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DECUS NO.	8-486
TITLE	SEGAR 7: A SEVEN SEGMENT ARRAY FOR ALPHANUMERIC CHARACTER GENERATION
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SOURCE LANGUAGE	PAL III

SEGAR 7: A SEVEN SEGMENT ARRAY FOR ALPHANUMERIC CHARACTER GENERATION

DECUS Program Library Write-up DECUS NO. 8-486

LANGUAGE AND APPLICATION : PDP Assembly Language designed for use with PDP 8 series computers with 34D or storage scope.

DESCRIPTION:

This programme is designed as a 1½ page (with pointers on Page Ø) sub-routine for displaying easily observed labels on an oscilloscope screen (34D).

A seven segment display allows all numerical and some useful alphabetical characters to be generated. Spacing is automatic and can be altered. Full repertoire is shown in Figure 1. The routine was designed as part of a real-time data acquisition programme where easily observed labels for data identification and warnings were required. It was used on a PDP8/S originally and it was necessary to reemphasize buffer store clearance of the scope D/A in locations 3Ø15;3Ø7Ø;3Ø71, to prevent undue noise content of the display.

CALLING THE SUBROUTINE:

The sub-routine can be situated anywhere in core memory and is called by JMS LABEL, the locations immediately following this instruction contain the address of the alpha - numerics. The routine terminator is an all zero location. The programme returns to the location following the terminator.

```
EXAMPLE:    JMS LABEL
              651    / D
              641    / E
              653    / C
              660    / U
              667    / S
              000    / terminator
              XXX    / Next instruction programme
                       return.
```

Programme loops can be arranged for non-storage type oscilloscopes (34D).

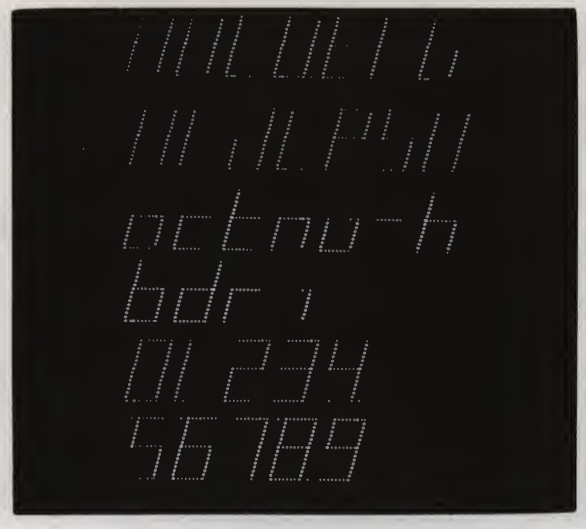

FIGURE 1.

USEFUL WORDS & ABREVIATIONS:

no - GO, turn , HI, LO, UP, run, Abort, HG, PSI, SAFE, Ch (channel), Stop, Job, LOG, Photo

LIMITATIONS:

Maximum number of characters / line as dictated by 1777 maximum 'X' axis of 34D. Allowing a margin of 35Ø and a "character-space" requirement of 15Ø, the number of characters is restricted to 7 per line.

USAGE:

Binary Tape
Ascii Tape.
Listing.

```
A       0644
BACK    0614
BAR1    3000
BAR2    3046
BLOK    0022
BRAK    0676
C       0653
CLOCK   3147
CONSTX  3150
C10     3141
C100    0021
C150    0033
C16     3154
C170    3143
C2      3153
C250    0032
C30     3142
C70     3144
DASH    0627
DCX     6051
DCY     6061
DXL     6053
DXS     6057
DYL     6063
DYS     6067
E       0641
F       0636
FIVE    4427
FOUR    4426
F1      0023
F2      0024
F3      0025
F4      0026
F5      0027
F6      0030
F7      0031
G       0652
H       0645
J       0661
L       0654
LABEL   0600
M10     3145
M16     3151
M2      0020
M40     3152
NEXT    0604
N1      0655
N2      0631
N3      0675
N4      0703
N5      0667
N6      0622
N7      0677
N8      0621
N9      0674
O       0651
ONE     4423
P       0635
R1      3073
R2      3104
```

```
SB        0623
SC        0625
SD        0665
SEVEN     4431
SH        0646
SI        0701
SIX       4430
SN        0647
SO        0624
SR        0626
ST        0642
STORE     0620
SU        0662
S1        3017
S2        3026
S3        3036
S4        3115
S5        3120
S6        3124
S7        3127
THREE     4425
TWO       4424
U         0660
V0        3133
V100      3136
V16       3135
V170      3137
V2        3134
V70       3140
X         0034
Y         3146
```

```
                        /SEGAR7...A SEVEN SEGMENT ARRAY FOR
                        /GENERATING SCOPE CHARACTERS ON 34D OR STORAGE SCOPE.
                        /ENTER ROUTINE WITH
                        /       JMS LABEL
                        /       X
                        /       X
                        /       X
                        /       0       ROUTINE TERMINATOR.
0200  0200    END OF DISPLAY ROUTINE RETURNS HERE.
              *20
0020  7776   M2,       -2
0021  0100   C100,     100
0022  1000   BLOK,     1000
0023  3017   F1,       3017
0024  3026   F2,       3026
0025  3036   F3,       3036
0026  3115   F4,       3115
0027  3120   F5,       3120
0030  3124   F6,       3124
0031  3127   F7,       3127
0032  0250   C250,     250
0033  0150   C150,     150
0034  0000   X,        0
                      DCX=6051
                       DCY=6061
                       DYS=6067
                       DYL=6063
                       DXS=6057
                       DXL=6053
              *3000
3000  0000   BAR1,     0
3001  0000             0
3002  6063             DYL
3003  7200             CLA
3004  1345             TAD M10
3005  3347             DCA CLOCK
3006  1350             TAD CONSTX
3007  1342             TAD C30
3010  1341             TAD C10
3011  6057             DXS
3012  2347             ISZ CLOCK
3013  5210             JMP .-3
3014  7200             CLA
3015  6051             DCX
3016  5600             JMP I BAR1
3017  0000   S1,       0       /FIRST HORIZONTAL SEGMENT
3020  1022             TAD BLOK
3021  3350             DCA CONSTX
3022  1337             TAD V170
3023  3201             DCA BAR1+1
3024  4200             JMS BAR1
3025  5617             JMP I S1
3026  0000   S2,       0       /SECOND HORIZONTAL SEGMENT
3027  1351             TAD M16
3030  1022             TAD BLOK
3031  3350             DCA CONSTX
3032  1336             TAD V100
3033  3201             DCA BAR1+1
3034  4200             JMS BAR1
3035  5626             JMP I S2
```

```
3036  0000  S3,     0       /THIRD HORIZONTAL SEGMENT
3037  1352          TAD M40
3040  1022          TAD BLOK
3041  3350          DCA CONSTX
3042  1333          TAD V0
3043  3201          DCA BAR1+1
3044  4200          JMS BAR1
3045  5636          JMP I S3
3046  0000  BAR2,    0
3047  0000          0
3050  3346          DCA Y
3051  1345          TAD M10
3052  3347          DCA CLOCK
3053  1350          TAD CONSTX
3054  0000          0
3055  3034          DCA X
3056  1353          TAD C2
3057  1034          TAD X
3060  6053          DXL
3061  3034          DCA X
3062  1346          TAD Y
3063  1341          TAD C10
3064  6067          DYS
3065  3346          DCA Y
3066  2347          ISZ CLOCK
3067  5256          JMP .-11
3070  6051          DCX
3071  6061          DCY
3072  5646          JMP I BAR2
3073  0000  R1,     0
3074  1022          TAD BLOK
3075  3350          DCA CONSTX
3076  1340          TAD V70
3077  3247          DCA BAR2+1
3100  1335          TAD V16
3101  3254          DCA BAR2+6
3102  4246          JMS BAR2
3103  5673          JMP I R1
3104  0000  R2,     0
3105  1022          TAD BLOK
3106  3350          DCA CONSTX
3107  1333          TAD V0
3110  3247          DCA BAR2+1
3111  1334          TAD V2
3112  3254          DCA BAR2+6
3113  4246          JMS BAR2
3114  5704          JMP I R2
3115  0000  S4,     0       /TOP LEFT VERTICAL
3116  4273          JMS R1
3117  5715          JMP I S4
3120  0000  S5,     0       /TOP RIGHT VERTICAL
3121  1021          TAD C100
3122  4273          JMS R1
3123  5720          JMP I S5
3124  0000  S6,     0       /BOTTOM LEFT VERTICAL
3125  4304          JMS R2
3126  5724          JMP I S6
3127  0000  S7,     0       /BOTTOM RIGHT VERTICAL.
3130  1021          TAD C100
3131  4304          JMS R2
3132  5727          JMP I S7
```

```
3133  7200  V0,      CLA
3134  1020  V2,      TAD M2
3135  1354  V16,     TAD C16
3136  1021  V100,    TAD C100
3137  1343  V170,    TAD C170
3140  1344  V70,     TAD C70
3141  0010  C10,     10
3142  0030  C30,     30
3143  0170  C170,    170
3144  0070  C70,     70
3145  7770  M10,     -10
3146  0000  Y,       0
3147  0000  CLOCK,   0
3150  0000  CONSTX,  0
3151  7762  M16,     -16
3152  7743  M40,     -35
3153  0002  C2,      2
3154  0016  C16,     16
            ONE=JMS I F1
            TWO=JMS I F2
            THREE=JMS I F3
            FOUR=JMS I F4
            FIVE=JMS I F5
            SIX=JMS I F6
            SEVEN=JMS I F7
            *600
0600  0000  LABEL,   0        /SUBROUTINE FOR CHARACTER GENERATION
0601  7300            CLA CLL /AUTOMATIC SPACING BETWEEN
0602  1032            TAD C250        /CHARACTERS.
0603  3022            DCA BLOK
0604  1600  NEXT,    TAD I LABEL
0605  7450            SNA
0606  5216            JMP BACK+2
0607  3220            DCA STORE
0610  1033            TAD C150
0611  1022            TAD BLOK
0612  3022            DCA BLOK
0613  5620            JMP I STORE
0614  2200  BACK,    ISZ LABEL
0615  5204            JMP NEXT
0616  2200            ISZ LABEL
0617  5600            JMP I LABEL
0620  0000  STORE,   0
0621  4427  N8,      FIVE     /NUMBER 8
0622  4423  N6,      ONE      /NUMBER 6
0623  4426  SB,      FOUR     /SMALL B
0624  4431  SO,      SEVEN    /SMALL O
0625  4425  SC,      THREE    /SMALL C
0626  4430  SR,      SIX      /SMALL R
0627  4424  DASH,    TWO      /UPPER CASE BAR
0630  5214            JMP BACK
0631  4423  N2,      ONE      /NUMBER 2
0632  4427            FIVE
0633  4425            THREE
0634  5226            JMP SR
```

```
0635   4427   P,       FIVE     /CAPITAL P
0636   4423   F,       ONE      /CAPITAL F
0637   4426            FOUR
0640   5226            JMP SR
0641   4423   E,       ONE      /CAPITAL E
0642   4426   ST,      FOUR     /SMALL T
0643   5225            JMP SC
0644   4423   A,       ONE      /CAPITAL A
0645   4427   H,       FIVE     /CAPITAL H
0646   4426   SH,      FOUR     /SMALL H
0647   4431   SN,      SEVEN    /SMALL N
0650   5226            JMP SR
0651   4427   O,       FIVE     /CAPITAL O,NUMBER 0
0652   4431   G,       SEVEN    /CAPITAL G
0653   4423   C,       ONE      /CAPITAL C
0654   4425   L,       THREE    /CAPITAL L
0655   4426   N1,      FOUR     /NUMBER 1, CAPITAL I
0656   4430            SIX
0657   5214            JMP BACK
0660   4426   U,       FOUR     /CAPITAL U
0661   4427   J,       FIVE     /CAPITAL J
0662   4431   SU,      SEVEN    /SMALL U
0663   4425            THREE
0664   5256            JMP N1+1
0665   4424   SD,      TWO      /SMALL D
0666   5261            JMP J
0667   4423   N5,      ONE      /NUMBER 5, CAPITAL S
0670   4426            FOUR
0671   4431            SEVEN
0672   4425            THREE
0673   5227            JMP DASH
0674   4426   N9,      FOUR     /NUMBER 9
0675   4424   N3,      TWO      /NUMBER 3
0676   4425   BRAK,    THREE    /BRACKET ]
0677   4423   N7,      ONE      /NUMBER 7
0700   4427            FIVE
0701   4431   SI,      SEVEN    /SMALL I
0702   5214            JMP BACK
0703   4426   N4,      FOUR     /NUMBER 4
0704   4427            FIVE
0705   4431            SEVEN
0706   5227            JMP DASH
```