DSD
STORAGE ALLOCATION.

ADDRESS	LENGTH
0	5727
5727	(1140)

BINARY CONTROL CARDS.

```
IDENT    DSD
END
```

```
                    IDENT   DSD
                    PERIPH
                    *
                    *
10          DSPCHN  EQU     10B
11          INTCHAN EQU     9
                    *
                    *
22          I.POINTS EQU    22B
 3          I.MSM   EQU     3
 6          I.DSP   EQU     6
 4          DSPINTX EQU     4       . THIS INTERRUPT CHECKS I.LOCK
 5          DSPINTX1 EQU    5       . THIS INTERRUPT DOESN*T
                    *
 2          I.SYSTAT EQU    2       . CM CELL FOR SYSTEM STATE
                    *
                    *
```

```
0                              ORG     *
0       4336                   VFD     12/START-1
1                      MESFLG  BSSZ    1
2                      MESLEN  BSSZ    1
3                      MESERR  BSSZ    1
4       6000                   DATA    6000B
5                      PPBUFF  BSSZ    5*1
12                     CM1     BSS     1
13                     CM2     BSS     1
14                     CM3     BSS     1
15                     CM4     BSS     1
16                     CM5     BSSZ    1
17      0000           ZERO    DATA    0,0,0,0,0
24                     T0      BSSZ    1
25                     T1      BSS     1
26                     T2      BSS     1
27                     T3      BSS     1
30                     T4      BSS     1
31                     T5      BSS     1
32                     O1      BSS     1
33                     O2      BSS     1
34                     O3      BSSZ    1
35                     O4      BSSZ    1
36                     O5      BSSZ    1
37                     UD1     BSSZ    1
40                     UD2     BSSZ    1
41                     UD3     BSSZ    1
42                     UD4     BSSZ    1
43                     UD5     BSSZ    1
44                     I1      BSSZ    1
45                     I2      BSSZ    1
46                     I3      BSSZ    1
47                     AD1     BSS     1
50                     AD2     BSS     1
51                     OF      BSSZ    1
52                     PASSFLG BSSZ    1
53                     BLNKCT  BSSZ    1
54                     BLNKFLG BSSZ    1
55                     INDEX   BSS     1
56      0001           KEYNAME DATA    1RA
57      0000           BADNEWS DATA    0
```

```
                *       THE FOLLOWING TWO TABLES AT L.DIS AND R.DIS DESCRIBE THE
                *       CURRENT LEFT AND RIGHT DISPLAY SCREENS. THEY ARE READ FORM
                *       A TABLE IN CENTRAL WHENEVER DISPLAYS ARE CHANGED.
                *       THEY ARE OF THE FOLLOWING FORMAT:
                *
                *       NAME    VFD     1/BUSY,1/0,6/SNAME
                *       TYPE    BSS     1
                *       LINE    BSS     1
                *       LAST    BSS     1
                *       LBSIZE  BSS     1
                *
                *
                *       SNAME IS THE SCREEN NAME DISPLAYED ON THE SCREEN
                *       BUSY IS A FLAG SET SO THAT THE OUTPUT ROUTINE WILL NOT
                *       ATTEMPT TO OUTPUT THE DISPLAY WHILE IT IS BEING READ IN.
                *
                *       TYPE IS USED BY THE UPDATE ROUTINE AS AN INDEX INTO A JUMP
                *       TABLE, AND BY OTHERS IN CHECKS
                *
                *       LINE IS USER FOR BOOKEEPING BY THE UPDATE ROUTINE
                *
                *       LAST AND LBSIZE ARE USED BY THE DISPLAY ROUTINE
                *       LAST POINTS TO THE LAST LOGICAL LINE, RELATIVE
                *       TO THE BUFFER ORIGON. LBSIZE IS THE LENGTH OF A
                *       LOGICAL LINE

60      4000    R.DIS   DATA    4000B
61      0000            VFD     12/0,12/0
62      0000
63      2232            VFD     12/LASTRT
64      0046            DATA    38
65      4015    L.DIS   VFD     12/4000B+IRM
66      0003            VFD     12/3,12/0
67      0000
70      0650            VFD     12/2*LINE1,12/LINE1
71      0324
```

```
72      HERE    EQU     *
                *
                *
                *
                *       CM ADDRESS MACRO
                *
                *
                *
                XLX     MICRO   1,,*01,02,03,04,05,06,07,08,09,11,12,13,14,15,16,17,
                ,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40*
 1              L       SET     1
                CMADD   MACRO
                XXL     MICRO   L,2,**XLX**
                L       SET     L+3
                CMADDR$*XXL*    EQU     *-1
                        ENDM
```

```
                        *
                        *       DEFINE VARIOUS THINGS
                        *
                        *       DISPLAY TYPES
1       T.CORE  EQU     1
2       T.USER  EQU     2
3       T.PPU   EQU     3
                        *
                        *       CM REQUEST INDICIES
1                       ORG     1
                        *
1       RQ.LOCK BSS     1       . LOCK UP CPU
2       RQ.UNLOC BSS    1
3       RQ.ECSR BSS     1       . READ ECS WORD
4       RQ.ECSW BSS     1       . WRITE ECS WORD
5       RQ.USER BSS     1       . GET LINE OF USER SCREEN
6       RQ.SMSG BSS     1       . SEND KEYBOARD MESSAGE
7       RQ.TIME BSS     1       . OPERATOR TIME
10      RQ.DATE BSS     1       . OPERATOR DATE
11      RQ.CLOCK BSS    1       . TENTH SECOND CLOCK TICK
12      RQ.INIT BSS     1       . DO INITIAL HANGS
                        *
                        *
                        USE     *
                        *
                        *       RELATIVE CM WORD LOCATIONS
                        *
0                       ORG     0
                        *
0       CMRESTOR BSS    1       . PPU P-COUNTERS SAVED HERE
1       CMLOCK  BSS     1       . CM LOCK WORD
2       CMCLOCK BSS     1       . TIME FOR NEXT CLOCK TICK
3       CMREQWD BSS     1       . REQUEST WORD
4       CMRESPWD BSS    1       . RESPONSE WORD
5       CMPPRQWD BSS    1       . REQUEST FOR PPU ACTION
6       CMBUFF  BSS     8       . BUFFER FOR CM/PPU
16      CMDSPWD BSS     2       . CM COPY OF CURRENT DISPLAYS
20      CMDSPTAB BSS    20-*    . DISPLAY TABLE KEPT IN CENTRAL FOR PPU
36      CMPPSHEL BSS    120     . PPU DISPLAY SHELL
                        *
                        USE     *
                        *
                        *
72                      ORG     HERE
                        *
                        *       DEFINE NUMBER OF KEYBOARDS
                        *
                        *
11      MAXKEYBD EQU    4+3     . ALLOW 8 KEYBOARDS
                        *
16      LSTSCREN EQU    4+8+1+1 .  IS LAST SCREEN
                        *
                        *
```

```
                6     MAXBRITE  EQU       4
                      *
                      *         CORE DISPLAY ADDRESS TABLES
                      *
               72     DSPADTAB  EQU       *
           000004               DUP       4,1       . DEFINE CORE DISPLAYS
                                DATA      0,0,0,8,0,16,0,24
```

```
                                *
                                *
                                *       PCTRTAB IS THE TABLE OF P-COUNTERS FOR THE VARIOUS PROCESSES
                                *
                                *
132         0162                PCTRTAB VFD     12/FLASH
133         0707                        VFD     12/KEYBOARD
134         2136                        VFD     12/UPDATE
135         2722                CLOCKP  VFD     12/CLOCK
136         2663                        VFD     12/DISCHK
                          5     PCTRTABE EQU    *-PCTRTAB
                                *
                                *
                                *       HERE IS THE MAIN CONTROL LOOP
                                *
                                *
137         5055 0132           MAINLOOP LDM    PCTRTAB,INDEX       . CURRENT PROCESS
141         3425                        STD     1
142         0125 0000                   LJM     0,1         . EXECUTE
144                             ALPHA   BSS     1
145         5000 0144                   LDM     ALPHA
147         5455 0132           ALPHA2  STM     PCTRTAB,INDEX       . SAVE NEXT P.CTR
151         3655                ALPHA3  AOD     INDEX       . NEXT PROCESS
152         1705                        SBN     PCTRTABE
153         0763                        MJN     MAINLOOP    . GET NEXT
154         3455                        STD     INDEX       . RESET TO FIRST
155         0361                        UJN     MAINLOOP
156         1702                ALPHA1  SBN     2
157         0367                        UJN     ALPHA2      . SUBROUTINE FRETURN POINT
                                *
```

```
                        3     HEADREP   EQU     3
                              *
                              *
                              *         FLASH OUTPUTS THE SCREENS AND HEADERS.
                              *         IT IS RESPONSIBLE FOR UPDATING THE HEADERS
                              *
                              *
160             0200 0144               RJM     ALPHA
162             3653            FLASH   AOD     BLNKCT
163             1071                    SHN     -6
164             1207                    LPN     7
165             3454                    STD     BLNKFLG
166             1460                    LDN     B.DIS
167             3426                    STD     T2
170             2000 5477               LDC     BBUFF
172             0200 0446               RJM       FLASH.IT          . DISPLAY RIGHT SCREEN
174             0200 0144               RJM     ALPHA       . WAIT FOR UPDATE
176             1465                    LDN     L.DIS
177             3426                    STD     T2
200             2000 3177               LDC     LBUFF
202             0200 0446               RJM       FLASH.IT          . SAME FOR LEFT
204             0200 0144               RJM     ALPHA       . WAIT AGAIN
                              *
                              *
                              *
206             2000 0002               LDC     I.SYSTAT    . CM ADDRESS OF SYSTEM STATE FLAG
210             6012                    CRD     CM1         . READ SYSTEM STATE
211             5016 0556               LDM     BASSES,CM5            . ADDRESS OF MESSAGE
213             5400 0342               STM     FLASHS      . STORE INTO OUTPUT INSTRUCTION
                              *
                              *
                              *
215             2700                    RPN     0
216             3406                    STD     BPBUFF+1
217             1063                    SHN     -12
220             3405                    STD     BPBUFF
221             1401                    LDN     1
222             3427                    STD     T3
223             3430                    STD     T4
224             1405                    LDN     BPBUFF
225             3426                    STD     T2
226             2000 0547               LDC     B.CTR-1
230             3424                    STD     T0
231             0200 2634               RJM     BCDOCT
233             1400                    LDN     0
234             5400 0547               STM     B.CTR-1
                              *
                              *
                              *
                              *
236             1513                    LCN     13B
237             5500 0255               RAM     CH1
241             1513                    LCN     13B
```

```
242  5500 0260          RAM   CH2
244  1414               LDN   12
245  3430               STD   T4
246  1400               LDN   0
247  3425               STD   T1
250  1404               LDN   4
251  3431               STD   T5
252  1405               LDN   BPBUFF
253  3424               STD   T0
                        *
254  1404      CHLP     LDN   IRD
255  6513 0263 CH1      IJM   CHO+13B
257  1601               ADN   1
260  6713 0263 CH2      EJM   CHO+13B
262  1601               ADN   1
263  3427      CHO      STD   T3
264  3025               LDD   T1
265  0506               NJN   *+6
266  3027               LDD   T3
267  1006               SHN   6
270  3426               STD   T2
271  3625               AOD   T1
272  0306               UJN   *+6
                        *
273  3027               LDD   T3
274  3126               ADD   T2
275  4424               STI   T0
276  3624               AOD   T0
277  3725               SOD   T1
                        *
300  3730               SOD   T4
301  0414               ZJN   CHW
302  5500 0255          AOM   CH1
304  5500 0260          AOM   CH2          . BUMP CHANNEL NUMBER
306  3731               SOD   T5
307  0544               NJN   CHLP
310  4424               STI   T0
311  3624               AOD   T0
312  1404               LDN   4
313  3431               STD   T5
314  0372               UJN   *-5
                        *
                        *
315  1403      CHW      LDN   HEADREP
316  3431               STD   T5
317  7710 7001 FLASHLP  FNC   7001B,DSPCHN          . MEDIUM LEFT
321  7410               ACN   DSPCHN
322  1405               LDN   SCRLEN
323  7310 0523          OAM   SCR+DSPCHN       . LEFT SCREEN HEADER
325  3065               LDD   L+DIS            . LEFT SCREEN NAME
326  1277               LPN   77B
327  7210               OAN   DSPCHN
330  1411               LDN   9
```

```
331      7310 0004                 OAM   PPBUFF-1,DSPCHN     . OUTPUT CHANNEL STATUSES
333      1406                      LDN   KEY.LEN
334      7310 0536                 OAM   KEYHEAD,DSPCHN . *KEYBOARD*
336      3056                      LDD   KEYNAME
337      7210                      OAN   DSPCHN         .NAME
340      1402                      LDN   2
341      7310 0001                 OAM   1,DSPCHN  . OUTPUT SYSTEM STATE
                  342   FLASHS     EQU   *-1
343      3003                      LDD   MESERR
344      0416                      ZJN   FLASHM         . NO ERROR MESSAFES
345      1701                      SBN   1
346      3425                      STD   T1
347      5025 0602                 LDM   EM.TAB,T1      . MESSAGE ADDRESS
351      5400 0361                 STM   EM.WHAT
353      1402                      LDN   2
354      7310 0600                 OAM   EM.CORD,DSPCHN . MESSAGE CO-ORDINATES
356      5025 0612                 LDM   EML.TAB,T1     . MESSAGE LENGTH
360      7310 0001                 OAM   1,DSPCHN       . OUTPUT ERROR MESSAGE
                  361   EM.WHAT    EQU   *-1
362      7510           FLASHM     DCN   DSPCHN
363      3002                      LDD   MESLEN
364      0420                      ZJN   FLASHR    . NO MESSAGES, DO RIGHT HEADER
365      1721                      SBN   17
366      0704                      MJN   *+4       . CHECK FOR MESSAGE LENGTH
367      7710 7000                 FNC   7000B,DSPCHN        . NEED SMALL CHARS
371      0303                      UJN   *+3
372      7710 7001                 FNC   7001B,DSPCHN        . MEDIUM WILL DO
374      7410                      ACN   DSPCHN
375      3002                      LDD   MESLEN
376      1602                      ADN   2
377      7310 1007                 OAM   MESBUFF-2,DSPCHN    . FLASH MESSAGE
401      6610 0401      FLASHW     FJM   FLASHW,DSPCHN       . WAIT FOR EMPTY
403      7510                      DCN   DSPCHN
                  404   FLASHR     EQU   *
404      7710 7102      FLASHLP1   FNC   7102B,DSPCHN        . GIANT LETTERS
406      7410                      ACN   DSPCHN
407      1406                      LDN   HEADLEN
410      7310 0530                 OAM   HEAD,DSPCHN
412      1406                      LDN   HEADLEN
413      7310 0530                 OAM   HEAD,DSPCHN
415      7510                      DCN   DSPCHN
416      7710 7101                 FNC   7101B,DSPCHN
420      7410                      ACN   DSPCHN
421      3052                      LDD   PASSFLG
422      0403                      ZJN   *+3
423      7310 0553                 OAM   PASSMES,DSPCHN
425      1405                      LDN   SCRLEN
426      7310 0523                 OAM   SCR,DSPCHN
430      3060                      LDD   B.DIS
431      1277                      LPN   77B
432      7210                      OAN   DSPCHN
433      1407                      LDN   LPCTR
434      7310 0544                 OAM   PCTR,DSPCHN
```

```
436   7510          DCN     DSPCHN
437   3731          SOD     5
440   0403          ZJN     *+3
441   0100 0317     LJM     FLASHLP
443   0100 0160     LJM     FLASH-2     . RETURN
```

```
                                *
                                *
                                *
                                *       FLASH.IT OUTPUTS A LOGICAL SCREEN TO THE DISPLAY
                                *
                                *       PARAMETERS ARE:
                                *
                                *       T1 = ADDRESS OF BUFFER IN PPU
                                *       T2 = POINTER TO DIS TAB (L.DIS OR R.DIS)
                                *
                                *
                                *
445             0100 0000               LJM     *
                          446   FLASH.IT  EQU     *-1
447             3425                    STD     T1
450             4026                    LDI     T2              . TABLE HEADER
451             1377                    SCN     77B
452             0572                    NJN     FLASH.IT-1      . BUSY BIT ON, SKIP
453             5026 0004               LDM     4,T2            . BUFFER SIZE
455             3427                    STD     T3
456             5026 0003               LDM     3,T2            . LAST INDEX
460             3125                    ADD     T1
461             3426                    STD     T2              . ABS ADDRESS OF LAST LINE
462             5026 0002       FLASH.LP  LDM     2,T2            . BYTE COUNT
464             0431                    ZJN     FLASH.T1        . SKIP EMPTIES
465             4026                    LDI     T2              . BRITENESS
466             0502                    NJN     *+2
467             1401                    LDN     1
470             3430                    STD     T4
471             1706                    SBN     MAXBRITE
472             0704                    MJN     *+4             . NOT BLINKING MESSAGE
473             3054                    LDD     BLNKFLG
474             0421                    ZJN     FLASH.T1        . DONT FLASH THIS TIME
475             3430                    STD     T4              . ELSE SET COUNT = FLAG
476             5026 0001               LDM     1,T2            . FUNCTION CODE
500             7510                    FAN     DSPCHN
501             1403                    LDN     3
502             3126                    ADD     T2              . START OF DATA
503             5400 0511               STM     FLASH.X
505             7410                    ACN     DSPCHN
506             5026 0002       FLASH.RP  LDM     2,T2            . BYTE COUNT
510             7310 0001               OAM     1,DSPCHN
                          511   FLASH.X   EQU     *-1
512             3730                    SOD     T4
513             0572                    NJN     FLASH.RP
514             7510                    DCN     DSPCHN
515             3227            FLASH.T1  SBD     T3              . NEXT BUFFER
516             3526                    RAD     T2
517             3225                    SBD     T1              . CHECK FOR LAST
520             0641                    PJN     FLASH.LP
521             0100 0445               LJM     FLASH.IT-1      . RETURN
```

```
                                *
                                *
                                *       MESSAGE DEFINITIONS AND TABLES
                                *
                                *
                                DSP     MACRO   STRING
                                        DIS     *STRING
                                         ORG      *-1
                                        ENDM
                                *
523     6600                    SCR      VFD     12/6000B+512-8*16
524     7777                             DATA      7777B
525     2303                            DSP     (*SCREEN*)
                          5     SCRLEN    EQU     *-SCR
530     7765                    HEAD     VFD     12/7777B-10
531     6000                             VFD     12/6000B
532     0301                             DSP     (*CAL_TSS*)
                          6     HEADLEN   EQU     *-HEAD
536     6540                    KEYHEAD  VFD     12/6000B+512-10*16
537     7754                             VFD     12/7000B+512-20
540     1305                            DSP     (*KEYBOARD*)
                          6     KEY.LEN   EQU     *-KEYHEAD
544     6540                    PCTR     VFD     12/6000B+512-10*16
545     7754                             VFD     12/7000B+512-20
546     2054                             DIS     *P=*
550                               P.CTR    BSS     3
                          7     LPCTR     EQU     *-PCTR
553     4725                    PASSMES  DSP     (.*UNP*.)
                          3     PASSLEN    EQU     *-PASSMES
556     0564                    BASSES   VFD     12/ST.U,12/ST.B,12/ST.S,12/ST.I,12/ST.W,12/ST.P
557     0566
560     0570
561     0572
562     0574
563     0576
                                *
564     6020                    ST.U     VFD     12/6020B,12/2RU
565     2555
566     6100                    ST.B     VFD     12/6100B,12/2RB
567     0255
570     6040                    ST.S     VFD     12/6040B,12/2RS
571     2355
572     6120                    ST.I     VFD     12/6120B,12/2RI
573     1155
574     6000                    ST.W     VFD     12/6000B,12/2RW
575     2755
576     6060                    ST.P     VFD     12/6060B,12/2RP
577     2055
                                *
                                *
                                *
600     6000                    EM.CORD  DATA    6000B
601     7024                             VFD     12/7000B+20
```

```
                                1     E.RPTMOD  EQU     1
                                2     E.ERR     EQU     2
                                3     E.ALPOCT  EQU     3
                                4     E.SCREEN  EQU     4
                                5     E.LOST    EQU     5
                                6     E.FRMT    EQU     6
                                7     E.NOM     EQU     7
                               10     E.NO      EQU     8
                                      *
                                      *
602             0622                  EM.TAB    VFD     12/M.RPTMOD
603             0630                            VFD     12/M.ERR
604             0634                            VFD     12/M.ALPOCT
605             0642                            VFD     12/M.SCREEN
606             0657                            VFD     12/M.LOST
607             0664                            VFD     12/M.FRMT
610             0672                            VFD     12/M.NOM
611             0701                            VFD     12/M.NO
612             0006                  EML.TAB   VFD     12/L.RPTMOD
613             0004                            VFD     12/L.ERR
614             0006                            VFD     12/L.ALPOCT
615             0015                            VFD     12/L.SCREEN
616             0005                            VFD     12/L.LOST
617             0006                            VFD     12/L.FRMT
620             0007                            VFD     12/L.NOM
621             0004                            VFD     12/L.NO
622             2205                  M.RPTMOD  DSP     (*REPEAT MODE*)
                               6     L.RPTMOD  EQU     *-M.RPTMOD
630             2516                  M.ERR     DSP     (*UNKNOWN*)
                               4     L.ERR     EQU     *-M.ERR
634             1703                  M.ALPOCT  DSP     (*OCTAL ERROR*)
                               6     L.ALPOCT  EQU     *-M.ALPOCT
642             0411                  M.SCREEN  DSP     (*DISPLAY OR KEYBOARD ERROR*)
                              15     L.SCREEN  EQU     *-M.SCREEN
657             1417                  M.LOST    DSP     (*LOST DATA*)
                               5     L.LOST    EQU     *-M.LOST
664             0617                  M.FRMT    DSP     (*FORMAT ERROR*)
                               6     L.FRMT    EQU     *-M.FRMT
672             1605                  M.NOM     DSP     (*NEED SCREEN M*)
                               7     L.NOM     EQU     *-M.NOM
701             1617                  M.NO      DSP     (*NOT SAFE*)
                               4     L.NO      EQU     *-M.NO
                                      *
```

```
                                *
                                *
                                *       KEYBOARD READS THE KEYBOARD, INTERPRETS SPECIAL CHARACTERS,
                                *       AND BUILDS UP A LINE IMAGE AT MESBUFF. IT JUMPS TO
                                *       INTREPT ON RECEIVING A CARRIAGE RETURN
                                *
                                *
                                *
                          60    CR$       EQU     40B
                          61    BKSP$     EQU     41B
                          53    CLR$      EQU       53B
                          62    SPCE$     EQU     42B
                                *
  705     0200 0144             KEY.RET   RJM     ALPHA
  707     7710 7020             KEYBOARD  FNC     7020B,DSPCHN    . SELECT INPUT
  711     7410                            ACN     DSPCHN
  712     7010                            IAN     DSPCHN          . INPUT CHAR
  713     7510                            DCN     DSPCHN
  714     0470                            ZJN     KEY.RET         . NO DATA
  715     1753                            SBN     CLR$            . SENSE CLEAR KEY
  716     0505                            NJN     NOTCLR
  717     3401                  CLEAR     STD     MESFLG
  720     3402                            STD     MESLEN
  721     3403                            STD     MESERR
  722     0362                            UJN     KEY.RET
  723     1705                  NOTCLR    SBN     CR$-CLR$        . TRY FOR CR
  724     0503                            NJN     NOTCR
  725     0100 1651                       LJM     INTREPT
  727     1701                  NOTCR     SBN     BKSP$-CR$       . TRY BACKSPZCE
  730     0503                            NJN     *+3
  731     0100 0764                       LJM     BKSP            . YES, JUMP
  733     1701                            SBN     SPCE$-BKSP$       . CHECK FOR SPACE
  734     0402                            ZJN     *+2       . IS, REPLACE WITH 0
  735     1662                            ADN     SPCE$     . ELSE RESTORE
  736     3425                            STD     T1              . SAVE IT
  737     3001                            LDD     MESFLG
  740     0413                            ZJN     READ1           . START NEW BYTE
  741     5002 1610                       LDM     MESBUFF-1,MESLEN    . OLD CHAR
  743     1377                            SCN     77B       . IN CASE CR FROM INTR, THEN ERROR OCCURRED
  744     3425                            ADD     T1              . ADD NEW ONE
  745     5402 1610                       STM     MESBUFF-1,MESLEN    . STORE
  747     3001                  READ.1    LDD     MESFLG
  750     1101                            LMN     1               . TOGGLE FLAG
  751     3401                            STD     MESFLG
  752     0347                            UJN     CLEAR+3   . GET TO KEY.RET
                                *
  753     3025                  READ1     LDD     T1
  754     1006                            SHN     6
  755     5402 1611                       STM     MESBUFF,MESLEN . CHAR IN UPPER PART OF NEW BYTE
  757     3602                            AOD     MESLEN          . BUMP LENGTH
  760     1737                            SBN     31        . CHECK FOR BUFFER OVERFLOW
  761     0765                            MJN     READ.1          . OK, TOGGLE FLAG
  762     3702                            SOD     MESLEN          . TOO LONK, RESTORE
```

```
 763        0366                     UJN      READ1-1    . GET TO KEY.RET
                            *
                            *
 764        3003            BKSP     LDD      MESERR
 765        1701                     SBN      F.RPTMOD
 766        0403                     ZJN      *+3
 767        1400                     LDN      0
 770        3403                     STD      MESERR
 771        3002                     LDD      MESLEN     . IGNORE ZERO LENGTH
 772        0503                     NJN      *+3
 773        3403                     STD      MESERR
 774        0355                     UJN      READ1-1    . GET TO KEY.RET
 775        3001                     LDD      MESFLG
 776        0403                     ZJN      BKSP1
 777        3702                     SOD      MESLEN
1000        0346                     UJN      READ.1
1001        5002 1010       BKSP1    LDM      MESBUFF-1,MESLEN
1003        1377                     SCN      77B
1004        5402 1010                STM      MESBUFF-1,MESLEN
1006        0371                     UJN      BKSP1-1    . GET TO READ+1
```

```
1007    6000                DATA    6000B
1010    7000                DATA       7000B
1011                MESBUFF BSSZ    32
                    *
                    *
```

```
                        *
                        *
                        *       INTREPT IS THE COMMAND INTERPRETER.
                        *
                        *
1051    3002            INTREPT LDD     MESLEN
1052    0504                    NJN     NOTRPTMD  . SENSE REPEAT MODE
1053    1401                    LDN     F.RPTMOD
1054    0100 1123               LJM     ERROR     . SET REPEAT MODE
                        *
1056    3001            NOTRPTMD LDD    MESFLG    . PUT NN CR
1057    0410                    ZJN     INTRPT1
1060    5002 1010               LDM     MESBUFF-1,MESLEN
1062    1377                    SCN     77B
1063    1660                    ADN     CR$
1064    5402 1010               STM     MESBUFF-1,MESLEN
1066    0305                    UJN     INTRPT2
1067    1460            INTRPT1 LDN     CR$
1070    1006                    SHN     6
1071    5402 1011               STM     MESBUFF,MESLEN
                        *
1073    5000 1011       INTRPT2 LDM     MESBUFF
1075    1071                    SHN     -6
1076    1750                    SBN     1R/       . SENSE +/-
1077    0403                    ZJN     *+3
1100    0100 1423               LJM     SENDMSG   . NONE, SEND MESSAGE
1102    1400                    LDN     0
1103    3425                    STD     T1        . FLAG FOR GETCHAR
1104    2000 1011               LDC     MESBUFF
1106    3426                    STD     T2        . START ADDRESS
1107    0200 2122               RJM     GETCHAR   . GET FIRST CHARACTER
1111    0411                    ZJN     INTR.E    . ERROR ON CR
1112    1625                    ADN     CR$-1R0
1113    0716                    MJN     INTRPTA   . SENSE ALPHABETIC
1114    1710                    SBN     1R8-1R0
1115    0711                    MJN     INTRPTN   . SENSE OCTAL DIDIT
1116    1713                    SBN     1R,-1R8   . MUST BE COMMA
1117    0503                    NJN     INTR.E    . NO, IS ERROR
1120    3444                    STD     T1        . OK, TRY TO CHANGE RIGHT SCREEN
1121    0323                    UJN     INTR.RT
                        *
1122    1402            INTR.E  LDN     F.ERR     . ERROR NUMBER
1123    3403            ERROR   STD     MESERR
1124    0100 0705               LJM     KEY.RET
                        *
1126    1610            INTRPTN ADN     1R8-1R0   . RESTORE NUMBER
1127    0100 1216               LJM     OCTAL     . MUST BE CM/ECS STORE OR DSP MOD
                        *
1131    1633            INTRPTA ADN     1R0       . RESTORE
1132    3444                    STD     T1        . POSSIBLE DISPLAY CHANGE
1133    0200 2122               RJM     GETCHAR   . NEXT CHAR
1135    0411                    ZJN     INTR.RT+2 . GET TO CHANGE LEFT
1136    1625                    ADN     CR$-1R0
```

```
1137      0603                  PJN    *+3        . SENSE NON ALPHABETIC
1140      0100 1461             LJM    OTHER      . IS ALPHABETIC
1142      1723                  SBN    1R,-1R0    . SENSE COMMA
1143      0513                  NJN    INTRM1     . ONLY MESSAGE IS LEFT
1144      0200 2122   INTR.RT   RJM    GETCHAR    . RIGHT SCREEN
1146      0431                  ZJN    CHG.DSPL   . CHANGE LEFT SCREEN
1147      1660                  ADN    CR$        . RESTORE
1150      3445                  STD    T2         . SAVE AS RIGHT SCREEN
1151      0200 2122             RJM    GETCHAR
1153      0411                  ZJN    CHG.DSP    . CHANGE BOTH SCREENS IF END
1154      0100 1122             LJM    INTR.E
                      *
1156      4026        INTRM1    LDI    T2         . CURRENT BYTE
1157      2177 2023             ADC    -2R.=      . MUST CONTAIN ↑.=↑
1161      0572                  NJN    INTRM1-2   . ELSE GET TO ERROR
1162      0100 1450             LJM    SENDMSG1   . SEND MESSAGE
```

```
                                *
                                *
                                *       CHG.DSP CHANGES DISPLAYS BY READING UP A NEW DISPLAY
                                *       FROM CENTRAL. ITS PARAMETERS ARE:
                                *
                                *       I2 = NEW RIGHT SCREEN NAME
                                *       I1 = NEW LEFT SCREEN NAME
                                *
                                *       NO CHANGE IS MADE IF A PARAMETER IS ZERO
                                *
                                *
1164    3745                    CHG.DSP SOD     I2          . CHANGE RIGHT FIRST
1165    0712                            MJN     CHG.DSPL
1166    1715                            SBN     LSTSCREN-1  . CHECK SCREEN NAME
1167    0704                            MJN     *+4         . GOOD
1170    1404                    CHG.DSPE LDN    E.SCREEN    . DISPLAY ERROR
1171    0100 1123                       LJM     ERROR
1173    2000 0020                       LDC     CMDSPTAB
                                        CMADD
1175    3145                            ADD     I2
1176    6060                            CRD     R.DIS       . READ UP SCREEN DISCRIPTOR
                                *
1177    3744                    CHG.DSPL SOD    I1          . CHNNGE LEFT SCREEN
1200    0707                            MJN     CHG.DSPF
1201    1715                            SBN     LSTSCREN-1  . CHSEK SCREEN
1202    0665                            PJN     CHG.DSPE    . ERROR
1203    2000 0020                       LDC     CMDSPTAB
                                        CMADD
1205    3144                            ADD     I1
1206    6065                            CRD     L.DIS       . READ UP LEFT DESCRIPTOR
1207    2000 0016               CHG.DSPF LDC    CMDSPWD
                                        CMADD
1211    6261                            CWD     L.DIS-4
1212    1601                            ADN     1
1213    6254                            CWD     R.DIS-4     . UPDATE CM DISPLAY WORDS
1214    0100 1655                       LJM     BLANK
```

```
                                *
                                *
                                *       OCTAL HANDLES COMMANDS BEGINNING WITH AN OCTAL DIGIT.
                                *       IT PROCESSES THE LINE AND JUMPS TO THE CORRECT ROUTINE.
                                *
                                *
1216    0200 2069       OCTAL   RJM     OCTALBCD  . CONVERT
1220    1604                    ADN     CRS-1R=
1221    0407                    ZJN     *+7
1222    1702                    SBN     1R,-1R=
1223    0404                    ZJN     *+4
1224    1403            OCTERR  LDN     F.ALPOCT  . BAD CHAR
1225    0100 1123               LJM     ERROR
1227    1401                    LDN     1
1230    3431                    STD     T5        . ↑,↑ OR ↑=↑ FLAG
1231    3035                    LDD     04
1232    3444                    STD     T1
1233    3036                    LDD     05
1234    3445                    STD     T2        . SAVE ADDRESS
1235    3051                    LDD     0F
1236    3430                    STD     T4        . SAVE ECS/CM FLAG
1237    0200 2125               RJM     GETCHAR
1241    1615                    ADN     CRS-1B8
1242    0661                    PJN     OCTERR    . MUST BE OCTAL DIGIT
1243    1610                    ADN     1R8-1R0
1244    0757                    MJN     OCTERR
1245    0200 2069               RJM     OCTALBCD  . CONVERT
1247    0554                    NJN     OCTERR    . MUST BE END
1250    3031                    LDD     T5
1251    0503                    NJN     DSP.MOD   . DISPLAY MODIFY IF ↑,↑
1252    0100 1356               LJM     STORESET  . STORE IN CORE/ECS IF ↑=↑
                                *
                                *
                                *       DSP.MOD MODIFIES TABLE OF THE CURRENT LEFT CORE/ECS DISPLAY
                                *
                                *
1254    3066            DSP.MOD LDD     L.DIS+1   . GET TYPE OF LEFT SCREEN
1255    1701                    SBN     T.CORE    . MUST BE CORE DISPLAY
1256    0403                    ZJN     *+3
1257    0100 1170               LJM     CHG.DSPE  . WRONG TYPE
1261    3065                    LDD     L.DIS     . SCREEN NAME
1262    1277                    LPN     77B
1263    1701                    SBN     1
1264    1003                    SHN     3         . *8
1265    2100 0072               ADC     DSPADTAB            . TABLE ADDRESS
1267    3431                    STD     T5        . SAVE
1270    1435                    LDN     04
1271    3425                    STD     T1
1272    3045                    LDD     T2
1273    1704                    SBN     4
1274    0734                    MJN     DSP.MOD3  . SET ONE GROUP
1275    0425                    ZJN     DSP.MOD4  . SET ALL GROUPS
1276    1701                    SBN     1
```

```
1277      0403                       ZJN      *+3          . MUST BE 5
1300      0100 1224                  LJM      OCTERR       . ELSE ERROR
                          *
                          *                                . ELSE INCREMENT ALL
                          *
1302      1401                       LDN      F.RPTMOD
1303      3403                       STD      MESERR       . AUTO REPEAT MODE
1304      3031                       LDD      T5           . TABLE ADDRESS
1305      3425                       STD      T1
1306      1435                       LDN      04
1307      3426                       STD      T2           . ADDEND
1310      1403                       LDN      3            . LOOP COUNTER
1311      3427                       STD      T3
1312      0200 1773                  RJM      ADD24        . INCREMENT ONE
1314      1402                       LDN      2
1315      3525                       RAD      T1           . BUMP TABLE POINTER
1316      3727                       SOD      T3
1317      0672                       PJN      *-5          . LOOP
1320      0100 1655                  LJM      BLANK        . DONE
                          *
1322      1410            DSP.MOD4   LDN      10B
1323      3424                       STD      T0
1324      1423                       LDN      T0-1
1325      3426                       STD      T2
1326      1403                       LDN      3
1327      0305                       UJN      DSP.MODL
                          *
1330      1604            DSP.MOD3   ADN      4            . WHICH GROUP
1331      1001                       SHN      1
1332      3531                       RAD      T5
1333      1400                       LDN      0
1334      3427            DSP.MODL   STD      T3           . LOOP COUNTER
1335      0303                       UJN      *+3          . SKIP FIRST ADD
1336      0200 1773       DSP.MODA   RJM      ADD24
1340      3036                       LDD      05
1341      5431 0001                  STM      1,T5         . BOTTOM OF ADDRESS
1343      3035                       LDD      04
1344      2200 0777                  LPC      777B
1346      3151                       ADD      0F           . ECS FLAG
1347      4431                       STI      T5           . STORE IN TABLE
1350      1402                       LDN      2
1351      3531                       RAD      T5           . BUMP TABLE POINTER
1352      3727                       SOD      T3
1353      0662                       PJN      DSP.MODA     . LOOP
1354      0343                       UJN      DSP.MOD4-2          . GET TO BLANK
```

```
                                *
                                *
                                *       STORESET STORES INTO CM/ECS IF PASSWORD HAS BEEN ENTERED
                                *
                                *
                                *
1355    3062                    STORESET LDD     PASSFLG
1356    0503                             NJN     *+3             . CHECK FOR PROTECTED MODE
1357    0100 1122                        LJM     INTR.E          . IS, GIVE ERROR
1361    3030                             LDD     T4
1362    0507                             NJN     SETECS          . CHECK CORE/ECS FLAG
1363    3044                             LDD     T1
1364    1277                             LPN     77B
1365    1014                             SHN     12
1366    3145                             ADD     T2              . CM ADDRESS LOADED
1367    6232                             CWD     Q1              . WRITE INTO CM
1370    0363                             UJN     STORESET-1              . GET TO BLANK
                                *
                                *
1371    0200 2773               SETECS   RJM     KEYCMST         . GET CPU
1373    2000 0004                        LDC     CMBUFF
                                         CMADD
1375    6232                             CWD     Q1              . WRITE WORD INTO CM BUFFER
1376    3044                             LDD     T1
1377    3412                             STD     CM1
1400    3045                             LDD     T2
1401    3413                             STD     CM2             . ADDRESS INTO REQUEST
1402    1404                             LDN     BQ.ECSW         . REQUEST INDEX
1403    3425                    KEY.CMRQ STD     T1
1404    3057                             LDD     BADNEWS         . DISASTER FLAG
1405    0403                             ZJN     *+3
1406    0100 1776                        LJM     DEBUGN          . ISSUE MESSAGE IF SET
1410    3025                             LDD     T1
1411    0200 3031                        RJM     CMREQ           . MAKE REQUEST
1413    0200 3050                        RJM     CMRESP          . WAIT FOR RESPONSE
1415    3016                             LDD     CM5
1416    1701                             SBN     1
1417    0450                             ZJN     SETECS-1        . GET TO BLANK
1420    3014                             LDD     CM3
1421    0100 1123                        LJM     ERROR           . ELSE GET ERROR NUMBER AND PUT MSG UP
```

```
                                *
                                *
                                *       SENDMSG SENDS A MESSAGE TO THE CURRENT DEFAULT USER KEYBOARD
                                *
                                *       SENDMSG2  IS ENTERED WITH I1, AND I2 SET TO SEND A MESSAGE
                                *       TO A SPECIFIED KEYBOARD
                                *
                                *
1423    3056                    SENDMSG LDD     KEYNAME
1424    3444                            STD     I1
1425    2000 1011                       LDC     MESBUFF
1427    3445                            STD     I2
1430    0200 2773               SENDMSG2 RJM    KEYCMST   . GET CPU
1432    3044                            LDD     I1
1433    3414                            STD     CM3       . SCREEN
1434    1407                            LDN     7
1435    3425                            STD     I1
1436    3045                            LDD     I2
1437    5400 1444                       STM     SENDOUTX
1441    2000 0006                       LDC     CMBUFF
                                        CMADD
1443    6325 0001                       CWM     I,I1
                        1444    SENDOUTX EQU    *-1
1445    1406                            LDN     RQ.SMSG
1446    0100 1403                       LJM     KEY.CMRQ  . MAKE REQUEST
                                *
1450    3044                    SENDMSG1 LDD    I1        . KEYBOARD NAME
1451    1711                            SBN     MAXKEYBD
1452    0703                            MJN     *+3       . CHECK LEGAL KEYBOARD
1453    0100 1170                       LJM     CHG.DSPE
1455    2000 1013                       LDC     MESBUFF+2
1457    3445                            STD     I2
1460    0347                            UJN     SENDMSG2
```

```
                                *
                                *
                                *       OTHER LOOKS UP THE COMMAND IN A TABLE, AND JUMPS TO A ROUTINE
                                *
                                *
1461            1400            OTHER   LDN     0
1462            3444                    STD     T1          . COMMAND COUNTER
1463            2000 1513               LDC     TABOFCOM    . TABLE PTR
1465            3427                    STD     T3
1466            2000 1011       TRY1    LDC     MESBUFF     . BUFFER PTR
1470            3425                    STD     T1
1471            4027            TRY     LDI     T3          . TABLE ENTRY
1472            0414                    ZJN     MATCH       . DONE
1473            4225                    SBI     T1          . = BUFFER CONTENTS
1474            0504                    NJN     *+4         . NO MATCH
1475            3625                    AOD     T1
1476            3627                    AOD     T3
1477            0371                    UJN     TRY         . TRY NEXT WORD
                                *
1500            3644                    AOD     T1          . NEXT COMMAND
1501            3627                    AOD     T3
1502            4027                    LDI     T3
1503            0575                    NJN     *-2         . SKIP TO NEXT ENTRY
1504            3627                    AOD     T3          . NEXT ENTRY
1505            0360                    UJN     TRY1        . LOOP
1506            5044 1572       MATCH   LDM     COMTAB,I1   . JUMP ADDRESS
1510            3427                    STD     T3
1511            0127 0000               LJM     0,T3        . JUMP TO ACTION
                                *
```

```
                                *
                                *       HERE ARE THE TABLES FOR OTHER
                                *
                                *
                                *
                    1513        TABOFCOM EQU     *
                                *       LOCK
1513        5014                        DATA     4H/LOC
1515        1360                        VFD      6/1RK,6/CR$,12/0
1516        0000
                                *       UNLOCK
1517        5025                        DATA     4H/UNLOC
1522        1360                        VFD      6/1RK,6/CR$,12/0
1523        0000
1524        5004                        DIS      .*/DATE,*
1530        5024                        DIS      .*/TIME,*
                                *
                                *       CM COMMANDS BEFOR HERE
                                *
                                *       USE
1534        5025                        DIS      .*/USE*
                                *       PASS AND RSP
1537        5020                        DATA     4H/PAS
1541        2360                        VFD      6/1RS,6/CR$,12/0
1542        0000
1543        5022                        DATA     4H/RSP
1545        6000                        VFD      6/CR$,6/0,12/0
1546        0000
                                *                RESTORE
1547        5022                        DATA     8H/RESTORE
1553        6000                        VFD      6/CR$,6/0,12/0
1554        0000
                                *
                                *
                                *       DEBUGGER COMMANDS
                                *
1555        5006                        DIS      .*/FAN*
1560        5004                        DIS      .*/DCN*
1563        5001                        DIS      .*/ACN*
1566        5017                        DIS      .*/DAN*
                                *
                                *       ERROR
                                *
1571        0000                        VFD      12/0
                                *
                                *
                    1572        COMTAB  EQU      *
                                *       CM COMMANDS
1572        1635                        VFD      12/CMCOM
1573        1635                        VFD      12/CMCOM
1574        1641                        VFD      12/CMCOM1,12/CMCOM1
1575        1641
                                *       CM COMMANDS ABOVE HERE
```

```
                                *       USE
1576            1613                    VFD         12/SETKEYBD
                                *       PASS AND RSP
1577            1665                    VFD         12/PASS
1600            1714                    VFD         12/RSP
                                *                   RESTORE
1601            1721                    VFD         12/RESTORE
                                *
                                *
                                *       DEBUGGER
                                *
                      10        DEBUGORG  EQU       *-COMTAB
                  000004                DUP         4,1
                                        VFD         12/DEBUGB
                                *
                                *       ERROR IS LAST
1606            1122                    VFD         12/INTR.E
                                *
                                *
                    1607        CMCOMTAB  EQU       *
                                *       CM REQUEST INDICIES

1607            0001                    VFD         12/RQ.LOCK
1610            0002                    VFD         12/RQ.UNLOC
1611            0010                    VFD         12/RQ.DATE,12/RQ.TIME
1612            0007
```

```
                                *
                                *
                                *       HERE LIE THE ROUTINES FOR OTHER COMMANDS
                                *
                                *
1613    3002            SETKEYBD LDD     MESLEN
1614    1703                     SBN     3
1615    0403                     ZJN     *+3
1616    0100 1170       SETKEYE  LJM     CHG.DSPE  . ERROR
1620    5000 1613                LDM     MESBUFF+2
1622    1071                     SHN     -6
1623    1756                     SBN     TR,       . MUST BE ↑,↑
1624    0513                     NJN     CMCOM+2   . GET TO ERROR
1625    5000 1613                LDM     MESBUFF+2
1627    1277                     LPN     77B
1630    1711                     SBN     MAXKEYBD
1631    0664                     PJN     SETKEYE   . ILLEGAL NAME
1632    1611                     ADN     MAXKEYBD
1633    3456                     STD     KEYNAME
1634    0321                     UJN     BLANK
                                *
                                *
                                *
                                *
1635    3052            CMCOM    LDD     PASSFLG
1636    0503                     NJN     *+3       . CHECK FOR PROTECTED MODE
1637    0100 1122                LJM     INTR.E    . IS,GIVE ERROR
1641    0200 2773       CMCOM1   RJM     KEYCMST   . GET CPU
1643    1407                     LDN     7
1644    3425                     STD     I1
1645    2000 0004                LDC     CMBUFF
                                 CMADD
1647    6325 1611                CWM     MESBUFF,I1
1651    5044 1607                LDM     CMCOMTAB,I1       . COMMAND INDEX
1653    0100 1403                LJM     KEY.CMRQ  . MAKE REQUEST
1655    3003            BLANK    LDD     MESERR
1656    1701                     SBN     E.RPTMOD
1657    0404                     ZJN     *+4
1660    1400                     LDN     0
1661    0100 0717                LJM     CLEAR
1663    0100 0708                LJM     KEY.RET
                                *
1665    1400            PASS     LDN     0
1666    3402                     STD     MESLEN    . BLANK MESSAGE
1667    3401                     STD     MESFLG    . RESET MESSAGE FLAG
1670    3444                     STD     I1
1671    0200 0144       PASS1    RJM     ALPHA     . WAIT AWHILE
1673    7710 7020                FNC     7020B,DSPCHN
1675    7410                     ACN     DSPCHN
1676    7010                     IAN     DSPCHN    . READ KEYBOARD
1677    7510                     DCN     DSPCHN
1700    0470                     ZJN     PASS1     . NO DATA
1701    5244 1716                SBM     PASSWD,I1 . CHECK THIS CHARACTER
```

```
1703  0403                        ZJN     *+3
1704  0100 1122                   LJM     INTR.E      . NO GOOD, ERROR
1706  3644                        AOD     T1          . GOOD, STEP POINTER
1707  1703                        SBN     3
1710  0760                        MJN     PASS1       . NOT DONE YET
1711  1403                        LDN     PASSLEN
1712  3452            PASS2       STD     PASSFLG     . SET FLAG
1713  0341                        UJN     BLANK       . QUIT
                      *
1714  1400            RSP         LDN     0
1715  0374                        UJN     PASS2       . CLEAR FLAG
                      *
1716  0024            PASSWD      VFD     12/1RT,12/1RS,12/1RS
1717  0023
1720  0023
                      *
                      *
                      *
                      *
1721  1401            RESTORE     LDN     1
1722  3425                        STD     T1
1723  2000 0000                   LDC     CMRESTOR
                                  CMADD
1725  6125 0132                   CRM     PCTRTAB,T1          . RESTORE P COUNTERS
1727  1415                        LDN     1RM
1730  3444                        STD     T1
1731  3445                        STD     T2
1732  2000 0003                   LDC     CMREQWD
                                  CMADD
1734  6217                        CWD     ZERO
1735  1601                        ADN     CMRESPWD-CMREQWD
1736  6217                        CWD     ZERO        . ZERO REQUEST AND RESPONSE WORDS
1737  1400                        LDN     0
1740  3457                        STD     BADNEWS     . CLEAR BAD NEWS FLAG
1741  0100 1164                   LJM     CHG.DSP
                      *
                      *
                      *
1743  3052            DEBUGB      LDD     PASSFLG
1744  0503                        NJN     *+3
1745  0100 1122                   LJM     INTR.E
1747  3065                        LDD     L.DIS
1750  1715                        SBN     1RM
1751  0506                        NJN     +6
1752  2000 3176                   LDC     LBUFF-2
1754  3431                        STD     T5
1755  0131 1007                   LJM     DEBUG,T5
1757  3060                        LDD     R.DIS
1760  1715                        SBN     1RM
1761  0504                        NJN     +4
1762  2000 5476                   LDC     RBUFF-2
1764  0367                        UJN     -8
1765  1407                        LDN     F.NOM
```

```
1766    0100 1123           LJM     ERROR

                    *
1770    1410        DEBUGN  LDN     E.NO
1771    0374                UJN     *-3
```

```
                                *
                                *
                                *       ADD24 DOES A 24 BIT ADD. PARAMETERS ARE:
                                *
                                *       T1 = PTR TO ADDEND, RESULT REGISTER
                                *       T2 = PTR TO SECOND ADDEND
                                *
                                *       PTRS POINT TO HIGH ORDER BYTE
                                *
                                *
                                *
                                *
1772    0100 0000                       LJM     *
                        1773    ADD24   EQU     *-1
1774    5026 0001                       LDM     1,T2
1776    5525 0001                       RAM     1,T1        . ADD
2000    1063                            SHN     -12         . GET CARRY
2001    4126                            ADI     T2          . SECOND WORD
2002    4525                            RAI     T1          . FINISH ADD
2003    1063                            SHN     -12
2004    1201                            LPN     1
2005    5525 0001                       RAM     1,T1        . END AROUND CARRY
2007    1063                            SHN     -12
2010    4525                            RAI     T1          . LAST CARRY
2011    2177 0000                       ADC     -7777B
2013    0556                            NJN     ADD24-1
2014    5025 0001                       LDM     1,T1
2016    2177 0000                       ADC     -7777B
2020    0551                            NJN     ADD24-1
2021    5425 0001                       STM     1,T1
2023    4425                            STI     T1
2024    0345                            UJN     ADD24-1     . RETURN
```

```
                                *
                                *
                                *       OCTALBCD EATS ADDRESS EXPRESSIONS. IT LEAVES ITS RESULT
                                *       AT 01-05. IF THE EXPRESSION ENDS WITH ↑E↑, ↑OF↑ IS SET
                                *       TO 4000B.
                                *
                                *
2025    1630                    BADCHARA ADN     1R0-1RC
2026    0406                             ZJN     BADCHARN
2027    1702                             SBN     1RE-1RC
2030    0530                             NJN     BADCHD1
2031    2000 4000                        LDC     4000B
2033    3451                             STD     0F
2034    0200 2122               BADCHARN RJM     GETCHAR
2036    0323                             UJN     OCTALBCD-1
2037    1702                    BADCHARP SBN     1R+-1R8
2040    0473                             ZJN     BADCHARN
2041    1701                             SBN     1R--1R+
2042    0403                             ZJN     *+3
2043    1712                             SBN     CR$-1R-
2044    0315                             UJN     OCTALBCD-1
2045    1436                             LDN     05
2046    3424                             STD     T0
2047    4024                             LDI     T0
2050    2377 7777                        LMC     777777B
2052    4424                             STI     T0
2053    3724                             SOD     T0
2054    1732                             SBN     01
2055    0671                             PJN     *-6
2056    0355                             UJN     BADCHARN
2057    0345                             UJN     BADCHARA
2060    1653                    BADCHD1  ADN     CR$-1RE
2061    0100 0006                        LJM     0
                        2062    OCTALBCD EQU     *-1
2063    3436                             STD     05
2064    1400                             LDN     0
2065    3435                             STD     04
2066    3434                             STD     03
2067    3433                             STD     02
2070    3432                             STD     01          . SET OUTPUT REQUSTER
2071    3451                             STD     0F
2072    0200 2122               OCTBCDN  RJM     GETCHAR
2074    1615                             ADN     CR$-1R8
2075    0641                             PJN     BADCHARP
2076    1610                             ADN     1R8-1R0
2077    0757                             MJN     BADCHD1-1   . GET TO BADCHARA
2100    3427                             STD     T3
2101    1436                             LDN     05
2102    3424                             STD     T0
2103    4024                    OCTBCDL  LDI     T0          . OLD REG
2104    1003                             SHN     3           . * 8
2105    3127                             ADD     T3          . VALUE OR CARRY
2106    4424                             STI     T0          . STORE
```

```
2107  1063    SHN     -12     . CARRY
2110  3427    STD     T3
2111  3724    SOD     T0
2112  1732    SBN     01      . TEST FOR END
2113  0667    PJN     OCTBCOL . LOOP
2114  0355    UJN     OCTBCON . GET NEXT CHAR
```

```
                                *
                                *
                                *       GET NEXT CHARACTER
                                *
                                *
2115    4026                    GETCHAR1 LDI    T2
2116    1071                             SHN    -6
2117    0404                    GETCHAR2 ZJN    GETCHAR+1 . SKIP BLANKS
2120    1760                             SBN    CRS
2121    0100 0000                        LJM    0
                        2122    GETCHAR  EQU    *-1
2123    3025                             LDD    T1        . CHECK FLAG
2124    1101                             LMN    1         . TOGGLE IT
2125    3425                             STD    T1        . SAVE IT
2126    0466                             ZJN    GETCHAR1  . DO OPPOSITE
2127    3626                             AOD    T2
2130    5026 7776                        LDM    -1,T2     .
2132    1277                             LPN    77B
2133    0363                             UJN    GETCHAR2
```

```
                        *
                        *       UPDATE IS THE PROCESS WHICH UPDATES THE DISPLAYS
                        *
2134    0200 0144       UPD.RET RJM     ALPHA
                        *
2136    1465            UPDATE  LDN     I.DIS
2137    3437                    STD     ID1             . DESCRIPTOR        POINTER
2140    2000 3175               LDC     IBUFF-2
2142    0200 2154               RJM     UPD             . UPDATE LEFT SCREEN
2144    1460                    LDN     R.DIS
2145    3437                    STD     ID1
2146    2000 5475               LDC     RBUFF-2
2150    0200 2154               RJM     UPD             . SAME FOR RIGHT SCREEN
2152    0361                    UJN     UPD.RET
```

```
                                *
                                *
                                *       MAIN UPDATE ROUTINE, JUMPS ON TYPE OF DISPLAY
                                *       PARAMETERS ARE:
                                *
                                *       UD1 = PTR TO DISPLAY DESCRIPTOR TABLE
                                *       UD2 = PTR TO DISPLAY BUFFER - 2  (IN #A# REG)
                                *
                                *
                                *
2153    0100 0000                       LJM     *
                        2154    UPD     EQU     *-1
2155    3440                    STD     UD2
2156    5037 0001               LDM     1,UD1   . TYPE
2160    3425                    STD     T1
2161    5025 2166               LDM     UPDTAB,T1 . ACTION P-COUNTER
2163    3425                    STD     T1
2164    0125 0000               LJM     0,T1    . JUMP TO ACTION
                                *
2166    2153            UPDTAB  VFD     12/UPD-1        . UNDEFINED
2167    2323                    VFD     12/UPDCORE      . CORE DISPLAY
2170    2172                    VFD     12/UPDUSER      . USER DISPLAY
2171    2564                    VFD     12/UPDPPU       . PPU DISPLAY
                                *
                                *
                                *       UPDUSER HANDLES USER SCREENS
                                *
                                *
                                *
2172    4037            UPDUSER LDI     UD1     . NAME/FLAG
2173    1006                    SHN     6
2174    0716                    MJN     NUSER   . FLAG SET, BRING IN DISPLAY
2175    2000 0000               LDC     CMPPRQWD . ELSE CHECK FOR CHANGES
                                CMADD
2177    6012                    CRD     CM1     . READ UP PP REQUEST WORD
2200    4037                    LDI     UD1
2201    3214                    SBD     CM3     . MUST BE CURRENT SCREEN
2202    0350                    NJN     UPD-1   . NOT, RETURN
2203    0200 3012               RJM     CMSTATUS . GET CPU
2205    2000 0005               LDC     CMPPRQWD
                                CMADD
2207    6012                    CRD     CM1     . READ UP REQUEST
2210    6217                    CWD     ZERO    . ZERO IT
2211    0321                    UJN     CMINTUPD . GET AND INTREPT RESPONSE
```

```
                                *
                                *
                                *       INUSER READS THE USER SCREEN IN INITIALLY
                                *
                                *
2212    0200 3012       INUSER  RJM     CMSTATUS        . GET CPU
2214    4037                    LDI     UD1
2215    1277                    LPN     77B
2216    3414                    STD     CM3             . NAME
2217    5037 0002               LDM     2,UD1           . LINE NUMBER
2221    3413                    STD     CM2
2222    1740                    SBN     32
2223    0505                    NJN     *+5             . NOT DONE YET
2224    3014                    LDD     CM3             . ALREADY DONE, RETREIVE NAME
2225    4437                    STI     UD1             . CLEAR FLAG
2226    0100 2153               LJM     UPD-1           . AND QUIT
2230    5637 0002               ADM     2,UD1           . BUMP LINE NUMBER
2232    1405            CMINTURD LDN    B0,USER
2233    0200 3031               RJM     CMREQ           . MAKE REQUEST
2235    0200 3050               RJM     CMRESP          . AND GET RESPONSE
2237    3016                    LDD     CM6
2240    1701                    SBN     1
2241    0500                    NJN     *
                                *
                                *
2242    3013                    LDD     CM2             . ADDRESS
2243    3540                    RAD     UD2             . ABSOLUTE ADDRESS
2244    5400 2260               STM     WHATININ
2246    4040                    LDI     UD2
2247    3441                    STD     UD3             . SAVE WORDS
2250    5040 0001               LDM     1,UD2
2252    3442                    STD     UD4
2253    1410                    LDN     6
2254    3425                    STD     T1
2255    2000 0004               LDC     CMBUFF
                                CMADD
2257    6125 0001               CRM     1,T1
                        2260    WHATININ EQU    *-1             . BUFFER READ INTO PPU CORE
2261    5040 0002               LDM     2,UD2           . BRITE COUNT
2263    1707                    SBN     MAXBRITE+1
2264    0704                    MJN     *+4
2265    1401                    LDN     1               . ONE IS DEFAULT BRITENESS
2266    5440 0002               STM     2,UD2
2270    5040 0003               LDM     3,UD2           .FCN CODE
2272    1213                    LPN     13B             . LEGAL PARTS ONLY
2273    3425                    STD     T1
2274    3037                    LDD     UD1
2275    1765                    SBN     L.DIS
2276    0402                    ZJN     *+2
2277    1401                    LDN     1
2300    1670                    ADN     70B
2301    1006                    SHN     6
2302    3125                    ADD     T1              . WHOLE FUNCTION CODE
```

```
2303  5440 0003      STM   3,UD2
2305  5040 0004      LDM   4,UD2     . BYTE COUNT
2307  1744           SBN   36
2310  0704           MJN   *+4       . FIX IF TOO BIG
2311  1443           LDN   35        . MAX BYTE COUNT IS 35
2312  5440 0004      STM   4,UD2
2314  3041           LDD   UD3
2315  4440           STI   UD2       . RESTORE SAVED WORDS
2316  3042           LDD   UD4
2317  5440 0001      STM   1,UD2
2321  0100 2153      LJM   UPD-1     . RETURN
```

```
                                *
                                *
                                *       UPDATE A CORE/ECS DISPLAY
                                *
                                *
2323    5037 0003       UPDCORE LDM     3,UD1     . LINE NUMBER
2325    3442                    STD     UD4       . SAVE
2326    1002                    SHN     2         .
2327    3142                    ADD     UD4
2330    1003                    SHN     3         . LINE * 40
2331    3242                    SBD     UD4
2332    3242                    SBD     UD4       . LINE * 38
2333    1502                    ADN     2
2334    3140                    ADD     UD2       . ABSOLUTE BUFFER POINTER
2335    3424                    STD     T0
2336    5637 0003               AOM     3,UD1     . INCREMENT LINE NUMBER
2340    1740                    SBN     32
2341    0707                    MJN     *+7       . OK
2342    1400                    LDN     0         . NO, RESET TO 0
2343    5437 0003               STM     3,UD1
2345    4037                    LDI     UD1       . REMOVE FLAG
2346    1277                    LPN     77B
2347    4437                    STI     UD1
2350    1401                    LDN     1
2351    4424                    STI     T0        . BRITHENSS
2352    3624                    AOD     T0        . BUMP OUTPUT COUNTER
2353    3037                    LDD     UD1
2354    1765                    SBN     L.DIS
2355    0402                    ZJN     *+2
2356    1401                    LDN     1
2357    1970                    ADN     70B
2360    1006                    SHN     6         . FCN CODE = 7X00B
2361    4424                    STI     T0
2362    3624                    AOD     T0
2363    3441                    STD     UD3       . SAVE BYTE COUNT POS
2364    3624                    AOD T0
2365    2000 6000               LDC     6000B     . X CO-ORDINATE
2367    4424                    STI     T0
2370    3624                    AOD     T0
                                *       SCREEN ADDRESS
2371    1437                    LDN     37
2372    3242                    SBD     UD4
2373    3425                    STD     T1
2374    1002                    SHN     2
2375    3426                    STD     T2
2376    1001                    SHN     1
2377    3126                    ADD     T2        . *12
2400    1650                    ADN     50B
2401    3426                    STD     T2
2402    3025                    LDD     T1
2403    1074                    SHN     -3
2404    1002                    SHN     2
2405    3425                    STD     T1
```

```
2406  1001                        SHN   1
2407  3125                        ADD   T1
2410  3126                        ADD   T2
2411  2100 7000                   ADC   7000B     . Y CO-ORDINATE
2413  4424                        STI   T0
2414  3624                        AOD   T0
                          *       NOW GET DATA
2415  3042                        LDD   UD4       . LINE NUMBER
2416  1074                        SHN   -3
2417  1001                        SHN   1
2420  3430                        STD   T4
2421  4037                        LDI   UD1       . NAME
2422  1277                        LPN   77B
2423  1701                        SBN   1
2424  1003                        SHN   3         . TABLE = 8*SCREEN
2425  2100 0072                   ADC   DSPADTAB
2427  3130                        ADD   T4
2430  3443                        STD   UD5       . ADDRESS ADDRESS
2431  3431                        STD   T5
2432  4043                        LDI   UD5       . TOP OF ADDRESS
2433  2200 3777                   LPC   3777B     . CLEAR TOP BIT
2435  3447                        STD   AD1
2436  4043                        LDI   UD5
2437  1064                        SHN   -11
2440  3425                        STD   T1        . CORE/ECS FLAG
2441  5043 0001                   LDM   1,UD5     . BOTTOM BIT AF ADDRESS
2443  3450                        STD   AD2
2444  3042                        LDD   UD4
2445  1207                        LPN   7
2446  3550                        RAD   AD2
2447  1063                        SHN   -12
2450  3547                        RAD   AD1
2451  1447                        LDN   AD1       . WORD TO CONVERT
2452  3426                        STD   T2
2453  1401                        LDN   1
2454  3427                        STD   T3        . DO 2 BYTES
2455  3430                        STD   T4        . NO BLANKS
2456  0200 2434                   RJM   BCDOCT    . DECODE ADDRESS
2460  3024                        LDD   T0
2461  3440                        STD   UD2
2462  1400                        LDN   0
2463  4440                        STI   UD2
2464  3640                        AOD   UD2
2465  3025                        LDD   T1        . CORE OR ECS
2466  0410                        ZJN   COREF
2467  2000 0503                   LDC   =REC
2471  4440                        STI   UD2
2472  3640                        AOD   UD2
2473  2000 2355                   LDC   =RS
2475  0306                        UJN   COREF1
2476  2000 0315           COREF   LDC   =RCM
2500  4440                        STI   UD2
2501  3640                        AOD   UD2
```

```
2502  1400          LDN   0
2503  4440  COREFI  STI   UD2
2504  3640          AOD   UD2
2505  1400          LDN   0
2506  4440          STI   UD2
2507  3600          AOD
2510  3640          AOD   UD2
2511  3025          LDD   T1
2512  0530          NJN   READECS
2513  3047          LDD   AD1
2514  1277          LPN   77B
2515  1014          SHN   12
2516  3150          ADD   AD2
2517  6005  READCORE CRD   BPBUFF    . READ CORE OR ECS WORD
2520  1405          LDN   BPBUFF
2521  3426          STD   T2          . WD TO CONVERT
2522  1404          LDN   4
2523  3427          STD   T3          . 5 BYTES
2524  1400          LDN   0
2525  3430          STD   T4          . INSERT BLANKS
2526  3040          LDD   UD2
2527  3424          STD   T0
2530  0200 2436     RJM   BCDOCT      . CONVERT
2532  3024          LDD   T0
2533  3440          STD   UD2
2534  3040  BYTECTIN LDD   UD2
2535  1701          SBN   1
2536  3241          SBD   UD3
2537  4441          STI   UD3         . BYTE COUNT INSERTED
2540  0100 2153     LJM   UPD-1       . RETURN
```

```
2542  0200 3012  READECS  RJM   CMSTATUS  . GET CPU
2544  3047               LDD   AD1
2545  3412               STD   CM1
2546  3050               LDD   AD2
2547  3413               STD   CM2
2550  1403               LDN   RQ.ECSR
2551  0200 3031          RJM   CMREQ     . MAKE REQUEST
2553  0200 3050          RJM   CMRESP
2555  3016               LDD   CMS
2556  1701               SBN   1
2557  0554               NJN   BYTECTIN  . BLANK LINE ON ERROR
2560  2000 0004          LDC   CMBUFF
                         CMADD
2562  0100 2517          LJM   READCORE
```

```
                                *
                                *
                                *       UPDATE THE PPU DISPLAY
                                *
                                *
2564    4037                    UPDPPU  LDI     UD1     . NAME AND FLAG
2565    1006                            SHN     6       . CHECK FLAG
2566    0703                            MJN     *+3
2567    0100 2431                       LJM     UPDPPU1 . ALREADY READ IN, UPDATE IT
2571    1071                            SHN     -6
2572    1277                            LPN     77B     . CLEAR FLAG
2573    4437                            STI     UD1
2574    2000 0173                       LDC     PPSHELEN . WORD COUNT
2576    3425                            STD     T1
2577    3040                            LDD     UD2     . BUFFER ORG
2600    1602                            ADN     2
2601    5400 2604                       STM     UPDPPUX
2603    2000 0036                       LDC     CMPPSHEL
                                        CMADD
2605    6125 0000                       CRM     0,T1
                        2606    UPDPPUX EQU     *-1
                                *
2607    2000 0653                       LDC     LINE3ORG-2
2611    3140                            ADD     UD2
2612    3425                            STD     T1
2613    3037                            LDD     UD1
2614    1765                            SBN     L.DIS
2615    0402                            ZJN     *+2
2616    1401                            LDN     1
2617    1670                            ADN     70B
2620    1006                            SHN     6
2621    3426                            STD     T2
2622    3026                            LDD     T2
2623    4525                            RAI     T1
2624    2077 7453                       LDC     -LINE1
2626    3525                            RAD     T1
2627    3240                            SBD     UD2
2630    0671                            PJN     *-6
2631    0140 0417               UPDPPU1 LJM     UPDPPUB,UD2     . JUMP INTO BUFFER
                                *                               . ( HOPE THE CODE IS THERE $$$$$)
```

```
                                *
                                *
                                *       BCDOCT TRANSLATES BYTES INTO DISPLAY CODE
                                *       PARAMETERS:
                                *
                                *       T0 = POINTER TO RESULT REGISTER ( HIGH END )
                                *       T2 = POINTER TO INPUT REGISTER ( HIGH END )
                                *       T3 = NUMBER OF BYTES TO TRANSLATE
                                *       T4 = FLAG ( IF ZERO, 2 BLANKS INSERTED BETWEEN BYTES )
                                *       T5 IS USED FOR SCRATCH
                                *
                                *       ON RETURN, T0 = NEXT FREE ADDRESS,T2 IS END + 1, T3 IS 0
                                *
                                *
2633    0100 0000                       LJM     0
                        2634    BCDOCT  EQU     *-1
2635    4026                            LDI     T2
2636    1071                            SHN     -6              . TOP CHAR
2637    3431                            STD     T5
2640    5031 3072                       LDM     OCTABLE,T5
2642    4424                            STI     T0              . CHAR
2643    3624                            AOD     T0
2644    4026                            LDI     T2              . BOTTOM CHARS
2645    1277                            LPN     77B
2646    3431                            STD     T5
2647    5031 3072                       LDM     OCTABLE,T5              . CONVERTED
2651    4424                            STI     T0
2652    3624                            AOD     T0
2653    3626                            AOD     T2              . TRANSLATE NEXT BYTE
2654    3727                            SOD     T3
2655    0755                            MJN     BCDOCT-1        . DONE
2656    3030                            LDD     T4
2657    0555                            NJN     BCDOCT+1        . LOOP IF NO BLANKS
2660    4424                            STI     T0              . INSERT A BLANK
2661    3624                            AOD T0
2662    0352                            UJN     BCDOCT+1        . LOOP
```

```
                                *
                                *
                                *       DISCHK IS A PROCESS WHICH PERIODICALLY CHECKS FOR A SYSTEM DISASTER
                                *              IN THE EVENT THAT ONE HAS OCCURRED, DISCHK ATTEMPTS TO
                                *              RESTORE AND PROTECT THE DISPLAY DRIVER
                                *
                                *
                     2663       DISCHK  EQU     *
                                *
2663        2000 0000           C.DIST  LDC     0
2665        6012                        CRD     CM1     . READ DISASTER
2666        3012                        LDD     CM1
2667        3113                        ADD     CM2
2670        3114                        ADD     CM3
2671        3115                        ADD     CM4
2672        3116                        ADD     CM5
2673        0503                        NJN     *+3     . FOUND ONE, CONTINUE
2674        0100 0151                   LJM     ALPHA3  . DO NOTHING RETURN
                                *
                                *       BAD NEWS FOLKS
                                *
2676        3457                        STD     BADNEWS . SET FLAG FOR KEYBOARD
                                *
                                *
2677        2000 4000                   LDC     4000B
2701        3465                        STD     L.DIS   . KILL LEFT SCREEN
2702        1400                        LDN     0
2703        3466                        STD     L.DIS+1
2704        2000 0026                   LDC     CMDSPTAB
                                        CMADD
2706        1614                        ADN     IRM-1
2707        6060                        CRD     R.DIS   . PUT M SCREEN ON RIGHT
2710        1401                        LDN     1
2711        3425                        STD     T1
2712        2000 0000                   LDC     CMRESTOR
                                        CMADD
2714        6125 0132                   CRM     PCTRTAB,T1          . RESTORE PPU P-COUNTERS
2716        0100 0160                   LJM     FLASH-2 . KILL SELF
```

```
                                *
                                *
                                *       CLOCK CAUSES AN INTERRUPT EVERY TENTH OF A SECOND
                                *
                                *
2720    0200 0144       CLOCKRT RJM     ALPHA
2722    2000 0000       CLOCK   LDC     0
2724    6005                    CRD     PPBUFF          . READ MASTER CLOCK
2725    2000 0002               LDC     CMCLOCK
                                CMADD
2727    6012                    CRD     CM1
                                *
2730    1400                    LDN     0
2731    3425                    STD     T1
2732    5025 0012               LDM     CM1,T1
2734    5225 0005               SBM     PPBUFF,T1
2736    0706                    MJN     CLOCKGO
2737    0560                    NJN     CLOCKRT
2740    3625                    AOD     T1
2741    1705                    SBN     5
2742    0767                    MJN     *-8
2743    0354                    UJN     CLOCKRT
2744    2030 3240       CLOCKGO LDC     100000
2746    3516                    RAD     CM5
2747    1063                    SHN     12
2750    3515                    RAD     CM4
2751    1063                    SHN     -12
2752    3514                    RAD     CM3
2753    1063                    SHN     -12
2754    3513                    RAD     CM2
2755    1063                    SHN     -12
2756    3512                    RAD     CM1
2757    2000 0002               LDC     CMCLOCK
                                CMADD
2761    6212                    CWD     CM1             .RE-WRITE CLOCK
2762    0200 3012               RJM     CMSTATUS
2764    1411                    LDN     RQ.CLOCK
2765    0200 3031               RJM     CMREQ           . MAKE REQUEST
2767    0200 3050               RJM     CMRESP
2771    0351                    UJN     CLOCKGO-1       . LOOP
```

```
                                *
                                *
                                *       INTERRUPT HANDLING SUBROUTINES
                                *
                                *
2772    0100 0000                       LJM     0
                        2773    KEYCMST EQU     *-1
2774    1412                            LDN     10
2775    3446                            STD     13              . COUNTER
2776    2000 3005               KEYCMST1 LDC    KEYCMST2+2
3000    5400 3012                       STM     CMSTATUS        . FAKE RJM TO GET CPU
3002    0311                            UJN     CMSTATUS+1
3003    3746                    KEYCMST2 SOD    13              . DECREMENT COUNTER ON FRETURN
3004    0302                            UJN     *+2
3005    0364                            UJN     KEYCMST-1       . RETURN ON RETURN
3006    0667                            PJN     KEYCMST1        . TRY FOR CPU AGAIN
3007    0100 1776                       LJM     DEBUGN          . NOT SAFE, INTERRUPTS LOCKED
                                *
                                *
                                *
3011    0100 0000                       LJM     0
                        3012    CMSTATUS EQU    *-1
3013    2000 0003                       LDC     CMREQWD
                                        CMADD
3015    6012                            CRD     CM1
3016    1601                            ADN     CMRESPWD-CMREQWD
3017    6005                            CRD     PPBUFF
3020    3016                            LDD     CM5
3021    3111                            ADD     PPBUFF+4
3022    0466                            ZJN     CMSTATUS-1
3023    5000 3012               CMFAIL  LDM     CMSTATUS
3025    0100 0156                       LJM     ALPHA1          . DO F-RETURN
                                *
                                *
3027    3457                            STD     BADNEWS         . PROTECT KEYBOARD
3030    0100 0000                       LJM     0
                        3031    CMREQ   EQU     *-1
3032    3416                            STD     CM5
3033    2000 0003                       LDC     CMREQWD
                                        CMADD
3035    6212                            CWD     CM1
3036    5016 3060                       LDM     INTAB-1,CM5
3040    6511 3027                       IJM     CMREQ-2,INTCHAN         . DONT HANG IF INTCHAN IS DEAD

3042    7211                            OAN     INTCHAN
3043    0364                            UJN     CMREQ-1
3044    2000 0004               CMDONE  LDC     CMRESPWD
                                        CMADD
3046    6217                            CWD     ZERO
3047    0100 0000                       LJM     0
                        3050    CMRESP  EQU     *-1
3051    2000 0004                       LDC     CMRESPWD
                                        CMADD
```

```
3053  6012                        CRD   CM1
3054  3016                        LDD   CM5
3055  0566                        NJN   CMDONE
3056  5000 3050                   LDM   CMRESP
3060  0344                        UJN   CMFAIL+2  . DO F-RETURN
3061                        INTAB BSS
                  000002          DUP   2,1
                                  VFD   12/DSPINTX          . CHECK I.LOCK
3063  0005                        VFD   12/DSPINTX1         . DON'T CHECK I.LOCK
                  000003          DUP   3,1
                                  VFD   12/DSPINTX          . DO CHECK I.LOCK
                  000002          DUP   2,1
                                  VFD   12/DSPINTX1
3071  0004                        VFD   12/DSPINTX
```

```
                    *
                    *
                    *       TABLE FOR RCDOCT
                    *
                    *
3072        OCTABLE EQU     *
0           I       SET     0
0           J       SET     0
000010      OUT     DUP     8
            IN      DUP     8
            *       VFD     6/IR0+I,6/IR0+J
            J       SET     J+1
            IN      ENDD
            J       SET     0
            I       SET     I+1
            OUT     ENDD
3172        FL      EQU     *
                    *
                    *
                    *       DEFINE SCREEN BUFFERS, ETC, AND END OF CODE.
                    *
                    *
                    *
3177                        ORG     100008-64*38-1
5           RMLEFT  EQU     *-FL
3177        LBUFF   EQU     *
3177                        BSSZ    38*32
2232        LASTLT  EQU     *-LBUFF-38
                    *
5477        RBUFF   EQU     *
2238        LASTRT  EQU     31*38
7777        EEEE    EQU     *+32*38
                    *
                            IFLT    RMLEFT,0,1
```

```
                                *
                                *
                                *                       ASSEMBLE PP DISPLAY INTO BUFFER
                                *
                                *
  3177                                  ORG       BUFF
1   2                                   LOC       2             . UD2 SET TO BUFF ORG - 2 AT RUN TIME
                                *
                                *
                                DES     MACRO     STRING
                                        DIS       $STRING
                                ALP     SET       $L
                                        ORG       $0-1
                                        LOC       ALP-1
                                        ENDM
                        7722    TOP     SET       7000B+512-50+4
                        6300    BYTES   EQU       6000B+512-20*16
                                LINE    MACRO     ST,X,NM,LN,Y
                                        IFC       NE,**ST*
                                        VFD       12/TOP
                                LAB     IFC       NE,^^X^
                                        VFD       12/6000B+X
                                LAB     ELSE
                                        VFD       12/6000B
                                LAB     ENDIF
                                        DES       (=ST=)
                                        IFC       NE,**NM*
                                        VFD       12/Y
                                NM      BSSZ      1N
                                        ENDIF
                                TOP     SET       TOP-22
                                        ENDM
                                *
                                *
                        6000    X       SET       4000B
                                CHCOL   MACRO     LB,INHIB,SLASHS
                                        VFD       12/TOP,12/X
                                LB      DATA      0
                                CH      IFC       EQ,**INHIB*
                                        VFD       12/TOP+2,12/X+40B,12/1L=
                                        VFD       12/TOP+8,12/X+40B,12/1L=
                                X       SET       X+50B
                                CH      ENDIF
                                SL      IFC       NE,**SLASHS*
                                        VFD       12/1L/
                                X       SET       X+60B
                                SL      ENDIF
                                        ENDM
                                *
                                *
1   2           0002        LINE1ORG    DATA      2,1         BRITE,MEDIUM CHARS
1   4           0321                    VFD       12/LINE1-3              . BYTE COUNT
1
                                *
```

```
                                   *
                                   *
L     5        7722                      CHCOL   CHH
L    16        7722                      CHCOL   CMM
L    27        7722                      CHCOL   CSS,I
                         6557      X     SET     6000B+512-3*60B-1
L    32        7722                      CHCOL   DMM,I,SLASHES
L    36        7722                      CHCOL   DDD,I,SLASHES
L    42        7722                      CHCOL   DYY,I
                                   *
L    45        0000                      LINE
L    45        0000                      LINE
                                   *
                                   *
                                   *
                                   *
                                   *
L    45        7646                      LINE    (.CLOCKS.),(6*16)
L    52        7620                      LINE    (.REAL.),,(TIM.R),10,BYTES
L    71        7572                      LINE    (.IDLE.),,(TIM.I),10,BYTES
L   110        7544                      LINE    (.USER.),,(TIM.U),10,BYTES
L   127        7516                      LINE    (.SYSTEM.),,(TIM.SY),10,BYTES
L   147        7470                      LINE    (.SWAP.),,(TIM.SW),10,BYTES
L   166        7442                      LINE    (.INTERRUPT.),,(TIM.IN),10,BYTES
L   210        0000                      LINE
L   210        7366                      LINE    (.ECS.),(6*16)
L   214        7340                      LINE    (.FREE SPACE.),,(ECS.S),10,BYTES
L   236        7312                      LINE    (.SLOP SPACE.),,(ECS.E),10,BYTES
L   260        7264                      LINE    (.FREE BLOCKS.),,(ECS.R),10,BYTES
L   303        7236                      LINE    (.USED BLOCKS.),,(ECS.U),10,BYTES
                          324      LINE1     EQU     *-LINE1ORG
L   326        0006                      VFD     12/MAXBRITE          . FLASHING
L   327        0001                      DATA    1,0        . MEDIUM CHARS,0 BYTES
L   331        7210                LINE2ORG  LINE    (.PARITY.),,(ECS.P),10,BYTES
L   351        7162                      LINE    (.ECS ERROR     ECS ERROR.),(6*16)
                           35      LINE2     EQU     *-LINE2ORG
                                   *
                                   *
   4047                                  ORG     BUFF+LINE2ORG+LINE1-5
L   652                                  LOC     LINE2ORG+LINE1-3
                                   *
                                   *
L   652        0006                      VFD     12/MAXBRITE
L   653        0002                      DATA    2,0        . GIANT CHARS, 0 BYTES
L   655        7122                LINE3ORG  VFD     12/TOP-10,12/6000B+128
L   656        6200
L   657        0411                      DES     (.DISASTER.)
L   663        7042                      VFD     12/TOP-42-16,12/6000B+128+32
L   664        6240
L   665                            DIS.AD    BSSZ    4
                           14      LINE3     EQU     *-LINE3ORG
                                   *
                                   *
```

```
                                *       END OF DATA WORDS
                                *
                                *
                                *               BEGIN TO PUT CODE IN BUFFER
                                *
                                *
  3563                          *       ORG     BUFF+LINE2ORG+LINE2-2
  366                           *       LOC     LINE2ORG+LINE2
                                *
                                *
  366   0100 0000               *       LJM     *
                          367   UPDPPCON  EQU     *-1
  370   3140                    *       ADD     UD2     . DESTINATION
  371   3424                    *       STD     T0      . SAVE
  372   3425                    *       STD     T1
  373   1412                    *       LDN     CM1
  374   3426                    *       STD     T2      . SOURCE
  375   1404                    *       LDN     4
  376   3427                    *       STD     T3      . BYTE COUNT
  377   3430                    *       STD     T4      . NO BLANKS
  400   0200 2634               *       RJM     BCDOCT
  402   4025                    *       LDI     T1
  403   2177 4444               *       ADC     =2R00
  405   0504                    *       NJN     *+4
  406   4425                    *       STI     T1
  407   3625                    *       ADD     T1
  410   0371                    *       UJN     *-6     . CLEAR LEADING 00
  411   1377                    *       SCN     77B
  412   0553                    *       NJN     UPDPPCON-1
  413   4025                    *       LDI     T1
  414   1277                    *       LPN     77B
  415   4425                    *       STI     T1      . CLEAR LEADING 0
  416   0347                    *       UJN     UPDPPCON-1
                                *
                                *
                                *
                                CMWORD  MACRO   AD,LC
                                AD      LDC     0
                                        CRD     CM1
                                        LDC     LC
                                        RJM     UPDPPCON,UD2
                                        ENDM
                                *
                                *
  417   2000 0000               UPDPPUB CMWORD  (C.IDLE),(TIM.I)
  426   2000 0000                       CMWORD  (C.USER),(TIM.U)
  435   2000 0000                       CMWORD  (C.SYSTEM),(TIM.SY)
  444   2000 0000                       CMWORD  (C.SWAP),(TIM.SW)
  453   2000 0000               C.CHARGE LDC    0
  455   6005                            CRD     PPBUFF
  456   2000 0000                       CMWORD  (C.REAL),(TIM.R)
  465   1411                            LDN     PPBUFF+4
  466   3425                            STD     T1
```

```
  467  1416                    LDN     CM5
  470  3426                    STD     T2
  471  1405                    LDN     5
  472  3427                    STD     T3
  473  1400                    LDN     0
  474  2101 0000               ADC     4096
  476  4126                    ADI     T2
  477  4225                    SBI     T1
  500  4426                    STI     T2
  501  1063                    SHN     -12
  502  1101                    LMN     1
  503  3424                    STD     T0
  504  3725                    SOD     T1
  505  3726                    SOD     T2
  506  3727                    SOD     T3
  507  0404                    ZJN     *+4
  510  1400                    LDN     0
  511  3224                    SBD     T0
  512  0361                    UJN     -14
  513  2000 0176               LDC     TIM.IN
  515  0240 0367               RJM     UPDPPCON.UD2        . INTERRUPT CLOCK
                       *
                       *
                       *      . NOW DO ECS DATA
                       *
                       *
  517  0200 0144               RJM     ALPHA       . TRY TO STOP FLICKER
                       *
                       *
                       *
  521  2000 0000               CMWORD  (C.SPACE),(ECS.S)
  530  2000 0000               CMWORD  (C.ERRS),(ECS.E)
  537  2000 0000               CMWORD  (C.RTRYS),(ECS.R)
  546  2000 0000               CMWORD  (C.UBLK),(ECS.U)
  555  1400                    LDN     0
  556  5440 0654               STM     LINE3ORG-1,UD2
  560  5440 0330               STM     LINE2ORG-1,UD2
  562  2000 0000    C.DISAST   LDC     0
  564  6012                    CRD     CM1         . READ DISASTER
  565  3012                    LDD     CM1
  566  3113                    ADD     CM2
  567  3114                    ADD     CM3
  570  3115                    ADD     CM4
  571  3116                    ADD     CM5
  572  0503                    NJN     *+3
  573  0140 0636               LJM     C.DISAS1,UD2
  575  1413                    LDN     LINE3-1
  576  5440 0654               STM     LINE3ORG-1,UD2
  600  1413                    LDN     CM2
  601  3426                    STD     T2
  602  2000 0665               LDC     DIS.AD
  604  3140                    ADD     UD2
  605  3424                    STD     T0
```

```
L  606       1401                       LDN      1
L  607       3427                       STD      T3
L  610       3430                       STD      T4
L  611       0200 2634                  RJM      RCDOCT
L  613       2000 0000        C.E.ECS   LDC      0
L  615       6012                       CRD      CM1       . READ E.ECS
L  616       3012                       LDD      CM1
L  617       3113                       ADD      CM2
L  620       3114                       ADD      CM3
L  621       3115                       ADD      CM4
L  622       3116                       ADD      CM5
L  623       0413                       ZJN      C.DISAS1
L  624       2000 0000                  CMWORD   (C.PARITY),(ECS.P)
L  633       1435                       LDN      LINE2
L  634       5440 0330                  STM      LINE2ORG-1,UD2
                              *
                              *
                              *
L  636       0140 0671        C.DISAS1  LJM      UPDPPUB2,UD2
                              *
                              *
  4066                                  ORG      BUFF-2+LINE3ORG+LINE3
L  671                                  LOC      LINE3ORG+LINE3
                              *
                              *
                     671      UPDPPUB2  EQU      *
                              *
                              *
                              *
                              *
                              *
                              *
                              PCLOCK    MACRO    WHICH,TEN
                                        RJM      GETONE,UD2
                                        IFC      EQ,*TEN**
                                        ADN      1R0
                                        STD      T2
                                        RJM      GETONE,UD2
                                        ADN      1R0
                                        SHN      6
                                        ADD      T2
                                        STM      WHICH,UD2
                                        ELSE
                                        RJM      TENBYTE,UD2
                                        STM      WHICH,UD2
                                        ENDIF
                                        ENDM
                              *
                              *
L  671       1401                       LDN      1
L  672       3425                       STD      T1
L  673       0240 0756                  PCLOCK   CSS
L  706       0240 0756                  PCLOCK   CMM
```

```
L  721    0240 0756                  PCLOCK   CHH,TEN
L  727    0240 0756                  PCLOCK   DDD,TEN
L  735    0240 0756                  PCLOCK   DMM,TEN
L  743    0240 0756                  PCLOCK   DYY,TEN
L  751    0200 0144                  RJM      ALPHA
L  753    0100 2153                  LJM      UPD-1      .RETURN
                           *
                           *
L  755    0100 0000                  LJM      0
                     756  GETONE    EQU      *-1
L  757    2000 0000       C.CLKS    LDC      0
L  761    3125                       ADD      T1
L  762    6012                       CRD      CM1
L  763    3625                       AOD      T1
L  764    3016                       LDD      CM5
L  765    0367                       UJN      GETONE-1
                           *
L  766    0100 0000                  LJM      0
                     767  TENBYTE   EQU      *-1
L  770    3427                       STD      T3
L  771    1400                       LDN      0
L  772    3430                       STD      T4
L  773    3027                       LDD      T3
L  774    1712                       SBN      10
L  775    0704                       MJN      4
L  776    3427                       STD      T3
L  777    3630                       AOD      T4
L 1000    0372                       UJN      -5
L 1001    3030                       LDD      T4
L 1002    1006                       SHN      6
L 1003    3127                       ADD      T3
L 1004    2100 3333                  ADC      2R00
L 1006    0357                       UJN      TENBYTE-1
```

```
                                *
                                *
                                *       DEBUG IS CALLED BY COMMAND INTERPRETER TO PROCESS SPECIAL COMMANDS
                                *
                                *
 1007   3626                    DEBUG   AOD     T2
 1010   1401                            LDN     1
 1011   3425                            STD     T1              . RESET GETCHAR
 1012   0200 2122                       RJM     GETCHAR
 1014   1625                            ADN     CR$-1R0
 1015   0724                            MJN     DEBUGE
 1016   1710                            SBN     8
 1017   0622                            PJN     DEBUGE
 1020   1610                            ADN     8
 1021   0200 2062                       RJM     OCTALBCD
 1023   0420                            ZJN     DEBUG1          . GO
 1024   3036                            LDD     05
 1025   3445                            STD     T2
 1026   0200 2122                       RJM     GETCHAR
 1030   0420                            ZJN     DEBUG2
 1031   1625                            ADN     CR$-1R0
 1032   0707                            MJN     DEBUGE
 1033   1710                            SBN     8
 1034   0605                            PJN     DEBUGE
 1035   1610                            ADN     8
 1036   0200 2062                       RJM     OCTALBCD
 1040   0410                            ZJN     DEBUG2
 1041   0100 1122               DEBUGE  LJM     INTR.E
 1043   3036                    DEBUG1  LDD     05
 1044   1277                            LPN     77B
 1045   3445                            STD     T2
 1046   1400                            LDN     0
 1047   3436                            STD     05
 1050   2000 1106               DEBUG2  LDC     DEBUGT
 1052   3131                            ADD     T5
 1053   5431 1066                       STM     DEBUG4,T5
 1055   1410                            LDN     DEBUGTL-1
 1056   3426                            STD     T2
 1057   3045                            LDD     I2              . CHANNEL
 1060   1710                            SBN     DSPCHN          . NEVER DIDDLE DISPLAY CHANNEL
 1061   0503                            NJN     *+3
 1062   0100 1770                       LJM     DEBUGN
 1064   5026 0000               DEBUG3  LDM     0,T2
                        1065    DEBUG4  EQU     *-1
 1066   3131                            ADD     T5
 1067   3427                            STD     T3
 1070   4027                            LDI     T3
 1071   1377                            SCN     77B
 1072   3145                            ADD     T2
 1073   4427                            STI     T3
 1074   3726                            SOD     T2
 1075   0666                            PJN     DEBUG3
 1076   3044                            LDD     T1
```

```
L 1077    1710                         SBN    DEBUGORG
L 1100    1002                         SHN    2
L 1101    3131                         ADD    T5
L 1102    3444                         STD    T1
L 1103    3036                         LDD    05
L 1104    0144 1117                    LJM    DEBUGACT,I1          . JUMP TO ACTION
                            *
                            *
L 1106    1117              DEBUGT     VFD    12/DEBUGACT
L 1107    1121                         VFD    12/DEBUGACT+2
L 1110    1123                         VFD    12/DEBUGAC2
L 1111    1125                         VFD    12/DEBUGAC2+2
L 1112    1127                         VFD    12/DEBUGAC3
L 1113    1131                         VFD    12/DEBUGAC3+2
L 1114    1133                         VFD    12/DEBUGAC4
L 1115    1135                         VFD    12/DEBUGAC4+2
L 1116    1137                         VFD    12/DEBUGAC4+4
L                      11   DEBUGTL    EQU    *-DEBUGT
                            *
                            *
L 1117    6400 1770         DEBUGACT   AJM    DEBUGN,0
L 1121    7600                         FAN    0
L 1122    0316                         UJN    DEBUGD
                            *
L 1123    6500 1770         DEBUGAC2   IJM    DEBUGN,0
L 1125    7500                         DCN    0
L 1126    0312                         UJN    DEBUGD
                            *
L 1127    6400 1770         DEBUGAC3   AJM    DEBUGN,0
L 1131    7400                         ACN    0
L 1132    0306                         UJN    DEBUGD
                            *
L 1133    6500 1770         DEBUGAC4   IJM    DEBUGN,0
L 1135    6600 1770                    FJM    DEBUGN,0
L 1137    7200                         OAN    0
                            *
L 1140    0100 1655         DEBUGD     LJM    BLANK
                            *
                            *
                            *
                      173   PPSHELEN   EQU    */5+1
                            *
                            *
```

```
                                *
                                *
                                *
                                *                INITIALIZATION CODE FOLLOWS
4337                            ORG     BUFF-2+*L
                                *
                                *
                                *
4337  1430                      START   LDN     I.POINTS+I.DSP      . PTR TO DISPLAY STUFF
4340  6012                              CRD     CMI
4341  2000 5673                        LDC     CMADDT
4343  3425                              STD     T1
4344  4025                      STARTI  LDI     T1
4345  0412                              ZJN     START2
4346  3426                              STD     T2
4347  3016                              LDD     CM5
4350  4526                              RAI     T2
4351  1063                              SHN     -12
4352  3115                              ADD     CM4
4353  5526 7776                         RAM     -1,T2
4355  3625                              AOD     T1
4356  0365                              UJN     STARTI
                                *
                                *
4357  1401                      START2  LDN     1
4360  3425                              STD     T1
4361  2000 0000                         LDC     CMRESTOR
                                        CMADD
4363  6325 0135                         CWM     PCTRTAB,T1          . WRITE P-COUNTERS TO CM
                                *
                                *
4365  1412                              LDN     50,INIT
4366  3416                              STD     CM5
4367  2000 0003                         LDC     CMREQWD
                                        CMADD
4371  6212                              CWD     CMI         . MAKE REQUEST
4372  1404                              LDN     50SPINTX
4373  7211                              OAN     INTCHAN     . RUN INTERRUPT
4374  0200 5115                 START3 RJM     M
4376  2000 0004                         LDC     CMRESPWD
                                        CMADD
4400  6012                              CRD     CMI
4401  3016                              LDD     CM5
4402  1701                              SBN     1
4403  0570                              NJN     START3
                                *
                                *
4404  2000 0004                         LDC     CMRESPWD
                                        CMADD
4406  6217                              CWD     ZERO        . ZERO RESPONSE WORD
                                *
                                *
                                TABLE   MACRO   TN,AD
```

```
                                    RJM     M
                                    LDD     CM4
                                    SHN     12
                                    ADD     CM5
                                    ADN     1N
                                    CRD     PPBUFF
                                    LDD     PPBUFF+4
                                    STM     LBUFF-1+AD
                                    LDD     PPBUFF+3
                                    RAM     LBUFF-2+AD
                                    ENDM
                              *
                              *
4407    1425                        LDN     I.POINTS+I.MSM      . KARLS PTR
4410    6012                        CRD     CM1
                              *
                              *
4411    0200 5115                   TABLE   0,(C.DISAST)
4426    0200 5115                   TABLE   0,(C.DIST-LBUFF+2)
4443    0200 5115                   TABLE   1,(C.REAL2-LBUFF+2)
4460    0200 5115                   TABLE   1,(CLOCK-LBUFF+2)
4475    0200 5115                   TABLE   1,(C.REAL)
4512    0200 5115                   TABLE   2,(C.USER)
4527    0200 5115                   TABLE   3,(C.IDLE)
4544    0200 5115                   TABLE   4,(C.SWAP)
4561    0200 5115                   TABLE   5,(C.SYSTEM)
4576    0200 5115                   TABLE   6,(C.SPACE)
4613    0200 5115                   TABLE   7,(C.PARITY)
4630    0200 5115                   TABLE   8,(C.CHARGE)
4645    0200 5115                   TABLE   9,(C.ERRS)
4662    0200 5115                   TABLE   10,(C.RTRYS)
4677    0200 5115                   TABLE   11,(C.E.ECS)
4714    0200 5115                   TABLE   12,(C.CLKS)
4731    0200 5115                   TABLE   13,(C.UBLK)
                              *
                              *
                              *                 NOW WRITE PP SHELL TO CM
                              *
                              *
4746    2000 0173                   LDC     PPSHELEN
4750    3425                        STD     T1
4751    2000 0036                   LDC     CMPPSHEL
                                    CMADD
4753    6325 3177                   CWM     LBUFF,T1    . WRITE SHELL TO CENTRAL
4755    2000 0000           C.REAL2 LDC     0
4757    6012                        CRD     CM1         . READ MASTER CLOCK
4760    2000 3240                   LDC     100000-100000/4096*4096
4762    3516                        RAD     CM5
4763    1063                        SHN     -12
4764    2100 0030                   ADC     100000/4096
4766    3515                        RAD     CM4
4767    1063                        SHN     -12
4770    3514                        RAD     CM3
```

```
4771  1063                        SHN     -12
4772  3513                        RAD     CM2
4773  1063                        SHN     -12
4774  3512                        RAD     CM1
4775  2000 0002                   LDC     CMCLOCK
                                  CMADD
4777  6212                        CWD     CM1         . WRITE TIME FOR NEXT TICK TO CM
                        *
5000  2000 0018                   LDC     (STSCREN-1
5002  3425                        STD     T1
5003  2000 0020                   LDC     CMDSPTAB
                                  CMADD
5005  6325 5013                   CWM     CMDSPTBL,T1         . WRITE DISPLAY DESCRIPTOR TABLE
                        *                                     . TO CM
5007  0200 5124                   RJM     STARSHL
                        *
5011  0100 0137                   LJM     MAINLOOP    . GO GO GO GO GO GO GO GO GO GO GO GO GO GO
                        *
                        *
                        *
                        DISPLAY   MACRO   NAME,TYPE,LAST,LINES
                                  VFD     1/1,11/1R,NAME,12/TYPE,12/0,12/LAST,12/LINES
                        DISPLAY   ENDM
                        *
                        *
5013                    CMDSPTBL  BSS     0
                        *
5013  4001                        DISPLAY   A,T.CORE,LASTRT,30
5020  4002                        DISPLAY   B,T.CORE,LASTRT,30
5025  4003                        DISPLAY   C,T.CORE,LASTRT,30
5032  4004                        DISPLAY   D,T.CORE,LASTRT,30
5037  4005                        DISPLAY   E,T.USER,LASTRT,30
5044  4006                        DISPLAY   F,T.USER,LASTRT,30
5051  4007                        DISPLAY   G,T.USER,LASTRT,30
5056  4010                        DISPLAY   H,T.USER,LASTRT,30
5063  4011                        DISPLAY   I,T.USER,LASTRT,30
5070  4012                        DISPLAY   J,T.USER,LASTRT,30
5075  4013                        DISPLAY   K,T.USER,LASTRT,30
5102  4014                        DISPLAY   L,T.USER,LASTRT,30
5107  4015                        DISPLAY   M,T.PPU,(2*LINE1),LINE1
                        *
                        *
                        *
                        *
                        *
5114  0100 0000                   LJM     0
                  5115  M         EQU     *-1
5116  2000 0144                   LDC     100
5120  1701                        SBN     1
5121  0676                        PJN     *-1
5122  0371                        UJN     M-1
                        *
                        *
```

```
                                *
5123    0100 0000                       LJM     0
                        5124    MSTARSHL EQU    *-1
                                *
5125    2000 5155                       LDC     ZERO$
5127    3430                            STD     T4
5130    2000 7010                       LDC     7010B
5132    5400 5262                       STM     STARBUF+2
5134    2000 5160                       LDC     LEFT$
5136    0200 5465                       RJM     STAR        . MAKE LEFT$ STAR
5140    2000 5160                       LDC     LEFT$
5142    3430                            STD     T4
5143    2000 7110                       LDC     7110B
5145    5400 5262                       STM     STARBUF+2
5147    2000 5167                       LDC     RIGHT$
5151    0200 5465                       RJM     STAR        . DO RIGHT$
5153    0100 5123                       LJM     MSTARSHL-1
                                *
                                *
5155    7002                    ZERO$    DATA    7002B,0,0
                                *
5160    7002                    LEFT$    DATA    7002B,4,6340B,7370B
                                *
5164    0301                            DIS     .*CAL*
                                *
                                *
5167    7102                    RIGHT$   DATA    7102B,5,6340B,7370B
                                *
5173    2423                            DIS     .*TSS*
```

```
5176        0100 0000                  LJM      0
                          5177  FLASH$   EQU      *-1
5200        3431                       STD      T5
5201        4031                       LDI      T5
5202        7610                       FAN      DSPCHN
                            10  DSPCHN   EQU      8
5203        3031                       LDD      T5
5204        1602                       ADN      2
5205        5400 5214                  STM      FLASH$W
5207        7410                       ACN      DSPCHN
5210        5031 0001                  LDM      1,T5
5212        0403                       ZJN      *+3
5213        7310 0000                  OAM      0,DSPCHN
                          5214  FLASH$W  EQU      *-1
5215        7510                       DCN      DSPCHN
5216        0357                       UJN      FLASH$-1
                                *
                                *
5217        0100 0000                  LJM      0
                          5220  STARINIT EQU      *-1
5221        2000 0077                  LDC      63
5223        3425                       STD      T1
5224        1420                       LDN      16
5225        5400 5263                  STM      STARBUF-1
5227        2000 7000       STARINIL   LDC      7000B
5231        5425 5264                  STM      STARBUF,T1
5233        3725                       SOD      T1
5234        2000 6000                  LDC      6000B
5236        5425 5264                  STM      STARBUF,T1
5240        3725                       SOD      T1
5241        0665                       PJN      STARINIL
5242        0354                       UJN      STARINIT-1
                                *
                                *
5243        0100 0000                  LJM      0
                          5244  MVEPNTS  EQU      *-1
5245        2000 0077                  LDC      63
5247        3425                       STD      T1
5250        5025 5364       MVEPNTS1   LDM      STARINCB,T1
5252        5525 5264                  RAM      STARBUF,T1
5254        1063                       SHN      -12
5255        5525 5264                  RAM      STARBUF,T1
5257        3725                       SOD      T1
5260        0667                       PJN      MVEPNTS1
5261        0361                       UJN      MVEPNTS-1
                                *
                                *
5262        7002                       DATA     7002B,0
5264                            STARBUF  BSSZ     64
                                *
                                *
                                T        MACRO    X,Y
                                         DATA     X,Y
```

```
                                          ENDM
5364                            STARINCB  BSS       0
                                *
5364          0000                        T         0,4
5366          0001                        T         1,4
5370          0002                        T         2,4
5372          0003                        T         3,4
5374          0004                        T         4,4
5376          0004                        T         4,3
5400          0004                        T         4,2
5402          0004                        T         4,1
5404          0004                        T         4,0
5406          0004                        T         4,-1
5410          0004                        T         4,-2
5412          0004                        T         4,-3
5414          0004                        T         4,-4
5416          0003                        T         3,-4
5420          0002                        T         2,-4
5422          0001                        T         1,-4
5424          0000                        T         0,-4
5426          7776                        T         -1,-4
5430          7775                        T         -2,-4
5432          7774                        T         -3,-4
5434          7773                        T         -4,-4
5436          7773                        T         -4,-3
5440          7773                        T         -4,-2
5442          7773                        T         -4,-1
5444          7773                        T         -4,0
5446          7773                        T         -4,1
5450          7773                        T         -4,2
5452          7773                        T         -4,3
5454          7773                        T         -4,4
5456          7774                        T         -3,4
5460          7775                        T         -2,4
5462          7776                        T         -1,4
```

```
5464           0100 0000                        LJM       0
                               5465   STAR      EQU       *-1
5466           3427                             STD       T3
5467           0200 5220                        RJM       STARINIT
5471           2000 0200                        LDC       128
5473           3426                             STD       T2
5474           3030                   STARLP1   LDD       T4
5475           0200 5177                        RJM       FLASH$
5477           2000 5262                        LDC       STARBUF-2
5501           0200 5177                        RJM       FLASH$
5503           2000 0077                        LDC       63
5505           3425                             STD       T1
5506           1402                   STARLP2   LDN       2
5507           5525 5264                        RAM       STARBUF,T1
5511           3725                             SOD       T1
5512           0673                             PJN       STARLP2
                                  2   F.RPTS1   EQU       2
5513           1404                             LDN       F.RPTS1*2
5514           3425                             STD       T1
5515           3030                   STARLP3   LDD       T4
5516           0200 5177                        RJM       FLASH$
5520           3030                             LDD       T4
5521           0200 5177                        RJM       FLASH$
5523           2000 5262                        LDC       STARBUF-2
5525           0200 5177                        RJM       FLASH$
5527           3725                             SOD       T1
5530           0564                             NJN       STARLP3
5531           2003 4136                        LDC       15000-250-F.RPTS1*80*2
5533           1701                             SBN       1
5534           0676                             PJN       *-1
5535           3726                             SOD       T2
5536           0403                             ZJN       *+3
5537           0100 5474                        LJM       STARLP1
5541           2000 0100                        LDC       64
5543           5400 5263                        STM       STARBUF-1
                                      *
5545           1420                             LDN       20B
5546           3426                             STD       T2
5547           2000 5262              STARLP4   LDC       STARBUF-2
5551           0200 5177                        RJM       FLASH$
5553           3030                             LDD       T4
5554           0200 5177                        RJM       FLASH$
5556           0200 5244              STARLP5   RJM       MVEPNTS
5560           1402                             LDN       F.RPTS1
5561           3425                             STD       T1
5562           3030                   STARLP6   LDD       T4
5563           0200 5177                        RJM       FLASH$
5565           3030                             LDD       T4
5566           0200 5177                        RJM       FLASH$
5570           3725                             SOD       T1
5571           0570                             NJN       STARLP6
5572           2004 5056                        LDC       20000-60-950
5574           1701                             SBN       1
```

```
5575  0676                    PJN   *-1
5576  3726                    SOD   T2
5577  0407                    ZJN   STARLP7
5600  1207                    LPN   7
5601  0403                    ZJN   *+3
5602  0100 5556               LJM   STARLP5
5604  0100 5547               LJM   STARLP4
                        *
5606  1454              STARLP7 LDN   54B
5607  3426                    STD   T2
5610  0200 5244         STARLP8 RJM   MVEPNTS
5612  1414                    LDN   6*F.RPTS1
5613  3425                    STD   T1
5614  2000 5262         STARLP9 LDC   STARBUF-2
5616  0200 5177               RJM   FLASH$
5620  3030                    LDD   T4
5621  0200 5177               RJM   FLASH$
5623  3027                    LDD   T3
5624  0200 5177               RJM   FLASH$
5626  2000 5262               LDC   STARBUF-2
5630  0200 5177               RJM   FLASH$
5632  3027                    LDD   T3
5633  0200 5177               RJM   FLASH$
5635  3030                    LDD   T4
5636  0200 5177               RJM   FLASH$
5640  3725                    SOD   T1
5641  0552                    NJN   STARLP9
5642  2003 5230               LDC   20000-1000-2000*F.RPTS1
5644  1701                    SBN   1
5645  0676                    PJN   *-1
5646  3726                    SOD   T2
5647  0403                    ZJN   *+3
5650  0100 5610               LJM   STARLP8
5652  2000 0144               LDC   100
5654  3425                    STD   T1
5655  3027              STARLP10 LDD  T3
5656  0200 5177               RJM   FLASH$
5660  3030                    LDD   T4
5661  0200 5177               RJM   FLASH$
5663  2000 5670               LDC   1000
5665  1701                    SBN   1
5666  0676                    PJN   *-1
5667  3725                    SOD   T1
5670  0664                    PJN   STARLP10
5671  0100 5464               LJM   STAR-1
                        *
                        *
                        *
                        *
                        *
```

```
                                     *
                                     *
                                     *
                                     *                   NOW MAKE TABLE OF CM ADDRESS REFERANCES FOR INITIALIZATION
                                     *
                                     *
                            5673  CMADDT    EQU     *
                                            LIST    G
 L    5                                     LOC     PPBUFF
                               1  L         SET     1
                          000050            DUP     40
                                  XXL       MICRO   1,2,*#XLX#*
                                  L         SET     L+3
                                            IF      DEF,CMADDR+#XXL#
                                            VFD     12/CMADDR+#XXL#
                                            ELSE
                                            STOPDUP
                                            ENDIF
                                            ENDD
 L    5          1174                       VFD     12/CMADDR01                                          *DUP*      1
 L    6          1204                       VFD     12/CMADDR02                                          *DUP*      1
 L    7          1210                       VFD     12/CMADDR03                                          *DUP*      1
 L   10          1374                       VFD     12/CMADDR04                                          *DUP*      1
 L   11          1442                       VFD     12/CMADDR05                                          *DUP*      1
 L   12          1646                       VFD     12/CMADDR06                                          *DUP*      1
 L   13          1724                       VFD     12/CMADDR07                                          *DUP*      1
 L   14          1733                       VFD     12/CMADDR08                                          *DUP*      1
 L   15          2176                       VFD     12/CMADDR09                                          *DUP*      1
 L   16          2206                       VFD     12/CMADDR11                                          *DUP*      1
 L   17          2256                       VFD     12/CMADDR12                                          *DUP*      1
 L   20          2561                       VFD     12/CMADDR13                                          *DUP*      1
 L   21          2604                       VFD     12/CMADDR14                                          *DUP*      1
 L   22          2705                       VFD     12/CMADDR15                                          *DUP*      1
 L   23          2713                       VFD     12/CMADDR16                                          *DUP*      1
 L   24          2726                       VFD     12/CMADDR17                                          *DUP*      1
 L   25          2760                       VFD     12/CMADDR18                                          *DUP*      1
 L   26          3014                       VFD     12/CMADDR19                                          *DUP*      1
 L   27          3034                       VFD     12/CMADDR20                                          *DUP*      1
 L   30          3045                       VFD     12/CMADDR21                                          *DUP*      1
 L   31          3052                       VFD     12/CMADDR22                                          *DUP*      1
 L   32          4362                       VFD     12/CMADDR23                                          *DUP*      1
 L   33          4370                       VFD     12/CMADDR24                                          *DUP*      1
 L   34          4377                       VFD     12/CMADDR25                                          *DUP*      1
 L   35          4405                       VFD     12/CMADDR26                                          *DUP*      1
 L   36          4752                       VFD     12/CMADDR27                                          *DUP*      1
 L   37          4776                       VFD     12/CMADDR28                                          *DUP*      1
 L   40          5004                       VFD     12/CMADDR29                                          *DUP*      1
                                     *
                             324  PPLILEN   EQU     LINE1
                             650  PPBUFLEN  EQU     2*LINE1
                             650  PPP       EQU     LINE3ORG-2-3
   5727                                     END
```

36050 STORAGE USED 3440 STATEMENTS 390 SYMBOLS
6600 ASSEMBLY 20.308 SECONDS 2475 REFERENCES

ADD24 1773
AD1 47
AD2 50
ALP 664
ALPHA 144
ALPHA1 156
ALPHA2 147
ALPHA3 151
BADCHARA 2025
BADCHARN 2034
BADCHARP 2037
BADCHD1 2060
BADNEWS 57
BASSES 556
BCDOCT 2634
BKSP 764
BKSP1 1001
BKSP$ 61
BLANK 1655
BLNKCT 53
BLNKFLG 54
BYTECTIN 2534
BYTES 6300
CHG.DSP 1164
CHG.DSPE 1170
CHG.DSPF 1207
CHG.DSPL 1177
CHH 7
CHLP 254
CHO 263
CHW 315
CH1 255
CH2 260
CLEAR 717
CLOCK 2722
CLOCKGO 2744
CLOCKP 135
CLOCKRT 2720
CLR$ 53
CMADDR01 1174
CMADDR02 1204
CMADDR03 1210
CMADDR04 1374
CMADDR05 1442
CMADDR06 1646
CMADDR07 1724

23/14 23/34 32/14 D 32/26 32/29 32/32
3/33 L 41/22 41/32 41/33 42/10 43/02
3/34 L 41/27 41/30 42/13 43/04
52/12 D 52/19 52/22 D 52/24 52/27 D 52/29 52/35 D 52/48
52/12 52/20 D 52/22 52/25 D 52/27 52/30 D 52/35
52/13 D 52/20 52/23 D 52/25 52/28 D 52/30 52/36 D
52/13 52/21 D 52/23 52/26 D 52/28 52/31 D 52/36
52/19 D 52/21 52/24 D 52/26 52/29 D 52/31 52/48 D
8/20 L 9/08 9/22 29/47 47/06 56/05
8/21 9/17 16/14 36/04 54/27
8/28 L 48/32
8/22 L 8/29
8/23 L 46/18
33/08 L 33/31
33/09 33/14 L 33/17 33/30
33/16 L 33/44
33/11 33/32 L 33/46
3/41 L 24/30 30/34 46/22 48/35
9/28 14/30 L
9/44 42/23 45/31 45/36 55/04
41/38 45/16 D 45/33 53/21
16/31 17/04 L
17/14 17/17 L 17/20
16/10 D 16/29 16/32
21/36 23/19 29/20 29/36 L 30/08 58/37
3/37 L 9/09
3/38 L 9/12 13/32
42/26 L 43/11
51/17 D 52/21 52/23 52/25 52/29 52/31
52/20 52/22 52/24 52/28 52/30 52/35
20/10 21/12 L 30/35
21/16 L 21/26 22/40 25/30 29/09
21/24 21/31 L
20/06 21/13 21/23 L
52/04 L 56/02
10/11 L 10/36
10/12 10/14 10/16 L
10/32 10/44 L
9/52 10/12 L 10/33
10/01 10/14 L 10/34
16/22 L 16/45 29/40
8/09 47/07 L 60/22 60/22
47/17 47/23 L 47/40
8/09 L
47/06 L 47/18 47/22
16/11 D 16/20 16/26
21/19 D 67/20
21/28 D 67/21
21/32 D 67/22
24/22 D 67/23
25/21 D 67/24
29/32 D 67/25
30/23 D 67/26

SYMBOLIC REFERENCE TABLE.

CMADDR08	1733	30/29 D	67/27						
CMADDR09	2176	37/34 D	67/28						
CMADDR11	2206	37/41 D	67/29						
CMADDR12	2256	38/36 D	67/30						
CMADDR13	2561	43/13 D	67/31						
CMADDR14	2604	44/19 D	67/32						
CMADDR15	2705	46/30 D	67/33						
CMADDR16	2713	46/36 D	67/34						
CMADDR17	2726	47/10 D	67/35						
CMADDR18	2760	47/34 D	67/36						
CMADDR19	3014	48/24 D	67/37						
CMADDR20	3034	48/40 D	67/38						
CMADDR21	3045	48/48 D	67/39						
CMADDR22	3052	48/53 D	67/40						
CMADDR23	4362	59/28 D	67/41						
CMADDR24	4370	59/35 D	67/42						
CMADDR25	4377	59/41 D	67/43						
CMADDR26	4405	59/49 D	67/44						
CMADDR27	4752	60/43 D	67/45						
CMADDR28	4776	61/06 D	67/46						
CMADDR29	5004	61/12 D	67/47						
CMADDT	5673	59/11	67/07 D						
CMBUFF	6	6/36 L	24/21	25/20	29/31	38/35	43/12		
CMCLOCK	2	6/32 L	47/09	47/33	61/05				
CMCOM	1635	27/49	27/50	29/13	29/25 L				
CMCOMTAB	1607	28/20 D	29/34						
CMCOM1	1641	27/51	27/52	29/28 L					
CMDONE	3044	48/47 L	49/03						
CMDSPTAB	20	6/38 L	21/18	21/27	46/29	61/11			
CMDSPTBL	5013	61/13	61/26 L						
CMDSPWD	16	6/37 L	21/31						
CMFAIL	3023	48/31 L	49/05						
CMINTUPD	2232	37/44	38/18 L						
CMLOCK	1	6/31 L							
CMM	20	52/05 L	56/01						
CMPPROWD	5	6/35 L	37/33	37/40					
CMPPSHEL	36	6/39 L	44/18	60/42					
CMREQ	3031	24/34	38/19	43/07	47/38	48/37 D	48/43	48/46	
CMREQWD	3	6/33 L	30/28	30/31	48/23	48/26	48/39	59/34	
CMRESP	3050	24/35	38/20	43/08	47/39	48/51 D	49/04		
CMRESPWD	4	6/34 L	30/31	48/26	48/47	48/52	59/40	59/48	
CMRESTOR	0	6/30 L	30/22	46/35	59/27				
CMSTATUS	3012	37/39	43/01	48/11	48/22 D	48/31			
		38/06	47/36	48/12	48/30				
CM1	12	3/08 L	43/03	47/32	53/16	53/52	54/39	56/13	60/44
		9/27	46/11	47/35	53/46	54/32	54/40	59/10	61/04
		24/25	46/12	48/25	53/47	54/33	55/06	59/36	61/07
		37/35	47/11	48/41	53/48	54/34	55/07	59/42	
		37/42	47/15	49/01	53/49	54/35	55/14	60/15	
CM2	13	3/09 L	38/11	43/05	47/30	54/49	61/02		
		24/27	38/26	46/13	54/41	55/08			
CM3	14	3/10 L	25/15	38/09	46/14	54/42	60/53		
		24/39	37/37	38/14	47/28	55/09			

CM4	15	3/11 L	54/43	60/19	60/22	60/25	60/28	60/31	60/34
		46/15	55/10	60/20	60/23	60/26	60/29	60/32	60/35
		47/26	59/19	60/21	60/24	60/27	60/30	60/33	60/51
CM5	16	3/12 L	46/16	49/02	59/16	60/21	60/26	60/31	60/4A
		9/28	47/24	54/01	59/33	60/22	60/27	60/32	
		24/36	48/28	54/44	59/43	60/23	60/28	60/33	
		38/21	48/38	55/11	60/19	60/24	60/29	60/34	
		43/09	48/42	56/15	60/20	60/25	60/30	60/35	
COMTAB	1572	26/26	27/47 D	28/12					
COREF	2476	41/45	41/51 L						
COREF1	2503	41/50	42/02 L						
CR$	60	16/09 D	19/15	19/53	22/23	27/24	33/20	35/09	
		16/26	19/18	20/07	27/09	27/27	33/32	57/10	
		16/29	19/33	22/08	27/13	27/31	33/43	57/21	
CSS	31	52/06 L	55/53						
C.CHARGE	453	53/49 L	60/30	60/30					
C.CLKS	757	56/11 L	60/34	60/34					
C.DISAST	562	54/38 L	60/19	60/19					
C.DISAS1	636	54/46	55/12	55/19 L					
C.DIST	2663	46/10 L	60/20	60/20					
C.ERRS	530	54/32 L	60/31	60/31					
C.E.ECS	613	55/05 L	60/33	60/33					
C.IDLE	417	53/45 L	60/25	60/25					
C.PARITY	624	55/13 L	60/29	60/29					
C.REAL	456	53/51 L	60/23	60/23					
C.REAL2	4755	60/21	60/21	60/45 L					
C.RTRYS	537	54/33 L	60/32	60/32					
C.SPACE	521	54/31 L	60/28	60/28					
C.SWAP	444	53/48 L	60/26	60/26					
C.SYSTEM	435	53/47 L	60/27	60/27					
C.UBLK	546	54/34 L	60/35	60/35					
C.USER	426	53/46 L	60/24	60/24					
DDD	40	52/09 L	56/03						
DEBUG	1007	30/47	57/06 L						
DEBUGACT	1117	58/06	58/09	58/10	58/21 L				
DEBUGAC2	1123	58/11	58/12	58/25 L					
DEBUGAC3	1127	58/13	58/14	58/29 L					
DEBUGAC4	1133	58/15	58/16	58/17	58/33 L				
DEBUGB	1743	28/15	28/15	28/15	28/15	30/39 L			
DEBUGD	1140	58/23	58/27	58/31	58/37 L				
DEBUGE	1041	57/11	57/13	57/22	57/24	57/28 L			
DEBUGN	1770	24/32	48/17	58/21	58/29	58/34			
		31/03 L	57/42	58/25	58/33				
DEBUGORG	10	28/12 D	58/01						
DEBUGT	1106	57/34	58/09 L	58/18					
DEBUGTL	11	57/37	58/18 D						
DEBUG1	1043	57/16	57/29 L						
DEBUG2	1050	57/20	57/27	57/34 L					
DEBUG3	1064	57/43 L	57/52						
DEBUG4	1065	57/36	57/44 D						
DISCHK	2663	8/10	46/08 D						
DIS.AD	665	52/50 L	54/51						
DMM	34	52/08 L	56/04						

DSPADTAB	72	7/05 D	22/45	41/16					
DSPCHN	10	2/05 D	11/03	11/25	11/35	11/43	13/36	16/17	57/40
		10/46	11/05	11/27	11/36	11/46	13/40	16/18	63/05
		10/47	11/07	11/28	11/38	11/48	13/42	29/48	63/04 D
		10/49	11/16	11/31	11/40	11/51	13/46	29/49	63/10
		10/52	11/18	11/32	11/41	11/53	16/15	29/50	63/13
		11/01	11/20	11/33	11/42	12/01	16/16	29/51	63/15
DSPINTX	4	2/12 D	49/09	49/09	49/12	49/12	49/12	49/14	59/37
DSPINTX1	5	2/13 D	49/09	49/14	49/14				
DSP.MOD	1254	22/30	22/37 L						
DSP.MODA	1336	23/34 L	23/44						
DSP.MODL	1334	23/26	23/32 L						
DSP.MOD3	1330	22/51	23/28 L						
DSP.MOD4	1322	22/52	23/21 L	23/45					
DYY	44	52/10 L	56/05						
ECS.E	246	52/29 L	54/33						
ECS.P	337	52/35 L	55/14						
ECS.R	271	52/30 L	54/34						
ECS.S	224	52/28 L	54/32						
ECS.U	314	52/31 L	54/35						
EEEE	7777	50/32 D							
EML.TAB	612	11/17	15/19 L						
EM.CORD	600	11/16	14/52 L						
EM.TAB	602	11/13	15/11 L						
EM.WHAT	361	11/14	11/19 D						
ERROR	1123	19/09	19/43 L	21/17	22/13	24/40	31/01		
E.ALPOCT	3	15/03 D	22/12						
E.ERR	2	15/02 D	19/42						
E.FRMT	6	15/06 D							
E.LOST	5	15/05 D							
E.NO	10	15/08 D	31/03						
E.NOM	7	15/07 D	30/53						
E.RPTMOD	1	15/01 D	17/05	19/08	23/06	29/37			
E.SCREEN	4	15/04 D	21/16						
FL	3172	50/17 D	50/25						
FLASH	162	8/06	9/09 L	12/05	46/38				
FLASHLP	317	10/46 L	12/04						
FLASHLP1	404	11/35 L							
FLASHM	362	11/10	11/20 L						
FLASHR	404	11/22	11/34 D						
FLASHS	342	9/29	11/08 D						
FLASHW	401	11/32 L	11/32						
FLASH$	5177	63/02 D	65/10	65/25	65/47	66/17	66/23	66/39	
		63/16	65/21	65/40	65/49	66/19	66/25		
		65/08	65/23	65/42	66/15	66/21	66/37		
FLASH$W	5214	63/09	63/14 D						
FLASH.IT	446	9/16	9/21	13/14 D	13/18	13/51			
FLASH.LP	462	13/24 L	13/50						
FLASH.RP	506	13/41 L	13/45						
FLASH.T1	515	13/25	13/33	13/47 L					
FLASH.X	511	13/39	13/43 D						
F.RPTS1	2	65/17 D	65/18	65/28	65/44	66/12	66/28		

SYMBOLIC REFERENCE TABLE.

GETCHAR	2122	19/31	20/05	22/22	33/42	35/11 D	57/19		
		19/51	20/09	33/14	35/08	57/09			
GETCHAR1	2115	35/06 L	35/15						
GETCHAR2	2117	35/08 L	35/19						
GETONE	756	55/52	55/53	56/01	56/03	56/10 D			
		55/53	56/01	56/02	56/04	56/16			
HEAD	530	11/38	11/40	14/15 L	14/18				
HEADLEN	6	11/37	11/39	14/18 D					
HEADREP	3	9/01 D	10/44						
HERE	72	5/01 D	6/44						
I	10	50/07 D	50/17	50/17	50/17	50/17	50/17	50/17	50/17
		50/17	50/17	50/17	50/17	50/17	50/17	50/17	50/17
		50/17	50/17	50/17	50/17	50/17	50/17	50/17	50/17 D
		50/17	50/17	50/17	50/17	50/17	50/17	50/17 D	50/17
		50/17	50/17	50/17	50/17	50/17	50/17 D	50/17	
		50/17	50/17	50/17	50/17	50/17 D	50/17	50/17	
		50/17	50/17	50/17	50/17 D	50/17	50/17	50/17	
		50/17	50/17	50/17 D	50/17	50/17	50/17	50/17	
		50/17	50/17 D	50/17	50/17	50/17	50/17	50/17	
		50/17 D	50/17	50/17	50/17	50/17	50/17		
INDEX	55	3/39 L	8/17	8/22	8/23	8/26			
INTAB	3061	48/42	49/06 L						
INTCHAN	11	2/06 D	48/43	48/45	59/38				
INTREPT	1051	16/28	19/06 L						
INTRM1	1156	20/04	20/13 L	20/15					
INTRPTA	1131	19/34	19/49 L						
INTRPTN	1126	19/36	19/46 L						
INTRPT1	1067	19/12	19/18 L						
INTRPT2	1073	19/17	19/22 L						
INTR.E	1122	19/32	19/42 L	24/09	29/27	30/41			
		19/38	20/11	28/17	30/02	57/28			
INTR.RT	1144	19/40	19/52	20/05 L					
INUSER	2212	37/32	38/06 L						
I1	44	3/30 L	21/23	24/12	25/14	26/20	29/46	30/26	58/04
		19/39	21/29	24/24	25/27	26/26	29/53	57/53	
		19/50	22/17	25/10	26/07	29/34	30/03	58/04	
I2	45	3/31 L	21/12	22/19	24/15	25/12	25/32	57/18	57/39
		20/08	21/20	22/49	24/26	25/18	30/27	57/31	57/49
I3	46	3/32 L	48/09	48/13					
I.DSP	6	2/11 D	59/09						
I.MSM	3	2/10 D	60/14						
I.POINTS	22	2/09 D	59/09	60/14					
I.SYSTAT	2	2/15 D	9/26						

J	0	50/08 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17
		50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D
		50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17
		50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D
		50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17
		50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D
		50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17
		50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D
		50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17
		50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D
		50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17
		50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D
		50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	
		50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	
		50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	
		50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	
		50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	
		50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	
		50/17 D	50/17	50/17 D	50/17	50/17 D	50/17	50/17 D	
KEYBOARD	707	8/07	16/15 L						
KEYCMST	2773	24/20	25/13	29/28	48/07 D	48/15			
KEYCMST1	2776	48/10 L	48/16						
KEYCMST2	3003	48/10	48/13 L						
KEYHEAD	536	11/03	14/19 L	14/22					
KEYNAME	56	3/40 L	11/04	25/09	29/19				
KEY.CMRQ	1403	24/29 L	25/25	29/35					
KEY.LEN	6	11/02	14/22 D						
KEY.RET	705	16/14 L	16/19	16/25	19/44	29/41			
L	130	5/11 D	30/29 D	46/36	59/35 D	67/21 D	67/28	67/36 D	67/43
		21/19 D	30/29	47/10 D	59/35	67/21	67/29 D	67/36	67/44 D
		21/19	37/34 D	47/10	59/41 D	67/22 D	67/29	67/37 D	67/44
		21/28 D	37/34	47/34 D	59/41	67/22	67/30 D	67/37	67/45 D
		21/28	37/41 D	47/34	59/49 D	67/23 D	67/30	67/38 D	67/45
		21/32 D	37/41	48/24 D	59/49	67/23	67/31 D	67/38	67/46 D
		21/32	38/36 D	48/24	60/43 D	67/24 D	67/31	67/39 D	67/46
		24/22 D	38/36	48/40 D	60/43	67/24	67/32 D	67/39	67/47 D
		24/22	43/13 D	48/40	61/06 D	67/25 D	67/32	67/40 D	67/47
		25/21 D	43/13	48/48 D	61/06	67/25	67/33 D	67/40	67/48 D
		25/21	44/19 D	48/48	61/12 D	67/26 D	67/33	67/41 D	67/48
		29/32 D	44/19	48/53 D	61/12	67/26	67/34 D	67/41	
		29/32	46/30 D	48/53	67/10 D	67/27 D	67/34	67/42 D	
		30/23 D	46/30	59/28 D	67/20 D	67/27	67/35 D	67/42	
		30/23	46/36 D	59/28	67/20	67/28 D	67/35	67/43 D	
LASTLT	2232	50/28 D							
LASTRT	2232	4/32	61/29	61/31	61/33	61/35	61/37	61/39	
		50/31 D	61/30	61/32	61/34	61/36	61/38	61/40	
LBUFF	3177	9/20	52/39	60/20	60/23	60/26	60/29	60/32	60/35
		30/45	53/07	60/20	60/23	60/26	60/29	60/32	60/35
		36/08	55/22	60/21	60/24	60/27	60/30	60/33	60/44
		50/26 D	59/05	60/21	60/24	60/27	60/30	60/33	
		50/28	60/19	60/22	60/25	60/28	60/31	60/34	
		51/06	60/19	60/22	60/25	60/28	60/31	60/34	
LEFT$	5160	62/09	62/11	62/22 L					

SYMBOLIC REFERENCE TABLE.

LINE1	324	4/37	44/35	52/31 D	52/40	61/41	67/50		
		4/38	51/52	52/39	61/41	67/49			
LINE1ORG	2	51/51 L	52/31						
LINE2	35	52/36 D	53/07	53/08	55/14				
LINE2ORG	331	52/34 L	52/36	52/39	52/40	53/07	53/08	54/37	55/15
LINE3	14	52/51 D	54/47	55/22	55/23				
LINE3ORG	655	44/23	52/45 L	52/51	54/36	54/48	55/22	55/23	67/51
LPCTR	7	11/52	14/27 D						
LSTSCREN	16	6/51 D	21/14	21/25	61/09				
L.ALPOCT	6	15/21	15/32 D						
L.DIS	65	4/34 L	10/50	21/33	22/41	36/06	40/28	46/26	
		9/18	21/30	22/37	30/42	38/48	44/27	46/28	
L.ERR	4	15/20	15/30 D						
L.FRMT	6	15/24	15/38 D						
L.LOST	5	15/23	15/36 D						
L.NO	4	15/26	15/42 D						
L.NOM	7	15/25	15/40 D						
L.RPTMOD	6	15/19	15/28 D						
L.SCREEN	15	15/22	15/34 D						
M	5115	59/39	60/20	60/23	60/26	60/29	60/32	61/47 D	
		60/18	60/21	60/24	60/27	60/30	60/33	61/51	
		60/19	60/22	60/25	60/28	60/31	60/34		
MAINLOOP	137	8/17 L	8/25	8/27	61/17				
MATCH	1506	26/13	26/26 L						
MAXBRITE	6	7/01 D	13/30	38/40	52/32	52/43			
MAXKEYBD	11	6/49 D	25/28	29/16	29/18				
MESBUFF	1011	11/31	16/49	18/03 L	19/20	25/11	29/10		
		16/38	17/17	19/13	19/22	25/31	29/14		
		16/41	17/19	19/16	19/29	26/10	29/33		
MESERR	3	3/05 L	16/24	17/08	19/43	29/36			
		11/09	17/04	17/11	23/07				
MESFLG	1	3/03 L	16/22	16/36	16/42	16/44	17/13	19/11	29/48
MESLEN	2	3/04 L	16/23	16/49	17/09	17/19	19/15	29/44	
		11/21	16/38	16/50	17/15	19/06	19/20		
		11/29	16/41	16/53	17/17	19/13	29/06		
MSTARSHL	5124	61/15	62/03 D	62/17					
MVEPNTS	5244	63/36 D	63/45	65/43	66/11				
MVEPNTS1	5250	63/39 L	63/44						
M.ALPOCT	634	15/13	15/31 L	15/32					
M.ERR	630	15/12	15/29 L	15/30					
M.FRMT	664	15/16	15/37 L	15/38					
M.LOST	657	15/15	15/35 L	15/36					
M.NO	701	15/18	15/41 L	15/42					
M.NOM	672	15/17	15/39 L	15/40					
M.RPTMOD	622	15/11	15/27 L	15/28					
M.SCREEN	642	15/14	15/33 L	15/34					
NOTCLR	723	16/21	16/26 L						
NOTCR	727	16/27	16/29 L						
NOTRPTMD	1056	19/07	19/11 L						
OCTABLE	3072	45/20	45/26	50/06 D					
OCTAL	1216	19/47	22/07 L						
OCTALBCD	2062	22/07	22/27	33/15	33/21	33/34 D	57/15	57/26	
OCTBCDL	2103	33/50 L	34/05						

SYMBOLIC REFERENCE TABLE.

OCTBCDN	2072	33/42 L	34/06						
OCTERR	1224	22/12 L	22/24	22/26	22/28	23/02			
OF	51	3/35 L	22/20	23/39	33/13	33/41			
OTHER	1461	20/02	26/06 L						
01	32	3/20 L	24/16	24/23	33/28	33/40	34/04		
02	33	3/21 L	33/35						
03	34	3/22 L	33/38						
04	35	3/23 L	22/16	22/47	23/10	23/37	33/37		
05	36	3/24 L	23/35	33/35	57/17	57/33			
		22/18	33/22	33/48	57/29	58/05			
PASS	1665	28/04	29/43 L						
PASSFLG	52	3/36 L	11/44	24/07	29/25	30/07	30/39		
PASSLEN	3	14/29 D	30/06						
PASSMES	553	11/46	14/28 L	14/29					
PASSWD	1716	29/53	30/13 L						
PASS1	1671	29/47 L	29/52	30/05					
PASS2	1712	30/07 L	30/11						
PCTR	544	11/53	14/23 L	14/27					
PCTRTAB	132	8/06 L	8/11	8/17	8/22	30/24	46/37	59/29	
PCTRTABE	5	8/11 D	8/24						
PPBUFF	5	3/37 L	47/16	60/20	60/23	60/26	60/29	60/32	60/35
		9/34	48/27	60/20	60/23	60/26	60/29	60/32	60/35
		9/36	48/29	60/21	60/24	60/27	60/30	60/33	67/06
		9/40	53/50	60/21	60/24	60/27	60/30	60/33	
		10/08	53/52	60/21	60/24	60/27	60/30	60/33	
		11/01	60/19	60/22	60/25	60/28	60/31	60/34	
		42/14	60/19	60/22	60/25	60/28	60/31	60/34	
		42/15	60/19	60/22	60/25	60/28	60/31	60/34	
		47/08	60/20	60/23	60/26	60/29	60/32	60/35	
PPBUFLEN	650	67/50 D							
PPLILEN	324	67/49 D							
PPP	650	67/51 D							
PPSHELEN	173	44/13	58/41 D	60/40					
P.CTR	550	9/42	9/46	14/26 L					
RBUFF	5477	9/15	30/51	36/12	50/30 D				
READCORE	2517	42/14 L	43/14						
READECS	2542	42/09	43/01 L						
READ1	753	16/37	16/47 L	17/01	17/12				
READ.1	747	16/42 L	16/52	17/16					
RESTORE	1721	28/07	30/20 L						
RIGHT$	5167	62/15	62/27 L						
RMLEFT	5	50/25 D							
RQ.CLOCK	11	6/20 L	47/37						
RQ.DATE	10	6/19 L	28/25						
RQ.ECSR	3	6/14 L	43/06						
RQ.ECSW	4	6/15 L	24/28						
RQ.INIT	12	6/21 L	59/32						
RQ.LOCK	1	6/12 L	28/23						
RQ.SMSG	6	6/17 L	25/24						
RQ.TIME	7	6/18 L	28/26						
RQ.UNLOC	2	6/13 L	28/24						
RQ.USER	5	6/16 L	38/18						
RSP	1714	28/05	30/10 L						

SYMBOLIC REFERENCE TABLE.

R.DIS	60	4/29 L	9/13	11/49	21/21	21/35	30/48	36/10	46/35
SCR	523	10/49	11/48	14/11 L	14/14				
SCRLEN	5	10/48	11/47	14/14 D					
SENDMSG	1423	19/26	25/09 L						
SENDMSG1	1450	20/16	25/27 L						
SENDMSG2	1430	25/13 L	25/33						
SENDOUTX	1444	25/19	25/23 D						
SETECS	1371	24/11	24/20 L	24/38					
SETKEYBD	1613	28/02	29/06 L						
SETKEYE	1616	29/09 L	29/17						
SPCE$	62	16/12 D	16/32	16/34					
STAR	5465	62/10	62/16	65/02 D	66/45				
STARBUF	5264	62/08	63/24	63/29	63/42	65/09	65/24	65/39	66/28
		62/14	63/26	63/40	63/49 L	65/14	65/35	66/14	
STARINCB	5364	63/39	64/02 L						
STARINIL	5227	63/25 L	63/31						
STARINIT	5220	63/20 D	63/32	65/04					
STARLP1	5474	65/07 L	65/33						
STARLP10	5655	66/36 L	66/44						
STARLP2	5506	65/13 L	65/16						
STARLP3	5515	65/20 L	65/27						
STARLP4	5547	65/39 L	66/07						
STARLP5	5556	65/43 L	66/06						
STARLP6	5562	65/46 L	65/51						
STARLP7	5606	66/03	66/09 L						
STARLP8	5610	66/11 L	66/33						
STARLP9	5614	66/14 L	66/27						
START	4337	3/02	59/09 L						
START1	4344	59/13 L	59/22						
START2	4357	59/14	59/25 L						
START3	4374	59/19 L	59/45						
STORESET	1355	22/31	24/07 L	24/17					
ST.B	565	14/31	14/39 L						
ST.I	572	14/33	14/43 L						
ST.P	576	14/35	14/47 L						
ST.S	570	14/32	14/41 L						
ST.U	564	14/30	14/37 L						
ST.W	574	14/34	14/45 L						
TABOFCOM	1513	26/08	27/06 D						
TENBYTE	767	56/02	56/03	56/04	56/05	56/19 D	56/33		
TIM.I	76	52/21 L	53/46						
TIM.IN	176	52/25 L	54/20						
TIM.R	57	52/20 L	53/52						
TIM.SW	154	52/24 L	53/49						
TIM.SY	135	52/23 L	53/48						
TIM.U	115	52/22 L	53/47						
TOP	7134	51/16 D	52/05	52/13	52/21	52/25 D	52/28	52/34	
		52/03	52/07	52/18	52/22 D	52/25	52/29 D	52/35 D	
		52/04	52/08	52/19 D	52/22	52/26 D	52/29	52/35	
		52/04	52/09	52/19	52/23 D	52/26	52/30 D	52/36 D	
		52/04	52/12 D	52/20 D	52/23	52/27 D	52/30	52/36	
		52/05	52/12	52/20	52/24 D	52/27	52/31 D	52/45	
		52/05	52/13 D	52/21 D	52/24	52/28 D	52/31	52/48	

TRY	147	26/12 L	26/18						
TRY1	146	26/10 L	26/25						
T0	24	3/14 L	10/37	33/24	33/53	40/33	41/05	45/21	45/35
		9/43	10/38	33/26	34/03	40/34	41/06	45/22	53/14
		10/09	23/22	33/27	40/15	40/36	41/39	45/27	54/12
		10/27	23/23	33/49	40/25	40/38	42/22	45/28	54/18
		10/28	33/23	33/50	40/26	40/39	42/24	45/34	54/53
T1	25	3/15 L	16/40	29/33	37/17	44/20	53/30	60/41	65/12
		8/18	16/47	30/21	37/18	44/25	53/32	60/44	65/14
		8/19	19/28	30/24	38/34	44/34	53/53	61/10	65/15
		10/05	22/48	32/16	38/37	44/36	54/08	61/13	65/19
		10/17	23/09	32/19	38/46	46/34	54/13	63/22	65/26
		10/22	23/16	32/22	38/53	46/37	55/51	63/26	65/45
		10/29	24/29	32/24	40/43	47/14	56/12	63/27	65/50
		11/12	24/33	32/27	40/50	47/15	56/14	63/29	66/13
		11/13	25/17	32/30	40/53	47/16	57/08	63/30	66/26
		11/17	25/22	32/31	41/02	47/19	59/12	63/38	66/35
		13/15	26/11	35/12	41/25	53/15	59/13	63/39	66/43
		13/22	26/14	35/14	41/44	53/22	59/21	63/40	
		13/49	26/16	37/15	42/08	53/25	59/26	63/42	
		16/35	29/30	37/16	44/14	53/26	59/29	63/43	
T2	26	3/16 L	13/21	19/30	35/17	44/33	54/14	57/43	66/02
		9/14	13/23	20/13	40/45	45/17	54/50	57/51	66/10
		9/19	13/24	23/11	40/47	45/23	55/53	59/15	66/31
		9/41	13/26	23/24	40/49	45/29	55/53	59/17	
		10/21	13/35	32/15	41/03	53/17	56/01	59/20	
		10/26	13/38	32/18	41/34	54/02	56/01	65/06	
		13/16	13/41	35/06	42/16	54/07	57/06	65/31	
		13/19	13/48	35/16	44/32	54/09	57/38	65/38	
T3	27	3/17 L	13/20	23/43	26/22	33/52	53/19	56/23	57/50
		9/38	13/47	26/09	26/24	34/02	54/04	56/26	65/03
		10/16	23/13	26/12	26/27	41/36	54/15	56/31	66/18
		10/19	23/17	26/17	26/28	42/18	55/02	57/46	66/22
		10/25	23/32	26/21	33/47	45/30	56/20	57/47	66/36
T4	30	3/18 L	13/29	24/10	42/20	56/22	62/12	65/41	66/24
		9/39	13/34	41/11	45/32	56/27	65/07	65/46	66/38
		10/03	13/44	41/17	53/20	56/29	65/20	65/48	
		10/31	22/21	41/37	55/03	62/06	65/22	66/16	
T5	31	3/19 L	10/45	22/46	23/40	41/19	45/26	58/03	63/11
		10/07	12/02	23/08	23/42	45/19	57/35	63/03	
		10/35	22/15	23/30	30/46	45/20	57/36	63/04	
		10/40	22/29	23/36	30/47	45/25	57/45	63/07	
T.CORE	1	6/05 D	22/38	61/29	61/30	61/31	61/32		
T.PPU	3	6/07 D	61/41						
T.USER	2	6/06 D	61/34	61/36	61/38	61/40			
		61/33	61/35	61/37	61/39				
UDI	37	3/25 L	37/14	38/07	38/17	40/16	40/23	44/06	
		36/07	37/30	38/10	38/47	40/20	40/27	44/12	
		36/11	37/36	38/15	40/06	40/21	41/12	44/26	

SYMBOLIC REFERENCE TABLE.

UD2	40	3/26 L	39/02	41/48	42/26	53/49	54/46	55/53	56/03
		37/13	39/06	41/52	44/15	53/52	54/48	56/01	56/04
		38/27	39/08	41/53	44/24	54/21	54/52	56/01	56/07
		38/29	39/10	42/02	44/37	54/32	55/14	56/01	56/04
		38/31	40/14	42/03	44/39	54/33	55/15	56/02	56/05
		38/39	41/40	42/05	53/13	54/34	55/19	56/02	56/08
		38/43	41/42	42/07	53/46	54/35	55/52	56/02	
		38/44	41/43	42/21	53/47	54/36	55/53	56/03	
		39/01	41/47	42/25	53/48	54/37	55/53	56/03	
UD3	41	3/27 L	38/30	39/07	40/35	42/28	42/29		
UD4	42	3/28 L	39/09	40/09	40/12	41/08			
		38/32	40/07	40/11	40/42	41/28			
UD5	43	3/29 L	41/18	41/20	41/23	41/26			
UPD	2154	36/09	37/12 D	37/38	39/11	56/06			
		36/13	37/20	38/16	42/30				
UPDATE	2136	8/08	36/06 L						
UPDCORE	2323	37/21	40/06 L						
UPDPPCON	367	53/12 D	53/33	53/47	53/49	54/21	54/33	54/35	
		53/29	53/46	53/48	53/52	54/32	54/34	55/14	
UPDPPU	2564	37/23	44/06 L						
UPDPPUB	417	44/39	53/45 L						
UPDPPUB2	671	55/19	55/26 D						
UPDPPUX	2606	44/17	44/21 D						
UPDPPU1	2631	44/09	44/39 L						
UPDTAB	2166	37/16	37/20 L						
UPDUSER	2172	37/22	37/30 L						
UPD.RET	2134	36/04 L	36/14						
WHATININ	2260	38/28	38/38 D						
X	6717	51/35 D	52/04	52/05	52/05 D	52/06 D	52/08	52/09	
		52/04	52/04 D	52/05	52/05	52/08	52/09	52/10	
		52/04	52/04	52/05	52/06	52/08 D	52/09 D		
ZERO	17	3/13 L	30/30	30/32	37/43	48/49	59/50		
ZERO$	5155	62/05	62/20 L						