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LINC Document No. 59

July 1969

TAPESPY

(Program Listing and Documentation)

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Abstract

A flowchart, listings and additional program notes on
TAPESPY. This program displays the contents of tape as
characters or in graphical form. Adjacent tape blocks
may be viewed by adjusting knob zero, to control both
the speed and direction of the scan. On the Spear
Micro-LINC 300, the program uses buffered tape instruc-
tions for continuous display. As a convenience, an
abbreviated set of operating instructions can be dis-
played by pressing START 20.

ADDITIONAL COMMENTS ABOUT TAPESPY

The tape scanning program occupies only three quarters (1, 2, 3).
(This was done so that this program could be used as part of another system
with a dispatch routine in quarter 0.) The instruction display now occupy-
ing quarter zero could be replaced by any routine or extension to TAPESPY
(in which case the name should be changed). (Note that the Q+A routine
cannot be used as a subroutine.)

TAPESPYP

One possible modification - called TAPESPYP permits the amount of for-
ward or backward motion to be controlled from the keyboard. During the
scan, when any key except EOL or "L" is struck, the display is advanced n
words where n is the keyboard code for the key struck. (This permits moves
of 0-54(8) words - two characters per word.) The direction of motion is
specified by sense switch 3, up: toward block zero, down: toward block 777.

The modification for TAPESPYP is at #5A as follows:

```
          [READ KEYBOARD
     #5A   KBD
           SHDi
            1200
           JMP  20 [BN REQUEST
           SHDi
           "L"
           JMP  2A [LAP6
           SNSi3
           COM
           JMP 6C-1 [ADVANCE SCAN
     [
```
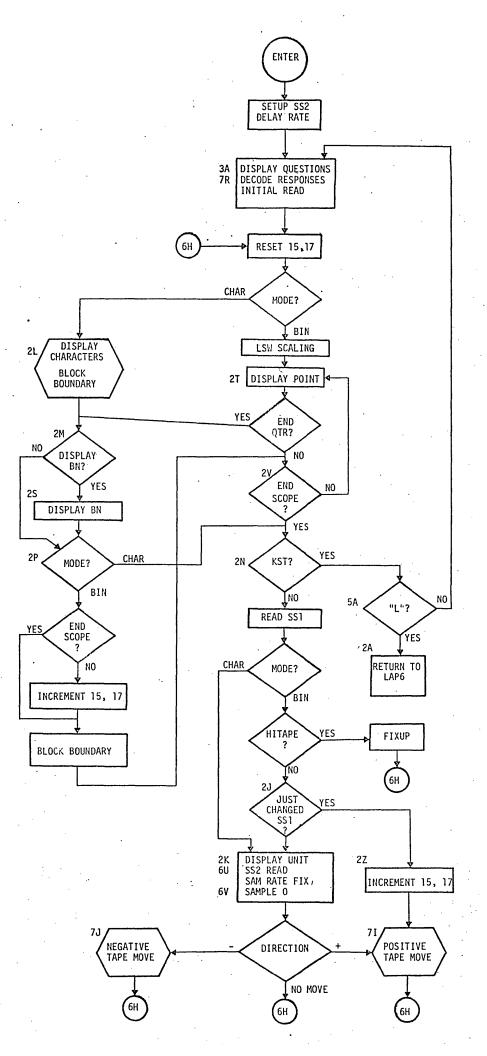
TAPESPY can be run from quarters 0, 1, 2 - requiring only 3 blocks to store

it on tape. Change the first few lines to:

```
      ⊟ 1
      CLR
      MSC 4
      APOi
      JMP P+4
      LDAi.
       -40
      STC 6V-1
  /   LDAi
      NOP
      STC 20
      SETi12
       -1
      JMP 3A
       ⊟ 20
      JMP 1
    [Q+A  ROUTINE - MODIFIED
  #3A SETi16
```

TAPESPY Beta Register Utilization

1 - horiz coordinate - MSGDIS Subroutine

2 - distance from top of scope - MSGDIS Subroutine

3 - data pointer - MSGDIS Subroutine

4 - used as temp in MSGDIS Subroutine

5 - counts max characters per line in MSGDIS Subroutine

6 - counts lines for calling MSGDIS Subroutine

7 - used in MSGDIS modified subroutine for block boundary display

10 - scope coordinate for binary display and block number display

11 - data pointer for binary display

13 - contains starting data location (2I)

14 - starting BN

15 - current BN (Binary mode only)

16 - starting quarter number

17 - current BN (Binary mode only)

ENTER

SETUP SS2
DELAY RATE

3A | DISPLAY QUESTIONS
7R | DECODE RESPONSES
INITIAL READ

6H → RESET 15,17

MODE?
CHAR ← | BIN ↓

2L DISPLAY
CHARACTERS
BLOCK
BOUNDARY

LSW SCALING

2T DISPLAY POINT

END
QTR?
YES / NO

2M DISPLAY
BN?
NO / YES

2V END
SCOPE
?
NO / YES

2S DISPLAY BN

2N KST?
YES / NO

5A "L"?
YES / NO

2P MODE?
CHAR / BIN

READ SS1

2A RETURN TO
LAP6

END
SCOPE
?
YES / NO

MODE?
CHAR / BIN

INCREMENT 15, 17

HITAPE
?
YES → FIXUP

BLOCK BOUNDARY

6H

2J JUST
CHANGED
SS1
?
NO / YES

2K | DISPLAY UNIT
6U | SS2 READ
SAM RATE FIX,
6V | SAMPLE 0

2Z INCREMENT 15, 17

7J NEGATIVE
TAPE MOVE

DIRECTION
− / + / NO MOVE

7I POSITIVE
TAPE MOVE

6H   6H   6H

TAPESPY,0

VALUE	LINE		VALUE	LINE
1B 1010	567		6U 1256	1045
1G 1753	1604		6V 1264	1054
1H 1756	1607		6X 1650	1471
1Q 0524	310		6Y 1335	1131
2A 1234	1017		6Z 1142	715
2B 1016	573		7I 1275	1066
2D 4770	563		7J 1424	1227
2E 1514	1324		7Q 0565	353
2G 1123	673		7R 1032	601
2H 1131	701		9A 0020	11
2I 0013	1612		9H 0032	23
2J 1241	1026		9J 0051	45
2K 1247	1035		9W 0371	153
2L 1513	1323		9X 0100	76
2M 1541	1352		9Y 0166	114
2N 1176	754		9Z 0277	132
2P 1603	1416			
2Q 0535	321			
2R 0421	203			
2S 1574	1407			
2T 1161	736			
2U 1402	1201			
2V 1172	747			
2W 1363	1162			
2X 1307	1100			
2Y 1554	1366			
2Z 1622	1440			
3A 0411	172			
3B 1632	1453			
3C 1532	1342			
3E 1707	1534			
3G 1647	1470			
3H 1652	1473			
3J 1673	1514			
3L 1674	1517			
3N 1702	1527			
3P 1656	1477			
3Q 0550	335			
3R 0433	215			
3X 1042	611			
3Y 1504	1312			
3Z 1304	1075			
4B 0771	564			
4Q 0447	231			
4R 0471	253			
5A 1230	1012			
5Q 0554	341			
5R 0460	242			
5W 1747	1601			
6C 1270	1060			
6E 1322	1116			
6F 1345	1141			
6G 1362	1161			
6H 1135	710			
6J 1452	1260			
6K 1470	1276			
6L 1474	1302			
6Q 0571	361			
6S 1406	1207			
6U 1256	1045			

```
P   CONT
                [TAPESPY      6|20|69
                [ AFTER MAGSPY FROM PDP12
                    ⊟1
  1  6400      · JMP 400
  2  4724
  3  4330
  4  4643
  5  5414

                 ꞁTAPESPY ꜜ
  6  0414
  7  2537
 10  4226
 11  3646

                 ꞁ4 BLOCKSꜜ
                 ⊟20
                [DISPLAY DIRECTIONS
 20  0074  #9A SETꞁ14
 21  0100      9X
 22  6047      JMP 9J-2
 23  6022      JMP P-1
 24  0074      SETꞁ14
 25  0166      9Y
 26  6047      JMP 9J-2
 27  6026      JMP P-1
 30  0074      SETꞁ14
 31  0277      9Z
 32  6047  #9H JMP 9J-2
 33  6035      JMP P+2
 34  6020      JMP 9A
                [SHOW EOL
 35  0062      SETꞁ2
 36  0006      6
 37  0063      SETꞁ3
 40  0371      9W
 41  0061      SETꞁ1
 42  0470      470
 43  0011      CLR
 44  0017      COM
 45  7633      JMP 3B+1
 46  6032      JMP 9H
                [
                [CALL DISPLAY
 47  0057      SET 17
 50  0000      0
 51  0043  #9J SET 3
 52  0014      14
 53  0066      SETꞁ6
 54  7764      -13
 55  0062      SETꞁ2
 56  0003      3
 57  0061      SETꞁ1
 60  0030      30
 61  7632      JMP 3B [MSGDIS
 62  0222      XSKꞁ2
 63  0226      XSKꞁ6
 64  6057      JMP P-5
 65  0415      KST
```

```
 P   CONT
 66  6017        JMP 17
 67  0515        KBD
 70  1420        SHDi
 71  3714         iLi
 72  7234        JMP 2A
 73  1460        SAEi
 74  0012         12
 75  6051        JMP 9J
 76  0237        XSKi17
 77  6017        JMP 17
                [
                [DISPLAYS
100  1414
101  1414
102  1447
103  2443
104  3046
105  4354
           #9X i        TAPESPYi
106  1212        1212
107  4647
110  2445
111  4714
112  0200
113  1414
114  2734
115  4530
116  2647
117  3442
120  4146
           iSTART 20   DIRECTIONSi
121  1214        i
121  1246
122  4724
123  4547
124  1404
125  0000
126  1214    START 400
                 i
127  1414
130  1414
131  3053
132  3026
133  5047
134  3014
135  4724
136  4330
137  4643
140  5414    i    EXECUTE TAPESPYi
141  1212        1212
142  3042
143  3714
144  1414
145  4130
146  5347
147  1427
150  3446
```

```
 P  CONT
151 4337
152 2454
153 1214        ↑EOL    NEXT DISPLAY
                ↓
154 1214        ↑
154 1270
155 3770
156 1414
157 1437
160 2443
161 0614
162 4530
163 4750
164 4541
165 1214        ↑L↑    LAP6 RETURN
                ↓
            [SECOND
166 3641
167 4225
170 1455
171 3045
172 4214
173 2642
174 4147
175 4542
176 3746
177 1214  #9Y ↑KNOB ZERO CONTROLS
177 1214
200 4643
201 3030
202 2714
203 2441
204 2714
205 2734
206 4530
207 2647
210 3442
211 4114        SPEED AND DIRECTION↓
212 1214        ↑
212 1246
213 4601
214 1414
215 5043
216 1426
217 3324
220 4524
221 2647
222 3045
223 4612    SS1  UP CHARACTERS
224 1414
225 1414
226 1427
227 4114
230 1425
231 3441
232 2445
233 5412        DN  BINARY
```

P	CONT
		↓
234	1214	↑
234	1246
235	4602
236	1414
237	5043
240	1414
241	3124
242	4647
243	3045
244	1214	SS2 UP FASTER
244	1214
245	1414
246	1414
247	2741
250	1414
251	4637
252	4252
253	3045
254	1214	DN SLOWER
		↓
255	1214	↑
255	1203
256	1433
257	3414
260	2534
261	4746
262	1437
263	4652
264	1214	3 HI BITS LSW
264	1214
265	1414
266	4626
267	2437
270	3014
271	2742
272	5241
273	1425
274	3441
275	2445
276	5414	SCALE DOWN BINARY↓
		[THIRD
277	1446
300	4330
301	2634
302	2437
303	1426
304	3324
305	4524
306	2647
307	3045
310	4612	#9Z ↑ SPECIAL CHARACTERS
		↓
311	1214	↑
311	1226
312	4227
313	3014

```
 P   CONT
314  1414
315  1414
316  1426
317  3324
320  4512        CODE        CHAR
                   ↓
321  1401
322  0214
323  1430
324  4237
325  1412        ↑ 12   EOL
                   ↓
326  1401
327  0314
330  1427
331  3037
332  1414
333  1414        ↑ 13   DEL     ↓
334  1312        1312
335  1402
336  0314
337  1426
340  2446
341  3014
342  1414        ↑ 23   CASE    ↓
343  2312        2312
344  1405
345  0614
346  1440
347  3047
350  2414
351  1414        ↑ 56   META    ↓
352  5612        5612
353  1405
354  0714
355  1440
356  3047
357  2414
360  1414        ↑ 57   META    ↓
361  5712        5712
362  1407
363  0714
364  1430
365  4240
366  1414
367  1414        ↑ 77   EOM     ↓
370  7712        7712
371  1212  #9W  1212
             [
           [TAPESPY -- CHARACTER OR BINARY WINDOW
           [  USES BUFFERED TAPE ON SPEAR MICROLINC 300
             B400
400  0072        SETi12
401  7776         -1
402  0011        CLR
403  0004        MSC 4
404  0471        APOi
```

```
    P   CONT
   405 6411        JMP P+4
   406 1020        LDAi
   407 7737         -40   [CHANGEABLE
   410 5263        STC 6V-1 [SS2 DELAY
                [Q+A ROUTINE - MODIFIED
   411 0076 #3A SETi16
   412 4770         2D    [TEXT START
   413 6554        JMP 5Q
   414 6417        JMP 2R-2 [76 FILL WITH '?'
   415 6421        JMP 2R    [77 DONE
   416 6413        JMP P-3
   417 6524        JMP 1Q
   420 6413        JMP P-5
                [ ELIM RET COMPUTE
   421 0076 #2R SETi16
   422 4770         .2D
   423 6554        JMP 5Q
   424 1336        LDHi16
   425 6427        JMP P+2
   426 6423        JMP P-3
   427 1020        LDAi
   430 3777         -4000
   431 1140        ADM
   432 0016         16
   433 4536 #3R STC 2Q+1
   434 1020        LDAi
   435 0101         101
   436 4446        STC 4Q-1
   437 0077        SETi17
   440 4770         2D
   441 0061        SETi1
   442 0100         100
   443 1020        LDAi
   444 7737         -40
   445 1160        ADMi
   446 0000         0    [VERT
   447 1337 #4Q LDHi17
   450 6555        JMP 5Q+1
   451 6447        JMP P-2
   452 6471        JMP 4R
   453 1420        SHDi
   454 1200         1200
   455 6441        JMP 3R+6
   456 0241        ROL 1
   457 1120        ADAi
   460 0571 #5R 6Q    [CONSTANT
   461 4015        STC 15
   462 3514        ADD 2E    [=4
   463 2001        ADD 1
   464 4001        STC 1
   465 2446        ADD 4Q-1
   466 1755        DSC 15
   467 1775        DSCi15
   470 6447        JMP 4Q
   471 0415 #4R KST
   472 6434        JMP 3R+1
   473 0515        KBD
```

```
  P   CONT
474  1420       SHDi
475  1300        1300
476  6535        JMP 2Q
477  1420        SHDi
500  1200        1200
501  6550        JMP 3Q
502  1420        SHDi
503  3714        iLi
504  7234        JMP 2A [LAP RET
           [ ACCEPT ONLY OCTAL
505  1060        STAi
506  0000         0
507  1560        BCLi
510  7770         7770
511  1440        SAE
512  0506         P-4
513  6434        JMP 3R+1
514  4521        STC P+5
515  6554        JMP 5Q
516  6427        JMP 3R-4
517  6427        JMP 3R-4
520  1020        LDAi
521  0000         0
522  1356        STH 16
523  6434        JMP 3R+1
           [FILL ANSWER FIELD WITH i?i
524  0055  #10 SET 15
525  0000         0
526  6554        JMP 5Q
527  6015        JMP 15
530  7032        JMP 7R
531  1020        LDAi
532  0060         60
533  1356        STH 16
534  6526        JMP P-6
535  1020  #20 LDAi
536  0000         0
537  1440        SAE
540  0016         16
541  6543        JMP P+2
542  6411        JMP 3A [C
543  4016        STC 16
544  6524        JMP 10
545  0056        SET 16
546  0536        20+1
547  6434        JMP 3R+1
           [EOL  -  IGNORE IT IF NOT AT END OF FIELD
550  6554  #30 JMP 5Q   [C
551  6565        JMP 7Q   [C
552  7032        JMP 7R [C RETURN
553  6427        JMP 3R-4 [C
554  1336  #5Q LDHi16
555  1420        SHDi
556  7600        7600
557  6000        JMP 0
560  1460        SAEi
561  0077         77
```

```
      P   CONT
     562 0220      XSKiO
     563 0220      XSKiO
     564 6000      JMP 0
                   [
     565 6554 #7Q  JMP 5Q
     566 6424      JMP 2R+3
     567 7032      JMP 7R  [77 RETURN
     570 6565      JMP P-3
                   [
                   [CHARGRID
     571 4136 #6Q  4136  [0
     572 3641      3641
     573 2101      2101  [1
     574 0177      0177
     575 4523      4523  [2
     576 2151      2151
     577 4122      4122  [3
     600 2651      2651
     601 2414      2414  [4
     602 0477      0477
     603 5172      5172  [5
     604 0651      0651
     605 1506      1506  [6
     606 4225      4225
     607 4443      4443  [7
     610 6050      6050
     611 5126      5126  [8
     612 2651      2651
     613 5120      5120  [9
     614 3651      3651
     615 0300      0300  [EOL
     616 0303      0303  [WIDE BAR
     617 0507      0507  [DEL
     620 0037      0037  [LITTLE D
     621 0000      0000  [SPACE
     622 0000      0000
     623 0101      0101  [i
     624 0126      0126
     625 3700      3700  [P
     626 3424      3424
     627 0404      0404  [- 17
     630 0404      0404
     631 0404      0404  [+ 20
     632 0437      0437
     633 0000      0000  [| 21
     634 0077      0077
     635 3614      3614  [# 22
     636 1436      1436
     637 1106      1106  [CASE
     640 1111      1111  [SMALL C
     641 4477      4477  [A
     642 7744      7744
     643 5177      5177  [B
     644 2651      2651
     645 4136      4136  [C
     646 2241      2241
     647 4177      4177  [D
```

P	CONT		
650	3641	3641	
651	4577	4577	[E
652	4145	4145	
653	4477	4477	[F 31
654	4044	4044	
655	4136	4136	[G
656	2645	2645	
657	1077	1077	[H
660	7710	7710	
661	7741	7741	[I
662	0041	0041	
663	4142	4142	[J
664	4076	4076	
665	1077	1077	[K
666	4324	4324	
667	0177	0177	[L
670	0301	0301	
671	3077	3077	[M 40
672	7730	7730	
673	3077	3077	[N
674	7706	7706	
675	4177	4177	[O
676	7741	7741	
677	4477	4477	[P
700	3044	3044	
701	4276	4276	[Q
702	0376	0376	
703	4477	4477	[R 45
704	3146	3146	
705	5121	5121	[S
706	4651	4651	
707	4040	4040	[T
710	4077	4077	
711	0177	0177	[U
712	7701	7701	
713	0176	0176	[V
714	7402	7402	
715	0677	0677	[W
716	7701	7701	
717	1463	1463	[X 53
720	6314	6314	
721	0770	0770	[Y
722	7007	7007	
723	4543	4543	[Z 55
724	6151	6151	
725	1272	1272	[LEFT META
726	0207	0207	[L AND ARROW
727	2504	2504	[RIGHT META
730	0416	0416	[AS IN LAP
731	4020	4020	[?
732	2055	2055	
733	1212	1212	[=
734	1212	1212	
735	0107	0107	[u
736	0107	0107	
737	0500	0500	[,
740	0006	0006	

```
  P   CONT
 741 0001        0001 [ .
 742 0000        0000
 743 4577        4577 [ ▣
 744 7745        7745
 745 4177        4177 [ [
 746 0000        0000
 747 0101        0101 [ ^
 750 0101        0101
 751 0070        0070 [ ↑
 752 0070        0070
 753 0700        0700 [ ↓
 754 0700        0700
 755 2410        2410 [ <
 756 0042        0042
 757 4200        4200 [ >
 760 1024        1024
 761 0000        0000 [ ]
 762 7741        7741
 763 2050        2050 [ *
 764 0050        0050
 765 2200        2200 [ :
 766 0000        0000
 767 7777        7777 [ EOM   77
 770 7777        7777
                 [
                 [ Q+A OPTION DISPLAY
                    2D=P-4000
 771 2734
 772 4643
 773 3724
 774 5414
 775 2724
 776 4724
 777 1446
1000 4724
1001 4547
1002 3441
1003 3214  #4B  ↑DISPLAY DATA STARTING↓
1004 1214        ↑
1004 1225
1005 3742
1006 2636
1007 1414
                 BLOCK   ↓
1010 7660  #1B  7660
1011 6060        6060
1012 7614        7614
1013 5041
1014 3447
1015 1414        ↑UNIT ↓
1016 7660  #2B  7660
1017 7612        7612
1020 4754
1021 4330
1022 1470
1023 3770
1024 1431
```

```
  P   CONT
1025 4245
1026 1437
1027 2443
1030 0614        ↑TYPE ↑L↑ FOR LAP6↓
1031 1277        1277
            [
            [DECODE UNIT,STORE IN TITLE AND RDC INSTR
1032 1000  #7R LDA
1033 1016        2B  [UNIT
1034 1560        BCLi
1035 7772        7772
1036 1340        STH
1037 1753        1G  [UNIT DISPLAY
1040 0243        ROL 3
1041 1060        STAi
1042 0000  #3X  0    [UNIT
1043 1120        ADAi
1044 0723        MTBi
1045 5047        STC P+2
1046 5270        STC 6C  [INIT SAM VALUE TO ZERO
1047 0703        MTB
1050 6411        JMP 3A [NO UNIT
1051 1000        LDA
1052 1042        3X
1053 1340        STH
1054 5321        4|6E-1
1055 1340        STH
1056 5451        4|6J-1
1057 1340        STH
1060 5131        4|2H
1061 1620        BSEi
1062 0020        i
1063 1340        STH
1064 5123        4|2G
1065 1300        LDH
1066 5011        4|1B+1 [LO BN DIGIT
1067 5074        STC P+5
1070 1300        LDH
1071 5010        4|1B  [HI BN DIGIT
1072 0246        ROL 6
1073 1160        ADMi
1074 0000        0    [TEMP
1075 1300        LDH
1076 1011        1B+1  [MID DIG
1077 0243        ROL 3
1100 3074        ADD P-4
1101 1040        STA
1102 0014        14  [▱14=BEG BN
1103 0076        SETi16
1104 5000        5000
1105 3104        ADD P-1
1106 1460        SAEi  [HITAPE?
1107 5777        5777
1110 7122        JMP 2G-1 [READ
1111 0441        SNS 1
1112 7116        JMP P+4  [CHARS
1113 1020        LDAi
```

```
    P   CONT
1114 4776         4776
1115 7122         JMP 2G-1
1116 0074         SETi14
1117 0776         776
1120 1020         LDAi
1121 5776         5776
             [ INITIAL READIN
1122 5124         STC 2G+1
1123 0700 #2G RDC
1124 0000         0        [05
1125 3124         ADD 2G+1
1126 1120         ADAi
1127 1001         1001
1130 5132         STC 2H+1
1131 0700 #2H ·RDC
1132 0000         0
1133 0073         SETi2I
1134 2400         2400     [INIT CORE LOCN
          [
          [##########
          [START OF MAJOR LOOP
1135 0055 #6H SET 15
1136 0014         14
1137 0057         SET 17
1140 0016         16
1141 1520         SROi
1142 0000 #6Z 0
1143 7513         JMP 2L [DISPLAY LAP6 CHARS
          [DISPLAY BINARY SETUP
1144 0517         LSW  [GET SCALING AMOUNT
1145 0243         ROL 3
1146 1560         BCLi
1147 7770         7770
1150 0470         AZEi
1151 3747         ADD 5W [=NOP-SCR
1152 1120         ADAi
1153 0340         SCR
1154 5162         STC 2T+1
1155 0070         SETi10
1156 0777         777
1157 0051         SET 11
1160 0013         2I
          [DISPLAY BINARY
1161 1011 #2T LDA 11 [DATA LOCN
1162 0016         NOP [OR SCR
1163 0170         DISi10
1164 1000         LDA
1165 0011         11
1166 1620         BSEi
1167 7400         7400
1170 0470         AZEi
1171 7541         JMP 2M [END OF QTR
1172 0231 #2V XSKi11
1173 0016         NOP
1174 0210         XSK 10
1175 7161         JMP 2T [MORE PTS TO DISPLAY
          [KEYSTRUCK?
```

```
   P  CONT
 1176 0435 #2N KSTi
 1177 7230      JMP 5A
            [READ SS1
 1200 0011      CLR
 1201 0461      SNSi1
 1202 0017       COM
 1203 1040      STA
 1204 1142      6Z
 1205 0451      APO
 1206 7247      JMP 2K [CHARS
 1207 2014      ADD 14
 1210 1460      SAEi
 1211 0777       777
 1212 7241      JMP 2J
            [ HITAPE STOP
 1213 0074      SETi14
 1214 0776       776
 1215 1020      LDAi
 1216 6777      -1000
 1217 2016      ADD 16
 1220 0471      APOi
 1221 3304      ADD 3Z  [=4000
 1222 1040      STA
 1223 0016       16
 1224 0301      ROR 1 [GET QTR
 1225 4013      STC 2I
 1226 5335      STC 6Y [NOT AT RIGHT END CHARS
 1227 7135      JMP 6H
            [
            [READ KEYBOARD
 1230 0515 #5A KBD
 1231 1460      SAEi
 1232 0037

                 tOLl
 1233 6411      JMP 3A [NEW BN
            [ RETURN TO LAP6
 1234 0075 #2A SETi 15
 1235 0701      RCG
 1236 0076      SETi16
 1237 7300       7300
 1240 6015      JMP 15
            [
            [JUST CHANGED SS1 TO BIN?
 1241 1440 #2J SAE
 1242 0015       15
 1243 7247      JMP P+4 [NO
 1244 7622      JMP 2Z [INCR 15.17
 1245 5270      STC 6C
 1246 7275      JMP 7I
            [DISPLAY UNIT#
 1247 0062 #2K SETi2   [DIST FROM TOP
 1250 0000       0
 1251 0063      SETi3
 1252 1750      1G-3
 1253 0061      SETi1 [FOR DSC
 1254 0030       30
 1255 7632      JMP 3B
```

```
  P  CONT
           [MODIFY SAM O RATE
1256 0462 #6U SNSi2
1257 7264     JMP 6V
1260 0232     XSKi12
1261 7135     JMP 6H
1262 0072     SETi12
1263 7773      -4   [-40 FOR uLINC
           [SAMPLE KNOB ZERO
1264 0100 #6V SAM 0
1265 0017     COM
1266 0344     SCR 4
1267 1060     STAi
1270 0000 #6C  0       [SAMPLED VALUE
1271 0470     AZEi
1272 7135     JMP 6H [NO MOTION
1273 0451     APO
1274 7424     JMP 7J [NEG
           [POSITIVE- MOVE BN UP
1275 1020 #7I LDAi
1276 0001      1
1277 2015     ADD 15 [CURRENT BN
1300 0242     ROL 2
1301 0451     APO
1302 7323     JMP 6E+1 [HI END
1303 0302     ROR 2
1304 4000 #3Z STC 0   [CONST=4000
1305 2017     ADD 17   [CURRENT QTR
1306 1120     ADAi
1307 1000 #2X  1000
1310 0471     APOi
1311 0301     ROR 1    [RESET Q=4
1312 2000     ADD 0   [NEW QN|BN
1313 1440     SAE
1314 1322      6E
1315 0470     AZEi   [SKIP
1316 7323     JMP 6E+1 [ALREADY IN CORE
1317 5322     STC 6E
           [   FOR PDP12: REPLACE  MSC 3
           [     BY:  0416  STD
           [               JMP P-1
1320 0003     MSC 3  [ uLINC BUFFERED TAPE
1321 0700     RDC
1322 0000 #6E  0
1323 0011     CLR
1324 5452     STC 6J   [FORCE NEG READ NEXT TIME
1325 2013     ADD 2I   [INIT CORE LOCN
1326 1560     BCLi
1327 0377      377
1330 5345     STC 6F
1331 1400     SHD  [SKIP IF CHAR
1332 1142      6Z
1333 7337     JMP P+4
1334 1520     SROi
1335 0000 #6Y  0
1336 7135     JMP 6H [RIGHT END CHARS
1337 3270     ADD 6C  [SAM VAL
1340 1140     ADM
```

```
  P   CONT
1341 0013  .     2I
1342 1560        BCLi
1343 0377        377
1344 1460        SAEi
1345 0000 #6F    0      [LAST INIT QTR
1346 7362        JMP 6G
1347 1500        SRO  [SKIP IF BIN
1350 1142        6Z
1351 7135        JMP 6H
          [TEST HI END OF TAPE
1352 1020        LDAi
1353 0776        776
1354 1440        SAE
1355 0014        14
1356 7135        JMP 6H [NO MOVE
1357 0053        SET 2I
1360 1345        6F
1361 7135        JMP 6H
          [
          [INCREMENT 14,16 [INIT QTR]
1362 1020 #6G LDAi
1363 0001 #2W   1
1364 2014        ADD 14   [BEG BN
1365 1460        SAEi
1366 1000        1000
1367 0470        AZEi   [SKIP
1370 7135        JMP 6H
1371 4014        STC 14
1372 3307        ADD 2X   [=1000
1373 1140        ADM
1374 0016        16
1375 0451        APO
1376 7135        JMP 6H
1377 0301        ROR 1
1400 4016        STC 16
1401 1020        LDAi
1402 5777 #2U    -2000 [CONST.
1403 1140        ADM
1404 0013        2I
1405 7135        JMP 6H
          [
          [LOW END TAPE
1406 1000 #6S LDA
1407 0013        2I
1410 1560        BCLi
1411 0377        377
1412 5470        STC 6K
1413 3270        ADD 6C [SAM VAL
1414 2013        ADD 2I
1415 0017        COM
1416 3470        ADD 6K
1417 0451        APO
1420 7453        JMP 6J+1
1421 0053        SET 2I
1422 1470        6K
1423 7135        JMP 6H
          [
```

```
    P   CONT
                    [NEG TAPE MOVE
1424  1000   #7J LDA
1425  0014        14   [BEG BN
1426  0470        AZEi
1427  7406        JMP 6S [LOW END TAPE
1430  1120        ADAi
1431  7776        -1
1432  0470        AZEi
1433  0011        CLR
1434  5474        STC 6L
1435  2016        ADD 16   [BEG Q
1436  1120        ADAi
1437  6777        -1000
1440  0471        APOi
1441  3304        ADD 3Z [=4000
1442  3474        ADD 6L
1443  1440        SAE
1444  1452        6J
1445  0470        AZEi   [SKIP
1446  7453        JMP 6J+1 [ALREADY IN CORE
1447  5452        STC 6J
            [ FOR PDP12 REPLACE  MSC 3
            [     BY    0416   STD
            [                  JMP P-1
1450  0003        MSC 3   [uLINC BUFFERED TAPE
1451  0700        RDC
1452  0000   #6J  0
1453  0011        CLR
1454  5322        STC 6E   [FORCE POS READ
1455  5335        STC 6Y [LET CHARS GO RIGHT
1456  2013        ADD 2I   [INIT CORE LOCN
1457  1560        BCLi
1460  0377        377
1461  5470        STC 6K
1462  3270        ADD 6C   [SAM VAL
1463  1140        ADM
1464  0013        2I
1465  1560        BCLi
1466  0377        377
1467  1460        SAEi
1470  0000   #6K  0
1471  7473        JMP P+2
1472  7135        JMP 6H [NO CHG IN Q
1473  0074        SETi14
1474  0000   #6L  0   [NEW INIT QTR
1475  1000        LDA
1476  1452        6J
1477  1560        BCLi
1500  0777        777
1501  1040        STA
1502  0016        16 [NEW INIT QTR
1503  1460        SAEi
1504  7000   #3Y  7000
1505  7135        JMP 6H
1506  1020        LDAi
1507  2000        2000
1510  1140        ADM
```

```
     P   CONT
1511 0013       2I
1512 7135       JMP 6H
                [
                [DISPLAY LAP6 CHARS
1513 0062  #2L  SETi2
1514 0004  #2E  4    [CONSTANT
1515 0070       SETi10  [TO DIS BN LATER
1516 1141       1141
1517 0066       SETi6
1520 7763       -14
1521 1000       LDA
1522 0013       2I
1523 1040       STA
1524 0003       3
1525 1560       BCLi
1526 4377       4377
1527 5707       STC 3E [INIT LOC QTR START
1530 0017       COM
1531 5650       STC 6X [TO SHOW EOL
1532 0061  #3C  SETi1
1533 0030       30
1534 0011       CLR
1535 7634       JMP 3B+2 [DISPLAY
1536 0222       XSKi2
1537 0226       XSKi6
1540 7532       JMP 3C
                [DISPLAY BN?
1541 1020  #2M  LDAi
1542 6637       -1140
1543 2010       ADD 10
1544 0451       APO
1545 7603       JMP 2P [DONiT SHOW BN
1546 5575       STC 2S+1
                [SETUP BN
1547 0011       CLR
1550 2015       ADD 15  [CURR BN
1551 5756       STC 1H
1552 1300       LDH
1553 4015       4I15
1554 0343  #2Y  SCR 3   [CONSTANT
1555 1340       STH
1556 5756       4I1H
1557 0005       ZTA
1560 0244       ROL 4
1561 1340       STH
1562 1757       1H+1
1563 0062       SETi2
1564 0001       1
1565 0063       SETi3
1566 1754       1H-2
1567 1000       LDA
1570 0003       3
1571 1560       BCLi
1572 4377       4377
1573 5707       STC 3E
                [DISPLAY BN
1574 0061  #2S  SETi1
```

```
     P    CONT
   1575  0000          0
   1576  7632          JMP 3B [DISPLAY
   1577  0222          XSKi2
   1600  1520          SROi
   1601  2525          2525
   1602  7574          JMP 2S
   1603  1500    #2P   SRO
   1604  1142          6Z   [SKIP IF BIN
   1605  7176          JMP 2N [DISP UNIT#
   1606  0210          XSK 10   [END OF SCOPE?
   1607  7622          JMP 2Z [INCR 15,17
                       [DISPLAY VERT LINE BETWEEN BLOCKS
   1610  0062          SETi2
   1611  7677          -100
   1612  1020          LDAi
   1613  7400          7400
   1614  0150          DIS 10
   1615  1120          ADAi
   1616  0006          6
   1617  0222          XSKi2
   1620  7614          JMP P-4
   1621  7172          JMP 2V
                       [
                       [INCREMENT 15,17
   1622  0235    #2Z   XSKi15
   1623  1020          LDAi
   1624  1000          1000
   1625  2017          ADD 17
   1626  0471          APOi
   1627  0301          ROR 1 [RESET Q4
   1630  4017          STC 17
   1631  6000          JMP 0
                       [
                       [DISPLAY CHARS SUBROUTINE
                       [ AFTER   MSGDIS OF JAMES HANCE
   1632  0011    #3B   CLR
   1633  5650          STC 6X
   1634  2000          ADD 0
   1635  5673          STC 3J [SAVE RET
   1636  2002          ADD 2
   1637  1560          BCLi
   1640  7760          7760
   1641  0245          ROL 5
   1642  0017          COM
   1643  3554          ADD 2Y [=343
   1644  4446          STC 4Q-1 [VERT
   1645  0065          SETi5  [#CHARS PER LINE
   1646  7753          -24
   1647  1520    #3G   SROi
   1650  0000    #6X   0
   1651  7702          JMP 3N
   1652  1303    #3H   LDH 3
   1653  1420          SHDi
   1654  1200          1200 [EOL
   1655  7674          JMP 3L
   1656  0241    #3P   ROL 1
   1657  2460          ADD 5R [CHAR GRID ADDR
```

```
     P   CONT
  1660 4004     STC 4
  1661 2446     ADD 40-1 [VERT
  1662 1744     DSC 4
  1663 1764     DSCi4
  1664 1020     LDAi
  1665 0010     10
  1666 1140     ADM
  1667 0001      1
  1670 1323     LDHi3
  1671 0225     XSKi5
  1672 7647     JMP 3G
  1673 0000 #3J RETURN
               [
               [EOL
  1674 0065 #3L SETi5
  1675 7776      -1   [FORCE RETURN
  1676 1500     SRO
  1677 1650     6X
  1700 7656     JMP 3P
  1701 7670     JMP 3J-3
               [
               [DISPLAY BLOCK BOUNDARY
  1702 1000 #3N LDA
  1703 0003      3
  1704 1560     BCLi
  1705 4377      4377
  1706 1460     SAEi
  1707 0000 #3E  0    [START OF INIT LOC QTR
  1710 0470     AZEi [SKIP
  1711 7652     JMP 3H [NOT BNDRY
  1712 5707     STC 3E
               [DISPLAY VERTICAL STROKE
  1713 1020     LDAi
  1714 7775     -2
  1715 2001     ADD 1
  1716 4007     STC 7
  1717 0064     SETi4
  1720 7767     -10
  1721 2446     ADD 40-1 [VERT
  1722 0147     DIS 7
  1723 1120     ADAi
  1724 0003      3
  1725 0224     XSKi4
  1726 7722     JMP P-4
               [DISPLAY HORIZ LINE
  1727 1120     ADAi
  1730 0002      2
  1731 0067     SETi7
  1732 0777      777
  1733 0167     DISi7
  1734 0227     XSKi7
  1735 0227     XSKi7
  1736 0227     XSKi7
  1737 7733     JMP P-4
               [TEST FOR HITAPE
  1740 1000     LDA
  1741 0014      14
```

```
   P   CONT
 1742 3504      ADD 3Y [=7000
 1743 0450      AZE
 1744 7652       JMP 3H
 1745 5335      STC 6Y [FREEZE 2I TO RIGHT
 1746 7541      JMP 2M [DISP BN
              [
              [CONSTANTS
 1747 7455  #5W NOP-SCR
              [DISPLAY TEXT
 1750 5041
 1751 3447
 1752 1414
               ↑UNIT   ↓
 1753 0012  #1G 0012
 1754 2541
 1755 1412       ↑BN
               ↓
 1756 0000  #1H 0000
 1757 0012      0012
              [
              2I=13
       [THE ABOVE IS AN ADAPTATION AND CORRECTION OF ↑MAGSPY↑
       ,
       [  FROM A BINARY COPY OBTAINED FROM DEC, THEN
       [  DISASSEMBLED AND REWORKED.
       [IT USES BUFFERED TAPE ON THE SPEAR MICROLINC 300.
       [M.SEIDEN
       [END TAPESPY 6!27!69
```