERROR CODE  
/TEMPORARY BUFFER FOR  
/'CFRS' AND 'BUFR'

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