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                        ;THIS SUB-PROGRAM ASSEMBLED WITH SYSTEM PARAMETER FILE - S.MAC(V414)
                                XLIST
                                LIST
                        TITLE   MTASRX - MAGTAPE ROUTINES FOR PDP-10(TM-10) V420
                        SUBTTL  T. WACHS/TH  TS  20 MAY 69
                                XP      VMTASR,420      ;DEFINE VERSION NUMBER FOR LOADER STORAGE MAP


                        ENTRY MTASRX
000000                  MTASRX:

                        INTERNAL MTADSP

                        ;DISPATCH TABLE
000000  254000  000232'          JRST    MTAINI
000001  254000  000071'          JRST    HUNGTP          ;HUNG DEVICE
000002  254000  000274' MTADSP: JRST    MTAREL          ;RELEASE
000003  254000  000047'          JRST    MTCLOS          ;CLOSE
000004  254000  000330'          JRST    MTOUT
000005  254000  000355'          JRST    MTIN
000006  254000  000042'          JRST    SAVCHK          ;ENTER
000007  254000  000042'          JRST    SAVCHK          ;LOOKUP
000010  254000  000515'          JRST    MTDMPO
000011  254000  000516'          JRST    MTDMPI
000012  263140  000000          POPJ    PDP,            ;USETO
000013  263140  000000          POPJ    PDP,            ;USETI
000014  263140  000000          POPJ    PDP,            ;UGETF
000015  254000  000000          JRST    CPOPJ1          ;RENAME
000016  263140  000000          POPJ    PDP,            ;CLOSE INPUT
000017  263140  000000          POPJ    PDP,            ;UTPCLR
000020  254000  000241'          JRST    MTAPG

                000340  MTC=340
                000344  MTS=344


                        ;MTACHN=FLAG CHANNEL
                        ;MTDCHN=DATA CHANNEL
                        ;MTFLAG=10*MTACHN + 400
                        ;MTBOTH=10*MTACHN+MTDCHN
                        ;MTALOC=40 + 2*MTDCHN
                        ;MTLOC1=MTALOC+1
                                INTERN  MTAINT,MTADDS,MTADDB
                                EXTERN  ADVBFE,ADVBFF,MTFLAG,MTBOTH,SETACT,CLRACT,WSYNC
                                EXTERN  STDENS,SETIOD,MTREQ,MTAVAL,CLOCK,MTALOC,MTLOC1,OUT
                                EXTERN  CPOPJ,CPOPJ1,PIOMOD,PUNIT,MTWAIT,JIFSC2,COMCHK
                                EXTERN  PIOFF,PION,MTASAV,ADRERR,POVCNT,MTSIZ,STOIOS,IADRCK

                010000  COMPAT=10000                    ;IBM COMPATABLE 9-TRACK
                200000  DMPMOD=200000                   ;DUMP MODE FILE
                400000  MTREW=400000                    ;MAGTAPE IS REWINDING

                000003  MTTRY=3                         ;NO. OF TIMES TO RETRY ON AN ERROR
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57                  000073  QUANT=3                 ;NO. OF RECORDS TO READ UNINTERRUPTED
```

```
                        000005  TP=DAT
                                ;DDB
000021  556441  200000  MTADDB: SIXBIT  /MTA0/
000022  000036  000021          XWD     .D30*HUNGST,MTSI#+1
000023  000000  000000          0
000024  000000  000002'        MTADSP
000025  001023  154403          XWD     1023,154403
000026  000000  000000          0
000027  000000  000000          0
000030  000007  000000          XWD     PROG,0
000031  000007  000000          XWD     PROG,0
                                XP      MTADDS,.-MTADDR ;SIZE OF DDB (FOR BUILD)
```

```
                                ;INITIALIZE
   71  000032  476000  000662' MTAINI: SETOM   NMTREW           ;RESET FLAGS
   72  000033  476000  000666'         SETOM   UNIT
   73  000034  402000  000670'         SETZM   ERRFLG
   74  000035  402000  000573'         SETZM   REMNDR
   75  000036  734200  000000          CONO    MTC,0            ;TURN OFF MTC
   76  000037  200040  000675'         MOVE    TAC,[JSR MTDEND] ;SET UP END-CONDITION
   77  000040  202040  000000          MOVEM   TAC,MTLOC1       ;FOR BLKI/BLKO
   78  000041  263140  000000          POPJ    PDP,
   79
   80                               ;IF ENTER OR LOOKUP IN SAVE MODE - CHANGE TO MODE 16
   81  000042  135040  000000  SAVCHK: LDB     TAC,PIOMOD       ;GET MODE
   82  000043  306040  000002          CAIN    TAC,2            ;SAVE MODE?
   83  000044  660000  000016          TRO     IOS,16           ;YES, CHANGE TO DUMP-MODE
   84  000045  202006  000002          MOVEM   IOS,DEVIOS(DEVDAT)
   85  000046  254000  000015'         JRST    CPOPJ1           ;GIVE GOOD RETURN FROM LOOKUP/ENTER
   86                               ;CLOSE
   87  000047  607320  004000  MTCLOS: TLNN    DEVDAT,OUTPB     ;OUTPUT BEEN DONE?
   88  000050  263140  000000          POPJ    PDP,             ;NO, GO AWAY

   89  000051  135040  000042'         LDB     TAC,PIOMOD
   90  000052  305040  000016          CAIGE   TAC,16           ;DUMP MODE?
   91  000053  260140  000000          PUSHJ   PDP,OUT          ;NO, EMPTY LAST PARTIAL BUFFER
   92  000054  260140  000000          PUSHJ   PDP,WSYNC        ;WAIT FOR IO TO STOP
   93  000055  201600  000003          MOVEI   UUO,3            ;WRITE 2 ENDS-OF FILE
   94  000056  260140  000245'         PUSHJ   PDP,MTAP1
   95  000057  602000  400000          TRNE    IOS,IOIMPM       ;WRITE LOCK?
   96  000060  263140  000000          POPJ    PDP,             ;YES! RETURN
   97  000061  260140  000000          PUSHJ   PDP,SETACT
   98  000062  260140  000054'         PUSHJ   PDP,WSYNC
   99  000063  201600  000003          MOVEI   UUO,3
  100  000064  260140  000245'         PUSHJ   PDP,MTAP1
  101  000065  260140  000061'         PUSHJ   PDP,SETACT
  102  000066  260140  000062'         PUSHJ   PDP,WSYNC
  103  000067  201600  000007          MOVEI   UUO,7            ;AND BACKSPACE OVER ONE OF THEM
  104  000070  254000  000245'         JRST    MTAP1
  105
  106  000071  627000  400000  HUNGTP: TLZN    IOS,MTREW        ;TAPE REWINDING?
  107  000072  254070  000416'         JRST    THRUTP  ;NO , GIVE UP CONTROL
  108  000073  370000  000662'         SOS     NMTREW  ;YES, DECREASE COUNT OF TAPES IN REW
  109  000074  350000  000000          AOS     MTREQ            ;THRUTP WILL SOS THIS BACK
  110  000075  254000  000416'         JRST    THRUTP  ;TURN OFF TM10
```

```
                                ;CONNECT CONTROL TO A TRANSPORT
000076  201040  440102  CONECT: MOVEI   TAC,440102       ;SET UP INTERRUPT CONDITIONS
000077  542040  000365'         HRRM    TAC,MTAINT
000100  542300  000663'         HRRM    DEVDAT,USEWRD   ;SAVE DEVDAT FOR INTERRUPT
000101  135240  000000          LDB     TP,PUNIT        ;GET UNIT
000102  316240  000666'         CAMN    TP,UNIT         ;ALREADY CONNECTED TO IT?
000103  254000  000116'         JRST    CNECT3          ;YES
000104  242240  000017          LSH     TP,17           ;NO, SET FOR CONO
000105  734700  000002          CONSZ   MTS,2           ;CONTROL FREE?
000106  254070  000112'         JRST    CNECT2          ;YES, DO A NO-OP CONO
000107  660240  000000          IOR     TP,MTFLAG       ;NO, SET CONTROL FREE ENABLE
000110  607070  400000          TLNN    IOS,MTREW       ;CONNECTING TO A REWINDING TAPE?
000111  260140  000122'         PUSHJ   PDP,CNECT4      ;NO,CHANGE RETURN
000112  506240  000663' CNECT2: HRLM    TP,USEWRD       ;MIGHT NEED ON INTERRUPT LEVEL
000113  734205  000000          CONO    MTC,(TP)        ;CONO TO MTC
000114  242240  000003          LSH     TP,3            ;SAVE UNIT
000115  556240  000666'         HLRZM   TP,UNIT
000116  325000  000066' CNECT3: JUMPGE  IOS,WSYNC       ;WAIT FOR DEV TO FREE IF NOT REWINDING
000117  606240  004000          TRNN    TP,4000         ;REWINDING, CONTROL FREE ENABLE?
000120  350003  000000          AOS     (PDP)           ;NO, SKIP RETURN
000121  263140  000000          POPJ    PDP,            ;YES, IMMEDIATE RETURN
000122  201040  000127' CNECT4: MOVEI   TAC,TPREDY      ;SET TO TRY CONTROL
000123  542043  777777          HRRM    TAC,-1(PDP)     ;AGAIN WHEN INACTIVE
000124  254000  000065'         JRST    SETACT          ;SET DEVICE ACTIVE

                                ;DELAY TILL TAPE COMES OUT OF IO WAIT, THEN GET CONTROL
000125  476000  000000  DLYRDY: SETOM   MTAVAL
000126  260140  000116'         PUSHJ   PDP,WSYNC       ;WAIT FOR IO TO STOP

                                ;GET MTC, CONECT TAPE TO CONTROL
000127  352000  000074' TPREDY: AOSE    MTREQ           ;GET CONTROL
000130  260140  000000          PUSHJ   PDP,MTWAIT      ;WAIT FOR IT
000131  201040  000003          MOVEI   TAC,QUANT       ;SET QUANTUM TIME
000132  202040  000671'         MOVEM   TAC,QUANTM
000133  202340  000664' TPRDY2: MOVEM   PROG,USEPRG
000134  260140  000076'         PUSHJ   PDP,CONECT      ;CONECT CONTROL TO TAPE

                                ;SET TP FOR THIS TAPE
000135  135240  000676' TPSET:  LDB     TP,[POINT 2,IOS,28] ;PARITY
000136  336000  000005          SKIPN   TP              ;USE STANDARD IF 0
000137  201240  000000          MOVEI   TP,STDENS       ;NOT SPECIFIED, USE STANDARD FOR SYS.
000140  370000  000005          SOS     TP              ;SET TO USER'S REQUEST
000141  242240  000006          LSH     TP,6
000142  606000  001000          TRNN    IOS,IOPAR       ;PARITY
000143  660240  040000          IOR     TP,40000        ;ODD
000144  200100  000666'         MOVE    TAC1,UNIT       ;UNIT
000145  137100  000677'         DPB     TAC1,[POINT 3,TP,20] ;INTO COMMAND
000146  660240  000000          IOR     TP,MTBOTH       ;PI CHANNELS
000147  201040  000003          MOVEI   TAC,MTTRY       ;SET ERROR COUNT
000150  212040  000667'         MOVNM   TAC,ERCNT
```

```
   164  000151  734700  000004          CONSZ   MTS,4           ;7 OR 9 TRACK?
   165  000152  254200  000156'          JRST    RDYCHK          ;7 TRACK
   166  000153  607200  210000          TLNN    IOS,COMPAT      ;9 TRACK, CORE DUMP?
   167  000154  664240  020000          TRCA    TP,20000        ;YES
   168  000155  660240  040300          TRO     TP,40300        ;NO. SET 800 BPI, ODD PARITY
```

```
                                ;MAKE SURE TAPE IS READY
000156  734700  000240  RDYCHK: CONSZ   MTS,40          ;READY?
000157  263140  000000          POPJ    P,              ;YES
000160  734740  200000          CONSO   MTS,200000      ;REWINDING?
000161  263140  000000          POPJ    P,              ;NO. LET XPORT HUNG INTERRUPT HANDLE IT

000162  661000  400000          TLO     IOS,MTREW       ;YES, MUST BE REWINDING
000163  260140  000124'          PUSHJ   P,SETACT        ;DEVICE ACTIVE
000164  350070  000662'          AOS     NMTREW          ;BUMP COUNT OF REWINDING DRIVES
000165  371270  000127'          SOSL    MTREQ           ;LET SOMEONE ELSE USE TAPES
000166  254000  000125'          JRST    DLYRDY          ;NOONE ELSE WANTS CONTROL
000167  260140  000231'          PUSHJ   P,CLOKRQ        ;PUT IN A TIME REQUEST
000170  254000  000126'          JRST    DLYRDY+1                ;AND WAIT
```

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  182  000171  000172' 000000  MTCLOK: XWD     .+1,JIFSC2
  183  000172  402000  000665'          SETZM   CLKREQ          ;INDICATE  NO CLOCK REQUEST IN NOW
  184  000173  331000  000165'          SKIPL   MTREQ           ;CONTROL FREE?
  185  000174  263140  000000          POPJ    PDP,            ;NO. COME BACK LATER
  186  000175  476000  000662' MTCLK2: SETOM   NMTREW          ;COUNT NO. OF TAPES REWINDING
  187  000176  202300  000240'          MOVEM   DEVDAT,SAVDEV
  188  000177  201300  000021'          MOVEI   DEVDAT,MTADDR   ;START AT MTA0
  189  000200  350000  000173'          AOS     MTREQ           ;MAKE SURE NO OTHER MTA REQUESTS ARE HONORED NOW
  190  000201  200006  000002  REWCHK: MOVE    IOS,DEVIOS(DEVDAT)
  191  000202  325000  000220'          JUMPGE  IOS,REWCK2      ;TAPE NOT REWINDING
  192  000203  260140  000076'          PUSHJ   PDP,CONECT      ;REWINDING - CONECT TO IT
  193  000204  263140  000000          POPJ    PDP,            ;CONTROL NOT FREE NOW - RETURN ON INTERRUPT LEVEL
  194  000205  734740  000040  REWCKA: CONSO   MTS,40          ;STILL REWINDING?
  195  000206  254000  000214'          JRST    REWCK1          ;YES
  196  000207  623000  000001          TLZE    IOS,IOW         ;NO, TAKE OUT OF IO WAIT
  197  000210  260140  000000          PUSHJ   PDP,SETIOD
  198  000211  621000  400000          TLZ     IOS,MTREW
  199  000212  260140  000000          PUSHJ   PDP,CLRACT      ;NO LONGER ACTIVE
  200  000213  254000  000220'          JRST    REWCK2

  201  000214  350000  000662' REWCK1: AOS     NMTREW          ;COUNT REWINDING TAPE
  202  000215  201040  000036          MOVEI   TAC,36
  203  000216  734700  200000          CONSZ   MTS,200000      ;IF TAPE IS STILL REWINDING
  204  000217  137040  000000          DPB     TAC,PDVCNT      ;MAKE SURE IT DOESN'T GET A HUNG DEVICE
  205  000220  554306  000003  REWCK2: HLRZ    DEVDAT,DEVSER(DEVDAT) ;NEXT DEVICE
  206  000221  554046  000000          HLRZ    TAC,DEVNAM(DEVDAT) ;A MAG TAPE?
  207  000222  306040  556441          CAIN    TAC,(SIXBIT .MTA.)
  208  000223  254000  000201'          JRST    REWCHK          ;YES, CHECK IT
  209  000224  200300  000240'          MOVE    DEVDAT,SAVDEV   ;PICK UP DEVDAT AGAIN
  210  000225  371000  000200'          SOSL    MTREQ           ;FREE MTASER AGAIN
  211  000226  476000  000125'          SETOM   MTAVAL          ;SOMEONE WAITING FOR CONTROL
  212  000227  335000  000662'          SKIPGE  NMTREW          ;ANY TAPE REWINDING?
  213  000230  254000  000436'          JRST    THRUT3          ;NO
  214
  215  000231  200040  000171' CLOKRQ: MOVE    TAC,MTCLOK      ;PUT A CLOCK REQUEST IN
  216  000232  700600  000000          CONO    PI,PIOFF        ;HAVE MONITOR WAKE UP
  217  000233  331000  000665'          SKIPL   CLKREQ          ;IF NO CLOCK REQUEST IN ASK TO WAKE UP
  218  000234  136040  000000          IDPB    TAC,CLOCK       ;IN HALF A SECOND
  219  000235  476000  000665'          SETOM   CLKREQ          ;NOW WE HAVE ONE
  220  000236  700600  000000          CONO    PI,PION
  221  000237  254000  000436'          JRST    THRUT3
  222  000240  000000  000000  SAVDEV: 0                       ;TEMPORARY STORAGE FOR DEVDAT
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                                ;MTAPE
000241  602600  000100  MTAP0:  TRNE    UUO,100         ;SETTING 7 TRACK MODE?
000242  254000  000272'          JRST    SET9TK          ;YES

000243  620000  776000  MTAP:   TRZ     IOS,776000      ;TURN OFF ERROR BITS
000244  202006  000002          MOVEM   IOS,DEVIOS(DEVDAT) ;SAVE IOS
000245  260140  000127' MTAP1:  PUSHJ   PDP,TPRDY       ;GET CONTROL FOR THIS TAPE
000246  620240  000007  MTAP3:  TRZ     TP,7            ;NO DATA TRANSFER
000247  405600  000017          ANDI    UUO,17          ;GET FUNCTION
000250  241600  777777          ROT     UUO,-1          ;TRANSLATE FROM TABLE
000251  331000  000014          SKIPL   UUO
000252  334054  000320'          SKIPA   TAC,MTPTBL(UUO)
000253  554054  000320'          HLRZ    TAC,MTPTBL(UUO)
000254  622040  000100          TRZE    TAC,100         ;MOVE TAPE BACKWARD?
000255  734740  100000          CONSO   MTS,100000      ;YES, TAPE AT LOAD POINT?
000256  606040  777777          TRNN    TAC,-1          ;OR NO-OP?
000257  254000  000413'          JRST    THRUTA           ;YES, GO CHECK FOR BOT
000260  622040  000200          TRZE    TAC,200         ;SKIP TO LOGICAL EOT?
000261  254000  000276'          JRST    LEOT            ;YES
000262  626040  000400          TRZN    TAC,400 ;TRY TO WRITE TAPE?
000263  254000  000266'          JRST    MTAGO           ;NO.
000264  734720  000010          CONSZ   MTS,10          ;YES, WRITE LOCKED?
000265  254000  000611'          JRST    ILLOP           ;YES, LIGHT ERROR BIT
000266  137040  000700' MTAGO:  DPB     TAC,[POINT 4,TP,26] ;PUT FUNCTION INTO COMMAND
000267  506240  000663'          HRLM    TP,USEWRD       ;SAVE COMMAND
000270  734205  000000          CONO    MTC,(TP)        ;START TAPE MOVING
000271  254000  000212'          JRST    CLRACT          ;AND RETURN


                                ;SET 9-TRACK TAPE
000272  602600  000001  SET9TK: TRNE UUO,1
000273  665000  010000          TLOA    IOS,COMPAT      ;SET IBM COMPAT,
000274  621000  010000  MTAREL: TLZ     IOS,COMPAT      ;NOT IBM COMPAT
000275  254000  000000          JRST STOIOS
                                ;SKIP TO LOGICAL EOT
000276  734700  100000  LEOT:   CONSZ   MTS,100000      ;TAPE AT BOT?
000277  254000  000302'          JRST    LEOT2           ;YES, DONT BACKSPACE
000300  260140  000266'          PUSHJ   PDP,MTAGO       ;BACKSPACE RECORD
000301  260140  000315'          PUSHJ   PDP,EOTWT       ;WAIT FOR IT
000302  201600  000016  LEOT2:  MOVEI   UUO,16          ;SKIP A FILE
000303  260140  000313'          PUSHJ   PDP,MTAP2
000304  201600  000006          MOVEI   UUO,6           ;SKIP A RECORD
000305  260140  000243'          PUSHJ   PDP,MTAP
000306  260140  000315'          PUSHJ   PDP,EOTWT       ;WAIT FOR IT
000307  200006  000002          MOVE    IOS,DEVIOS(DEVDAT)
000310  606000  020000          TRNN    IOS,IODEND      ;END OF FILE SEEN?
000311  254000  000322'          JRST    LEOT2           ;NO. SKIP TO NEXT FILE
000312  201600  000007          MOVEI   UUO,7           ;YES. BACKSPACE RECORD

000313  260140  000133' MTAP2:  PUSHJ   PDP,TPRDY2
000314  254000  000246'          JRST    MTAP3
                                ;WAIT FOR TAPE TO FINISH, MTREQ WILL COUNT DOWN AT END OF OPERATION
000315  352000  000225' EOTWT:  AOSE    MTREQ
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  276  000316  260140  000130'          PUSHJ   P,MTWAIT        ;WAIT TILL MTREQ IS COUNTED DOWN
  277  000317  263140  000000           POPJ    P,
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278  000320  000101  000000  MTPTRL: XWD     101,0           ;REW,NOP
279  000321  000405  000000          XWD     405,0           ;WRITE EOF,
280  000322  000000  000000          XWD     0,0
281  000323  000107  000006          XWD     107,6           ;BACKSPACE REC,SKIP REC
282  000324  000111  000207          XWD     111,207         ;REW,UNLOAD,LOG EOT
283  000325  000415  000000          XWD     415,0           ;WRITE BLANK TAPE,
284  000326  000000  000000          XWD     0,0
285  000327  000117  000016          XWD     117,16          ;BACK FILE,SKIP FILE
```

```
286                                     ;OUTPUT UUO
287  000330  260140  000127' MTOUT:  PUSHJ   P,DPREDY       ;GET CONTROL, SETUP TP
288  000331  734700  003010          CONSZ   MTS,10          ;WRITE LOCK?
289  000332  254030  000611'         JRST    ILLOP           ;YES, SET IOIMPM AND RETURN
290  000333  734700  004000          CONSZ   MTS,4000        ;EOT?
291  000334  664000  042000          TROA    IOS,IOTEND+IOBKTL ;YES, LIGHT BIT
292  000335  665000  000020          TLOA    IOS,IO          ;NO, INDICATE OUTPUT
293  000336  254000  000454'         JRST    ADVOUT          ;DONE IF EOT
294  000337  201066  000010  MTOUT1: MOVEI   TAC,@DEVOAD(DEVDAT) ;ADDRESS OF BUFFER
295  000340  210101  000001          MOVN    TAC1,1(TAC)     ;-WORD COUNT
296  000341  504040  000002          HRL     TAC,TAC1        ;IN LH OF COMMAND
297  000342  347040  000454'         AOJG    TAC,ADVOUT      ;SKIP IF 0 WORDS
298  000343  660240  004000  MTOUT2: TRO     TP,4000         ;FUNCTION = WRITE
299  000344  205100  734100          MOVSI   TAC1,(BLKO MTC,) ;SETUP BLKO
300  000345  202040  000673'  MTDTGO: MOVEM   TAC,PNTR        ;SAVE BLKI/BLKO POINTER
301  000346  202040  000674'         MOVEM   TAC,SVPNTR
302  000347  541100  000673'         HRRI    TAC1,PNTR       ;BLKI/BLKO PNTR
303  000350  202100  000000          MOVEM   TAC1,MTALOC     ;INTO INTERRUPT LOC
304  000351  506240  000663'         HRLM    TP,USEWRD       ;SAVE COMMAND

305  000352  734205  000000          CONO    MTC,(TP)        ;START TAPE MOVING
306  000353  660040  010000          TRO     IOS,IOACT       ;SETACT CLEARS IOW
307  000354  254020  000275'         JRST    STOIOS          ;STORE IOS AND RETURN
308
309                                     ;INPUT UUO
310  000355  260140  000127' MTIN:   PUSHJ   P,DPREDY       ;SETUP TP FOR THIS DRIVE
311  000356  621000  000020          TLZ     IOS,IO          ;INPUT
312  000357  460066  000007  MTIN1:  SETCM   TAC,@DEVIAD(DEVDAT) ;-LARGEST POSSIBLE WRD CNT
313  000360  541066  000007          HRRI    TAC,@DEVIAD(DEVDAT) ;STARTING ADDRESS
314  000361  270040  000701'         ADD     TAC,[XWD 2,1]   ;MAKE REAL IOWD
315  000362  660240  002000  MTIN2:  TRO     TP,2000         ;FUNCTION = READ
316  000363  205100  734000          MOVSI   TAC1,(BLKI MTC,) ;SETUP BLKI
317  000364  254020  000345'         JRST    MTDTGO          ;GO START TAPE
318
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319  000365  734740  440102  MTAINT: CONSO   MTS,440102       ;INTERRUPT FOR MAG TAPE?
320  000366  254000  000366'         JRST    .               ;NO. GO AWAY
321  000367  734340  000400          CONSO   MTC,400         ;WAS CONTROL FREE ENABLED?
322  000370  734700  440100          CONSZ   MTS,440100      ;NO. CONTROL FREE ERRONEOUSLY ON?
323  000371  254000  000373'         JRST    .+2             ;REAL MTA INTERRUPT
324  000372  254000  000366'         JRST    MTAINT+1        ;THIS INTERRUPT NOT REALLY FOR MTA
325  000373  264000  000000          JSR     MTASAV          ;YES, SAVE ACS
326  000374  550300  000663'         HRRZ    DEVDAT,USEWRD   ;RESET DEVDAT
327  000375  200006  000002          MOVE    IOS,DEVIOS(DEVDAT) ;AND IOS
328  000376  321000  000395'         JUMPL   IOS,REWCKA      ;CNTRL FREE INTERRUPT ON A REW. TAPE
329  000377  200340  000664'         MOVE    PROG,USEPRG
330  000400  332040  000670'         SKIPE   TAC,ERRFLG      ;BACKSPACE FROM ERROR?
331  000401  254000  000625'         JRST    TRYAGN          ;YES, REISSUE COMMAND
332  000402  734700  440000          CONSZ   MTS,440000      ;ERROR?
333  000403  254000  000602'         JRST    ERROR           ;YES, ILLEGAL OP OR HUNG DEVICE
334  000404  734300  000007          CONSZ   MTC,7           ;DATA OPERATION?
335  000405  254000  000446'         JRST    DATEND          ;YES
336  000406  135240  000722'         LDB     TP,[POINT 4,USEWRD,8] ;GET FUNCTION
337  000407  306240  000006          CAIN    TP,6            ;SKIPPING A RECORD?
338  000410  734740  010000          CONSO   MTS,10000       ;YES, SEEN AN EOF?
339  000411  334000  000000          SKIPA                   ;NO.
340  000412  660000  020000          TRO     IOS,IODEND      ;YES, TURN ON EOF BIT
341  000413  734700  300000  THRUTA: CONSZ   MTS,300000      ;NO, BOT OR REWINDING?
342  000414  664000  004000          TROA    IOS,IOBOT       ;YES, SET BOT BIT FOR USER TO SEE
343  000415  624000  004000          TRZ     IOS,IOBOT       ;NO. TURN OFF BOT BIT
344  000416  734700  004000  THRUTP: CONSZ   MTS,4000        ;NO. EOT?
345  000417  660000  002000          TRO     IOS,IOTEND      ;YES
346  000420  626000  000001          TLZE    IOS,IOW         ;JOB IN IO WAIT?
347  000421  260140  000210'         PUSHJ   PDP,SETIOD      ;YES, TAKE IT OUT
348  000422  621000  200000          TLZ     IOS,DMPMOD
349  000423  260140  000271'         PUSHJ   PDP,CLRACT
350                                                          ;CONTROL FREE INTERRUPT?
351                                                          ;YES, DONT COUNT DOWN MTREQ
352  000424  375000  000315'         SOSGE   MTREQ           ;COUNT DOWN REQUEST COUNT
353  000425  254000  000434'         JRST    THRUT2          ;NOONE ELSE WAITING
354  000426  331000  000662'         SKIPL   NMTREW          ;IF THERE ARE TAPES REWINDING
355  000427  332000  000665'         SKIPE   CLKREQ          ;WHICH HAVEN'T BEEN CHECKED IN
356  000430  334000  000000          SKIPA                   ;MORE THAN 1/2 A SECOND
357  000431  254000  000175'         JRST    MTCLK2          ;GO CHECK THEM NOW
358  000432  476000  000226'         SETOM   MTAVAL          ;SOMEONE ELSE WANTS IT
359  000433  254000  000436'         JRST    THRUT3          ;DISMISS INTERRUPT AND RETURN
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                                ;HERE WHEN CONTROL IS ALL DONE, CHECK ON REWINDING TAPES IF NEEDED
000434  331000  000662' THRUT2: SKIPL   NMTREW          ;ANY DRIVES REWINDING?
000435  254000  000175'         JRST    MTCLK2          ;YES, CHECK IF ANY THROUGH
000436  554240  000663' THRUT3: HLRZ    TP,USEWRD       ;GET UNIT
000437  620240  017777          TRZ     TP,17777        ;MASK OUT FUNCTION
000440  734205  000000          CONO    MTC,(TP)        ;DISMISS INTERRUPT
000441  513000  000365'         HLLZS   MTAINT          ;DONT LOOK AT ANY MORE INTERRUPTS
000442  263140  000000          POPJ    PDP,            ;AND EXIT


                                ;HERE WHEN BLKI/BLKO COUNTS DOWN TO ZERO
000443  000000  000000  MTDEND: 0
000444  734620  000001          CONO    MTS,1           ;GIVE A FUNCTION STOP
000445  254520  000443'         JEN     @MTDEND         ;AND EXIT
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000446  734700  020600  DATEND: CONSZ   MTS,20600         ;RECORD OK?
000447  254020  000614'         JRST    RETRY           ;PARITY, DATA LATE OR BAD TAPE
000450  603040  200200  DATN02: TLNE    IOS,DMPMOD      ;DUMP MODE?
000451  254000  000537'         JRST    DMPEND          ;YES
000452  607000  000220         TLNN    IOS,IO          ;READING?
000453  254000  000476'         JRST    INPTND          ;YES, FINISH INPUT
000454  260140  000000  ADVOUT: PUSHJ   PDP,ADVBFE      ;WRITING, ADVANCE BUFFERS
                                                        ;END OF TAPE?
000455  254040  000416'         JRST    THRUTP          ;YES, DONT WRITE ANY MORE
000456  623000  000001  NXTREC: TLZE    IOS,IOW         ;IN IO WAIT?
000457  260140  000421'         PUSHJ   PDP,SETIOD      ;RESTART JOB
000460  377000  000671'         SOSG    QUANTM          ;COUNT DOWN PROTECT TIME
000461  337000  000424'         SKIPG   MTREQ           ;ANYONE ELSE WANT CONTROL?
000462  734700  004000         CONSZ   MTS,4000        ;NO. KEEP GOING UNLESS EOT
000463  254000  000416'         JRST    THRUTP          ;YES, GIVE UP CONTROL
000464  211040  000033         MOVNI   TAC,MTTRY       ;RESET ERROR COUNT
000465  202040  000667'         MOVEM   TAC,ERCNT
000466  554240  000663'         HLRZ    TP,USEWRD       ;PICK UP COMMAND
000467  603000  000020         TLNE    IOS,IO          ;AND DO NEXT RECORD
000470  254000  000337'         JRST    MTOUT1
000471  554066  000027         HLRZ    TAC,@DEVIAD(DEVDAT)     ;PICK MAX. SIZE OF BUFFER
000472  271066  000027         ADDI    TAC,@DEVIAD(DEVDAT)     ;ADD IN FIRST ADDRESS
000473  260140  000000         PUSHJ   PDP,IADRCK              ;CHECK IT'S O.K.
000474  254000  000416'         JRST    THRUTP                  ;NO - RELEASE CONTROL
000475  254000  000357'         JRST    MTIN1                   ;O.K. DO NEXT INPUT.

                        ;HERE WHEN THROUGH AN INPUT RECORD
000476  734700  010000  INPTND: CONSZ   MTS,10000         ;EOF?
000477  254000  000612'         JRST    DATEOF          ;YES
000500  201066  000007         MOVEI   TAC,@DEVIAD(DEVDAT) ;START OF RECORD
000501  550100  000673'         HRRZ    TAC1,PNTR       ;WHERE WE ARE NOW
000502  275101  000001         SUBI    TAC1,1(TAC)     ;LAST LOC-FIRST LOC
000503  542101  000001         HRRM    TAC1,1(TAC)     ;=WORD COUNT
000504  260140  000000         PUSHJ   PDP,ADVBFF      ;ADVANCE BUFFERS
000505  254000  000416'         JRST    THRUTP          ;NONE FREE
000506  254000  000456'         JRST    NXTREC          ;CONTINUE WITH NEXT RECORD


                        ; HERE AT THE END OF A DUMP MODE RECORD
000507  554240  000663' DMPEND: HLRZ    TP,USEWRD       ;SET UP COMMAND AGAIN
000510  734740  014000         CONSO   MTS,14000       ;EOF OR EOT?
000511  254000  000537'         JRST    DMPBLK          ;NO,GET NEXT COMMAND
000512  734740  004000         CONSO   MTS,4000        ;EOF?
000513  660000  020000         IOR     IOS,IODEND      ;YES,SET EOF BIT
000514  254000  000416'         JRST    THRUTP          ;AND RETURN TO USER
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  419  000515  665000  000020  MTDMPO: TLOA    IOS,IO          ;DUMP OUTPUT
  420  000516  621000  000020  MTDMPI: TLZ     IOS,IO          ;DUMP INPUT
  421  000517  505010  000037          HRLI    UUO,PROG
  422  000520  260140  002030          PUSHJ   PDP,COMCHK      ;CHECK VALIDITY OF LIST
  423  000521  254030  000030          JRST    ADRERR          ;NOT VALID
  424  000522  261140  000000          PUSH    PDP,IOS         ;WSYNC WILL CLOBBER IOS
  425  000523  260140  000127'         PUSHJ   PDP,TPREDY      ;GET CONTROL, SETUP TP
  426  000524  262140  000000          POP     PDP,IOS
  427  000525  603010  002020          TLNE    IOS,IO          ;CHECK WRITE LOCK
  428  000526  734740  004010          CONSO   MTS,4010        ;AND EOT IF WRITING
  429  000527  254030  000534'         JRST    MTDMP2
  430  000530  734740  004000          CONSO   MTS,4000        ;ERROR
  431  000531  664000  400000          TROA    IOS,IOIMPM      ;WRITE LOCK
  432  000532  660000  042000          TRO     IOS,IOTEND+IOBKTL  ;EOT
  433  000533  254000  000416'         JRST    THRUTP          ;GIVE UP TAPE AND RETURN
  434  000534  661000  200000  MTDMP2: TLO     IOS,DMPMOD      ;INDICATE DUMP-MODE
  435  000535  370000  000014          SOS     UUO             ;WILL COUNT IT UP LATER
  436  000536  202600  000672'         MOVEM   UUO,LSTLOC      ;SAVE LOC OF LIST
  437  000537  260140  000546'  DMPBLK: PUSHJ   PDP,NXTCOM      ;GET NEXT COMMAND

  438  000540  271047  000000          ADDI    TAC,(PROG)      ;ADD RELOCATION FACTOR
  439  000541  603000  000020          TLNE    IOS,IO          ;WRITING?
  440  000542  254000  000343'         JRST    MTOUT2          ;YES, GO WRITE RECORD
  441  000543  606000  000001          TRNN    IOS,1
  442  000544  660240  012000          TRO     TP,12000        ;DR - READ ACROSS RECORD BOUNDARIES
  443  000545  254070  000362'         JRST    MTIN2           ;GO READ RECORD(S)
  444
  445  000546  332040  000573'  NXTCOM: SKIPE   TAC,REMNDR      ;PARTIAL IOWD LEFT TO DO?
  446  000547  254000  000562'         JRST    NXTCM3          ;YES, CONTINUE WITH IT
  447  000550  354040  000672'         AOSA    TAC,LSTLOC      ;GET NEXT COMMAND LOC
  448  000551  542040  000672'         HRRM    TAC,LSTLOC
  449  000552  200060  000001          MOVE    TAC,@TAC        ;PICK UP COMMAND
  450  000553  321040  000557'         JUMPL   TAC,NXTCM2      ;REAL COMMAND
  451  000554  327040  000547'         JUMPG   TAC,NXTCOM+1    ;GO-TO-WORD
  452  000555  262140  000001          POP     PDP,TAC         ;0 - THROUGH
  453  000556  254000  000416'         JRST    THRUTP
  454
  455                                   EXTERN  MMTSIZ          ;-MTSIZ
  456  000557  603000  000020  NXTCM2: TLNE    IOS,IO          ;WRITING?
  457  000560  602000  000001          TRNE    IOS,1           ;YES, MODE 16?
  458  000561  263140  000000          POPJ    PDP,            ;NO, USE IOWD AS OBTAINED
  459  000562  574100  000001  NXTCM3: HLRE    TAC1,TAC        ;YES, GET WORDCOUNT
  460  000563  402000  000573'         SETZM   REMNDR
  461  000564  311100  000574'         CAML    TAC1,MTSIZ      ;RECORD TOO LARGE?
  462  000565  263140  000000          POPJ    PDP,            ;NO, GO WRITE
  463  000566  270040  000703'         ADD     TAC,[XWD MTSIZ,MTSIZ] ;YES,
  464  000567  202040  000573'         MOVEM   TAC,REMNDR      ;IOWD TO USE FOR NEXT RECORD
  465  000570  275040  000000          SUBI    TAC,MTSIZ       ;ADDRESS FOR THIS IOWD
  466  000571  505040  000000          HRLI    TAC,MMTSIZ      ;WRITE -MTSIZ WORD RECORDS
  467  000572  263140  000000          POPJ    PDP,            ;RETURN THE IOWD
  468  000573  000000  000000  REMNDR: 0
  469  000574  777777  000571' MTSIZ:  XWD -1,MMTSIZ           ;NEG. OF RECORD SIZE IN WORDS
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000575  260140  000436' MTHUNG: PUSHJ   PDP,THRUT3       ;TURN OFF ERROR PI BIT
000576  260140  000163'         PUSHJ   PDP,SETACT       ;TURN ON IOACT
000577  201040  000001          MOVEI   TAC,1            ;SET HUNG-TIME TO 1 MORE TICK
000600  137040  000217'         DPB     TAC,PDVCNT       ;SET HUNG TIME
000601  263140  000000          POPJ    PDP,             ;AND EXIT

000602  734720  400000  ERROR:  CONSZ   MTS,400000       ;HUNG DEVICE?
000603  254070  000575'         JRST    MTHUNG           ;YES

                              ;ILLEGAL OP INTERRUPT
000604  606070  010000          TRNN    IOS,IOACT        ;DATA OPERATION?
000605  254070  000611'         JRST    ILLOP            ;NO, LIGHT ERROR BIT, GIVE UP CONTROL
000606  660000  400000          TRO     IOS,IOIMPM       ;YES, LIGHT IOIMPM
000607  202006  000002          MOVEM   IOS,DEVIOS(DEVDAT) ;SINCE DEVICE IS STILL ACTIVE
000610  254000  000434'         JRST    THRUT2           ;COUNT DOWN MTREQ ON HUNG CALL

000611  664000  400000  ILLOP:  TROA    IOS,IOIMPM
000612  661000  000040  DATEOF: TLO     IOS,IOEND        ;EOF - LIGHT BIT
000613  254070  000416'         JRST    THRUTP           ;AND GIVE UP CONTROL

                              ;TRY AGAIN ON PARITY ERROR OR BAD TAPE
000614  606030  000100  RETRY:  TRNN    IOS,IONRCK       ;WANT TO STOP ON ERROR?
000615  351040  000667'         AOSL    TAC,ERCNT        ;OR TRIED ENOUGH?
000616  254000  000644'         JRST    PERMER           ;YES, PERMANENT ERROR
000617  201040  000002  RETRY1: MOVEI   TAC,2            ;SET RETRY SWITCH
000620  202040  000670'         MOVEM   TAC,ERRFLG
000621  554240  000663' RETRY2: HLRZ    TP,USEWRD        ;PICK UP COMMAND
000622  405240  760770          ANDI    TP,760770        ;SET FOR BACKSPACE
000623  734205  007000          CONO    MTC,7000(TP)     ;BACKSPACE RECORD
000624  263140  000000          POPJ    PDP,             ;AND GO AWAY

                              ;COME HERE AFTER BACKSPACE IS THROUGH
000625  363040  000636' TRYAGN: SOJLE   TAC,TRYSKP       ;GO IF NOT 2ND BACKSPACE
000626  734740  100000          CONSO   MTS,100000       ;BOT?
000627  254060  000620'         JRST    RETRY2-1         ;NO, BACKSPACE AGAIN
000630                  TRYNXT:                          ;READ RECORD AGAIN
000630  200040  000674'         MOVE    TAC,SVPNTR       ;RESET POINTER
000631  202040  000673'         MOVEM   TAC,PNTR
000632  554240  000663'         HLRZ    TP,USEWRD        ;GET COMMAND
000633  734205  000000          CONO    MTC,(TP)         ;EXECUTE IT AGAIN
000634  402070  000670'         SETZM   ERRFLG
000635  263140  000000          POPJ    PDP,             ;AND GO AWAY

                              ;HERE AFTER 2ND BACKSPACE OR SKIP AFTER ERROR
000636  321040  000630' TRYSKP: JUMPL   TAC,TRYNXT       ;AFTER FORWARD SKIP IF NEGATIVE
000637  554240  000663'         HLRZ    TP,USEWRD        ;AFTER 2ND BACKSPACE - SKIPA RECORD
000640  405240  760770          ANDI    TP,760770
000641  734205  006000          CONO    MTC,6000(TP)     ;SKIP A RECORD
000642  476070  000670'         SETOM   ERRFLG           ;INDICATE FORWARD SKIP
000643  263140  000000          POPJ    PDP,             ;AND GO AWAY
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  521  000644  603000  000020  PERMER: TLNE    IOS,IO          ;READING?
  522  000645  602000  000120          TRNE    IOS,IONRCK      ;NO RECOVERY WANTED?
  523  000646  254000  000655'        JRST    SETIOS          ;REALLY PERMANENT
  524  000647  303040  000100          CAILE   TAC,100         ;TRIED TO REWRITE 100 TIMES
  525  000650  254000  000655'        JRST    SETIOS          ;YES, REALLY PERMANENT
  526  000651  327040  000621'        JUMPG   TAC,RETRY2      ;TRY WRITING WITH 3 INCHES OF
  527  000652  205040  010000          MOVSI   TAC,10000       ;BLANK TAPE TO ERASE BAD SPOT
  528  000653  436040  000663'        ORM     TAC,USEWRD      ;SET COMMAND TO 14 (FROM 4)
  529  000654  254000  000617'        JRST    RETRY1          ;AND TRY AGAIN
  530
  531  000655  734000  000400  SETIOS: CONSZ   MTS,400         ;DATA MISSED OR BAD TAPE?
  532  000656  660000  200000          TRO     IOS,IODERR      ;YES
  533  000657  734000  020200          CONSZ   MTS,20200       ;PARITY ERROR?
  534  000660  660000  100000          TRO     IOS,IODTER      ;YES
  535  000661  254000  000450'        JRST    DATN02          ;SAVE ERROR WORD AND GO AWAY
  536  000662  000000  000000  NMTREW: 0
  537  000663  000000  000000  USEWRD: 0
  538  000664  000000  000000  USEPRG: 0
  539  000665  000000  000000  CLKREQ: 0

  540  000666  000000  000000  UNIT:   0
  541  000667  000000  000000  FRCNT:  0
  542  000670  000000  000000  ERRFLG: 0
  543  000671  000000  000000  QUANTM: 0
  544  000672  000000  000000  LSTLOC: 0
  545  000673  000000  000000  PNTR:   0
  546  000674  000000  000000  SVPNTR: 0
  547  000675                  MTAEND: END
  548  000675  264000  000443'
  549  000676  270200  000000
  550  000677  170300  000005
  551  000700  110400  000005
  552  000701  000002  000001
  553  000702  330400  000663'
  554  000703  000000  000570'
```

NO ERRORS DETECTED

PROGRAM BREAK IS 000704

SYMBOL TABLE

ADRERR	000521'	EXT	ADVBFE	000454'	EXT	ADVBFF	000504'	EXT
ADVOUT	000454'		CLKREQ	000665'		CLOCK	000234'	EXT
CLOKRQ	002231'		CLRACT	000423'	EXT	CNECT2	000112'	
CNECT3	000116'		CNECT4	000122'		COMCHK	000520'	EXT
COMPAT	010000		CONECT	000076'		CPOPJ	000000'	EXT
CPOPJ1	000046'	EXT	DAT	000005	INT	DATEND	000446'	
DATEOF	000612'		DATND2	000450'		DEVDAT	000006	INT
DEVIAD	000007	INT	DEVIOS	000002	INT	DEVNAM	000000	INT
DEVOAD	000010	INT	DEVSER	000003	INT	DLYRDY	000125'	
DMPBLK	000537'		DMPEND	000587'		DMPMOD	200000	
EOTWT	000315'		ERCNT	000667'		ERRFLG	000670'	
ERROR	000602'		HUNGST	000001	INT	HUNGTP	000071'	
IADRCK	000473'	EXT	ILLOP	000611'		INPTND	000476'	
IO	000020	INT	IOACT	010000	INT	IOBKTL	040000	INT
IOBOT	004000	INT	IODEND	020000	INT	IODERR	200000	INT
IODTER	100000	INT	IOEND	000040	INT	IOIMPM	400000	INT
IONRCK	000100	INT	IOPAR	001000	INT	IOS	000000	INT
IOTEND	002000	INT	IOW	000001	INT	JIFSC2	000171'	EXT
LEOT	000276'		LEOT2	000302'		LSTLOC	000672'	
MMTSIZ	000574'	EXT	MTADDB	000021	INT	MTADDS	000011	INT
MTADSP	000032	INT	MTAEND	000675'		MTAGO	000266'	
MTAINI	000032'		MTAINT	000365'	INT	MTALOC	000350'	EXT
MTAP	000243'		MTAP0	000241'		MTAP1	000245'	
MTAP2	000313'		MTAP3	000246'		MTAREL	000274'	
MTASAV	000373'	EXT	MTASRX	000000	INT	MTAVAL	000432'	EXT
MTBOTH	000146'	EXT	MTC	000340		MTCLK2	000175'	
MTCLOK	000171'		MTCLOS	000047'		MTDEND	000443'	
MTDMP2	000534'		MTDMPI	000516'		MTDMPO	000515'	
MTDTGO	000345'		MTFLAG	000127'	EXT	MTHUNG	000575'	
MTIN	000355'		MTIN1	000357'		MTIN2	000362'	
MTLOC1	000040'	EXT	MTOUT	000330'		MTOUT1	000337'	
MTOUT2	000343'		MTPTRL	000320'		MTREQ	000461'	EXT
MTREW	400000		MTS	000344		MTSIZ	000703'	EXT
MTSZ	000574'		MTTRY	000003		MTWAIT	000316'	EXT
NMTREW	000662'		NXTCM2	000557'		NXTCM3	000562'	
NXTCOM	000546'		NXTREC	000456'		OUT	000053'	EXT
OUTPR	004000	INT	PDP	000003	INT	PDVCNT	000600'	EXT
PERMER	000644'		PIOFF	000232'	EXT	PIOMOD	000051'	EXT
PION	000236'	EXT	PNTR	000673'		PROG	000007	INT
PUNIT	000101'	EXT	QUANT	000003		QUANTM	000671'	
RDYCHK	000156'		REMNDR	000573'		RETRY	000614'	
RETRY1	000617'		RETRY2	000621'		REWCHK	000201'	
REWCK1	000214'		REWCK2	000220'		REWCKA	000205'	
SAVCHK	000042'		SAVDEV	000240'		SET9TK	000272'	
SETACT	000576'	EXT	SETIOD	000457'	EXT	SETIOS	000655'	
STDENS	000137'	EXT	STOIOS	000354'	EXT	SVPNTR	000674'	
TAC	000001	INT	TAC1	000002	INT	THRUT2	000434'	
THRUT3	000436'		THRUTA	000413'		THRUTP	000416'	
TP	000005		TPRDY2	000133'		TPREDY	000127'	
TPSET	000135'		TRYAGN	000625'		TRYNXT	000630'	
TRYSKP	000636'		UNIT	000666'		USEPRG	000664'	
USEWRD	000663'		UUO	000014	INT	VMTASR	000420	INT
WSYNC	000126'	EXT						

CODES	6#			
DISABL	6#			
ENABLE	6#			
NOSCHE	6#			
NOSHUF	6#			
QUEUES	6#			
SCHEDU	6#			
SHUFFL	6#			
STARTD	6#			
XP	6#	6	9	69