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DECUS NO.	8-384
TITLE	BLOK
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SOURCE LANGUAGE	PAL-D

BLOK

DECUS Program Library Write-up DECUS NO. 8-384

This is a two-page programme for examining the disk when using the Disk Monitor system. Individual blocks are printed on the teletype with their Link words. Directory Name Files appear with one line for each file, the name being decoded. Other blocks are printed in octal, eight words to a line with headings from which the word-number may be read off.

The programme occupies locations 6000-6377. (6127 through 6153 are unused). Initial entry point is 6000, where the programme loops waiting for the keyboard flag. Type "D" for directory format or "space" for standard octal format. The programme now halts to allow the block number to be set on the switch register. Press Continue to initiate the print-out.

Output may be interrupted during spacing by pressing any key on the teletype. D will give the next block in Directory File format, ↑C returns to Monitor, 0 transfers to Loc 4000 at which it is convenient to have a version of ODT (ODT4). Any other character gives the normal octal print-out suitable for the SAM Blocks.

Block numbers may be inserted from the teletype, using ODT4, after altering WAIT (6123) from 7602 to JMP I ODT (5673). The procedure with ODT is to open 6105/... and enter the Block No; following this by 6100G to return to BLOK. SAM Block format will be used unless Directory format has been specifically asked for by pressing D.

When ODT is being used, the programme returns to ODT at the end of each block, or after any interruption of the print-out. The return address in BLOK, for the format already specified, is 6100. To re-specify the format, type 6000G, type "D" or "space" as appropriate, and then type 6100G. When ODT is not being used, the programme responds to the keyboard only while typing is in progress.

The buffer area is 1000-1177 and these are the addresses used in the print-out. To derive the word number in the original block, just disregard the first digit - thus, for example, the word found at location 1035 in the buffer is word 35 in the block being examined, and so on.

In deriving the word number for entries in the DN file, allow two words for the file name. The three octal numbers following the file name are: the core loading point, the programme entry point, and the file code respectively. In the file code, the first two digits are a classification incorporating extended memory bits (see Monitor manual) the last two are the file number. Loading points and entry points are zero for files other than Saved files. Where the Load point is given as 7777 this means that non-contiguous pages are used in core. The start addresses of each of the pages used then appear in sequence in the first block of the saved file.

The first three words in the first DN Block are: the block number for the first of the Monitor Scratch blocks (0373), the code for the version of Monitor that is in use (not decoded in this programme), and the block number for the first SAM block.

The words in the SAM block indicate which files occupy the corresponding blocks in a set of 400. Thus word 1135 in the buffer, when examining block 200, might contain the number 3315 (say). This

would mean that block 135 contains a page of file no. 15 and that block 335 contains a page of file no. 33. If the same entry were found when reading the second SAM block (Block 401) this would signify a page of 15 in block 535 and a page of 33 in block 735. Zeros indicate unallocated blocks.

To find which block contains the nth page of a particular file, find the file number from the Directory, locate the earliest entry for this file number in the SAM block, and then count along, taking account of the 7777 convention (above) for files which are to be loaded into non-contiguous pages in core.

Once the content of the relevant locations on the disk is known, it is a simple matter to make changes. These may be made directly on the disk using DISKLOOK (Decus 8-111) or SYSLUK (Decus 8-141), or alternatively the required changes may be made to the buffer in core, using ODT, and the buffer can then be written back onto the disk using the following short routine built for the purpose, again using ODT.

```
1200/...        4607    (LF)/   JMS I SYSIO
                   5    (LF)/   = write, 3 = read
             Block No.  (LF)
                1000    (LF)/   core address of buffer
             LINK word  (LF)
                7402    (LF)/   error return
                5610    (LF)/   return to ODT4
                7642    (LF)/   Monitor SYSIO
                4000    (CR)/   ODT4 address
```

To preserve paper-tape versions of individual blocks, e.g. of particular states of the DN files or SAM blocks, it is convenient to add the above routine to be punched out by ODT along with the buffer. Restoration is then effected by reading back the paper-tape and starting at 1200. For short-term use, the DN and SAM blocks may be brought

down into core, one by one, and saved in new files on the disk using Monitor. When the saved versions are written back into place, all files not recorded in the current DN file cease to be accessible through Monitor and count as deleted. If the disk images are still intact, however, these 'lost' files can be recovered by patching the appropriate entries in the DN and SAM blocks.

It is possible to alter a file name, to change the classification from SYS to USER or vice versa, or to alter either the load point or the entry point. A change of entry point is particularly useful when there is a need to patch programmes such as PIP or PALD which normally start with an initialization routine that alters the core image as soon as the programme is called down. If the entry point is patched to one of the HLT locations in Monitor head (e.g. 7606), the computer will halt before the initialization routine. The programme may then be patched in core with the switch register and re-saved.

If the load point is to be altered, care is needed in dealing with multi-page programmes. All the off-page references will need to be patched before the programme will run in the new area. To find the relevant locations, set the ODT mask to 0600 and search the appropriate area with 0600W. The last 7 bits of the indirect instructions found in this way indicate the locations of the off-page references. Pointers in page zero are traced using 0400W. and the same mask.

The contents of saved files are recognisable core images. Binary and ASCII files, on the other hand, contain 8-bit paper-tape characters packed three characters to two 12-bit words. The octal print-out is thus not readily recognisable without some decoding.

A single page from an ASCII file may be decoded by the following procedure: create a new entry for an ASCII file in the Directory by giving a file name (e.g. S: QRY) in answer to the OUT- request under

the A option of PIP. Determine the corresponding file number with BLOK. Patch the appropriate word in the SAM block with this new file number. Patch zero into the link word for the block to be decoded. Call PIP again and copy S: QRY onto the teletype under the A option. Remember to restore all the patched locations afterwards.

Binary files need special treatment because of the occurrence of "origins" or load points. The first page, or a run of pages including the first, can be decoded by copying onto paper tape under the B option of PIP and running the tape through a reverse assembler (such as Decus 5/8-18a).

A further use of BLOK is to facilitate re-arrangement of the files on the disk. An area can be cleared by judicious copying and deleting, using PIP, and a known set of blocks can be reserved for direct interaction with one of the user's own programmes. This is done by inserting dummy file-numbers in the appropriate places in the SAM block. The maximum number of file names permitted depends on the system configuration and is governed by the length of the available DN blocks. If a larger dummy file-number is used in the SAM block, there is no chance of the corresponding blocks being taken over by Monitor because the Monitor SAVE operation searches for zeros in the SAM block entries before allocating blocks to a new file.

To use ODTL at 1000, with the buffer at 4000, make the following patches to BLOK:

6106,	1000 → 4000	(Start of buffer area)
6073,	4000 → 1000	(Location to be jumped to
6370,	4000 → 1000	after 0 is struck on keyboard.)

```
.PA;
.PALD
*OUT-S:B2
*
*IN-S:B2
*
*OPT-T


                /
                /       BLOK
                /
                /PRINT DN FILE AND SAM BLOCKS
                / WITH LINK WORD
                /
                /TYPE   D FOR DIRECTORY FORMAT
                /               (TYPE 6100G IF BLOCK NO IS ALREADY IN)
                /       CONTRL/C FOR MONITOR
                /       O FOR ODT AT 4000
                /       ANY OTHER CHARACTER FOR SAM FORMAT
                /
                /WITH ODT, PLANT BLOCK NO AT 6105,
                /       RETURN WITH 6100G
                /
                /WITHOUT ODT, COLLECT BLOCK NO FROM SR
                /       AFTER PLANTING 7602 AT "WAIT" (6123)
                /
                        *6000
6000  6032  START,  KCC
6001  6031          KSF
6002  5201          JMP .-1
6003  6036  K,      KRB
6004  6046          TLS             /ECHO
6005  6041          TSF
6006  5205          JMP .-1
6007  3274          DCA CH
6010  4777          JMS CRLF
6011  1274          TAD CH
6012  1376          TAD (-203       /TEST FOR ↑C
6013  7650          SNA CLA
6014  5672          JMP I MON       /RETURN TO MONITOR
6015  1274          TAD CH
6016  1375          TAD (-"O        /TEST FOR O
6017  7650          SNA CLA
6020  5673          JMP I ODT       /GO TO ODT4
6021  1274          TAD CH
6022  1374          TAD (-"D        /TEST FOR D
6023  7650          SNA CLA
6024  5773          JMP DNF
6025  4777  SAM,    JMS CRLF
6026  4276          JMS BLOCK
6027  1372          TAD (-200
6030  3771          DCA WC          /SET TO 200 WORDS
6031  1306          TAD BN+1
6032  3770          DCA CA
6033  4246          JMS HDG         /PRINT COLUMN HEADINGS
```

```
6034  4767  B,      JMS ADDRESS
6035  1366          TAD (-3
6036  1365          TAD (-5
6037  3764          DCA WDS          /8 WORDS TO A LINE
6040  4763          JMS OCT
6041  4777          JMS CRLF
6042  5234          JMP B
6043  7642  MDT,     7642
6044  5451  L,      5451      /LI
6045  5653          5653      /NK
6046  0000  HDG,     0
6047  7240          CLA CMA
6050  1366          TAD (-3
6051  4762          JMS SPN          /4 SPACES
6052  1366          TAD (-3
6053  1365          TAD (-5          /SET 8 HEADINGS
6054  3270          DCA HC
6055  1361          TAD ("0
6056  3271          DCA COL          /SET COLUMN HEADING
6057  1365  H2,     TAD (-5
6060  4762          JMS SPN          /5 SPACES
6061  1271          TAD COL          /GET HEADING
6062  4760          JMS TYPE
6063  2271          ISZ COL
6064  2270          ISZ HC
6065  5257          JMP H2           /REPEAT HEADINGS 0 - 7
6066  4777          JMS CRLF
6067  5646          JMP I HDG
6070  0000  HC,     0
6071  0000  COL,    0
6072  7600  MON,    7600
6073  4000  ODT,    4000
6074  0000  CH,     0
6075  7000                NOP
6076  0000  BLOCK,  0                /BRING DOWN BLOCK
6077  4322          JMS GET
6100  4777  BACK,   JMS CRLF
6101  1305          TAD BN
6102  4757          JMS P4F
6103  4643          JMS I MDT        /MONITOR DISC TRANSFER
6104  0003          3
6105  0000  BN,     0
6106  1000          1000
6107  0000  LINK,   0
6110  7402          HLT              /ERROR
6111  1356          TAD CL
6112  3770          DCA CA
6113  4755          JMS FILE         /PRINT "LINK"
6114  1354          TAD (-2
6115  4762          JMS SPN          /TWO SPACES
6116  1307          TAD LINK         /GET LINK WORD
6117  4757          JMS P4F          /AND TYPE IT
6120  4777          JMS CRLF
6121  5676          JMP I BLOCK
6122  0000  GET,    0
6123  5673  WAIT,   JMP I ODT        /OR CLA HLT FOR USE OF SR
6124  7604          LAS
6125  3305          DCA BN
6126  5722          JMP I GET
```

```
6154  7776
6155  6254
6156  6044
6157  6224
6160  6345
6161  0260
6162  6310
6163  6322
6164  6357
6165  7773
6166  7775
6167  6246
6170  6367
6171  6364
6172  7600
6173  6200
6174  7474
6175  7461
6176  7575
6177  6336

                    *6200
6200  4336  DNF,    JMS CRLF
6201  4777          JMS BLOCK
6202  1363          TAD CON2        /SET TO 200 WORDS
6203  3364          DCA WC
6204  7040          CMA
6205  1365          TAD M2
6206  3357          DCA WDS         /SET 3 WORDS IN FIRST LINE
6207  1776          TAD BN+1
6210  3367          DCA CA          /SET CA = 1000
6211  4246          JMS ADDRESS
6212  4322          JMS OCT
6213  4336          JMS CRLF
6214  4246  A,      JMS ADDRESS
6215  4254          JMS FILE        /DECODE FILE NAME
6216  7240          CLA CMA
6217  1365          TAD M2
6220  3357          DCA WDS         /THREE WORDS IN OCTAL
6221  4322          JMS OCT
6222  4336          JMS CRLF
6223  5214          JMP A
6224  0000  P4F,     0               /FOUR FIGURES
6225  3356          DCA FIG         /TEMP STORE
6226  1355          TAD M4
6227  3336          DCA CRLF        /DIGIT COUNT
6230  1356          TAD FIG
6231  7004          RAL
6232  7004  NEXT,    RAL
6233  7006          RTL
6234  3356          DCA FIG
6235  1356          TAD FIG
6236  0360          AND M7
6237  1361          TAD CON1
6240  4345          JMS TYPE
6241  1356          TAD FIG
6242  2336          ISZ CRLF
6243  5232          JMP NEXT
6244  7200          CLA
6245  5624          JMP I P4F
```

```
6246  0000  ADDRESS,      0
6247  1367                TAD CA
6250  4224                JMS P4F
6251  1362                TAD SP
6252  4345                JMS TYPE
6253  5646                JMP I ADDRESS
6254  0000  FILE,         0                  /PRINT FILE NAME
6255  1365                TAD M2
6256  3357                DCA WDS            /TWO WORDS TO FILE NAME
6257  1365                TAD M2
6260  4310                JMS SPN
6261  1767  F1,           TAD I CA
6262  3356                DCA FIG
6263  1365                TAD M2
6264  3336                DCA CRLF
6265  1356                TAD FIG
6266  7004                RAL
6267  7006  F2,           RTL
6270  7006                RTL
6271  7006                RTL
6272  3356                DCA FIG
6273  1356                TAD FIG
6274  0366                AND ML             /MASK 0077
6275  1362                TAD SP
6276  4345                JMS TYPE
6277  1356                TAD FIG
6300  2336                ISZ CRLF
6301  5267                JMP F2
6302  2367                ISZ CA
6303  2364                ISZ WC
6304  7200                CLA
6305  2357                ISZ WDS
6306  5261                JMP F1
6307  5654                JMP I FILE
6310  0000  SPN,          0                  /TYPE N SPACES
6311  3336                DCA CRLF
6312  1362                TAD SP
6313  4345                JMS TYPE
6314  2336                ISZ CRLF
6315  5312                JMP .-3
6316  6031                KSF                /LISTEN FOR KEYBOARD
6317  7410                SKP
6320  5775                JMP K
6321  5710                JMP I SPN
6322  0000  OCT,          0                  /OCTAL NUMBER
6323  1365                TAD M2
6324  4310                JMS SPN            /TWO SPACES
6325  1767                TAD I CA
6326  4224                JMS P4F
6327  2367                ISZ CA
6330  2364                ISZ WC
6331  7410                SKP
6332  5774                JMP SAM
6333  2357                ISZ WDS
6334  5323                JMP OCT+1
6335  5722                JMP I OCT
```

```
6336  0000  CRLF,   0
6337  7200        CLA
6340  1353        TAD CR
6341  4345        JMS TYPE
6342  1354        TAD LF
6343  4345        JMS TYPE
6344  5736        JMP I CRLF
6345  0000  TYPE,   0
6346  6046        TLS
6347  6041        TSF
6350  5347        JMP .-1
6351  7200        CLA
6352  5745        JMP I TYPE
6353  0215  CR,     215
6354  0212  LF,     212
6355  7774  M4,     -4
6356  0000  FIG,    0
6357  0000  WDS,    0
6360  0007  M7,     7
6361  0260  CON1,   260
6362  0240  SP,     240
6363  7600  CON2,   -200
6364  0000  WC,     0
6365  7776  M2,     -2
6366  0077  ML,     0077
6367  0000  CA,     0
6370  4000  ODTT,   4000
```

```
6374  6025
6375  6003
6376  6136
6377  6076

A         6214
ADDRES    6246
B         6034
BACK      6100
BLOCK     6076
BN        6105
CA        6367
CH        6074
COL       6071
CON1      6361
CON2      6363
CR        6353
CRLF      6336
DNF       6200
FIG       6356
FILE      6254
F1        6261
F2        6267
GET       6122
HC        6070
HDG       6046
H2        6057
K         6003
L         6044
LF        6354
LINK      6107
MDT       6043
ML        6366
MON       6072
M2        6365
M4        6355
M7        6360
NEXT      6232
OCT       6322
ODT       6073
ODTT      6370
P4F       6224
SAM       6025
SP        6362
SPN       6310
START     6000
TYPE      6345
WAIT      6123
WC        6364
WDS       6357
```

```
 LOAD
*IN-S:B2
*
ST=
↑↑
.SAVE BLOK!6000-6377:6000
.ODT4
7600G

.BLOK
B


6100G

0000  LINK   0001
          0      1      2      3      4      5      6      7
1000    0077   4242   0005   0373   7200   0000   7402   4242
1010    0005   0374   D


6105/0000 177
6100G

0177  LINK   0201
1000    0373   4146   0200
1003    EX C   7000   7000   6101
1010    PIP    0000   1000   6102
1015    AV1    7777   0600   6103
1022    LOAD   7400   7400   6104
1027    .CD.   0000   0000   6105
1034    FPT2   0000   0000   2006
1041    MF11   0000   0000   4007
1046    EDIT   0000   2600


6105/0177 200
6100G

0200  LINK   0401
          0      1      2      3      4      5      6      7
1000    0101   0101   0101   4701   4701   4701   4701   4701
1010    4701   4701   4704   4704   4704   4705   4705   4705
1020    4705   4705   4705   4705   4704   4704   4702   4702
1030    4702   4702   4702   2302   2302   5502   5502   1302
1040    1302   1302   1302   1302   1302   1302   1302   1302
1050    1302   1302   1302   1403   1403   1403   1403   1403
1060    1403   1403   1403   1503   K


6106?
6105/0200 53
6100G

0053  LINK   0054
                1      2      3      4      5      6      7
1000    0000   0600   1000   1200   1400   1600   2000   2200
1010    2400   2600   3000   3200   3400

.BLOK
D
```

```
6105/0000 201
6106G

0201  LINK  0000
1001    0000  0000  0000
1003    CSYM  0000  0000  0032
1010    ND1   0000  0000  4033
1015    AV4
```