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DECUS NO.	8-579
TITLE	LISTIT
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SOURCE LANGUAGE	PAL III

DECUS Program Library Write-up

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"LISTIT"

Function: 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 of uniform length.

Hardware: PDP-8/E, F, or M; console typewriter; paper tape reader, either high-speed (optical) or low (TTY reader).

Core: (Field 0 only) The program is contained in locations 0 to 336; buffer storage, in locations 4001 to 7540.

Offset: S.R. bits 6-11 are read when the program is started and stored as an offset count. The tab expansion, in multiples of 8 spaces, begins where the offset ends. This allows correct listing of tapes output by assemblers. For PAL-III third-pass tapes, for example, the proper offset is 12 columns (octal 14); for source tapes the offset is 0.

Pagination: (a) all pages printed by Listit are 70 lines long; this includes the margins at top and bottom.
(b) pages are ejected after 58 lines of text, if no other provision has been made on the tape being read.
(c) 4 successive carriage returns (or CR/LF's) cause a page ejection; so also does a FORM code.
(d) carriage returns and FORMs read after a page ejection are ignored until some other significant code has been read. This prevents multiple ejections.

Example: PAL-III echoes a FORM on the source tape by 6 CR/LF's, FORM, and 6 more CR/LF's. Listit in turn echoes all this by one page ejection.

Since 55 lines (or less) is a fairly standard page length, the presumption is that user-written format will take precedence of the 58 line default eject in Listit.

Input Format: (a) blanks, code 200, rubouts and line feeds are ignored.
(b) other codes are read as 7 bits, ignoring parity.
(c) carriage returns generate CR/LF pairs on output.

Use: Load Listit into Field 0 with the Binary Loader.
Load address = 0200; set bits 6-11 to offset.
Turn on console printer; load tape to be listed into reader.
Start. The program runs until halted at the processor.

User Modification: Locations 100,101,330, and 332 (see listing) may be altered to meet the user's needs. To change, for example, the default ejection from 58 lines to 60 lines, deposit 7704 into location 330.

Other Uses: (a) it is perfectly feasible to use this routine with the console keyboard as its input source. The offset feature enables one to make the first tab code any arbitrary number of columns; the page eject (FORM) might also be useful.

(b) Listit can be used as a simple paginator for getting manageable copy from a long tape. One might want to use it with BASIC language programs, since the language allows little user control of source program format.

(c) the author believes this program could be modified for use with a line printer, but has no such device available to make the experiment.

Glitch: The tail of a tape passing through the high-speed reader can generate a garbage character at the end of a print-out. One cure is to square off the tape end with scissors; another, to toggle in a FORM code and punch it on the tape at the time of its making.

```
                / "LISTIT" INTERRUPT VERSION
                /       9/26/72
                /PROGRAM TO LIST SOURCE & 3RD-PASS TAPES.

                FIELD 0

                *1
0001  7200              CLA
0002  5020              JMP 20
                *20

0020  0000  SW,         0                   /0 OR JMP PUN
0021  6011              RSF
0022  5057              JMP LO
0023  6012              RRB
0024  0111  TEST,       AND K177            /STRIP TO 7 BITS (DROP PARITY)
0025  7421              MQL
0026  1010              TAD 10
0027  1112              TAD K240
0030  7710              SPA CLA
0031  5035              JMP GETMOR
                /--------
0032  1063              TAD STOP            /STORAGE FULL, HALT READER
0033  3020              DCA SW
0034  5037              JMP READ
                /--------
0035  6032  GETMOR,     KCC                 /STILL ROOM IN STORAGE,
0036  6014              RFC                 /  RESTART READERS
                /--------
0037  7501  READ,       MQA
0040  7440              SZA
0041  1077              TAD M177
0042  7650              SNA CLA
0043  5104              JMP EXIT2           /IGNORE BLANKS, 200, RUBOUTS
0044  7501              MQA
0045  1113              TAD M12
0046  7450              SNA
0047  5104              JMP EXIT2           /...AND LINE FEEDS
0050  1114              TAD M26             /A PRINTING CHARACTER?
0051  7710              SPA CLA
0052  5055                JMP .+3
0053  7501              MQA
0054  5507              JMP I PRI           /YES
0055  7501                MQA
0056  5510                JMP I NONP        /NO
0057  6031  LO,         KSF
0060  5064              JMP PUN
0061  6034              KRS
0062  5024              JMP TEST

0063  5064  STOP,       JMP PUN
```

```
0064  6041  PUN,    TSF
0065  5077          JMP EXIT
0066  1010          TAD 10          /CAUGHT UP WITH READER?
0067  7041          CIA
0070  1011          TAD 11
0071  7710          SPA CLA
0072  5075          JMP PUNCH       /NO
                /--------
0073  4115          JMS RESET       /YES
0074  5077          JMP EXIT
                /--------
0075  1411  PUNCH,  TAD I 11
0076  6046          TLS
0077  7601  EXIT,   7601            /[=CLA]
0100  7410          SKP     / **
0101  7000          NOP     / **
0102  6001          ION
0103  5400          JMP I 0

0104  7200  EXIT2,  KCC
0105  7200          RFC
0106  5064          JMP PUN         /...AFTER CHECKING PUNCH

0107  0223  PRI,    PRNTNG
0110  0235  NONP,   NONPRI

0111  0177  K177,   177
0112  0240  K240,   240
0113  7766  M12,    -12
0114  7752  M26,    -26

              M177=   EXIT

0115  0000  RESET,  0
0116  7330          CLA STL RAR     /4000
0117  3010          DCA 10          /RESET TEXT POINTERS
0120  7130          STL RAR
0121  3011          DCA 11
0122  1020          TAD SW          /[SW=0 IF READER IS RUNNING]
0123  7650          SNA CLA
0124  5515          JMP I RESET     /NO NEED TO RESTART RDRS.

0125  6032             KCC             /SW NOT 0, RESTART READERS
0126  6014             RFC
0127  3020             DCA SW          /ENABLE RDR. SKIP CHAIN
0130  5515             JMP I RESET

              / ** CHANGE THESE TO FLAG KILLER CODES
              /    (IF SPURIOUS INTERRUPTS ARE A PROBLEM)
```

```
                *200                /START (SET BITS 6-11 TO OFFSET)
                                    /  PAL-III 3RD PASS: OFFSET=14 OCTAL
                                    /  SOURCE TAPES:     OFFSET=0

0200  6032                KCC
0201  6014                RFC
0202  6040                SPF
0203  3334                DCA CRCT
0204  3020                DCA SW
0205  4115                JMS RESET         /INITIALIZE POINTERS
0206  7604                LAS
0207  0322                AND K77           /BITS 6-11 = OFFSET
0210  7041                CIA
0211  3336                DCA OFFSET
0212  3333                DCA LINECT

0213  1333  LINE,         TAD LINECT
0214  1330                TAD M72           /58 LINES = DEFAULT EJECT
0215  7700                SMA CLA
0216  5306                JMP FORM
0217  1336                TAD OFFSET
0220  3335                DCA LTRCT         /COUNTS PRINTING CHARS.

0221  6001  CHAR,         ION
0222  5222                JMP .             /WAIT FOR INTERRUPT

0223  3410  PRNTNG,       DCA I 10
0224  3334                DCA CRCT          /NON-C.R., CLEAR "CRCT"
0225  2335                ISZ LTRCT
0226  0007  K7,           7
0227  1335                TAD LTRCT
0230  7550                SPA SNA           /POSITIVE?
0231  5221                JMP CHAR          /NO, STILL READING OFFSET
0232  0226                AND K7            /YES
0233  3335                DCA LTRCT         /STORE COUNT (MODULO 8)
0234  5221                JMP CHAR
0235  1327  NONPRI,       TAD M15           /C.R.?
0236  7640                SZA CLA
0237  5255                JMP NOTCR         /NO
0240  1334  CR,           TAD CRCT          /YES.  IS "CRCT" < 0 ?
0241  7510                SPA
0242  5221                  JMP CHAR        /YES, SO IGNORE C.R.
0243  1332                TAD M3            /NO
0244  7700                SMA CLA
0245  5306                JMP FORM          /4TH C.R. IN A ROW.  EJECT.
0246  2334                ISZ CRCT          /NOT YET, BUT COUNT UP "CRCT"
0247  2333                ISZ LINECT
0250  1324                TAD K15
0251  3410                DCA I 10
0252  1323                TAD K12
0253  3410                DCA I 10
0254  5213                JMP LINE
```

```
0255  7501  NOTCR,  MQA
0256  1326          TAD M14          /FORM?
0257  7640          SZA CLA
0260  5265          JMP NOTFRM       /NO
                    /--------
0261  1334          TAD CRCT         /YES.  IS "CRCT" < 0 ?
0262  7710          SPA CLA
0263  5221          JMP CHAR         /YES, FORGET FORM FEED
0264  5306          JMP FORM         /NO, EXECUTE IT
                    /--------
0265  3334  NOTFRM, DCA CRCT         /(CLEAR "CRCT")
0266  7501          MQA
0267  1325          TAD M11          /TAB?
0270  7650          SNA CLA
0271  5275          JMP TAB          /YES
0272  7501          MQA              /NO
0273  3410          DCA I 10         /STORE IT
0274  5221          JMP CHAR         /AND LOOK FOR NEW CHAR

0275  1226  TAB,    TAD K7
0276  7040          CMA              /-10 OCTAL
0277  1335          TAD LTRCT
0300  3335          DCA LTRCT        /SPACES TO NEXT TAB STOP
0301  1112          TAD K240
0302  3410          DCA I 10         /STORE SPACES
0303  2335          ISZ LTRCT
0304  5301          JMP .-3
0305  5221          JMP CHAR
0306  1331  FORM,    TAD M106         /EJECT PAGE: SUBTRACT 70
0307  1333          TAD LINECT       /  FROM LINE COUNT
0310  3333          DCA LINECT
0311  1324          TAD K15          /ONE C.R.
0312  3410          DCA I 10
0313  1323          TAD K12          /(70-LINECT) LINE FEEDS
0314  3410          DCA I 10
0315  2333          ISZ LINECT
0316  5313          JMP .-3          /[OR .-5 , FOR CR/LF'S]

0317  7040          CMA
0320  3334          DCA CRCT         /INHIBIT C.R. & FORM FEEDS
0321  5213          JMP LINE         /"LINECT" BEING NOW 0

0322  0077  K77,     77
0323  0012  K12,     12
0324  0015  K15,     15
0325  7767  M11,     -11
0326  7764  M14,     -14
0327  7763  M15,     -15
0330  7706  M72,     -72      /CONTROLS DEFAULT PAGE EJECTION
0331  7672  M106,    -106
0332  7775  M3,      -3       /4 C.R.'S = EJECT
```

```
0333  0000  LINECT, 0        /NO. OF LINES SINCE LAST PAGE EJECT
0334  0000  CRCT,   0        /NO. OF SUCCESSIVE C.R. OR CR/LF'S

0335  0000  LTRCT,  0        /NO. OF PRINTING CHARACTERS [- OFFSET]
                    /          SINCE LINE BEGAN [MODULO 8, IF > 0 ]

0336  0000  OFFSET, 0        /COMPENSATES FOR INDENTATION OF TEXT
                    /          IN CERTAIN FORMATS (E.G., LISTINGS)
```

```
CHAR     0221
CR       0240
CRCT     0334
EXIT     0077
EXIT2    0104
FORM     0306
GETMOR   0035
K12      0323
K15      0324
K177     0111
K240     0112
K7       0226
K77      0322
LINE     0213
LINECT   0333
LO       0057
LTRCT    0335
M106     0331
M11      0325
M12      0113
M14      0326
M15      0327
M177     0077
M26      0114
M3       0332
M72      0330
NONP     0110
NONPRI   0235
NOTCR    0255
NOTFRM   0265
OFFSET   0336
PRI      0107
PRNTNG   0223
PUN      0064
PUNCH    0075
READ     0037
RESET    0115
STOP     0063
SW       0020
TAB      0275
TEST     0024
```