# DECUS
## PROGRAM LIBRARY

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| DECUS NO. | 12-10 |
| TITLE | FOCAL LIBRARY (LINCTAPE FOCAL FOR THE PDP-12) |
| AUTHOR | Roger A. Nace |
| COMPANY | University of Washington<br>Anesthesia Research Center<br>Seattle, Washington |
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| SOURCE LANGUAGE | LAP6-DIAL |

# FOCAL LIBRARY (LINCTAPE FOCAL FOR THE PDP-12)

DECUS Program Library Write-up DECUS No. 12-10

Initial setup instructions: As the FOCAL LIBRARY operates with a minimum of two tapes, it is necessary to prepare the second tape before operating the system. This is accomplished by "PIP'ing" the first 50 blocks of the system tape onto the second tape. This section includes the program ØØ, (System), two simple statistical programs (for demonstrational use), and an index. Once this tape is prepared, the library is ready to function.

Note that the two statistical programs may be removed, but program ØØ is necessary to the system as it provides a raw FOCAL to be used when adding to the Library.

Due to the absence of DIAL on this tape it became difficult to provide ready access to the ASCII source files. To retrieve the sources use a DIAL tape and the AP (BN) command (where BN is the Block Number of the desired source).

The files are:

| NAME | STARTING BLOCK |
|---|---|
| FOCALL | 5ØØ |
| FOCINDEX | 6ØØ |
| FOCALL P | 7ØØ |

# FOCAL LIBRARY

Abstract: A 4K FOCAL library system to call FOCAL program from LINC Tape. Up to $62_{(10)}$ programs may be stored on One tape. An index routine may be called which displays the index of the library. Through this program the index may be updated, and new programs added to the system.

## FOCAL LIBRARY

This program is in two parts, the initial calling routine, (FOCALL) and the index routine (FOCINDEX). The FOCALL binary system is stored on tape at block, 300-307 so that the startup procedure is the same as for Dial. Ie. LS=0701, RS=7300, push I/O Preset, DO and Start 20. The display now asks for the number of the Focal program. Type the number (leading zeros are required) and hit LINE FEED. The FOCAL program will be loaded, type GO and return, and it will start. To return to the monitor stop the FOCAL program (CTRL C if necessary) type L and Return.

Index Manipulation: Program ØØ is the systems index. Loading it will produce an index display. One page, 8 programs, will be displayed at one time. To turn pages type 1 to go forward, Q to go backward. To add a name in the index type Return. The first blank name from ØØ will be opened and displayed at the top of the screen. Type the name (11 characters maximum for all but page terminators where 10 is maximum)

and hit return. The name is now in the index buffer. To modify a name, or place one out of sequence, type Alt Mode, followed by the program number, type Return and follow the same procedure as above. To file the new index on tape, type CTRL F. To overlay the tape index back into core over an edited index type CTRL C. To restart at the Library introduction type CTRL D.

A utility routine has been inserted in FOCINDEX to remake a crashed index. To do this type CTRL R. A fail-safe now holds the program in a keyboard wait routine. The user must type a colon (:) to write the new index on tape. Typing any other character restarts the index routine. Note that a badly crashed index will destroy the rest of the program when QANDA tries to display it. If this is the case, load FOCINDEX by the usual way (calling program ØØ), but Fetch Stop the computer at 4Ø2Ø. Restart (L mode) at NEWINX (467Ø) and type a colon.

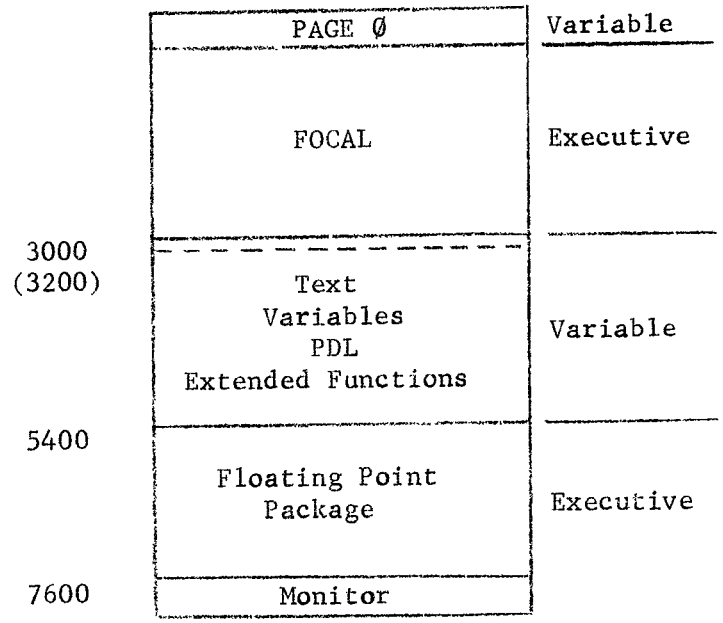
Program Addition: To add a program to the library file get the index program (ØØ), enter a name by either of the above methods, and type CTRL A. The last program number opened will be the destination for the new program. As a fail-safe procedure, a display asks FILE?, Y-YES, N-NO. To add the program type Y. The current index buffer will be filed on tape (no need to use ↑F) and the FOCAL loading routine is started. When entry and editing are complete type L and Return. The new program will now be filed in the library and the monitor will return.

Typing N to the "FILE?" display will restart the index routine from the beginning.

Note that the extended functions have been left in the loading program. If it is necessary to remove them change location ØØ35 to 5377 and locations Ø4Ø1 through Ø4Ø5 to 2725.

Method of Operation:

FOCAL operates according to the following core map.*




*Reproduced from ADVANCED FOCAL Page D-4.

Page 0 and locations 32ØØ-5377 are used for the particular FOCAL program being executed. Locations 2ØØ-3177 and 55ØØ-7777 are for the Focal operating system.

FOCALL separates this scheme into two segments. The fixed core segments being referred to as the FOCAL executive, and the rest as FOCAL variables.

When FOCALL has received a command to load a particular program, it first loads the FOCAL executive from the systems tape:

| BLOCKS | DESTINATION |
|---|---|
| 353-357 | 54ØØ-7777 |
| 365-367 | Ø4ØØ-1777 |
| 374-376 | 2ØØØ-3377 |

FOCAL then calculates the block numbers for the FOCAL variable. The program number (XX) is stored in the form ØXXØ and added to the following, to make the specific block numbers:

| BLOCKS | DESTINATION |
|---|---|
| ØXXØ + 4ØØØ | ØØØØ-Ø377 |
| ØXXØ + 1ØØ6-1ØØ7 | 3ØØØ-3777 |
| ØXXØ + 5ØØ2 | 44ØØ-4777 |
| ØXXØ + 6ØØ3 | 5ØØØ-5377 |
| OXXO + 4ØØ1 | 4ØØØ-4377 |

The last block is the final overlay of FOCALL, a patch at 771Ø in the executive accomplishes this read.

To store a program, the same procedure is duplicated, except with write commands. This part of the library system is a patch. It at 76ØØ of the loading executive.

Operating Hints: To leave a preliminary version of a source FOCAL program on LINC tape for later editing, call the library index (ØØ) and go directly to the ↑A (add). Do not specify a program number. After entry and editing the L command will then file the preliminary text on ØØ. To finally add the text to the library go through the program name routine. This brings ØØ into core for final editing. Now the L command will file the new program under the proper number. Next time through ØØ be sure to erase the previous text.

The only way to bring out a filed program is to dump it on paper tape, and go through ØØ program addition.

Note that the final digit of any ASCII character will suffice for providing a number to the introductory message (or program number). For example, the index system may be called with 00, PP, or XX (or by typing Line Feed and nothing else). A program in location 25 may be called by typing RE (for example REgression analysis).

Note that FOCALL does not write on the system tape. As a protection against accidental writing, leave the Write Lock on.

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```
0000                    *20
0001                    /       PROGRAM FOCALL
0002                    / LINC TAPE FOCAL FOR THE PDP-12
0003                    /
0004                    / ROGER A NACE
0005                    / ANESTHESIA RESEARCH CENTER
0006                    / UNIVERSITY OF WASHINGTON
0007                    / SEATTLE, WASHINGTON 98105
0010                    /
0011                            *16
0012        0016  0701          0701            /FOCINDEX
0013        0017  7440          7440            /OVERLAY
0014        0020  0643  DSP1,    LDF 3
0015        0021  7000          JMP QAINIT /Q AND A TO SET UP
0016        0022  2001          2\ DS1          /DISPLAY
0017        0023  0116          A0              /ANSWER BUFFER
0020        0024  7053          JMP QARFSH      /REFRESH
0021        0025  0016          NOP
0022        0026  1000          LDA
0023        0027  0116          A0              /FIRST ANSWER
0024        0030  1560          BCL I           /PACK IN 0XX0
0025        0031  7770          7770            /FORMAT WITH
0026        0032  0246          ROL 6           /SECOND ANSWER
0027        0033  4116          STC A0
0030        0034  1000          LDA
0031        0035  0117          A1              /SECOND ANSWER
0032        0036  1560          BCL I
0033        0037  7077          7077
0034        0040  0303          ROR 3
0035        0041  2116          ADD A0
0036        0042  4116          STC A0          /HOLD RESULT
0037        0043  2116          ADD A0          /IF A0=0 JUMP
0040        0044  0470          AZE I           /TO FOCINDEX
0041        0045  6016          JMP 16          /OVERLAY CALL
0042        0046  0701          0701            /LOAD FOCAL EXEC
0043        0047  4353          4353    /5400-7777
0044        0050  0640  FOCENT, LDF 0           /ENTRY FROM INDX
0045        0051  0701          0701            /LOAD EXEC
0046        0052  2365          2365    /0400-1777
0047        0053  0641          LDF 1
0050        0054  0701          0701
0051        0055  2374          2374    /2000-3377
0052        0056  0640          LDF 0
0053        0057  1020          LDA I
0054        0060  4000          4000
0055        0061  2116          ADD A0
0056        0062  4064          STC .+2
0057        0063  0710          0710    /LOAD FOCAL VARIABLE
0060        0064  0000          0       /0000-0377
0061        0065  0641          LDF 1
0062        0066  1020          LDA I
0063        0067  1006          1006
0064        0070  2116          ADD A0
0065        0071  4073          STC .+2
0066        0072  0711          0711
0067        0073  0000          0       /3000-3777
0070        0074  0642          LDF 2
0071        0075  1020          LDA I
0072        0076  5002          5002
0073        0077  2116          ADD A0
0074        0100  4102          STC .+2
0075        0101  0710          0710
```

```
0076    0102  0000          0       /4400-4777
0077    0103  1020          LDA I
0100    0104  6003          6003
0101    0105  2116          ADD A0
0102    0106  4110          STC .+2
0103    0107  0710          0710
0104    0110  0000          0       /5000-5377
0105    0111  1020          LDA I
0106    0112  4001          4001
0107    0113  2116          ADD A0
0110    0114  0603          LIF 3           /JUMP TO FOCAL
0111    0115  7710          JMP 1710 /TO LOAD FINAL BLOCK
0112    0116  0000  A0,      0               /QANDA ANSWER
0113    0117  0000  A1,      0               /BUFFERS
0114                /THE FOLLOWING PATCHES ARE IN FOCAL
0115                /
0116                /TO READ IN FINAL BLOCK
0117                /       *7710
0120                /       STC .+2
0121                /       0710
0122                /       0    /FINAL BLOCK 4000-4377
0123                /       PDP
0124                /       JMP 0177        /START FOCAL
0125                /
0126                /TO RECALL MONITOR
0127                /       *7600
0130                /       LINC
0131                /       LDF 2
0132                /       0700            /LOAD BLOCK 400
0133                /       4400
0134                /       LDF 3
0135                /       LIF 2
0136                /       JMP 16          /START AT 16
0137                /BLOCK 400 OF MONITOR IS:
0140                /       *0016
0141                /       0701            /MONITOR OVERLAY
0142                /       7300
0143                /QANDA SUBROUTINE FOR THE PDP-12
0144                        *1000
0145                /
0146                        NOLIST
1115                /LISTING CONTINUES WITH THE TEXT
1116                        SEGMNT3
1117                /TEXT OF MESSAGE
1120                        *0001
1121    0001  0640
1121    0002  4006
1121    0003  1703
1121    0004  0114
1121    0005  4014
1121    0006  1102
1121    0007  2201
1121                DS1,    TEXT ZF  FOCAL LIBRARY
1122    0010  2231
1122                H
1123    0011  4310
1123    0012  4310
1123    0013  4040
1123    0014  4040
1123    0015  4023
1123    0016  0514
1123    0017  0503
```

```
1123       0021  1625
1123       0022  1502
1123       0023  0522
1123       0024  4017
1123       0025  0640
1123       0026  2022
1123       0027  1707
1123       0030  2201
1123                     H      SELECT NUMBER OF PROGRAM
1124       0031  1540
1124       0032  4310
1124       0033  4040
1124       0034  4040
1124       0035  4001
1124       0036  1604
1124       0037  4010
1124       0040  1124
1124       0041  4014
1124       0042  1116
1124       0043  0540
1124       0044  0605
1124       0045  0504
1124       0046  4017
1124       0047  1640
1124       0050  2410
1124                     H      AND HIT LINE FEED ON THE
1125       0051  0543
1125       0052  1040
1125       0053  4040
1125       0054  4040
1125       0055  2405
1125       0056  1405
1125       0057  2431
1125       0060  2005
1125                     H      TELETYPE.
1126       0061  5643
1126                     H
1127       0062  1043
1127       0063  0640
1127       0064  4023
1127       0065  0514
1127       0066  0503
1127       0067  2440
1127                     F   SELECT <2
1130       0070  7462
1130       0071  4334
1130                     \Z

0000  ERRORS

A0       4116
A1       4117
DSP1     4020
DS1      6001
FOCENT   4050
GETKBD   5521
QAB      5004
QACA     5015
QACHAR   5655
QACKLF   5621
QACNTR   5604
QAD      5026
QAE      5050
```

```
QAEXIT 5635
QAF    5516
QAG    5062
QAH    5114
QAI    5131
QAINIT 5000
QAJ    5136
QAK    5305
QAKRB  6036
QAL    5175
QALEGL 5575
QAM    5101
QAN    5223
QAO    5231
QAP    5242
QAQ    5263
QARFSH 5053
QAT    5270
QATLS  6046
QATPE  5644
QATSF  6041
QATY   5536
QAU    5506
QAV    5316
QAW    5512
QAX    5424
QAY    5412
QAZ    5301
REFRES 1053
```

```
0000                    *20
0001                    /       PROGRAM FOCINDEX
0002                    / USED WITH FOCALL TO SUPPLY AN
0003                    / INDEXING ROUTINE TO THE FOCAL LIBRARY
0004                    /
0005                    / ROGER A NACE
0006                    / ANESTHESIA RESEARCH CENTER
0007                    / UNIVERSITY OF WASHINGTON
0010                    / SEATTLE, WASHINGTON 98105
0011                    /
0012                    KRB=6036                /PDP IOTS
0013                    TLS=6046
0014                    TSF=6041
0015                    / THE FOLLOWING POINTERS ARE USED
0016                    / WHEN Q AND A IS ASSEMBLED
0017                    / PRIOR TO FOCINDEX ASSEMBLY
0020                    REFRES=1053     /POINTERS FOR QANDA
0021                    QAINIT=5000
0022                    T1=5526         /POINTERS FOR FILDIS
0023                    T1L=14
0024                    T2=5543
0025                    T2L=12
0026                    T3=5556
0027                    T3L=10
0030                            *20
0031    0020    0711            0711            /LOAD INDEX
0032    0021    1044            1044            /INDEX IN 44
0033    0022    1000            LDA             /PATCH LAST
0034    0023    6000            6000            /WORD TO
0035    0024    1040            STA             /PROPER
0036    0025    7000            7000            /POSITION
0037    0026    0500            IOB
0040    0027    6046            TLS             /SET FLAG
0041    0030    6260            JMP INIT        /GO TO INDEX
0042                    /FIND BLANK SPOT IN INDEX BUFFER
0043    0031    1020    INDEX,  LDA I
0044    0032    6071            JMP SAT         /DELT WILL ALTER
0045    0033    4061            STC SATREM      /SATREM LATER
0046    0034    1020            LDA I
0047    0035    0215            0215            /C RET
0050    0036    6244            JMP NTYPE       /TYPE
0051    0037    1020            LDA I
0052    0040    0212            0212            /L FEED
0053    0041    6244            JMP NTYPE
0054    0042    0066            SET I 6
0055    0043    1677            1777-100        /NAME COUNTER
0056    0044    1020            LDA I
0057    0045    6002            6002            /STARTING POINT
0060    0046    4050            STC IN5
0061    0047    0065            SET I 5
0062    0050    0000    IN5,    0
0063    0051    0067            SET I 7
0064    0052    1765            1777-12         /CHAR COUNT
0065    0053    1325            LDH I 5 /CHECK FOR ALL BLANKS
0066    0054    1460            SAE I
0067    0055    0040            0040
0070    0056    6062            JMP .+4         /NOT ALL BLANK
0071    0057    0227            XSK I 7         /SO FAR OK
0072    0060    6053            JMP .-5         /BACK FOR MORE
0073    0061    6071    SATREM, JMP SAT         /SEARCH SATISFY
0074    0062    1020            LDA I           /BUMP POINTER
0075    0063    0010            0010            /BY 10
```

```
0076    0064  1140          ADM
0077    0065  0050          IN5
0100    0066  0226          XSK I 6          /ALL 100?
0101    0067  6047          JMP IN5-1        /NO
0102    0070  6423          JMP HOME         /YES CANT FIND
0103    0071  1000  SAT,     LDA              /GET ADDRESS
0104    0072  0050          IN5
0105    0073  1120          ADA I            /CORRECT IT
0106    0074  3777          3777
0107    0075  4135          STC NINTL+1      /NEXT REFERENCE
0110    0076  0070          SET I 10   /SETUP DISPLAY BUFFER
0111    0077  7100          7100             /START ADDRESS
0112    0100  1020          LDA I
0113    0101  0006          0006             /F (FULL SIZE)
0114    0102  1370          STH I 10
0115    0103  1300          LDH
0116    0104  0050          IN5              /FORM ASCII ADDR
0117    0105  1620          BSE I
0120    0106  0060          0060
0121    0107  1560          BCL I
0122    0110  7710          7710
0123    0111  1370          STH I 10         /MOST SEG
0124    0112  1300          LDH
0125    0113  4050          4000+IN5         /NEXT PART
0126    0114  0303          ROR 3
0127    0115  1620          BSE I
0130    0116  0060          0060
0131    0117  1560          BCL I
0132    0120  7710          7710
0133    0121  1370          STH I 10         /LEAST SEG
0134    0122  0071          SET I 11         /BLANK DISP BUF
0135    0123  1763          1777-14
0136    0124  1020          LDA I
0137    0125  0040          0040
0140    0126  1370          STH I 10
0141    0127  0231          XSK I 11
0142    0130  6126          JMP .-2
0143    0131  1020          LDA I
0144    0132  0034          0034             /TERMINATOR
0145    0133  1370          STH I 10
0146                /GET NAME
0147    0134  0071  NINTL,   SET I 11
0150    0135  0000          0                /ADDR FROM SAT
0151    0136  0067          SET I 7          /WORD COUNT
0152    0137  1764          1777-13
0153    0140  0070          SET I 10         /INPUT BUFFER
0154    0141  7102          7102
0155    0142  1020          LDA I
0156    0143  6150          JMP NLOOP        /VARIABLE JUMP
0157    0144  4226          STC VJMP
0160    0145  1020          LDA I
0161    0146  0040          0040
0162    0147  1371          STH I 11
0163    0150  7000  NLOOP,  JMP QAINIT       /Q AND A
0164    0151  3101          3101             /TO DISPLAY
0165    0152  0362          A0               /INPUT BUFFER
0166    0153  0500          IOB
0167    0154  6036          KRB              /HERE ON INPUT
0170    0155  1460          SAE I
0171    0156  0377          377              /RUBOUT ?
0172    0157  6207          JMP NORUB        /NO
0173    0160  1020          LDA I            /YES, CORRECT
0174    0161  0334          0334
```

```
0175    0162  6244          JMP NTYPE       /ECHO "\"
0176    0163  1020          LDA I
0177    0164  3777          3777
0200    0165  1140          ADM
0201    0166  0011          11              /FIX POINTER
0202    0167  1020          LDA I
0203    0170  0040          0040
0204    0171  1350          STH 10          /FIX INDEX
0205    0172  1020          LDA I
0206    0173  3777          3777
0207    0174  1140          ADM
0210    0175  0010          10
0211    0176  1020          LDA I
0212    0177  7776          -1
0213    0200  2007          ADD 7
0214    0201  1460          SAE I
0215    0202  1763          1777-14         /NOT TOO FAR!
0216    0203  0467          SKP
0217    0204  6134          JMP NINTL       /GO BACK
0220    0205  4007          STC 7           /FIX COUNT
0221    0206  6150          JMP NLOOP       /RE-DISPLAY
0222    0207  6244  NORUB,   JMP NTYPE       /ECHO INPUT
0223    0210  1460          SAE I
0224    0211  0215          215             /RTN?
0225    0212  6223          JMP VJMP-3      /NO
0226    0213  1020          LDA I           /YES
0227    0214  6223          JMP VJMP-3      /CHANGE VJMP
0230    0215  4226          STC VJMP
0231    0216  1020          LDA I
0232    0217  0212          212             /L FEED
0233    0220  6244          JMP NTYPE
0234    0221  1020          LDA I
0235    0222  0040          0040            /BLANK REST
0236    0223  1370          STH I 10        /NAME DISPLAY
0237    0224  1371          STH I 11
0240    0225  0227          XSK I 7
0241    0226  0000  VJMP,    0
0242    0227  1000          LDA
0243    0230  0011          11
0244    0231  1420          SHD I           /WHICH TERMINAL?
0245    0232  0000          0000
0246    0233  6240          JMP .+5
0247    0234  1020          LDA I           /LINE END
0250    0235  0043          0043
0251    0236  1371          STH I 11
0252    0237  6263          JMP INDX
0253    0240  1020          LDA I           /PAGE END
0254    0241  0034          0034
0255    0242  1351          STH 11
0256    0243  6263          JMP INDX
0257                  /LINC TYPE SUBROUTINE
0260    0244  4251  NTYPE,   STC .+5         /HOLD CHARACTER
0261    0245  2000          ADD 0           /GET RETURN ADDR
0262    0246  1060          STA I
0263    0247  0000  NRTN,    0
0264    0250  1020          LDA I
0265    0251  0000          0               /CET CHAR
0266    0252  0500          IOB
0267    0253  6041          TSF
0270    0254  6252          JMP .-2
0271    0255  0500          IOB
0272    0256  6046          TLS             /OUTPUT IT
0273    0257  6247          JMP NRTN
```

```
0274                    /DISPLAY INDEX BUFFER
0275    0260  1020  INIT, LDA I
0276    0261  2001        2001              /FIRST PAGE
0277    0262  4264        STC START
0300    0263  7000  INDX, JMP QAINIT        /DISPLAY
0301    0264  0000  START, 0
0302    0265  0362        A0
0303    0266  1420        SHD I             /TEST INPUT
0304    0267  2100        2100
0305    0270  6350        JMP TWO           /WAS 2
0306    0271  1420        SHD I
0307    0272  6100        6100
0310    0273  6336        JMP ONE           /WAS 1
0311    0274  1460        SAE I
0312    0275  0206        0206              /↑F
0313    0276  6301        JMP .+3
0314    0277  6366        JMP FILE          /STORE NEW INDEX
0315    0300  6263        JMP INDX          /BACK TO DISPLAY
0316    0301  1460        SAE I
0317    0302  0203        0203              /↑C
0320    0303  0467        SKP
0321    0304  6020        JMP 20            /GET OLD INDEX
0322    0305  1460        SAE I
0323    0306  0204        0204              /↑D
0324    0307  0467        SKP
0325    0310  6423        JMP HOME          /CALL MONITOR
0326    0311  1460        SAE I
0327    0312  0377        0377              /RUBOUT
0330    0313  0467        SKP
0331    0314  6375        JMP DELT          /REMOVE LAST ONE
0332    0315  1460        SAE I
0333    0316  0215        0215              /RTN
0334    0317  0467        SKP
0335    0320  6031        JMP INDEX         /NEW ENTRY
0336    0321  1460        SAE I
0337    0322  0222        222               /↑R
0340    0323  0467        SKP
0341    0324  6670        JMP NEWINX        /REMAKE INDEX
0342    0325  1460        SAE I
0343    0326  0375        375               /ALT MODE
0344    0327  0467        SKP
0345    0330  6432        JMP MOD           /MODIFY NAME
0346    0331  1460        SAE I
0347    0332  0201        201               /↑A (ADD)
0350    0333  0467        SKP
0351    0334  6527        JMP FILDIS        /FILE QUESTION
0352    0335  6263        JMP INDX          /BAD ENTRY
0353    0336  6244  ONE,  JMP NTYPE         /DISP NEXT PAGE
0354    0337  1020        LDA I             /BUMP START
0355    0340  0100        0100
0356    0341  1140        ADM
0357    0342  0264        START
0360    0343  1120        ADA I             /CHECK LAST PAGE
0361    0344  4777        -3000
0362    0345  0451        APO
0363    0346  6263        JMP INDX          /GOOD TURN
0364    0347  0467        SKP               /BAD, DECREMENT
0365    0350  6244  TWO,  JMP NTYPE         /BACK 1 PAGE
0366    0351  1020        LDA I             /DECREMENT PAGE
0367    0352  7677        -100
0370    0353  1140        ADM
0371    0354  0264        START
0372    0355  1120        ADA I
```

```
0373    0356  5776          -2001           /CHECK PAGE ONE
0374    0357  0451          APO
0375    0360  6260          JMP INIT        /BAD, RE-INITAL.
0376    0361  6263          JMP INDX        /OK, DISPLAY
0377    0362  0000  A0,     0               /SCRATCH FOR Q-A
0400    0363  0000          0
0401    0364  0000          0
0402    0365  0000  A1,     0
0403    0366  1000  FILE,   LDA             /PATCH LAST WORD
0404    0367  7000          7000            /BACK TO FIRST
0405    0370  1040          STA             /WORD OF INDEX
0406    0371  6000          6000
0407    0372  0715          0715            /STORE NEW INDEX
0410    0373  1044          1044
0411    0374  6000          JMP 0           /SUBROUTINE RTRN
0412    0375  1000  DELT,   LDA             /DELETE LAST
0413    0376  0000          0               /ENTRY
0414    0377  1060          STA I           /HOLD RETURN
0415    0400  0000          0
0416    0401  1020          LDA I
0417    0402  6405          JMP .+3
0420    0403  4061          STC SATREM      /VARIABLE JUMP
0421    0404  6042          JMP IN5-6
0422    0405  1020          LDA I
0423    0406  7767          7767            /-10
0424    0407  1140          ADM
0425    0410  0050          IN5
0426    0411  0051          SET 11
0427    0412  0050          IN5
0430    0413  0067          SET I 7         /SET UP COUNTS
0431    0414  1764          1777-13
0432    0415  1020          LDA I
0433    0416  0040          0040            /BLANK OUT
0434    0417  1371          STH I 11        /ALL CHARACTERS
0435    0420  0227          XSK I 7
0436    0421  6417          JMP .-2
0437    0422  6400          JMP DELT+3      /RETURN
0440    0423  1020  HOME,   LDA I           /OVERLAY MONITOR
0441    0424  0701          0701
0442    0425  4016          STC 0016
0443    0426  1020          LDA I
0444    0427  7300          7300
0445    0430  4017          STC 0017
0446    0431  6016          JMP 16
0447    0432  6442  MOD,    JMP INPT        /CHANGE 1 NAME
0450    0433  0243          ROL 3
0451    0434  1120          ADA I           /SETUP IN5
0452    0435  2002          2002
0453    0436  1040          STA
0454    0437  0050          IN5
0455    0440  4135          STC NINTL+1     /AND BUFFER
0456    0441  6076          JMP SAT+5       /SIMULATE SAT
0457    0442  1000  INPT,   LDA     /GET KBD 2 CHARACTERS
0460    0443  0000          0               /GET RETURN
0461    0444  1060          STA I
0462    0445  0000  RTN,    0
0463    0446  0075          SET I 15        /COUNTER
0464    0447  1774          1777-3
0465    0450  0011          CLR
0466    0451  4503          STC FINL        /HOLDING BUFFER
0467    0452  0415  NEXT,   KST             /WAIT FOR INPUT
0470    0453  6452          JMP .-1
0471    0454  0500          IOB
```

```
0472    0455  6036          KRB             /READ
0473    0456  1460          SAE I
0474    0457  0377          377             /RUBOUT
0475    0460  0467          SKP
0476    0461  6505          JMP RUB         /CORRECT
0477    0462  1460          SAE I
0500    0463  0215          215             /RETURN
0501    0464  0467          SKP
0502    0465  6502          JMP RTRN        /GET OUT
0503    0466  0235          XSK I 15        /ADD INPUT
0504    0467  0467          SKP
0505    0470  6502          JMP RTRN        /2 IS LIMIT
0506    0471  0500          IOB
0507    0472  6046          TLS             /ECHO
0510    0473  1560          BCL I           /NUMERICAL ONLY
0511    0474  7770          7770
0512    0475  0303          ROR 3
0513    0476  2503          ADD FINL        /HOLD NEW ENTRY
0514    0477  0243          ROL 3
0515    0500  4503          STC FINL
0516    0501  6452          JMP NEXT        /MORE-MORE!
0517    0502  1020  RTRN,    LDA I           /ALL DONE
0520    0503  0000  FINL,    0       /EXIT WITH FINAL IN AC
0521    0504  6445          JMP RTN
0522    0505  1020  RUB,     LDA I           /RUBOUT
0523    0506  7776          7776
0524    0507  1140          ADM             /DECREMENT COUNT
0525    0510  0015          15
0526    0511  1420          SHD I           /NOT TOO FAR
0527    0512  7373          7373
0530    0513  0235          XSK I 15        /FIX IF NEEDED
0531    0514  1000          LDA
0532    0515  0503          FINL            /FIX FINAL
0533    0516  0303          ROR 3
0534    0517  1560          BCL I
0535    0520  7770          7770
0536    0521  4503          STC FINL
0537    0522  1020          LDA I           /ECHO "\"
0540    0523  0334          334
0541    0524  0500          IOB
0542    0525  6046          TLS
0543    0526  6452          JMP NEXT        /BACK FOR MORE
0544                  /
0545    0527  1020  FILDIS,  LDA I           /DISPLAY "FILE"
0546    0530  0200          0200
0547    0531  0004          ESF             /FULLSIZE
0550    0532  0065          SET I 5         /SET UP BLINK
0551    0533  1477          1777-300
0552    0534  0067          SET I 7
0553    0535  1377          1777-400
0554    0536  6571  FLOOP,  JMP LINDIS       /"FILE"
0555    0537  0014          TIL
0556    0540  5526          TI
0557    0541  0040          40
0560    0542  0435          KST I           /CHECK FOR INPUT
0561    0543  6641          JMP SLCT
0562    0544  0225          XSK I 5
0563    0545  0467          SKP
0564    0546  6554          JMP .+6
0565    0547  0070          SET I 10
0566    0550  1577          1777-200
0567    0551  0230          XSK I 10  /ELIMINATE INTENSITY
0570    0552  6551          JMP .-1   /FLICKER DURING "FILE"
```

```
0571    0553  6536          JMP FLOOP
0572    0554  6571          JMP LINDIS      /"Y-YES"
0573    0555  0012          T2L
0574    0556  5543          T2
0575    0557  7707          -70
0576    0560  6571          JMP LINDIS      /"N-NO"
0577    0561  0010          T3L
0600    0562  5556          T3
0601    0563  7637          -140
0602    0564  0065          SET I 5
0603    0565  1776          1776
0604    0566  0227          XSK I 7
0605    0567  6536          JMP FLOOP
0606    0570  6532          JMP FLOOP-4
0607    0571  1000  LINDIS, LDA  /ROUTINE TO DISPLAY 1 LINE
0610    0572  0000          0               /GET RETURN
0611    0573  1560          BCL I           /STRIP OFF 6
0612    0574  6000          6000
0613    0575  4003          STC 3           /GET FIRST ARG
0614    0576  1020          LDA I           /BUMP 0 FOR RTN
0615    0577  0003          3
0616    0600  1100          ADA
0617    0601  0000          0
0620    0602  1060          STA I
0621    0603  0000  RET,    0
0622    0604  1003          LDA 3           /GET LENGTH
0623    0605  0017          COM             /MAKE NEGATIVE
0624    0606  1120          ADA I
0625    0607  1777          1777            /SET UP INDEX
0626    0610  4616          STC DS1
0627    0611  1023          LDA I 3         /GET TEXT START
0630    0612  4622          STC DS2
0631    0613  1023          LDA I 3         /GET LINE HEIGHT
0632    0614  4626          STC LINE
0633    0615  0064          SET I 4
0634    0616  0000  DS1,    0               /LENGTH
0635    0617  0061          SET I 1
0636    0620  0300          300             /HORIZONTAL
0637    0621  0063          SET I 3
0640    0622  0000  DS2,    0               /START
0641    0623  0066          SET I 6
0642    0624  1775          1775            /-2
0643    0625  1020          LDA I
0644    0626  0000  LINE,   0               /HEIGHT IN AC
0645    0627  1743          DSC 3           /DISP HALF WORD
0646    0630  0223          XSK I 3         /NEXT PLEASE
0647    0631  0224          XSK I 4         /LINE FINISHED?
0650    0632  0467          SKP
0651    0633  6603          JMP RET         /YUP
0652    0634  0226          XSK I 6         /NO, BOTH HALVES
0653    0635  6625          JMP .-10        /NO
0654    0636  1760          DSC I           /YES, HALF SPACE
0655    0637  0000          0000
0656    0640  6623          JMP .-15
0657                  /TEXTS AT END OF QANDA
0660    0641  0500  SLCT,   IOB             /ANSWER DISPATCH
0661    0642  6036          KRB
0662    0643  1460          SAE I
0663    0644  0331          331             /YES
0664    0645  0467          SKP
0665    0646  6654          JMP YES
0666    0647  1460          SAE I
0667    0650  0316          316             /NO
```

```
1647        1563   7706             7706
1650        1564   4177             4177              /0
1651        1565   7741             7741
1652        1566   0000   T3E,      0
1653                      T3L=T3E-T3
1654        1567   1567   AA,       .                 /END TAG ONLY

0000  ERRORS

AA       5567
A0       4362
A1       4365
BL       4764
C1       4752
C10      4757
C2       4756
DELT     4375
DS1      4616
DS2      4622
END      4760
FILDIS   4527
FILE     4366
FIN      4763
FINL     4503
FLOOP    4536
FW       4755
GETKBD   5521
HOME     4423
HW       4753
HW2      4754
INDEX    4031
INDX     4263
INIT     4260
INPT     4442
IN5      4050
KRB      6036
LINDIS   4571
LINE     4626
MAK      4706
MOD      4432
M10      4762
M5       4761
NEWINX   0670
NEXT     4452
NINTL    4134
NLOOP    4150
NORUB    4207
NRTN     4247
NTYPE    4244
ONE      4336
QAB      5004
QACA     5015
QAD      5026
QAE      5050
QAF      5516
QAG      5062
QAH      5114
QAI      5131
QAINIT   5000
QAJ      5136
QAK      5305
QAKRB    6036
QAL      5175
```

| | |
|---|---|
| QAM | 5101 |
| QAN | 5223 |
| QAO | 5231 |
| QAP | 5242 |
| QAQ | 5263 |
| QARFSH | 5053 |
| QAT | 5270 |
| QATLS | 6046 |
| QATSF | 6041 |
| QAU | 5506 |
| QAV | 5316 |
| QAW | 5512 |
| QAX | 5424 |
| QAY | 5412 |
| QAZ | 5301 |
| REFRES | 1053 |
| RET | 4603 |
| RTN | 4445 |
| RTRN | 4502 |
| RUB | 4505 |
| SAT | 4071 |
| SATREM | 4061 |
| SLCT | 4641 |
| START | 4264 |
| TLS | 6046 |
| TSF | 6041 |
| TWO | 4350 |
| T1 | 5526 |
| T1E | 5542 |
| T1L | 0014 |
| T2 | 5543 |
| T2E | 5555 |
| T2L | 0012 |
| T3 | 5556 |
| T3E | 5566 |
| T3L | 0010 |
| VJMP | 4226 |
| YES | 4654 |

```
0000                    *20
0001                    / PATCH TO FOCAL EXEC (5400-7777)
0002                    / USED IN STORE EXEC, FOR ADDING
0003                    / TO THE FOCAL LIBRARY.
0004                    / THE DESIRED PROGRAM NUMBER WILL
0005                    / BE STORED IN LOCATION 7777 AFTER
0006                    / THIS SECTION HAS BEEN READ IN
0007                            PMODE
0010                            *7600
0011        7600  6141          LINC;
0012                            LMODE
0013        1601  0640          LDF 0
0014        1602  1020          LDA I           /SET UP TAPE
0015        1603  4000          4000            /SECOND WORDS
0016        1604  3777          ADD 1777        /PROG NO. IN
0017        1605  5607          STC .+2         /0XX0 FORM
0020        1606  0714          0714            /WRITE
0021        1607  0000          0     /0000-0377
0022        1610  0641          LDF 1
0023        1611  1020          LDA I           /REPEAT FOR
0024        1612  1006          1006            /REST OF BLOCKS
0025        1613  3777          ADD 1777
0026        1614  5616          STC .+2
0027        1615  0715          0715
0030        1616  0000          0     /3000-3777
0031        1617  0642          LDF 2
0032        1620  1020          LDA I
0033        1621  5002          5002
0034        1622  3777          ADD 1777
0035        1623  5625          STC .+2
0036        1624  0714          0714
0037        1625  0000          0     /4400-4777
0040        1626  1020          LDA I
0041        1627  6003          6003
0042        1630  3777          ADD 1777
0043        1631  5633          STC .+2
0044        1632  0714          0714
0045        1633  0000          0     /5000-5377
0046        1634  1020          LDA I
0047        1635  4001          4001
0050        1636  3777          ADD 1777
0051        1637  5641          STC .+2
0052        1640  0714          0714
0053        1641  0000          0     /4000-4377
0054        1642  0642          LDF 2
0055        1643  0700          0700     /OVERLAY MONITOR CALL
0056        1644  4400          4400
0057        1645  0643          LDF 3
0060        1646  0602          LIF 2
0061        1647  6016          JMP 16
0062                    / TO READ IN THE FINAL BLOCK
0063                    / THE FOLLOWING PATCH IS USED
0064                    / C(AC) = SECOND TAPE WORD.
0065                            *7710
0066        1710  5712          STC .+2
0067        1711  0710          0710
0070        1712  0000          0
0071        1713  0002          PDP;
0072                            PMODE
0073        7714  5177          JMP 0177        /START FOCAL

0000  ERRORS
-
```