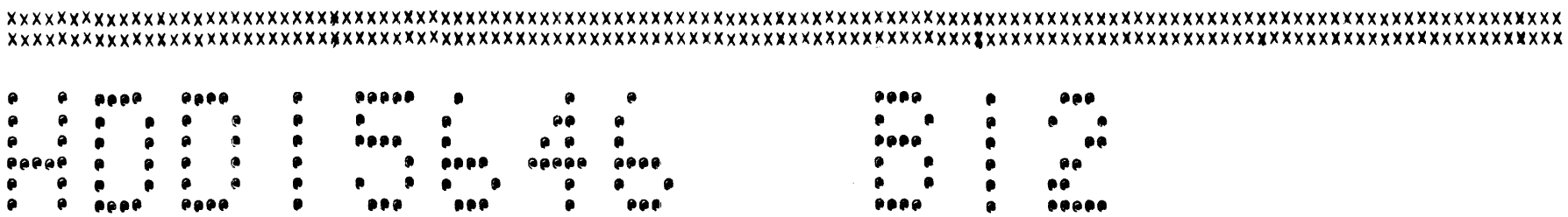

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```
**********************************
**********************************
**                              **
**  PDP-9 MINI TIME-SHARING SYSTEM  **
**  SPECIAL IOT HANDLER OVERLAY #1  **
**            DTSS:SPL            **
**            MTSS:B12            **
**                              **
**********************************
**********************************
```

```
100             .TITLE  SPECIAL IOT INSTRUCTION (EXECUTIVE SERVICE CALL) HANDLER
110             .NAME   SPL--B12
120             .INSRT  DEFINS
100             .IFUND  DEFINS
```

```
5720            .LIST   ON
5730            .END
130             .HEAD   Q
140     *               1610
150     *
160     *       ENTRY TO THE SPECIAL IOT INSTRUCTION (EXECUTIVE CALL) HANDLER IS
170     *       FROM THE SWAPPER WITH:
180     *
190     *            1) THE PROGRAM INTERRUPT SYSTEM TURNED OFF
200     *            2) $DKLOK = 0
210     *            3) $RCORE = CURRENT CORE USER
220     *            4) AC, 10, 11 AND RESTART DATA NOT SAVED BOTH IN THE INTERRUPT SAVE LOCATIONS
230     *               AND IN THE USER JOB TABLE.
240     *            5) CLOCK IS ON
250     *
260     *       IN ORDER TO PERMIT TELETYPE INPUT/OUTPUT TO CONTINUE, THE SPECIAL
270     *       HANDLER RUNS WITH THE FOLLOWING SETTINGS:
280     *            1) $DKLOK IS NEGATIVE
290     *            2) $RCORE = 0
300     *            3) THE PROGRAM INTERRUPT SYSTEM TURNED ON
310     *            4) CLOCK IS ON
320     *            5) SAVE THE AC, ETC INTO THE USER JOB TABLE
330     *
340     *
350     *       IN ALL CASES, EXIT IS TO THE SWAPPER WITH THE FOLLOWING SETTINGS:
360     *            1) $DKLOK IS NEGATIVE
370     *            2) $RCORE IS RESET TO THE VALUE IT HAD ON ENTRANCE
380     *            3) AC, 10, 11, AND RESTART DATA ARE ALSO RESET
390     *            4) PROGRAM INTERRUPT SYSTEM TURNED OFF
400     *            5) CLOCK IS ON
```

```
                Q                       CORE LAYOUT FOR THIS OVERLAY

                    410                 .STITL  CORE LAYOUT FOR THIS OVERLAY
                    420         *
                    430         *
                    440         *       THE LAST 400(8) WORDS OF THE OVERLAY AREA ARE USED BY THIS OVERLAY
                    450         *       AS A BUFFER AREA TO ALLOW READING IN OF A FULL DEVICE CATALOG AT ONCE.
                    460         *
                    470         *       CORE IS ALLOCATED UNDER TWO USE COUNTERS: 'PERM' AND 'OVRLAY'.
                    480         *       'PERM' CONTAINS THE CODE WHICH MUST BE CORE-RESIDENT AT ALL TIMES.
                    490         *       'OVRLAY' CONTAINS THAT CODE WHICH WILL NOT BE NEEDED ANY MORE AFTER
                    500         *       THE CATALOG IS READ IN. IF 'PERM' GETS TOO LONG (I.E. IF IT STARTS
                    510         *       TO INTRUDE INTO THE OVERLAY AREA) AN ASSEMBLY-TIME ERROR MESSAGE
                    520         *       IS GENERATED.
                    530         *
                    540         *       ARRANGE THE USE COUNTERS IN ORDER:
    001000          550                 .LOC    OVSTRT
    001000          560                 .USE    PERM
p001000  601447     570                 JMP     SPLST           START THE PROGRAM
    001300          580                 .USE    OVRLAY
                    590
    001300          600         BUFFER  .EQU    1300            START OF THE CATALOG BUFFER AREA
                    610                 .IFG    CHECK,BUFFER    PRINT THE ASSEMBLY ERROR MESSAGE IF 'PERM' IS TOO LONG
```

```
                Q                       MPOFF (705000)      TERMINATE (705001)

                      630               .STIT   MPOFF (705000)      TERMINATE (705001)
           001300     640               .USE    OVRLAY
                      650     *
                      660     *
                      670     *         SPECIAL IOT INSTRUCTIONS ARE THE MEANS BY WHICH A PROGRAM RUNNING
                      680     *         UNDER MTSS CAN CALL UPON THE EXECUTIVE FOR SYSTEM SERVICES. THE
                      690     *         FUNDAMENTAL SPECIAL IOT INSTRUCTION IS 705000. POSSIBLE SPECIALS
                      700     *         RANGE FROM SPECIAL+0 TO SPECIAL+377, ONLY A FEW OF THESE ARE
                      710     *         CURRENTLY ENABLED, LEAVING THIS AS ONE AREA FOR MAJOR FUTURE
                      720     *         SYSTEM EXPANSION.
                      730     *
                      740     *
                      750     *         MPOFF (705000) IS LEGAL ONLY FOR PHANTOM PROGRAMS.
                      760     *         CONTROL IS RETURNED TO THE USER AT THE NEXT INSTRUCTION AFTER THE
                      770     *         SPECIAL, WITH THE STATE OF THE MACHINE UNCHANGED EXCEPT THAT
                      780     *         USER MODE IS DISABLED.
                      790     *         THE PROGRAM ITSELF SHOULD RE-ENABLE USER MODE AS SOON AS POSSIBLE
                      800     *         BY ISSUING AN MPEU (701742) INSTRUCTION TO GUARD AGAINST ITS
                      810     *         OWN  BUGS CRASHING THE SYSTEM.
                      820     *
                      830     *         MPOFF SHOULD BE DISALLOWED AS SOON AS PRACTICABLE BY ADDING ENOUGH
                      840     *         EXECUTIVE SERVICES TO THE SYSTEM TO MAKE IT UNNECESSARY. THIS WILL
                      850     *         GREATLY ENHANCE SYSTEM RELIABILITY.
                      860     *
                      870     *
           001300     880     SP000     ...                           TURN OFF MEMORY PROTECT (MPOFF)
001300     101521     890               JMS     PHCHK                 ONLY PHANTOM PROGRAMS CAN BE ALLOWED TO TURN OFF MEMORY PROTECT.
001301     201776     900               LAC     $RSTRT                GET THE RESTART
001302     501633     910               AND     (677777)              REMOVE THE MEMORY PROTECTION BIT
001303     041776     920               DAC     $RSTRT                REPLACE THE RESTART
001304     140703     930               DZM     $OC1                  NO NEW OVERLAY REQUESTED
001305     140704     940               DZM     $OC2                  NO RESTART OVERRIDE REQUESTED
001306     601077     950               JMP     SPLDON                EXIT
                      960     *
                      970     *
                      980     *
                      990     *         TERMINATE (705001) IS LEGAL FOR ALL PROGRAMS.
                     1000     *         ITS EFFECT IS EXACTLY THE SAME AS IF A HLT INSTRUCTION WERE ENCOUNTERED
                     1010     *         IN THE RUNNING PROGRAM EXCEPT IT RETURNS CONTROL TO THE MONITOR
                     1020     *         WITHOUT THE ERROR MESSAGE "HALTED AT..." BEING PRINTED. IN EITHER
                     1030     *         CASE, IF THE MONITOR IS REQUESTED TO 'CONTINUE', PROGRAM EXECUTION
                     1040     *         WILL BE RESUMED AT THE NEXT INSTRUCTION WITH REGISTERS UNALTERED.
                     1050     *
                     1060     *
                     1070     *
           001307    1080     SP001     ...                           TERMINATE THE RUN AND RETURN TO THE MONITOR
001307     750000    1090               CLA                           REQUEST THE MONITOR

001310     601074    1100               JMP     ERR                   WILL NOT PRINT AN ERROR MESSAGE
```

```
Q                                       PHYSICAL DISK/DECTAPE READ (705002, 705003) & WRITE (705004, 705005)

                1110            .STITL  PHYSICAL DISK/DECTAPE READ (705002, 705003) & WRITE (705004, 705005)
001311          1120            .USE    OVRLAY
                1130    *
                1140    *
                1150    *       THE DISK AND DECTAPE SPECIALS MAKE USE OF A MODIFIED STANDARD GROWTH SYSTEM
                1160    *       DISK/DECTAPE HANDLER; TO SIMPLIFY MODIFYING STAND-ALONE PROGRAMS
                1170    *       TO RUN UNDER MTSS THE FORMAT USED BY THE SPECIALS IS THE SAME
                1180    *       ONE THAT THE HANDLER NORMALLY USES ANYWAY.
                1190    *
                1200    *       ALL DISK/DECTAPE SPECIALS ARE EXECUTED WITH THE AC CONTAINING
                1210    *       A POINTER TO A LIST OF PARAMETERS OF THE FOLLOWING FORM:
                1220    *            WORD1: BITS 0-2 ARE THE DECTAPE HANDLER NUMBER OR THE
                1230    *                   PHYSICAL DISK NUMBER, AS APPROPRIATE.
                1240    *                   BIT 3 = 0 FOR A DECTAPE OPERATION; = 1 FOR A DISK OPERATION.
                1250    *                   BITS 8-17 CONTAIN THE BLOCK NUMBER FOR THE START OF THE
                1260    *                   DATA TRANSFER.
                1270    *            WORD2: CORE ADDRESS FOR THE START OF THE DATA TRANSFER.
                1280    *            WORD3: WORD COUNT TO BE TRANSFERRED.
                1290    *
                1300    *       THE DISK/DECTAPE SPECIALS PERFORM THE FOLLOWING CHECKS:
                1310    *            1) AN ATTEMPT TO READ OR WRITE OFF THE END OF A DECTAPE OR DISK GENERATES
                1320    *               AN ERROR MESSAGE FOR THE USER.
                1330    *            2) AN ATTEMPT TO TRANSFER DATA TO OR FROM A CORE ADDRESS IN
                1340    *               EXCESS OF 8K GENERATES AN ERROR MESSAGE FOR THE USER.
                1350    *            3) A CORE ADDRESS BELOW THE MEMORY PROTECT BOUNDARY IS LEGAL
                1360    *               ONLY FOR PHANTOM PROGRAMS. IF A USER PROGRAM ATTEMPTS
                1370    *               A DATA TRANSFER TO OR FROM SUCH AN ADDRESS, AN ERROR
                1380    *               MESSAGE IS GENERATED FOR HIM.
                1390    *            4) AN ATTEMPT TO TRANSFER DATA TO/FROM A NON-EXISTANT DISK
                1400    *               GENERATES AN ERROR MESSAGE FOR THE USER.
                1410    *            5) AN ATTEMPT TO TRANSFER DATA TO/FROM A DECTAPE NOT ASSIGNED
                1420    *               TO THE USER GENERATES AN ERROR MESSAGE.
                1430    *            6) AN ATTEMPT BY A USER PROGRAM TO WRITE TO THE PHYSICAL
                1440    *               DISK GENERATES AN ERROR MESSAGE.
                1450    *
                1460    *       THE DISK/DECTAPE SPECIALS PROVIDE ALL PROGRAMS WITH THE CAPABILITIES OF:
                1470    *            1)READING OR WRITING IN A LOGICAL-BLOCK-ADDRESSED FORMAT
                1480    *               THE PROGRAM'S DECTAPES OR "USER "PHYSICAL DISK".
                1490    *            2) READING IN A LOGICAL-BLOCK-ADDRESSED FORMAT THE ACTUAL PHYSICAL DISK.
                1500    *
                1510    *       IN ADDITION, PHANTOM PROGRAMS CAN WRITE IN A LOGICAL-BLOCK-ADDRESSED
                1520    *       FORMAT THE ACTUAL PHYSICAL DISK.
                1530    *
                1540    *       THESE CAPABILITIES ALLOW DEVICE INDEPENDENT PROGRAMMING
                1550    *       WITH RESPECT TO DISK AND DECTAPE.
                1560    *
                1570    *        RETURN OF CONTROL TO THE USER:
                1580    *            1) IF THE DISK/DECTAPE TRANSFER IS SUCCESSFULLY COMPLETED
                1590    *               CONTROL IS RETURNED TO THE USER AT THE ADDRESS THE USER PASSED IN THE MQ.
                1600    *            2) IF A DEVICE ERROR WAS ENCOUNTERED CONTROL IS RETURNED TO
                1610    *               THE USER ONE LOCATION PAST THE SPECIAL.
                1620    *            3) IF A USER SOFTWARE ERROR IS ENCOUNTERED AN ERROR
```

```
                Q                       PHYSICAL DISK/DECTAPE READ (705002, 705003) & WRITE (705004, 705005)

                1630    *               MESSAGE IS PRINTED ON HIS TELETYPE AND CONTROL
                1640    *               IS RETURNED TO MONITOR.
                1650    *
                1660    *        SOME POSSIBLE CAUSES OF A "DEVICE ERROR" ARE:
                1670    *            1) A DISK OR DECTAPE HARDWARE MALFUNCTION
                1680    *            2) A DECTAPE CALLED WHICH HAS NOT BEEN REMOTE-ENABLED.
                1690    *            3) A DECTAPE NOT WOUND FAR ENOUGH  ONTO THE SPOOL TO START.
                1700    *
                1710    *
                1720    *
                1730    *
                1740    *       READ (705002) AND WRITE (705004) ARE LEGAL FOR ALL PROGRAMS.
                1750    *       THESE SPECIALS USE THE STANDARD DISK/DECTAPE FORMAT (SEE ABOVE.)
                1760    *       THEY CAUSE THE OPERATION INDICATED BY THEIR PARAMETERS TO BE
                1770    *       ATTEMPTED TO/FROM THE DECTAPE OR "USER PHYSICAL DISK".
                1780    *            1) IF THE READ/WRITE IS TO/FROM DECTAPE, IT IS PASSED ALONG
                1790    *               UNALTERED.
                1800    *            2) IF THE READ/WRITE IS TO/FROM THE DISK, THE BLOCK NUMBER
                1810    *               IS UNDERSTOOD TO REFER TO THE BLOCK DESIRED ON THE USER'S
                1820    *               "PHYSICAL DISK".
                1830    *
                1840    *       PREAD (705003) AND PWRITE (705005) ARE IDENTICAL TO READ AND
                1850    *       WRITE EXCEPT THAT:
                1860    *            1) DISK REFERENCES ARE TO THE ACTUAL PHYSICAL DISK INSTEAD OF
                1870    *               TO THE "USER PHYSICAL DISK".
                1880    *            2) PWRITE IS ILLEGAL FOR USER PROGRAMS
                1890    *
                1900    *
                1910    *
                1920    *
    001311      1930            .USE    OVRLAY
    001311      1940    SP005   ...                     PWRITE
001311  101521  1950            JMS     PHCHK           PWRITE IS LEGAL ONLY FOR PHANTOM PROGRAMS
001312  761255  1960            LAW     WRITE           LOAD A POINTER TO THE WRITE COMMANDS
001313  741000  1970            SKP
    001314      1980    SP003   ...                     PREAD
001314  761257  1990            LAW     READ            LOAD A POINTER TO THE READ COMMANDS
001315  101622  2000            JMS     PARAM1          SET UP THE PARAMETERS LIST; DO SOFTWARE ERROR CHECKS
001316  601323  2010            JMP     SP4
                2020
    001317      2030    SP002   ...                     READ
001317  761257  2040            LAW     READ            LOAD A POINTER TO THE READ COMMANDS
001320  741000  2050            SKP
    001321      2060    SP004   ...                     WRITE
001321  761255  2070            LAW     WRITE           LOAD A POINTER TO THE WRITE COMMANDS
001322  101526  2080            JMS     PARAM           SET UP THE PARAMETERS LIST; DO SOFTWARE ERROR CHECKS
                2090
    001323      2100    SP4     ...                     ALL DISK SPECIALS CONVERGE HERE
001323  761117  2110            LAW     TEMP0-1         LOAD A POINTER TO THE PARAMETERS LIST
001324  101130  2120            JMS     DO              DO THE OPERATION
001325  601077  2130            JMP     SPLDON          SOME SORT OF HARDWARE ERROR OCCURRED
001326  201124  2140            LAC     XFER            GOOD RETURN -- LOAD THE USER'S REQUESTED RETURN
```

Q PHYSICAL DISK/DECTAPE READ (705002, 705003) & WRITE (705004, 705005)

```
001327  500651  2150          AND     $ADRSS          MASK TO JUST THE ADDRESS BITS
001330  241264  2160          XOR     TPMSK           PUT THE MEMORY PROTECT BIT IN
001331  041776  2170          DAC     $RSTRT          SET IT FOR THE EXIT ROUTINE
001332  601077  2180          JMP     SPLDON          RETURN TO THE USER
```

```
                0                       OPEN (705018)

                        2190            .STITL  OPEN (705018)
            001333      2200            .USE    OVRLAY
                        2210    *
                        2220    *
                        2230    *       OPEN (705018) IS LEGAL FOR ALL PROGRAMS.
                        2240    *       THE DISK FILE WHOSE NAME IS PASSED IN THE AC IS LOCATED AND ITS
                        2250    *       PARAMETERS ARE STORED IN THE USER'S JOB TABLE.
                        2260    *
                        2270    *       ON ENTRANCE THE FOLLOWING PARAMETERS ARE PASSED:
                        2280    *               AC: FILENAME TO BE OPENED
                        2290    *            WORD1: OPEN
                        2300    *            WORD2: BITS 0-2 HANDLER NUMBER
                        2310    *                   BIT 3 IS 0 FOR DECTAPE; 1 FOR DISK
                        2320    *
                        2330    *       RETURN TO THE USER IS:
                        2340    *            +1 FOR A HARDWARE ERROR
                        2350    *            TO AN ERROR MESSAGE AND THE MONITOR FOR A SOFTWARE ERROR
                        2360    *            +2 FOR SUCCESS
                        2370    *
                        2380    *       IN ADDITION TO ANY APPLICABLE ERROR MESSAGE WHICH CAN BE CAUSED BY
                        2390    *       A DISK/DECTAPE SPECIAL, OPEN CAN ALSO CAUSE A "FILE NOT FOUND"
                        2400    *       MESSAGE.
                        2410    *
            001333      2420    $0006   ...                     OPEN THE FILE WHOSE NAME WAS PASSED IN THE AC
                        2430    *
                        2440    *       GET THE CATALOG FROM THE DEVICE SPECIFIED
                        2450    *
                        2460    *       FIRST GET THE DEVICE ADDRESS
                        2470    *
    001333  760000      2480            LAW     0               LOAD A DEVICE NUMBER/TYPE MASK
    001334  521776      2490            AND     SRSTRT,X        GET THE REQUESTED DEVICE NUMBER/TYPE
    001335  441776      2500            INX     SRSTRT          CORRECT THE RETURN
    001336  041120      2510            DAC     TEMP0           SAVE THE DEVICE NUMBER/TYPE FOR LATER OPERATIONS
    001337  041115      2520            DAC     DA              SET THE DEVICE ADDRESS FOR THE CATALOG READ
    001340  441115      2530            INX     DA              SET THE DEVICE ADDRESS TO BE THE CATALOG BLOCK
                        2540    *
                        2550    *       READ THE CATALOG
                        2560    *
    001341  761114      2570            LAW     DA-1            GET A POINTER TO THE PARAMETERS LIST
    001342  601001      2580            JMP     OPEN2
        001001          2590            .USE    PERM
    001001  101130      2600    OPEN2   JMS     DO              READ THE CATALOG
    001002  601077      2610            JMP     SPLDON          SOME SORT OF HARDWARE ERROR
    001003  441776      2620            INX     SRSTRT          GOOD READ -- BUMP THE RETURN
                        2630    *
                        2640    *       NOW FIND THE REQUESTED FILE
                        2650    *
    001004  761303      2660            LAW     BUFFER+3        LOAD A POINTER TO THE FIRST FILE CONTROL BLOCK
    001005  040010      2670            DAC     10              AND SAVE IT FOR INDEXING
    001006  201302      2680            LAC     BUFFER+2        GET THE COUNT OF SAVED FILES
    001007  041121      2690            DAC     TEMP1           AND SAVE IT
    001010  201753      2700    OPEN4   LAC     SAC             GET THE NAME TO SEARCH FOR
```

```
                Q                               OPEN (705018)

001011  560010  2710            SAD     10,X            CHECK IT AGAINST THE NEXT SAVED FILE'S NAME
001012  601021  2720            JMP     OPEN6           FOUND IT!!!
001013  200010  2730            LAC     10
001014  341634  2740            TAD     (FCBLEN-1)      FAILED -- MOVE THE POINTER TO THE NEXT FILE CONTROL BLOCK
001015  040010  2750            DAC     10
001016  441121  2760            ISZ     TEMP1           COUNT THE FILE JUST CHECKED
001017  601010  2770            JMP     OPEN4           TRY THE NEXT ONE
001020  601064  2780            JMP     ERR11           UTTER FAILURE -- THE FILE IS NOT SAVED
                2790    *
                2800    *       THE REQUESTED FILE HAS BEEN FOUND -- TRANSFER THE FILE CONTROL
                2810    *       BLOCK DATA TO THE JOB TABLE.
                2820    *
001021  220010  2830    OPEN6   LAC     10,X            LOAD THE FILE'S DEVICE ADDRESS
001022  501265  2840            AND     BMSK            RETAIN JUST THE BLOCK NUMBER
001023  241120  2850            XOR     TEMP0           FORM THE CURRENT DEVICE ADDRESS
001024  041700  2860            DAC     SFRDA           SET IT IN THE JOB TABLE -- REFERRING TO ITS CURRENT HANDLER
001025  220010  2870            LAC     10,X
001026  041701  2880            DAC     SFRCA           SET THE FILE'S CORE ADDRESS IN THE JOB TABLE
001027  220010  2890            LAC     10,X
001030  041702  2900            DAC     SFRLEN          SET THE FILE'S LENGTH IN THE JOB TABLE
001031  220010  2910            LAC     10,X
001032  041703  2920            DAC     SFRSTA          SET THE FILE'S TRANSFER ADDRESS IN THE JOB TABLE
001033  601077  2930            JMP     SPLDON          EXIT
```

```
          Q                       COPY (705019)

                2940              ,STITL  COPY (705019)
          001343      2950        ,USE    OVRLAY
                      2960    *
                      2970    *
                      2980    *   COPY (705019) IS LEGAL FOR ALL PROGRAMS.
                      2990    *   IT PROVIDES CORE-TO-DEVICE AND DEVICE-TO-CORE COPIES TO OR
                      3000    *   FROM FILES ON DECTAPE OR ON THE SYSTEM DISK.
                      3010    *   ON ENTRANCE, THE PARAMETERS PASSED ARE:
                      3020    *           AC: BIT 0 : = 0 FOR DEVICE-TO-CORE COPY
                      3030    *                       = 1 FOR CORE-TO-DEVICE COPY
                      3040    *           MQ: BITS 5-17: USER'S DESIRED RESTART ADDRESS
                      3050    *        WORD1: COPY
                      3060    *        WORD2: BITS 5-17: STARTING CORE ADDRESS FOR THE COPY
                      3070    *        WORD3: LENGTH OF THE COPY
                      3080    *
                      3090    *   DEFINITIONS USED IN THE COPY ROUTINES:
                      3100    *        $FRDA: FILE'S DEVICE ADDRESS
                      3110    *        $FRCA: FILE'S CORE ADDRESS
                      3120    *       $FRLEN: FILE'S LENGTH IN WORDS
                      3130    *          FEA: FILE'S END ADDRESS+1
                      3140    *   LIKEWISE RCA, RLEN, AND REA ARE USED FOR THE VALUES REQUESTED
                      3150    *   BY THE SPECIAL CALL AND CDA, CCA, CLEN, AND CEA ARE USED TO
                      3160    *   DESIGNATE THE VALUES DECIDED ON BY THE COPY ROUTINES.
                      3170    *
                      3180    *
                      3190    *   THE INTERSECTION OF THE SAVED FILE (WHICH MUST HAVE BEEN PREVIOUSLY
                      3200    *   "OPEN"ED) WITH THE PORTION OF USER CORE INDICATED BY THE REQUESTED
                      3210    *   CORE ADDRESS AND LENGTH WILL BE COPIED.
                      3220    *
                      3230    *   THE COPY VALUES ARE DECIDED AS FOLLOWS:
                      3240    *        1) CCA = GREATER (SFRCA,RCA)
                      3250    *        2) CEA = LESSER (FEA,REA)
                      3260    *        3) CLEN = CEA-CCA (CLEN > 0 ELSE ERROR MESSAGE IS PRINTED)
                      3270    *        4) STOFF = CCA - $FRCA IS START ADDRESS OFFSET
                      3280    *        5) SOB = INTEGER (STOFF/400) IS STOFF IN BLOCKS
                      3290    *        6) SOW = REMAINDER (STOFF/400) IS STOFF - SOB (0 <= SOW <=377)
                      3300    *                 THIS IS THE NUMBER OF WORDS THE START IS PAST
                      3310    *                 AN EVEN BLOCK BOUNDARY ON THE FILE'S DEVICE
                      3320    *        7) CDA = $FRDA + SOB IS THE FIRST BLOCK BOUNDARY BEFORE THE
                      3330    *                 DESIRED STARTING WORD
                      3340    *
                      3350    *   CONTROL IS RETURNED TO THE USER AFTER A SUCCESFUL COPY AT THE
                      3360    *   USER-SPECIFIED RESTART ADDRESS. THIS ALLOWS A 100% OVERLAY.
                      3370    *
                      3380    *   AN ERROR MESSAGE IS PRINTED AND CONTROL IS RETURNED TO MONITOR
                      3390    *   IF FOR ANY REASON THE COPY WAS UNSUCCESSFUL.
                      3400    *   THIS IS BECAUSE THAT IS WHAT SHOULD HAPPEN FOR A SOFTWARE ERROR
                      3410    *   ON THE PART OF THE USER. IF THE ERROR WAS A HARDWARE ERROR, IT IS
                      3420    *   PROBABLY UNRECOVERABLE, ANYWAY.
                      3430    *
                      3440    *
                      3450    *   THE DEVICE-TO-CORE COPY ALGORITHM IS:
```

Q COPY (705019)

```
                    3460    *
                    3470    *           1) IF SOW = 0 GOTO 5, SINCE THERE ARE NO ODD WORDS TO COPY
                    3480    *           2) COPY FROM CDA TO BUFFER FOR 400 WORDS (ONE BLOCK)
                    3490    *           3) CORE-COPY FROM (BUFFER+SOW) TO CCA FOR (400-SOW) WORDS
                    3500    *           4) CDA := CDA + 1
                    3510    *              CCA := CCA + 400 - SOW
                    3520    *             CLEN := CLEN - SOW
                    3530    *           5) IF CLEN <= 0 THEN DONE
                    3540    *           6) COPY FROM CDA TO CCA FOR CLEN WORDS
                    3550    *           7) DONE
                    3560    *
                    3570    *
                    3580    *       THE CORE-TO-DEVICE COPY IS NOT YET IMPLIMENTED
                    3590    *
                    3600    *
                    3610    *       INITIALIZE THE COPY
    001120          3620    SOB     ,EQU    TEMP0
    001120          3630    CDA     ,EQU    TEMP0
    001121          3640    RCA     ,EQU    TEMP1
    001121          3650    CCA     ,EQU    TEMP1
    001122          3660    RLEN    ,EQU    TEMP2
    001122          3670    CLEN    ,EQU    TEMP2
    001123          3680    STOFF   ,EQU    TEMP3
    001123          3690    SOW     ,EQU    TEMP3
    001343          3700    SP007   ,,,                     COPY
001343  141124      3710            DZM     XFER            INITIALIZE THE COPY DIRECTION FLAG
001344  777777      3720            LAW     -1
001345  341776      3730            TAD     SRSTRT          ADD THE SPECIAL'S ADDRESS
001346  040010      3740            DAC     10              SET A POINTER TO THE COPY PARAMETERS
001347  501635      3750            AND     (700000)        RETAIN JUST THE USER'S MACHINE STATE
001350  041776      3760            DAC     SRSTRT          AND SAVE IT FOR NOW
001351  201753      3770            LAC     SAC             LOAD THE USER'S DESIRED RESTART ADDRESS
001352  741100      3780            SPA                     SKIP IF A DEVICE-TO-CORE COPY IS REQUESTED
001353  441124      3790            INX     XFER            ELSE FLAG A CORE-TO-DEVICE COPY
001354  501636      3800            AND     (077777)        RETAIN JUST THE ADDRESS BITS
001355  241776      3810            XOR     SRSTRT          ADD IN THE PREVIOUS MACHINE STATE
001356  041776      3820            DAC     SRSTRT          SAVE THE CORRECTED USER RESTART DATA
                    3830    *
                    3840    *       SET UP THE REQUESTED CORE ADDRESS AND LENGTH
                    3850    *
001357  220010      3860            LAC     10,X
001360  041121      3870            DAC     RCA             SET THE REQUESTED CORE ADDRESS
001361  041123      3880            DAC     TEMP3           AND SAVE IT FOR LATER CHECKS
001362  220010      3890            LAC     10,X
001363  041122      3900            DAC     RLEN            SET THE REQUESTED LENGTH
                    3910    *
                    3920    *       THE COPY WILL ACTUALLY BE DONE FROM GREATER (SFRCA,RCA) TO
                    3930    *       LESSER (FEA,REA), AN ERROR MESSAGE WILL BE GENERATED IF THIS
                    3940    *       RESULTS IN A NEGATIVE OR ZERO LENGTH COPY.
                    3950    *
                    3960    *       SET UP THE ACTUAL COPY START
                    3970    *
```

```
          Q                              COPY (705019)

001364  777777  3980            LAW     -1
001365  341121  3990            TAD     RCA
001366  740001  4000            CMA                     AC = TWO'S COMPLEMENT OF THE RCA
001367  341701  4010            TAD     $FRCA
001370  741100  4020            SPA                     SKIP IF THE COPY START NEEDS TO BE OVER RIDDEN
001371  601374  4030            JMP     COPY2           ELSE GO ON TO THE NEXT CHECK
001372  201701  4040            LAC     $FRCA
001373  041121  4050            DAC     CCA             $FRCA > RCA, SO USE $FRCA FOR A STARTING CORE ADDRESS
                4060    *
                4070    *       SET UP THE ACTUAL COPY LENGTH
                4080    *
001374  777777  4090    COPY2   LAW     -1
001375  341123  4100            TAD     TEMP3           ADD THE REQUESTED START ADDRESS
001376  341122  4110            TAD     RLEN            ADD THE REQUESTED LENGTH TO GET THE REQUESTED END ADDRESS
001377  740001  4120            CMA                     AC = TWO'S COMPLEMENT OF THE REA
001400  341701  4130            TAD     $FRCA
001401  341702  4140            TAD     $FRLEN          ADD THE FEA
001402  740100  4150            SMA                     SKIP IF THE COPY LENGTH NEEDS TO BE CHANGED
001403  601414  4160            JMP     COPY4           ELSE GO ON TO FURTHER CHECKS
                4170    *
                4180    *       FEA < REA, SO COMPUTE CLEN, WHICH MAY BE LESS THAN EITHER
                4190    *       $FRLEN OR RLEN,
                4200    *
001404  777777  4210            LAW     -1
001405  341121  4220            TAD     CCA             ADD THE ACTUAL CORE ADDRESS OF THE COPY
001406  740001  4230            CMA                     AC = TWO'S COMPLEMENT OF CCA
001407  341701  4240            TAD     $FRCA
001410  341702  4250            TAD     $FRLEN          ADD FEA -- AC = CLEN
001411  741300  4260            SNA!SPA                 SKIP IF THE COPY LENGTH IS LEGAL
001412  601073  4270            JMP     ERR3            ELSE GO PRINT AN ERROR MESSAGE
001413  041122  4280            DAC     CLEN            SET THE LENGTH TO ACTUALLY BE COPIED
                4290    *
                4300    *       SET THE STARTING ADDRESS OFFSET CONSTANTS
                4310    *
001414  777777  4320    COPY4   LAW     -1
001415  341701  4330            TAD     $FRCA
001416  740001  4340            CMA                     AC = TWO'S COMPLEMENT OF $FRCA
001417  341121  4350            TAD     CCA             ADD THE ACTUAL CORE ADDRESS OF THE COPY
001420  041123  4360            DAC     STOFF           SAVE THE ENTIRE STARTING ADDRESS OFFSET
001421  744000  4370            CLL                     PREPARE FOR THE SHIFT
001422  640510  4380            LRS     8.              DIVIDE BY 400
001423  041120  4390            DAC     SOB             SAVE THE NUMBER OF WHOLE BLOCKS IN THE OFFSET
001424  201123  4400            LAC     STOFF
001425  501637  4410            AND     (377)           MODULO 400
001426  041123  4420            DAC     SOW             SAVE THE NUMNER OF WORDS OF OFFSET PAST A BLOCK BOUNDARY
                4430    *
                4440    *       CALCULATE THE STARTING DEVICE ADDRESS
                4450    *
001427  201700  4460            LAC     $FRDA           LOAD THE FILE'S ACTUAL DEVICE ADDRESS
001430  341120  4470            TAD     SOB             ADD THE NUMBER OF BLOCKS OF OFFSET
001431  041120  4480            DAC     CDA             SET THE DEVICE ADDRESS OF THE START OF THE COPY
001432  041115  4490            DAC     DA              SET THE CDA FOR A (1) BLOCK READ IN CASE IT IS NEEDED
```

```
          Q                         COPY (705019)

                    4500    *
                    4510    *       NOW UPDATE ALL POINTERS TO WHAT THEY SHOULD BE AFTER THE FIRST BLOCK IS READ
                    4520    *
001433  441120      4530            INX     CDA             COUNT THE BLOCK JUST READ
001434  777777      4540            LAW     -1
001435  341123      4550            TAD     SOW
001436  740001      4560            CMA                     AC = TWO'S COMPLEMENT OF SOW
001437  341122      4570            TAD     CLEN
001440  041122      4580            DAC     CLEN            UPDATE THE LENGTH BY THE AMOUNT JUST COPIED
001441  101627      4590            JMS     PARAM2          CHECK THE PARAMETERS BEFORE TRYING THE TRANSFER
                    4600    *
                    4610    *       THE COPY IS LEGAL -- CHECK TO SEE WHETHER OR NOT IT STARTS FROM A BLOCK BOUNDARY
                    4620    *
001442  201123      4630            LAC     SOW             LOAD THE WORD OFFSET
001443  741200      4640            SNA                     SKIP IF THERE IS ONE
001444  601055      4650            JMP     COPY6           ELSE THE COPY STARTS FROM A BLOCK BOUNDARY
                    4660    *
                    4670    *       THE COPY DOES NOT START AT A BLOCK BOUNDARY, READ A BLOCK INTO
                    4680    *       OUR BUFFER SO THE JUNK CAN BE DELETED.
                    4690    *
001445  761115      4700            LAW     DA              LOAD THE POINTER TO THE READ PARAMETERS
001446  601034      4710            JMP     COPY7
  001034            4720            .USE    PERM
001034  101130      4730    COPY7   JMS     DO              AND READ THE FIRST BLOCK OF THE COPY
001035  601073      4740            JMP     ERR3            SOME SORT OF A HARDWARE ERROR
                    4750    *
                    4760    *       WE NOW HAVE IN OUR CORE THE ODD WORDS AND SOME GARBAGE, TOO.
                    4770    *       COPY THE GOOD WORDS INTO THE USER CORE
                    4780    *
001036  777777      4790            LAW     -1
001037  341116      4800            TAD     BUFADD          ADD THE START ADDRESS OF THE BUFFER
001040  341123      4810            TAD     SOW             ADD THE WORD OFFSET
001041  040010      4820            DAC     10              SET THE POINTER TO THE FIRST GOOD WORD TO BE COPIED
001042  777400      4830            LAW     -400
001043  341123      4840            TAD     SOW             ADD THE WORD OFFSET
001044  041115      4850            DAC     DA              SET THE TOTAL NUMBER OF WORDS TO TRANSFER
001045  777777      4860            LAW     -1
001046  341121      4870            TAD     CCA
001047  040011      4880            DAC     11              SET THE START OF THE USER CORE TO TRANSFER TO
001050  220010      4890    COPY8   LAC     10,X
001051  060011      4900            DAC     11,X            COPY THE NEXT GOOD WORD
001052  441121      4910            INX     CCA             BUMP THE CORE ADDRESS POINTER
001053  441115      4920            ISZ     DA              AND COUNT THE WORD
001054  601050      4930            JMP     COPY8           NEXT ...
                    4940    *
                    4950    *       SEE IF THERE IS STILL ANY COPYING TO DO
                    4960    *
  001055            4970    COPY6   ...
001055  201122      4980            LAC     CLEN
001056  741300      4990            SNA!SPA                 SKIP IF THERE IS STILL COPYING TO DO
001057  601063      5000            JMP     COPYD           ELSE DONE
                    5010    *
```

Q COPY (705019)

```
                    5020    *       THERE IS COPYING TO DO -- THE CORRECT PARAMETERS ARE ALREADY IN
                    5030    *       CDA, CCA, & CLEN, -- SO START IT UP
                    5040    *
001060  761120      5050            LAW     CDA             LOAD A POINTER TO THE PARAMETERS
001061  101130      5060            JMS     DO              DO THE REST OF THE COPY
001062  601073      5070            JMP     ERR3            SOME SORT OF HARDWARE ERROR
                    5080    *
                    5090    *       DONE
                    5100    *
001063  601077      5110    COPYD   JMP     SPLDON
```

Q MAIN PROGRAM

```
                    5120            .STITL  MAIN PROGRAM
          001447    5130            .USE    OVRLAY
                    5140    *
                    5150    *
                    5160    *       PROTECT OURSELVES FROM RESIDENT PROGRAM INTERFERENCE AND TURN THE
                    5170    *       PROGRAM INTERRUPT SYSTEM BACK ON, NOTE THAT THE THINGS THE PROGRAM INTERRUPT
                    5180    *       SYSTEM MAY CLOBBER ARE ALL STILL SAVED IN THE USER JOB TABLE.
                    5190    *
          001447    5200    SPLST   ...
001447    641002    5210            LACQ
001450    041124    5220            DAC     XFER            SAVE THE USER'S REQUESTED RESTART FROM A DISK/DECTAPE OPERATION
001451    200005    5230            LAC     $3AC
001452    041753    5240            DAC     $AC             SAVE THE USER'S AC
001453    200026    5250            LAC     $,310
001454    041723    5260            DAC     $,0+10          SAVE THE USER'S REGISTER 10
001455    200027    5270            LAC     $,311
001456    041724    5280            DAC     $,0+11          SAVE THE USER'S AUTO-INDEX REGISTER 11
001457    201776    5290            LAC     $RSTRT          LOAD THE PC SO THAT IT CAN BE SAVED FOR THE CALLER
001460    040702    5300            DAC     $OC0            PASS THE OLD PC  BACK TO THE CALLER
001461    200000    5310            LAC     0
001462    041776    5320            DAC     $RSTRT          SAVE THE USER'S EXTENDED PC FOR RESTART
001463    750001    5330            CLC
001464    040266    5340            DAC     $DKLOK          TIE UP THE DISK TO INHIBIT INTERRUPTS FROM AFFECTING US
001465    200035    5350            LAC     $RCORE
001466    140035    5360            DZM     $RCORE          TELL THE RESIDENT PROGRAM THERE IS NO MEMORY PROTECTION OVERLAY IN CORE
001467    041125    5370            DAC     CCU             AND SAVE THE CURRENT CORE USER NAME
001470    700042    5380            ION                     AT LAST IT IS SAFE TO TURN THE INTERRUPT SYSTEM BACK ON
                    5390    *
                    5400    *       DECIPHER THE TYPE OF SPECIAL IOT GIVEN <0:377>. CHECK THAT IT DOESN'T
                    5410    *       EXCEED THE MAXIMUM PERMISSIBLE (-SPMAX), WHICH WOULD RESULT IN AN UNDEFINED
                    5420    *       TRANSFER. IF LEGAL, TRANSFER THROUGH THE SPECIAL TABLE, ELSE PRINT AN ERROR MESSAGE.
                    5430    *
001471    777777    5440            LAW     -1
001472    341776    5450            TAD     $RSTRT
001473    041120    5460            DAC     TEMP0           SAVE THE ADDRESS OF THE SPECIAL
001474    500651    5470            AND     $ADRSS
001475    041711    5480            DAC     $UTEM5          SAVE JUST THE ADDRESS IN CASE OF ILLEGAL CALL
001476    221120    5490            LAC     TEMP0,X         NOW RECOVER THE SPECIAL
001477    501637    5500            AND     ($SPCOD)        RECOVER THE SPECIAL CODE
001500    041121    5510            DAC     TEMP1
001501    341520    5520            TAD     SPMAX           CHECK FOR LEGALITY
001502    750300    5530    SPL1    SMA!SZA!CLA
001503    601073    5540            JMP     ERR3            ILLEGAL SPECIAL CALL
001504    201121    5550            LAC     TEMP1           RELOAD THE CODE
001505    341640    5560            TAD     (SPTABL)
001506    041122    5570            DAC     TEMP2           SET UP THE TRANSFER
001507    621122    5580            JMP     TEMP2,X
                    5590    *
                    5600    *
                    5610    *       TRANSFER TABLE FOR LEGAL SPECIAL IOT CODES
                    5620    *
001510    601300    5630    SPTABL  JMP     SP000           MPOFF
```

Q MAIN PROGRAM

```
001511  601307  5640          JMP     SP001           TERMINATE
001512  601317  5650          JMP     SP002           READ
001513  601314  5660          JMP     SP003           PREAD
001514  601321  5670          JMP     SP004           WRITE
001515  601311  5680          JMP     SP005           PWRITE
001516  601333  5690          JMP     SP006           OPEN
001517  601343  5700          JMP     SP007           COPY
001520  777771  5710  SPMAX   SPTABL-.+1              MINUS THE GREATEST LEGAL SPECIAL NUMBER
```

```
          Q                                MISCELLANEOUS SUBROUTINES

                    5720                   .STITL  MISCELLANEOUS SUBROUTINES
    001521          5730                   .USE    OVRLAY
                    5740    *
                    5750    *
                    5760    *       CHECK TO SEE IF THE CALLER IS A PHANTOM PROGRAM, IF SO, RETURN
                    5770    *       NORMALLY, OTHERWISE FALL THROUGH AND PRINT AN ERROR MESSAGE ABOUT
                    5780    *       HIS ILLEGAL SPECIAL IOT INSTRUCTION.
                    5790    *
    001521          5800    PHCHK   ENTER
                                    .PMC    SAVE,ON
001521  740040                      XX
001522  201774  5810                LAC     $TYPE           FIND OUT WHAT TYPE OF PROGRAM THE USER IS
001523  740200  5820                SZA                     SKIP IF HE IS A USER PROGRAM
001524  621521  5830                RET     PHCHK,X         RETURN NORMALLY IF HE IS A PHANTOM PROGRAM
001525  601073  5840                JMP     ERR3            ELSE THE SPECIAL CALL WAS ILLEGAL
    001064          5850                   .USE    PERM
                    5860    *
                    5870    *
                    5880    *       SET UP TO PRINT THE APPROPRIATE ERROR MESSAGE FOR THE USER
                    5890    *
001064  760003  5900    ERR11   LAW     3
001065  741000  5910            SKP
001066  760001  5920    ERR9    LAW     1
001067  341641  5930    ERR8    TAD     (1)
001070  341641  5940    ERR7    TAD     (1)
001071  341642  5950    ERR6    TAD     (6)
001072  741000  5960            SKP
001073  760003  5970    ERR3    LAW     3
001074  041706  5980    ERR     DAC     $UTEM2          SET THE MESSAGE NUMBER
001075  761004  5990            LAW     $SWERR          LOAD THE SWAPPER ENTRANCE TO GET MONITOR/SYSTEM MESSAGES
001076  741000  6000            SKP
                    6010    *
                    6020    *
                    6030    *       RESET THE NECESSARY REGISTERS BEFORE RETURNING TO THE SWAPPER
                    6040    *
                    6050    *
    001077          6060    SPLDON  ...
001077  761006  6070            LAW     $SXSPL          LOAD THE SWAPPER ENTRANCE TO EXIT THE SPECIAL HANDLER
001100  040654  6080            DAC     $DO             SET THE SWAPPER ENTRANCE
001101  700002  6090            IOF                     SWAPPER MUST BE ENTERED WITH THE INTERRUPT SYSTEM OFF
001102  201125  6100            LAC     CCU
001103  040035  6110            DAC     $RCORE          RESTORE THE CURRENT CORE USER'S NAME
001104  201753  6120            LAC     $AC
001105  040005  6130            DAC     $3AC            RESET THE USER'S AC
001106  201723  6140            LAC     $,0+10
001107  040026  6150            DAC     $,310           RESET THE USER'S LOCATION 10
001110  201724  6160            LAC     $,0+11
001111  040027  6170            DAC     $,311           RESET THE USER'S LOCATION 11
001112  201776  6180            LAC     $RSTRT
001113  040000  6190            DAC     0               RESET THE USER'S RESTART DATA
001114  600336  6200            JMP     $SWAP1          GET THE SWAPPER
    001526          6210            .USE    OVRLAY
```

Q DISK/DECTAPE PARAMETER CHECKING

```
                    6220            .STITL  DISK/DECTAPE PARAMETER CHECKING
                    6230    *
                    6240    *       PARAMETER SETUP AND CHECKING FOR THE DISK/DECTAPE HANDLER IS
                    6250    *       DIVORCED FROM THE ACTUAL HANDLER SO THAT THE CODE FOR CHECKING CAN
                    6260    *       BE PUT INTO THE BUFFER AREA. THE HANDLER ITSELF MUST BE IN THE
                    6270    *       PERMANENT AREA.
                    6280    *
    001526          6290    PARAM   ENTER                   THIS ENTRANCE WILL RESTRICT USERS TO THEIR "PHYSICAL DISK"
                                    .PMC    SAVE,ON
001526  740040                      XX
001527  041263      6300            DAC     CMND            SET THE COMMAND POINTER
001530  201767      6310            LAC     $UDISK          LOAD THE STARTING BLOCK OF HIS "PHYSICAL DISK"
001531  041126      6320            DAC     DKMIN           RESET THE DISK BASE ADDRESS
001532  341643      6330            TAD     ($DKLENB)       ADD THE LENGTH (IN BLOCKS) OF HIS "PHYSICAL DISK"
001533  341144      6340            TAD     M1              SUBTRACT 1
001534  740001      6350            CMA                     AC = TWO'S COMPLEMENT OF MAXIMUM BLOCK NUMBER
001535  057601      6360            DAC     DKMAX           SET IT FOR THE HANDLER
                    6370
    001536          6380    PAR2    ...                     COPY THE USER'S PARAMETERS
001536  777777      6390            LAW     -1              LOAD (-1)
001537  341753      6400            TAD     $AC             ADD THE USER'S PARAMETER POINTER
001540  040010      6410            DAC     10              SET AN AUTO-INDEX POINTER TO THE USER'S PARAMETERS
001541  220010      6420            LAC     10,X
001542  041120      6430            DAC     TEMP0           SET THE USER'S DEVICE ADDRESS
001543  220010      6440            LAC     10,X
001544  041121      6450            DAC     TEMP1           SET THE USER'S CORE ADDRESS
001545  220010      6460            LAC     10,X
001546  041122      6470            DAC     TEMP2           SET THE USER'S WORD COUNT
                    6480    *
                    6490    *       NOW THE USER'S PARAMETERS ARE SET UP IN TEMP0-TEMP2. NEXT DO A
                    6500    *       SERIES OF TESTS FOR PARAMETER ERRORS. IF ONE IS FOUND, PRINT AN
                    6510    *       ERROR MESSAGE, OTHERWISE RETURN TO THE CALLER. THE DISK/DECTAPE
                    6520    *       WILL DO NO FURTHER ERROR CHECKING
                    6530    *
    001547          6540    PAR4    ...                     SEPARATE DISK AND DECTAPE FOR LEGAL HANDLER CHECKS
001547  201120      6550            LAC     CDA             LOAD THE DEVICE ADDRESS
001550  640603      6560            LLS     3               MOVE THE DEVICE TYPE BIT TO THE SIGN BIT
001551  740100      6570            SMA                     SKIP FOR DISK
001552  601560      6580            JMP     PART            ELSE IT IS A TAPE OPERATION
                    6590    *
                    6600    *       THE DISK NUMBER IS PHYSICAL. WE ONLY HAVE PHYSICAL DISK 0.
                    6610    *       ANY OTHER DISK NUMBER IS A PARAMETER ERROR; NON-EXISTANT DISK REFERENCE.
                    6620    *
001553  201120      6630            LAC     CDA             RELOAD THE DEVICE ADDRESS
001554  501264      6640            AND     TPMSK           RECOVER JUST THE HANDLER NUMBER
001555  750200      6650            SZA!CLA                 SKIP IF LEGAL
001556  601067      6660            JMP     ERR8            ELSE PARAMETER ERROR: NON-EXISTANT DISK REFERENCE
001557  601575      6670            JMP     PAR5            CONTINUE
                    6680    *
                    6690    *       THE DECTAPE HANDLER MUST HAVE BEEN ASSIGNED TO THIS USER TO
                    6700    *       BE LEGAL. NO DISTINCTION IS MADE BETWEEN A HANDLER NOT YET ASSIGNED
                    6710    *       TO ANYONE AND ONE ASSIGNED TO SOMEONE ELSE.
```

Q DISK/DECTAPE PARAMETER CHECKING

```
                    6720    *
          001560    6730    PART    ...                     CHECK FOR AN UNASSIGNED DECTAPE HANDLER
001560    201120    6740            LAC     CDA             RELOAD THE DEVICE ADDRESS
001561    501264    6750            AND     TPMSK           RECOVER JUST THE HANDLER NUMBER
001562    744020    6760            CLL!RAR
001563    742020    6770            RTR                     MOVE THE HANDLER NUMBER TO THE PROPER POSITION
001564    341771    6780            TAD     $NUMBR          FORM THE DECTAPE ALLOCATION TAG
001565    540032    6790            SAD     $RDT0           CHECK THE FIRST HANDLER
001566    601572    6800            JMP     PAR6            OK -- MATCH FOUND -- CONTINUE
001567    540033    6810            SAD     $RDT1           CHECK THE OTHER HANDLER
001570    741000    6820            SKP                     OK -- MATCH FOUND -- CONTINUE
001571    601066    6830            JMP     ERR9            ELSE PARAMETER ERROR: DEVICE NOT ASSIGNED TO THIS USER
001572    141126    6840    PAR6    DZM     DKMIN           DECTAPE IS LEGAL FROM BLOCK 0
001573    776700    6850            LAW     -1100
001574    041127    6860            DAC     TDMAX           SET THE MAXIMUM LEGAL DECTAPE BLOCK
                    6870    *
                    6880    *       CHECK FOR AN ATTEMPT TO TRANSFER PAST THE HIGH END OF A DECTAPE
                    6890    *       OR A LOGICAL DISK -- EITHER SYSTEM LOGICAL DISK OR
                    6900    *       "USER PHYSICAL DISK"
                    6910    *
          001575    6920    PAR5    ...                     DEVICE NUMBER/TYPE HAS BEEN FOUND LEGAL
001575    744000    6930            CLL
001576    201122    6940            LAC     CLEN            LOAD THE LENGTH OF THE TRANSFER
001577    650510    6950            CLQ!LRS 8.              DIVIDE BY 400 TO GET NUMBER OF BLOCKS
001600    041130    6960            DAC     DQ              SAVE IT FOR FURTHER CHECKS
001601    201120    6970            LAC     CDA             RELOAD THE DEVICE ADDRESS
001602    501265    6980            AND     BMSK            RETAIN JUST THE STARTING BLOCK NUMBER
001603    341126    6990            TAD     DKMIN           ADD THE DEVICE BASE TO GET THE STARTING BLOCK
001604    341130    7000            TAD     DQ              ADD IN THE NUMBER OF BLOCKS ASKED FOR TO GET THE MAXIMUM ADDRESS REFERENCED
001605    341127    7010            TAD     TDMAX           SUBTRACT OFF THE MAXIMUM LEGAL BLOCK
001606    750100    7020            SMA!CLA                 SKIP IF THE TRANSFER IS LEGAL
001607    601071    7030            JMP     ERR6            ELSE PARAMETER ERROR: ATTEMPT TO TRANSFER DATA OVER THE END OF THE DEVICE
                    7040    *
                    7050    *       CHECK FOR AN ATTEMPT TO TRANSFER DATA TO/FROM BELOW THE MEMORY PROTECTION BOUNDARY
                    7060    *
001610    776001    7070            LAW     -BOUNDARY+1     SUBTRACT THE BOUNDARY
001611    341121    7080            TAD     CCA             FROM THE DESIRED CORE ADDRESS
001612    741300    7090            SNA!SPA                 SKIP IF THE ADDRESS IS INDEED ABOVE THE BOUNDARY
001613    101521    7100            JMS     PHCHK           ELSE CHECK TO SEE IF THE USER IS A PHANTOM (THEN IT IS LEGAL)
                    7110    *
                    7120    *       EITHER THE TRANSFER WAS TO/FROM ABOVE THE BOUNDARY, OR ELSE THE
                    7130    *       USER IS A PHANTOM PROGRAM
                    7140    *
                    7150    *       NOW CHECK FOR AN ATTEMPT TO TRANSFER DATA OVER THE END OF CORE --
                    7160    *       THIS WOULD WRAP CORE, AND ON A WRITE COULD DESTROY THE EXECUTIVE.
                    7170    *
001614    762000    7180            LAW     -CORMAX         SUBTRACT THE END OF CORE
001615    341121    7190            TAD     CCA             FROM THE DESIRED CORE ADDRESS
001616    341122    7200            TAD     CLEN            PLUS THE DESIRED LENGTH
001617    750100    7210            SMA!CLA                 SKIP IF OK
001620    601070    7220            JMP     ERR7            ELSE IS  PARAMETER ERROR: TRANSFER OF DATA PAST CORE MAX
001621    621526    7230            RET     PARAM,X         EXIT
```

Q DISK/DECTAPE PARAMETER CHECKING

```
                    7240    *
                    7250    *       SET UP THE PARAMETERS FOR THE DISK/DECTAPE HANDLER ALLOWING
                    7260    *       DISK OPERATIONS ON THE WHOLE  DISK
                    7270    *
        001622      7280    PARAM1  ENTER
                                    ,PMC    SAVE,ON
    001622  740040                  XX
    001623  041263  7290            DAC     CMND            SET THE COMMAND POINTER
    001624  201622  7300            LAC     PARAM1
    001625  041526  7310            DAC     PARAM           SET UP THE EXIT
    001626  601536  7320            JMP     PAR2            FROM HERE, THE ROUTINES ARE IDENTICAL
                    7330    *
                    7340    *       CHECK THE PARAMETERS BEFORE A DISK/DECTAPE OPERATION TO THE BUFFER
                    7350    *
        001627      7360    PARAM2  ENTER
                                    ,PMC    SAVE,ON
    001627  740040                  XX
    001630  201627  7370            LAC     PARAM2
    001631  041526  7380            DAC     PARAM           SET UP THE EXIT
    001632  601547  7390            JMP     PAR4            GO CHECK THE PARAMETERS
                    7400
                    7410
```

Q DISK/DECTAPE PARAMETER CHECKING

```
                    7420            .EJECT
          001115    7430            .USE    PERM
                    7440    *
                    7450    *
                    7460    *       MISCELLANEOUS STORAGE
                    7470    *
001115  000000      7480    DA      .DSA                    DEVICE ADDRESS FOR A DISK/DECTAPE TRANSFER TO THE BUFFER BLOCK
001116  001300      7490    BUFADD  BUFFER                  BUFFER CORE ADDRESS
001117  000400      7500            400
001120  000000      7510    TEMP0   .DSA
001121  000000      7520    TEMP1   .DSA
001122  000000      7530    TEMP2   .DSA
001123  000000      7540    TEMP3   .DSA
001124  000000      7550    XFER    .DSA
001125  000000      7560    CCU     .DSA
001126  000000      7570    DKMIN   0                       MINIMUM DISK ADDRESS IS ZERO
001127  776001      7580    TDMAX   -1777                   MINUS THE MAXIMUM DISK ADDRESS
                    7590            .INSRT  INSERT!GRODEFIN
                    100             .IFUND  $DEBUG
                    1250            .LIST   ON
                    1260            .END
```

Q DECTAPE AND DISK SUBROUTINES

```
                7600            ,STITL  DECTAPE AND DISK SUBROUTINES
                7610    *
                7620    *       PROGRAMMED BY JAMES CRUCE '72
                7630    *                     WARREN MONTGOMERY '73
                7640    *
                7650    *       THESE SUBROUTINES ALLOW A PDP-9 PROGRAM TO BE ABLE TO READ OR WRITE
                7660    *       TO DECTAPE OR TO THE RS09 DISK BY SIMPLY DOING A JMS TO ONE OF
                7670    *       THE ENTRANCES WITH THE AC POINTING TO A LIST OF 3 PARAMETERS.
                7680    *       THE TWO ENTRANCES ARE 'DECIN' AND 'DECOT' WHICH ARE USED TO
                7690    *       READ INTO CORE OR WRITE OUT CORE RESPECTIVELY.
                7700    *       IF THE SUBROUTINES DETECT AN ERROR WHILE THEY
                7710    *       ARE EITHER WRITING OR READING THEY WILL HALT THE OPERATION IN PROGRESSS
                7720    *       AND PLACE THE STATUS IN THE AC AND TRANSFER TO A HLT AT 17504.
                7730    *
                7740    *       PARAMETER LIST
                7750    *       **************
                7760    *            THE PARAMETER LIST CONSISTS OF 3 CONSECUTIVE WORDS.
                7770    *       THE LIST WOULD LOOK SOMETHING LIKE THIS:
                7780    *
                7790    *       WORD 1----TAPE OR DISK HANDLER NUMBER, BLOCK NUMBER
                7800    *       WORD 2----CORE ADDRESS TO START WRITING TO/FROM
                7810    *       WORD 3----LENGTH TO BE WRITTEN
                7820    *
                7830    *       THE LAST TWO ARE SELF EXPLANATORY BUT THE FIRST WILL REQUIRE A LITTLE
                7840    *       BIT MORE EXPLANATION.  BITS 0-2 ARE THE HANDLER OR DISK NUMBER.
                7850    *       BIT 3 SHOULD BE 1 IF THE PROGRAM WANTS TO DO I/O WITH THE DISK
                7860    *       AND IT SHOULD BE 0 IF THE PROGRAM WANTS TO USE THE DECTAPE.
                7870    *       BITS 8-17 ARE USED TO DETERMINE THE BLOCK NUMBER TO BEGIN THE READING
                7880    *       OR WRITING AT.
                7890    *
                7900    *            THE PROGRAM WILL ONLY BE ABLE TO WRITE TO A SELECTED PORTION OF THE
                7910    *       DISK BUT WILL BE ABLE TO READ ANYWHERE ON THE DISK THAT IS PAST
                7920    *       THE PLACEMENT OF THE PROGRAM'S BLOCK 0.  THE TWO PARAMETERS TO MODIFY
                7930    *       TO GAIN ACCESS TO A SPECIFIC PORTION OF THE DISK 'HPAR' WHICH
                7940    *       GIVES THE HIGHEST BLOCK NUMBER THAT THE PROGRAM WILL BE ABLE TO WRITE.
                7950    *       THE ADDRESS GIVEN IN 'DSKAD' DEFINES WHERE BLOCK 0 WILL BE ON THE
                7960    *       DISK AND ALL OF THE REST OF THE BLOCKS ARE IN RELATION TO THIS.
                7970    *

                7980    *
                7990    *
000030          8000    TAPWC   ,EQU    30
000031          8010    TAPCA   ,EQU    31
000036          8020    DSKWC   ,EQU    36
000037          8030    DSKCA   ,EQU    37
000010          8040    DSKLN   ,EQU    8.
```

```
                Q                       ROUTINES TO GET THE POINTERS FOR DECTAPE

                        8050            .STITL  ROUTINES TO GET THE POINTERS FOR DECTAPE
            001130      8060            .USE    PERM
                        8070    *
                        8080    *       THIS ROUTINE WILL CALL THE GTCBLK AND STPNTR ROUTINES TO
                        8090    *       GET THE COMMAND EXECUTED.
                        8100    *
            001130      8110    DO      ENTER
    001131  040010      8120            DAC     10              SET THE COMMAND POINTER
                        8130    *
                        8140    *       NOW SET THE PHYSICAL ADDRESS FOR BOTH DEVICES
                        8150    *
    001132  220010      8160            LAC     10,X            LOAD THE FIRST PARAMETER WORD
    001133  041176      8170            DAC     WTINT           SAVE IT FOR NOW
    001134  501265      8180            AND     BMSK            RECOVER JUST THE BLOCK NUMBER
    001135  041270      8190            DAC     RBLK            SET IT FOR THE DECTAPE ROUTINES
    001136  341126      8200            TAD     DKMIN           ADD IN THE RELOCATION CONSTANT FOR THE BOTTOM OF THE LOGICAL DISK
    001137  660710      8210            ALSS    DSKLN           CONVERT THE BLOCK COUNT TO WORD COUNT
    001140  707024      8220            DLAL                    PLACE IT INTO THE DISK ADDRESS REGISTER
                        8230    *
                        8240    *       SET UP THE CORE ADDRESS FOR THE DISK ONLY -- THE DECTAPE DATA CHANNEL
                        8250    *       CELL IS STILL NEEDED FOR OTHER THINGS IF IT IS A DECTAPE TRANSFER,
                        8260    *
    001141  777777      8270            LAW     -1              LOAD A MINUS 1
    001142  360010      8280            TAD     10,X            ADD THE SECOND PARAMETER TO GET THE STARTING CORE ADDRESS FOR THE TRANSFER
    001143  040037      8290            DAC     DSKCA           SET IT FOR A DISK OPERATION; SAVE IT FOR A DECTAPE OPERATION
                        8300    *
                        8310    *       SET UP THE WORD COUNT FOR BOTH DEVICES
                        8320    *
    001144  777777      8330    M1      LAW     -1              LOAD A MINUS 1
    001145  360010      8340            TAD     10,X            ADD THE THIRD POINTER TO GET THE LENGTH TO BE COMPLEMENTED
    001146  740001      8350            CMA                     FORM THE TWO'S COMPLEMENT LENGTH
    001147  040030      8360            DAC     TAPWC           SET THE DECTAPE WORD COUNT
    001150  040036      8370            DAC     DSKWC           SET THE DISK WORD COUNT
                        8380    *
                        8390    *
                        8400    *       DECIDE WHETHER TO DO A DISK OR A DECTAPE OPERATION
                        8410    *
    001151  201176      8420            LAC     WTINT           RELOAD THE FIRST PARAMETER WORD
    001152  640603      8430            LLS     3               MOVE THE TYPE BIT TO AC(0)
    001153  741100      8440            SPA                     SKIP IF THE DEVICE IS A DECTAPE
    001154  601242      8450            JMP     DODSK           ELSE TRANSFER TO THE DISK ROUTINES
                        8460    *
                        8470    *       THIS SECTION WILL GET THE BLOCK THAT IS SPECIFIED IN THE
                        8480    *       PARAMTERS UNDER THE WRITE OR READ HEADS OF THE DECTAPE
                        8490    *       UNIT.
                        8500    *
    001155  761256      8510    DTO     LAW     TCA1            GET A POINTER TO THE BUFFER
    001156  040031      8520            DAC     TAPCA           PUT IT IN THE RIGHT PLACE
    001157  201176      8530            LAC     WTINT           GET THE PARAMETER WORD BACK
    001160  501264      8540            AND     TPMSK           AND IT DOWN TO ONLY THE TAPE HANDLER NUMBER
    001161  041260      8550            DAC     STPTP           PUT IT INTO THE STOP TAPE INSTRUCTION
    001162  241262      8560            XOR     SNST1           OR IN THE REST OF THE INSTRUCTION
```

```
                Q                       ROUTINES TO GET THE POINTERS FOR DECTAPE

001163  707545  8570            DTLA                    ISSUE THE INSTRUCTION
001164  101176  8580    DT1     JMS     WTINT           WAIT FOR DECTAPE TO STOP
001165  601206  8590            JMP     SEA1            ANALYSE IN CASE OF ERROR FROM BOT
001166  201256  8600            LAC     TCA1            GET TAPE ADDRESS
001167  740001  8610            CMA
001170  341270  8620            TAD     RBLK            ADD BLOCK WE ARE AT
001171  341144  8630            TAD     M1              CHANGE TO ONE LESS
001172  744100  8640            SMAICLL                 SEE IF WE ARE PAST DO (AND KEEP THE LINK CLEAR
001173  601212  8650            JMP     REV             YES -- REVERSE
001174  707554  8660            DTXA+10                 CLEAR DTF
001175  601164  8670            JMP     DT1             AND TRY AGAIN
                8680    *
                8690    *       WAIT FOR DT INTERRUPT
                8700    *
                8710    *       RETURN IS TO *+1 IF ERROR, *+2 IF NOT
                8720    *
    001176      8730    WTINT   ENTER
001177  707573  8740            DTEF!DTRB               CHECK FOR DECTAPE ERROR
001200  741000  8750            SKP                     NO ERROR
001201  621176  8760            JMP     WTINT,X         ERROR, RETURN
001202  707601  8770            DTDF                    CHECK FOR DECTAPE OPERATION COMPLETE
001203  601177  8780            JMP     WTINT+1         JUST LOOP IF NOT
001204  441176  8790            ISZ     WTINT           RETURN PROPERLY
001205  621176  8800            JMP     WTINT,X         RETURN
                8810    *
                8820    *       ERROR OCCURRED, CHECK FOR BOT
                8830    *
    001206      8840    SEA1    ...                     GET THE STATUS REGISTER
001206  501266  8850            AND     BITB            CHECK FOR OBVIOUS EOT ERROR
001207  743220  8860            SNA!RTR                 CHECK FOR EOT, AND ROTATE BIT FOR START TAPE BIT
001210  621130  8870            JMP     DO,X            DECTAPE ERROR
001211  707544  8880            DTXA                    SET IT
                8890    *
                8900    *       REVERSE THE TAPE
                8910    *
001212  201261  8920    REV     LAC     REVDR           TURN TAPE ARROUND
001213  707544  8930            DTXA
001214  101176  8940    DT2     JMS     WTINT           WAIT FOR AN INTERRUPT
001215  741000  8950            SKP                     SKIP IF ERROR
001216  601221  8960            JMP     .+3             NO ERROR - OK
001217  201267  8970            LAC     DTST            RESTART THE TAPE
001220  707544  8980            DTXA                    SET IT
001221  201256  8990            LAC     TCA1            MAKE SURE BLOCK IS THE SAME
001222  541270  9000            SAD     RBLK            CHECK AGAINST WHERE WE WANT TO BE
001223  601226  9010            JMP     DT3             HERE
001224  707554  9020            DTXA+10                 CLEAR THE FLAG
001225  601214  9030            JMP     DT2             AND WAIT AGAIN
    001226      9040    DT3     ...
                9050    *
                9060    *        WE HAVE FOUND THE PLACE ON THE TAPE SO CHANGE THE SWITCH WORD
                9070    *        AND THE OTHER PARAMETERS NECESSARY TO EXECUTE THE COMMAND.
                9080    *
```

```
                Q                       ROUTINES TO GET THE POINTERS FOR DECTAPE

001226  200036  9090          LAC     DSKWC           LOAD THE OLD WORD COUNT
001227  040030  9100          DAC     TAPWC           RESTORE IT
001230  200037  9110          LAC     DSKCA           LOAD THE CORE ADDRESS FROM WHERE IT WAS SAVED FOR THE DISK
001231  040031  9120          DAC     TAPCA           AND SET IT FOR THE DECTAPE
001232  221263  9130          LAC     CMND,X          GET THE COMMAND THAT IS TO BE ISSUED
001233  707544  9140          DTXA                    ISSUE THE INSTRUCTION
001234  101176  9150          JMS     WTINT           WAIT FOR OPERATION TO COMPLETE
001235  621130  9160          JMP     DO,X            DECTAPE ERROR
001236  201260  9170          LAC     STPTP           GET THE STOP INSTRUCTION
001237  707545  9180          DTLA                    STOP THE TAPE
001240  441130  9190          INX     DO
001241  621130  9200          JMP     DO,X            RETURN TO THE CALLER +2 FOR A SUCCESSFUL OPERATION
```

```
                Q                               DISK ROUTINES

                        9210            .STITL  DISK ROUTINES
                        9220    *
                        9230    *
          001242        9240    DQDSK   ...                     DISK AND DECTAPE USE THE SAME PASS LIST
                        9250    *
                        9260    *       ISSUE THE OPERATION
                        9270    *
     001242   441263     9280            ISZ     CMND            MOVE THE POINTER TO THE DISK COMMANDS
     001243   221263     9290            LAC     CMND,X          GET THE COMMAND
     001244   707047     9300            DSCF!DSFX!DSCN          ISSUE THE OPERATION
     001245   707001     9310            DSSF                    SEE IF THE OPERATION IS DONE
     001246   601245     9320            JMP     .-1             IF NOT THEN WAIT A LITTLE LONGER
                        9330    *
                        9340    *       CHECK THE OPERATION AND RETURN TO THE APPROPRIATE PLACE
                        9350    *
     001247   707272     9360            DSRS+10                 CLEAR THE AC AND GET THE STATUS OF THE OPERATION
     001250   707242     9370            DSCD                    CLEAR THE FLAGS
     001251   741100     9380            SPA                     SEE IF OK
     001252   621130     9390            JMP     DO,X            IT WAS BAD SO TELL THE USER
     001253   441130     9400            ISZ     DO
     001254   621130     9410            JMP     DO,X            RETURN TO THE CALLER +2 FOR A SUCCESSFUL OPERATION
```

```
                Q                               STORAGE AREA

                        9420                    ,STITL  STORAGE AREA
                        9430            *
                        9440            *       STORAGE USED BY ALL OF THE ABOVE ROUTINES
                        9450            *
001255  015000          9460    WRITE   015000                  WRITE COMMAND
001256  000004          9470    TCA1    4                       COMMAND FOR A DISK WRITE; ALSO USED FOR DECTAPE TEMPORARY STORAGE
001257  013000          9480    READ    013000                  READ COMMAND
001260  000002          9490    STPTP   2                       COMMAND FOR A DISK READ; ALSO USED FOR DECTAPE TEMPORARY STORAGE
001261  040000          9500    REVDR   040000                  REVERSE COMMAND
001262  061000          9510    SNST1   61000                   INSTRUCTION TO START THE TAPE
001263  705002          9520    CMND    READ                    STORAGE FOR THE COMMAND POINTER
001264  700000          9530    TPMSK   700000                  WORD TO MASK DOWN TO ONLY HANDLER NUMBER
001265  001777          9540    BMSK    1777                    MASK TO SAVE ONLY THE BLOCK NUMBER
001266  100000          9550    BITB    100000                  BIT FOR END ERROR ON TAPE
001267  020000          9560    DTST    20000                   MOTION BIT FOR TAPE
001270  000000          9570    RBLK    0
    001271              9580    CHECK   ,EQU    .
    001633              9590            ,USE    OVRLAY
001633  677777          9600            ,END    OVSTRT
001634  000004
001635  700000
001636  077777
001637  000377
001640  001510
001641  000001
001642  000006
001643  000034

TRANSFER ADDRESS  601000
```

Q

CROSS REFERENCE TABLE

1713	.Q	4510	4520	5260	5280	6140	6160			
26	.310	3400	5250	6150						
27	.311	3410	5270	6170						
4464	.DT	570								
6460	.TP	550								
2023	10SAVE	1870	1880							
2024	11SAVE	1880	1920							
5	3AC	3370	5230	6130						
305	3REST	3870	3880							
51	3TEM0	3530	3540							
52	3TEM1	3540	3550							
53	3TEM2	3550	3560							
54	3TEM3	3560	3570							
55	3TEM4	3570	3580							
56	3TEM5	3580	3590							
57	3TEM6	3590	3600							
50	3TM20	3520	3530							
2	3TM21	3350								
3	3TM22	3360								
14000	7K	1030								
16000	8K	1020	910	1010	2640	2650				
1753	AC	4520	4530	2700	3770	5240	6120	6400		
1756	ACS	4550	4560							
2015	ACSAVE	1810	1820							
2022	ACSW	1860	1870							
651	ADRSS	4100	4110	2150	5470					
246	AMPRSN	290								
300	AT	2950								
300	ATSGN	2900								
422030	BAS	420								
2151	BCNTRL	2330	2340							
634	BIT0	3970	3980							
641	BIT17	4020	4030							
635	BIT36	3980	3990							
636	BIT5	3990	4000							
637	BIT6	4000	4010							
640	BIT7	4010	4020							
642	BL7	4030	4040							
643	BL8	4040	4050							
400	BLKLEN	630								
1777	BLKMSK	610								
2000	BOUNDA	440	960	980	990	1000	1630	5040	5080	7070
377	BRK	5550								
334	BSLASH	390								
1116	BUFADD	7490	4800							
1300	BUFFER	600	2550	610	2660	2680	7490			
1000	BUFLEN	2500	2550							
1	CATBLK	550								
400	CATLEN	560								
17000	CATLOG	540	590							
777716	CATMAX	620								
644	CB0	4050	4060							

Q CROSS REFERENCE TABLE

645	CB1	4060	4070		
646	CB5	4070	4080		
647	CB7	4080	4090		
650	CBL8	4090	4100		
6	CHRMAX	3180	3200		
2	CHRPAK	3130	3200		
50	CLKMAX	2840	3180		
60	CLKSPD	3160	3170		
1757	CLOCK	4560	4570		
45	CMP1	3490	3500		
46	CMP2	3500	3510		
6	CNTRL	3380	3390		
2053	COMFLG	2200	2210		
2150	COMSTO	2270	2280		
16000	CORMAX	910	980	7180	
17005	CPARAM	590			
47	CSPL	3510	3520		
44	CSWP	3480	3490		
60	CTBFR	3600	3630	3640	
100	CTBIN	3640	3650	3670	4250
2000	CTEMP0	1630			
2001	CTEMP1	1640			
2002	CTEMP2	1650			
2003	CTEMP3	1660			
2004	CTEMP4	1670			
2005	CTEMP5	1680			
2006	CTEMP6	1690			
2007	CTEMP7	1700			
2010	CTEMP8	1710			
2011	CTEMP9	1720			
102	CTFLG	3650	3660		
104	CTNAM	3660			
2043	D PC	2120	2130		
2154	D BCA	2370	2380		
2153	D BDA	2360	2370		
2163	D FDA	2440	2450		
2042	D LOC	2110	2120		
2022	D ACSW	1860			
2156	D BALT	2390	2400		
2155	D BLEN	2380	2390		
2161	D BMAX	2420	2430		
2157	D BMIN	2400	2410		
2162	D BPTR	2430	2440		
2167	D FMAX	2480	2490		
2165	D FMIN	2460	2470		
2046	D MASK	2150	2160		
2164	D MFDA	2450	2460		
2036	DADRSW	2070	2080		
1762	DAP0	4590	4600		
1763	DAP1	4600	4610		
653	DBK	4120	4130		
24	DBKNUM	2220	2270		

Q

CROSS REFERENCE TABLE

2054	DBKTAB	2210	2270	
2035	DBSTOR	2050	2060	
422027	DDT	410		
12000	DDTST	5000		
2037	DDUMSW	2080	2090	
1761	DFLAG	4580	4590	
1764	DFN	4610	4620	
2151	DFTYPE	2340	2350	
2045	DHICOR	2140	2150	
2050	DINDIR	2170	2180	
100	DK0	4270		
127	DK1	4310		
156	DK2	4350		
37	DKCA	2750		
675	DKDON	4170	4180	
16000	DKLEN	2650	2660	
34	DKLENB	2660	6330	
266	DKLOK	3830	3840	5340
672	DKOVR	4160	4170	
2	DKRD	2760		
36	DKWC	2740		
4	DKWRT	2770		
2041	DLIMIT	2100	2110	
2044	DLOCOR	2130	2140	
2160	DMBMIN	2410	2420	
2166	DMFMIN	2470	2480	
654	DO	4130	4140	6080
662	DO2	4140	4150	
663	DO3	4150	4160	
2152	DOFTYP	2350	2360	
244	DOLLAR	280		
2032	DPACSW	1980		
2040	DPATSW	2090	2100	
2051	DPCMSK	2180	2190	
2052	DREGBR	2190	2200	
2035	DREGSW	2060	2070	
2047	DRELOC	2160	2170	
1765	DSTAT	4620	4630	
446400	DT.	560		
2000	DTEMP0	1630		
2001	DTEMP1	1640		
2002	DTEMP2	1650		
2003	DTEMP3	1660		
2004	DTEMP4	1670		
2005	DTEMP5	1680		
2006	DTEMP6	1690		
2007	DTEMP7	1700		
2010	DTEMP8	1710		
2011	DTEMP9	1720		
740000	DVCMSK	600		
275	EQUAL	2910		
241	EXCLAM	260		

Q CROSS REFERENCE TABLE

5	FCBLEN	570	2740						
602	FGET	3950	3960						
1701	FRCA	4410	4420	2880	4010	4040	4130	4240	4330
1700	FRDA	4400	4410	2860	4460				
1702	FRLEN	4420	4430	2900	4140	4250			
1703	FRSTA	4430	4440	2920					
2	FUDGE	3190	3200						
276	GREAT	2930							
4	HDRLEN	580							
1700	IMPLEN	990							
3170	IMPSTR	2550							
422020	INT	320							
513	IO.IN	3910	3920						
525	IO.OT	3920	3930						
300000	IOBLK	2830							
1760	IOR$	4570	4580						
1002	IOTO	4900	4910						
652	JMP	4110	4120						
100	JTLEN	960							
1700	JTSTRT	950	940	960	1000	4400			
16	KBLEN	3610	3630	3640	3680	3690	3730	3740	
10	KBNUM	3620	3670	3720					
76	L0LOK	3630							
107	L1BFR	3670	3680	3690					
127	L1BIN	3690	3700	3720	4290				
131	L1FLG	3700	3710						
125	L1LOK	3680							
133	L1NAM	3710							
136	L2BFR	3720	3730	3740					
156	L2BIN	3740	3750	4330					
160	L2FLG	3750	3760						
154	L2LOK	3730							
162	L2NAM	3760	3770						
422026	LDR	390							
2090	LDRST	5040							
274	LES$	2920							
2022	M ACSW	1860							
10	MINBUF	3200	3610						
422023	MP1	350							
422024	MP2	360							
2032	MPACSW	1980							
1004	MPOPR	4920							
1000	MPST	4880	4890						
1754	MQ	4530	4540						
2016	MQSAVE	1820	1830						
2000	MTEMP0	1630							
2001	MTEMP1	1640							
2002	MTEMP2	1650							
2003	MTEMP3	1660							
2004	MTEMP4	1670							
2005	MTEMP5	1680							
2006	MTEMP6	1690							

0 CROSS REFERENCE TABLE

```
  2007   MTEMP7     1700
  2010   MTEMP8     1710
  2011   MTEMP9     1720
422025   MTR         370
  2000   MTRST      5080
  1772   NAME       4670    4680
   540   NEWBR      3930    3940
  1771   NUMBR      4660    4670    6780
   243   NUMSGN      270
   623   NXPTR      3960    3970
   702   OC0        4180    4190    5300
   703   OC1        4190    4200     930
   704   OC2        4200    4210     940
   705   OC3        4210
574646   OFF        2730
575600   ON         2720
  1773   OVER       4680    4690
   700   OVLEN       940
  1000   OVSTRT      930     920     940    4750    4880    4960     550    9600
  2033   P10SAV     1990    2000
  2034   P11SAV     2000    2050
  2025   PACSAV     1930    1940
  2032   PACSW      1980    1990
  1622   PARAM1     7280    2000    7300
  1627   PARAM2     7360    4590    7370
   241   PBFLAG     3810    3820
  2017   PCSAVE     1830    1840
   256   PERIOD      340     350
   227   PFLAG      3770    3780
    77   PH0        4260    4270
   126   PH1        4300    4310
   155   PH2        4340    4350
     1   PHANTO     2780
  2150   PHFLAG     2280    2330
  1700   PHLEN      2640
  2025   PHSTOR     1920    1930
   274   PIDN2      3850    3860
   270   PIDON      3840    3850
  1001   PINT       4890    4900
   303   PIOUT      3860    3870
602026   PLDR        400
  2026   PMQSAV     1940    1950
602025   PMTR        380
  2027   PPCSAV     1950    1960
606064   PPT         520
  2031   PSCSAV     1970    1980
  2030   PSTSAV     1960    1970
606460   PTP         510
606462   PTR         500
 12100   PURLEN     1010
  1775   PURNM      4700    4710
  3700   PURSTR     2560     990    1010    2560
```

Q CROSS REFERENCE TABLE

```
   546  PUTIN     3940    3950
   215  Q   CR     220
  1115  Q   DA     7480    2520    2530    2570    4490    4700    4850    4920
  1130  Q   DO     8110    2120    2600    4730    5060    6960    7000    8870    9160    9190    9200    9390    9400
                        9410
   212  Q   LF     210
  1144  Q   M1     8330    6340    8630
  4453  Q   ,DK    770
  4464  Q   ,DT    750
  6460  Q   ,TP    760
414263  Q   ABS    850
425156  Q   BIN    860
  1121  Q   CCA    3650    4050    4220    4350    4870    4910    7080    7190
  1125  Q   CCU    7560    5370    6100
  1120  Q   CDA    3630    4480    4530    5050    5550    6630    6740    6970
435762  Q   COR    880
436454  Q   CTL    810
445300  Q   DK,    740
445320  Q   DK0    780
446400  Q   DT,    720
  1155  Q   DT0    8510
  1164  Q   DT1    8580    8670
  1214  Q   DT2    8940    9030
  1226  Q   DT3    9040    9010
  1074  Q   ERR    5980    1100
476257  Q   GRO    870
606064  Q   PPT    690
606460  Q   PTP    710
606462  Q   PTR    700
  1121  Q   RCA    3640    3870    3990
  1212  Q   REV    8920    8650
  1120  Q   SOB    3620    4390    4470
  1123  Q   SOW    3690    4420    4550    4630    4810    4840
  1323  Q   SP4    2100    2010
646000  Q   TP,    730
  1286  Q BITB     9550    8850
  1265  Q BMSK     9540    2840    6980    8180
 17740  Q BOOT     520     530
    11  Q CATX     500
  1122  Q CLEN     3670    4280    4570    4580    4980    6940    7200
    12  Q CMDX     510
  1263  Q CMND     9520    6300    7290    9130    9280    9290
  1267  Q DTST     9560    8970
  1073  Q ERR3     5970    4270    4740    5070    5540    5840
  1071  Q ERR6     5950    7030
  1070  Q ERR7     5940    7220
  1067  Q ERR8     5930    6660
  1066  Q ERR9     5920    6830
  1536  Q PAR2     6380    7320
  1547  Q PAR4     6540    7390
  1575  Q PAR5     6920    6670
  1572  Q PAR6     6840    6800
```

Q CROSS REFERENCE TABLE

1560	Q PART	6730	6580			
253	Q PLUS	310				
1270	Q RBLK	9570	8190	8620	9000	
1257	Q READ	9480	1990	2040		
1122	Q RLEN	3660	3900	4110		
1206	Q SEA1	8840	8590			
1502	Q SPL1	5530				
252	Q STAR	300				
1256	Q TCA1	9470	8510	8600	8990	
1124	Q XFER	7550	2140	3710	3790	5220
17777	QADRSS	430				
337	QBKARR	240				
1271	QCHECK	9580	610			
272	QCOLON	370				
254	QCOMMA	320				
230	QCONTX	230				
1374	QCOPY2	4090	4030			
1414	QCOPY4	4320	4160			
1055	QCOPY6	4970	4650			
1034	QCOPY7	4730	4710			
1050	QCOPY8	4890	4930			
1063	QCOPYD	5110	5000			
777601	QDKMAX	650	6360			
1126	QDKMIN	7570	6320	6840	6990	8200
1242	QDODSK	9240	8450			
37	QDSKCA	8030	8290	9110		
10	QDSKLN	8040	8210			
36	QDSKWC	8020	8370	9090		
776701	QDTMAX	640				
1064	QERR11	5900	2780			
10	QINDEX	490				
255	QMINUS	330				
1001	QOPEN2	2600	2580			
1010	QOPEN4	2700	2770			
1021	QOPEN6	2830	2720			
1526	QPARAM	6290	2080	7230	7310	7380
1521	QPHCHK	5800	890	1950	5830	7100
256	QPOINT	350				
17505	QRECOV	470				
1261	QREVDR	9500	8920			
257	QSLASH	360				
1262	QSNST1	9510	8560			
1333	QSO006	2420	5690			
1300	QSP000	880	5630			
1307	QSP001	1080	5640			
1317	QSP002	2030	5650			
1314	QSP003	1980	5660			
1321	QSP004	2060	5670			
1311	QSP005	1940	5680			
1343	QSP007	3700	5700			
240	QSPACE	250				
1447	QSPLST	5200	570			

Q CROSS REFERENCE TABLE

1520	QSPMAX	5710	5520										
1123	QSTOFF	3680	4360	4400									
1260	QSTPTP	9490	8550	9170									
31	QTAPCA	8010	8520	9120									
17500	QTAPIN	450											
17502	QTAPOT	460											
30	QTAPWC	8000	8360	9100									
1127	QTDMAX	7580	6860	7010									
1120	QTEMP0	7510	2110	2510	2850	3620	3630	5460	5490	6430			
1121	QTEMP1	7520	2690	2760	3640	3650	5510	5550	6450				
1122	QTEMP2	7530	3660	3670	5570	5580	6470						
1123	QTEMP3	7540	3680	3690	3880	4100							
1264	QTPMSK	9530	2160	6640	6750	8540							
17777	QVFLAG	480											
1255	QWRITE	9460	1960	2070									
1176	QWTINT	8730	8170	8420	8530	8580	8760	8780	8790	8800	8940	9150	
34	RAC$	3440											
6	RCNT	3390											
35	RCORE	3450	5350	5360	6110								
1003	RDBLK	4910	4920										
32	RDT0	3420	6790										
33	RDT1	3430	6810										
422021	RES	330											
40	RESCAT	3470	3480										
1000	RESLEN	920											
234	RFLAG	3790	3800										
230	RPTP	3780	3790										
235	RPTR	3800	3810										
242	RSCO	3820	3830										
1776	RSTRT	4710	900	920	2170	2490	2500	2620	3730	3760	3810	3820	5290	5320
			5450	6180									
1755	SC	4540	4550										
273	SCOLON	380											
640000	SCRSTR	2670											
2021	SCSAVE	1850	1860										
243	SHARP	2890											
377	SPCOD	5410	5500										
422122	SPL	430											
1077	SPLDON	6060	950	2130	2180	2610	2930	5110					
1090	SPLST	4960											
777400	SPMSK	5390											
1510	SPTABL	5630	5560	5710									
2020	STSAVE	1840	1850										
335	SWAP	3880	3890										
336	SWAP1	3890	3900	6200									
340	SWAP3	3900	3910										
1000	SWCAT	4750	4760										
1003	SWCLK	4780	4790										
1004	SWERR	4790	4800	5990									
1007	SWMP1	4820	4830										
1010	SWMP2	4830	4840										
1002	SWMTR	4770	4780										

Q CROSS REFERENCE TABLE

1011	SWOPR	4840		
422022	SWP	340		
1001	SWPPR	4760	4770	
40	SWPS	3460	3470	
1005	SWSPL	4800	4810	
1006	SXSPL	4810	4820	6070
1300	SYSBAS	2800	2810	
41300	SYSDA	2810		
17735	SYSDEV	530		
1777	SYSMAX	2820		
100	TABLEN	2630	2640	
2000	TEMP0	1630	1640	
2001	TEMP1	1640	1650	
2012	TEMP10	1730	1740	
2013	TEMP11	1740	1750	
2014	TEMP12	1750	1800	
2002	TEMP2	1650	1660	
2003	TEMP3	1660	1670	
2004	TEMP4	1670	1680	
2005	TEMP5	1680	1690	
2006	TEMP6	1690	1700	
2007	TEMP7	1700	1710	
2010	TEMP8	1710	1720	
2011	TEMP9	1720	1730	
646000	TP.	540		
376	TRCOFF	5540		
375	TRCON	5530		
2000	TTEMP0	1630		
2001	TTEMP1	1640		
2002	TTEMP2	1650		
2003	TTEMP3	1660		
2004	TTEMP4	1670		
2005	TTEMP5	1680		
2006	TTEMP6	1690		
2007	TTEMP7	1700		
2010	TTEMP8	1710		
2011	TTEMP9	1720		
6	TTYCLK	3170	3180	
3	TTYNUM	3140		
10	TTYSPD	3150	3170	
1774	TYPE	4690	4700	5810
1766	UCORE	4630	4640	
1767	UDISK	4640	4650	6310
336	UPARR	2940		
76	US0	4250	4260	4280
125	US1	4290	4300	4320
154	US2	4330	4340	4360
0	USER	2790		
3	USERS	2850	3200	
14000	USLEN	980	2640	
2015	USTORE	1800	1810	
75	UT0	4280		

Q CROSS REFERENCE TABLE

124	UT1	4320		
153	UT2	4360		
1704	UTEM0	4440	4450	
1705	UTEM1	4450	4460	
1706	UTEM2	4460	4470	5980
1707	UTEM3	4470	4480	
1710	UTEM4	4480	4490	
1711	UTEM5	4490	4500	5480
1712	UTEM6	4500	4510	
1770	VALID	4650	4660	

Q UNDEFINED SYMBOLS

#1	5630											
#2	5640											
#3	5650											
#4	5660											
#5	5680											
DEBUG	100	100	120	120								
DEFINS	100	100	120	120	580	580	2680	2680	3210	3210	5330	5330
PURCOD	5140	5270										
Q BAD	620											
Q LINE	1210											
Q MESS	1190	1200										

Q MACRO CROSS REFERENCE TABLE

ENTER	920	8110	8730
FORMAT	1060		
LOOP	960		
MPOFF	5430		
NEG	1010		
START	1100		
SWAP	5610		

0 USE CROSS REFERENCE TABLE

0 .....
0 .REL.
1000 PERM 560 2590 4720 5850 7430 8060
1300 OVRLAY 580 640 1120 1930 2200 2950 5130 5730 6210 9590