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1          ;***COPYRIGHT 1969, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.***
2
3
4          ;THIS SUB-PROGRAM ASSEMBLED WITH SYSTEM PARAMETER FILE - S,MAC(V414)
5          XLIST
6          LIST
7          TITLE MTCSR6 - MAGNETIC TAPE ROUTINES FOR 516 CONTROL
8          SUBTTL C,WHITE 27-APR-69 V406
9          XP      VMTCSR,406      ;DEFINE GLOBAL VERSION NUMBER FOR LOADER MAP,
10
11
12          ENTRY MTCSR6
13          MTCSR6:
14          INTERNAL FTCHECK,FTMONP
15          IFN FTCHECK+FTMONP,<
16          EXTERNAL MTCDDR,MTCDDS,MTECNT,MTBKCN
17          >
18          IFE FTCHECK+FTMONP,<
19
20          INTERNAL MTCDDR,MTCDSP
21
22          ;MTC DEVICE DATA BLOCK
23          ;REMAINING MTA DDB'S (IF ANY) ARE
24          ;GENERATED OUT OF LINE AT BUILD TIME
25          ZZ=.
26          000000 556441 207220 MTCDDB: SIXBIT /MTA/
27          000001 000002 000001 XWD 2*HUNGST,MTSIZ+1
28          000002 000000 000000 ?
29          000003 000000 000015' FXP MTCDSP
30          000004 001023 154407 XWD DVMTA+DVIN+DVOUT+DVLNG,154407
31          000005 000000 000000 ?
32          000006 000000 000000 ?
33          000007 000007 000000 XWD PROG,0
34          000010 000007 000000 XWD PROG,0
35          XP      MTECNT,.-ZZ+
36          000011 000000 000000 ? ;CUMMULATIVE ERROR COUNT FOR THIS UNIT
37          ;BITS 0-8=LONG, PARITY ERROR COUNT
38          ;BITS 9-17=LAT, PARITY ERROR COUNT
39          ;BITS 18-26=ILL, OP, COUNT
40          ;BITS 27-35=DATA MISSED COUNT
41          XP      MTBKCN,.-ZZ+
42          000012 000000 000000 ? ;CUMMULATIVE RECORD COUNTER FOR THIS UNIT
43          XP      MTCDDS,.-ZZ ;SIZE OF MTC DDB
44
45          >

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86
87 000043 260140 000144 MTAPE:  PUSHJ PDF,MTCHK2      ;CHECK IF MAG TAPE CONTROL AVAIL.
88 000044 630000 000712 MTAPE2:  TDZ IOS,EXWD IODT:IOEOF,IOACTJ
89 000045 606200 000240      TRNN T,SLICE      ;SET SLICE LEVEL THIS UUD?
90 000046 254000 000252      JRST NOSFT      ;NO
91 000047 621000 022000      TLZ IOS,IOSLIC  ;YES, CLEAR LEVEL
92 000050 602200 000000      TRNE T,SLEVEL  ;SET TO 1?
93 000051 661000 022000      TLD IOS,IOSLIC ;YES
94 000052                      NOSET:
95 000052 242200 000010      LSH T,+DR      ;MOVE TO FUNCTION
96 000053 405200 007400      ANDJ T,7400    ;MODE BITS
97 000054 306200 004000      CAIN T,4000    ;LOGICAL EOT?
98 000055 254000 000613      JRST MLEFOT
99 000056 302200 001400      CAIE T,1400    ;WRITE EOF
100 000057 306200 005400      CAIN T,5400    ;OR WRITE BLANK TAPE?
101 000060 254000 000253      JRST CHKLOK    ;YES, CHECK WRITE-LOCK
102 000061 722740 004000      CONS  224,4000 ;AT LOAD POINT?
103 000062 254000 000070      JRST MTGC0     ;NO
104 000063 302200 003400      CAIE T,3400    ;YES, BACKSPACE RECORD?

105 000064 306200 000400      CAIN T,400     ;NO, REW?
106 000065 254000 000354      JRST MTFIN     ;YES
107 000066 306200 007400      CAIN T,7400    ;NO, BACKSPACE FILE?
108 000067 254000 000354      JRST MTFIN     ;YES
109 000070 205040 000001 MTGC0:  MOVSI TAC,TCF ;LOOK FOR TAPE CONTROL FREE ONLY
    
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110
111
112
113 000071 135100 000000 MTG01: LDR TAC1,PUNIT ;UNIT
114 000072 137100 000713' CLR TAC1,[POINT 3,T,31] ;UNIT
115 000073 135100 000714' LDR TAC1,[POINT 3,IOS,28] ;DENSITY PARITY
116 000074 606100 000007 TRNN TAC1,7 ;NO DENSITY OR PARITY SPECIFIED?
117 000075 435100 000000 TORI TAC1,STDENS ;YES, USE STANDARD
118 000076 431100 000005 XORI TAC1, 5 ;ODD, 556
119 000077 137100 000715' CLR TAC1,[POINT 3,T,23]
120 000100 541044 000000 HRRI TAC,MTCCNV(T) ;CHANNEL
121 000101 660040 000200 TRD TAC, 200 ;INHIBIT RETURN TO POOL
122 000102 503000 020000 TLNE IOS,IOSLIC ;SLICE LEVEL A 1?
123 000103 660040 100000 TRD TAC,100000 ;YES, SET COMMAND.
124 000104 542300 000600' HRRM DEVCAT,MTDEV ;COMMAND, DVDB
125 000105 506040 000600' HRLM TAC,MTDEV
126 000106 201100 000317' MTG03: MOVEI TAC1,MTPDUN
127 000107 542100 000612' HRRM TAC1,MTIDSP
128 000110 402000 000577' SETZM MTEOFF ;CLEAR EOF FLAG
129 000111 607000 010000 TLNN IOS,IODT ;IS THIS A DATA TRANSFER OPERATION
130 ;REQUIRING DATA CONTROL
131 000112 254000 000115' JRST MTG02 ;NO, MUST BE SPACING OPERATION
132 000113 720200 000603' CONO DC,@MDCSAV ;YES, ATTACH DC TO MAGTAPE
133 000114 700600 000000 CONO PI,DCON ;TURN DC PI CHANNEL ON
134 000115 402000 000604' MTG02: SETZM MISSED ;CLEAR DATA MISSED FLAG
135 STARTDV MTC+EXTERNAL PIOFF,PION
136 000116 700600 000000 CONO PI,PIOFF
137 000117 722001 000000 CONO MTC,(TAC)
138 000120 546040 000611' HLRM TAC,MTCCON
139 000121 700600 000000 CONO PI,PION
140 000122 557000 000001 HLRZS TAC
141 000123 722601 000000 CONO 224,(TAC) ;ENABLE FOR TCF OR ERF
142 000124 254000 000000 JRST ST010S ;STORE HUNG COUNT, EXIT
143
144 ;READ
145 000125 260140 000135' MTIN: PUSHJ PDP,MTCHK ;IS SYSTEM AVAILABLE?
146 000126 621000 000000 TLZ IOS,IO ;READING.
147 000127 460266 000007 MTIN1: SETCM TAC,@DEVIAD(DEVDAT) ;-SIZE-1
148 000130 541066 000007 HRRI TAC,@DEVIAD(DEVDAT) ;BUFFER ADDRESS,PROG INCLUDED
149 000131 270040 000716' ADD TAC,[XWD 2,1] ;-SIZE+1,BUFFER+1
150 000132 201200 000240' MOVEI T,2400 ;READ
151 000133 200100 000717' MTIN2: MOVE TAC1,[BLKI DC,4000+MTOC*10]
152 000134 254000 000235' JRST MTINDC
    
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153
154
155 000135 260140 000200 ;IS SYSTEM AVAILABLE
156 000136 352000 000000 MTCHEK: PUSHJ PDP,GETDCMT ;GET DATA AND MAG TAPE CONTROLS
157 000137 200026 000322 AOSE MTREQ ;ARGUMENT
158 000140 661000 010000 MOVE IOS,DEVIOS(DEV DAT)
159 000141 256023 000000 TLO IOS,IODT ;FLAG DATA TRANSFER
160 000142 260140 000152' XCT *(PDP)
161 000143 254000 000135' PUSHJ PDP,MTCHK4 ;WAIT FOR REWIND
162 JRST MTCHEK ;GET DC & MT AGAIN
163 000144 352000 000136' MTCHK2: AOSE MTREQ
164 000145 260140 000000 PUSHJ PDP,MTWAIT
165 000146 200006 000022 MOVE IOS,DEVIOS(DEV DAT)
166 000147 621000 000020 TLZ IOS,IO ;CLEAR IO INDICATION SO "REWCK" WILL WORK
167 000150 260140 000152' PUSHJ PDP,MTCHK4 ;CHECK STATUS
168 000151 254000 000144' JRST MTCHK2 ;GET MT AGAIN
169
170 000152 661000 040000 MTCHK4: TLO IOS,HASMT ;THIS JOB NOW HAS MTC
171 000153 623000 000002 TLZE IOS,IOBEG ;FIRST OPERATION AFTER INIT OR SETSTS
172 000154 621000 020000 TLZ IOS,IOSLIC ;YES, SET SLICE LEVEL TO 0.
173 000155 621000 400000 TLZ IOS,IOREW ;CLEAR MAG TAPE REWINDING
174 000156 260140 000212' PUSHJ PDP,REWCK ;CHECK IF REWINDING?
175 000157 254000 000000 JRST TPOPJ ;NO - STATUS OK
176 000160 254000 000167' JRST QSTAT ;QUERY STATUS
177 000161 260140 000172' PUSHJ PDP,DETMDC ;REWINDING- DETACH MTC, DC AND TURN OFF
178 ;IODT AND HASMT
179 000162 661000 400000 TLO IOS,IOREW ;SET DEVICE ACTIVE AND IN REWIND WAIT
180 000163 260140 000000 PUSHJ PDP,ORACT
181 000164 357000 000026' AOSG MTRFVN ;ADD 1 TO REWIND WAIT COUNT
182 000165 260140 000426' PUSHJ PDP,MTCLK ;PUT IN CLOCK REQUEST,
183 ;(NO OTHER UNITS IN REWIND WAIT)
184
185 000166 254000 000000 JRST WSYNC
186
187 000167 260140 000172' QSTAT: PUSHJ PDP,DETMDC ;DETACH MTC AND DC
188 000170 254000 000000 JRST HNGSTP ;CHECK STATUS (PULL FINGERS OUT, ETC)
189

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190
191
192 ;MTAPE 0 WAITS UNTIL THE CONTROL IS FREE
193 ;THUS MTAPE 0 PROVIDES THE ONLY WAY FOR A USER TO WAIT UNTIL A SPACING OPERATION
194 ; (I.E., SKIP, BACKSPACE, OR REWIND) IS COMPLETED.
195 000171 260140 000144' MTP0: PUSHJ PDP,MTCHK2 ;WAIT FOR CONTROL TO BECOME FREE,
196 ; THEN GIVE IT BACK IMMEDIATELY,
197 ; AND RETURN TO THE USER.
198
199
200
201
202 ;DETMDC-
203 ; DETACH MTC, AND TURN OFF HASMT,
204 ; THEN (IFF IODT ON)
205 ; TURN OFF IODT AND DETACH DC
206
207 000172 DETMDC:
208 000172 MTHUNG:
209 000172 627000 040000 TLZN IOS,HASMT ;THIS JOB HAS MTC?
210 000173 254000 000124' JRST STOIOS ;NO
211 000174 260140 000206' PUSHJ PDP,RELCON
212 000175 371000 000144' SOSL MTREQ ;YES- ANYONE ELSE WAITING FOR IT?
213 000176 476000 000000 SETOM MTAVAL ;YES- FLAG AS JUST BECOME AVAILABLE
214 000177 627000 010000 DETDC: TLZN IOS,IODT ;DOES JOB HAVE DATA CONTROL?
215 000200 254000 000173' JRST STOIOS ;NO- EXIT
216 000201 720200 000000 CONO DC,0
217 000202 700600 000000 CONO PI,DCOFF
218 000203 371000 000000 SOSL DCREQ ;ANYONE ELSE WAITING FOR IT?
219 000204 476000 000000 SETOM DCAVAL ;YES- FLAG AS JUST BECOME AVAILABLE
220 000205 254000 000200' JRST STOIOS ;AND EXIT
221
222 000206 722000 000000 RELCON: CONO 220,0
223 000207 722600 000000 CONO 224,0
224 000210 402000 000611' SETEM MTCCON
225 000211 263140 000000 POPJ PDP,
    
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226
227
228 ;ROUTINE TO SEE IF UNIT IS REWINDING
229 ;CALL MOVE DEVCAT,ADDRESS OF DCR
230 ; PUSHJ PDP,REWCK
231 ; UNIT READY
232 ; UNIT OFF OR WRITE LOCKED
233 ; UNIT REWINDING
234 000212 135040 000071' REWCK: LDR TAC,PUNIT
235 000213 241040 000004 ROT TAC,4
236 000214 722201 000200 CONO MTC,200(TAC)
237 000215 722600 000022 CONO MTS1,SEL ;JAM UNIT INTO COMMAND BUFFER
238 000216 722700 020000 CONS7 MTS1,20000 ;SKIP IF REWIND MOTION OFF
239 000217 254000 000000 JRST CPOPJ2 ;RETURN TO CALL+2 IF TAPE REWINDING
240 000220 603000 000020 TLNE IOS,I0 ;OUTPUT ?
241 000221 722740 000200 CONS0 MTS1,200 ;YES-WRITE LOCKED ?
242 000222 722740 000002 CONS0 MTS1,2 ;NO-IS UNIT READY?
243 000223 350003 000000 AOS (PDP)
244 000224 263140 000000 POPJ PDP, ;YES- RETURN TO CALL+1

245
246
247 REPEAT 0,k
248 THIS WORKS WITH THE FOLLOWING MOD TO 545 TRANSPORT:
249
250 DELETE 1023k TO ??
251
252 ADD 1B18H TO 1B08K REW(1)(GND)
253 1B19S TO 1B08L FWD/LP(1)(GND)
254 1B08V TO 1B23K (REW(1),OR,FWD/LP(1))
255
256 THIS MOD SETS IOR22(1) WHILE MAGTAPE IS REWINDING OR SPACING FORWARD
257 TO LOAD POINT- IF ENABLES THE PROCESSOR TO DISTINGUISH BETWEEN A
258 TAPE WHICH IS AT THE END OF A REWIND COMMAND, AND A TAPE WHICH IS
259 SWITCHED TO LOCAL, OR OFF>

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260
261
262 000225 260140 000135' ;WRITE
263 000226 661000 000020 MTOUT: PUSHJ PDP,MTCHK
264 000227 201066 000010 TLO IOS,IO ;WRITING
265 000230 210101 000001 MTOUT1: MOVEI TAC,@DEVOAD(DEVDAT) ;BUFFER ADDRESS, PROG INCLUDED
266 000231 504040 000002 MOVN TAC1,1(TAC) ;-WD COUNT
267 000232 347040 000434' HRL TAC,TAC1 ;-WD CMT,BUFFER
268 000233 200100 000720' AOJG TAC,MTACTI ;BUFFER+1, TEST FOR ZERO WORD COUNT
269 000234 201200 001300 MTOUT2: MOVE TAC1,[BLKO DC,3400+MTDC*10]
270 000235 202040 000601' MOVEI T,1000 ;WRITE
271 000236 435100 000000 MTINDC: MOVEM TAC,MTDCCN ;BLKO POINTER
272 000237 202040 000602' IORI TAC1,DC1CHN ;DC PI CHANNEL NO.
273 000240 552100 000603' MOVEM TAC,DCWRD
274 000241 541100 000602' HRRZM TAC1, MDCSAV ;SAVE DC COMMAND
275 000242 700600 000202' HRRJ TAC1,DCWRD
276 000243 202100 000000 CONO PI,DCOFF ;TURN DC PI CHANNEL OFF
277 000244 200100 000721' MOVEM TAC1,DCLOC ;BLK COMMAND
278 000245 202100 000200 MOVE TAC1,[JSR MTDCND]
279 000246 660000 010000' MOVEM TAC1,DCLOC1
280 000247 205040 000004 TR0 IOS,IOACT ;SET IOACT
281 000250 722700 000004 MOVSI TAC,ERF ;ENABLE FOR EOR IF EOR FLAG NOT ON.
282 000251 205040 040000' CONS# 224,ERF ;END OF RECORD?
283 000252 254000 000071' MOVSI TAC,XNC ;NO. COME BACK WHEN COMMAND BUFFER IS EMPTY
284 JRST MTGQ1
285
286
287 000253 722740 000200 CHKLOK: CONS0 224,200 ;WRITE LOCKED?
288 000254 254000 000070' JRST MTGQ0 ;NO, DO MTAPE
289 000255 260140 000167' PUSHJ PDP,QSTAT
290 000256 254000 000253' JRST CHKLOK
    
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291                                     ;CLOSE OUTPUT
292
293 000257 607300 004000 MTCLSO: TLNN DEVDAT,OUTPR      ;HAS AN OUTPUT BEEN DONE?
294 000260 263140 000000          POPJ PDP,              ;NO. DON'T WRITE ON TAPE.
295 000261 135040 000000          LDR TAC,PIOMOD        ;DUMP MODE?
296 000262 305040 000016          CAIGF TAC,16
297 000263 260140 000000          PUSHJ PDP,OUT        ;NO. OUTPUT LAST PARTIAL BUFFER
298 000264 260140 000000          PUSHJ PDP,WAIT1     ;WAIT FOR OUTPUT TO FINISH
299 000265 201200 000003 MWLEOT: MOVEI T,3          ;WRITE EOF
300 000266 260140 000043          PUSHJ PDP, MTAPE
301 000267 201200 000003          MOVEI T,3          ;WRITE EOF
302 000270 260140 000043          PUSHJ PDP, MTAPE
303 000271 201200 000007          MOVEI T,7
304 000272 254000 000043          JKST MTAPE        ;BSP
305
306
307 000273 260140 000206 MTCINI: PUSHJ PDP,RELCON
308 000274 476000 000606          SETOM MTREWN      ;SET CLOCK REQUEST COUNT TO -1
309 000275 254000 000361          JKST MTNIO1

310
311
312                                     ;BLK COUNTED OUT
313
314 IFE FTICHECK+FTMONP,<
315 000276 000000 000000 MTCND: 0
316 >
317 000277 700600 000242 MTCND1: CONO PI,DCOFF ;SHUT OFF DC CHANNEL
318 000300 720300 010000          CONS7 DC,10000
319 000301 476000 000604          SETOM MISSED
320 000302 254500 000276          JEN @MTCND
321

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322
323
324 000303 722760 000611' ;FLAG FROM TAPE CONTROL. SET UP BY INSERT MACRO
325 000304 254000 000304' MTCINT: CONSO 224,@MTCCON
326 000305 264000 000000' JRST .
327 000306 550300 000600' JSR MTC SAV ;SAVE AC'S
328 000307 135340 000000' HRRZ DEVDAT,MTDEV ;DVDR
329 000310 200347 000000' LDB PROG,PJCRN; JOR NUMBER
330 000311 200006 000002' MOVE PROG,JBTADR(PROG)
331 000312 722740 000001' MOVE IOS, DEVIOS(DEVDAT)
332 000313 254000 000460' CONSO 224,TCF ;TAPE CONTROL FREE
333 000314 256000 000612' JRST MTEOR
334 000315 254000 000556' XCT MTIDSP
335 000316 254000 000531' JRST MTBSP ;AFTER BACKSPACE
336 000317 607000 010000' JRST MTEFF ;IF ERROR FOUND
337 000320 254000 000451' MTPDUN: TLNN IOS,IODT
338 000321 135040 000261' JRST MTNIO2
339 000322 301040 000016' LDR TAC,PIOMOD
340 000323 254000 000341' CAIL TAC,16
341 000324 603000 000020' JRST DMPDUN ;DUMP
342 000325 254000 000434' TLNE IOS,IO
343 000326 332000 000577' JRST MTNOTI ;WRITING
344 000327 254000 000345' SKIPF MTEOFF ;NOT EOF?
345 000330 201066 000007' JRST MTEOF
346 000331 210100 000601' MOVEI TAC,@DEVIAD(DEVDAT) ;BUFFER ADDRESS
347 000332 253100 000333' MOVN TAC1,MTCCN ;WD CNT-1
348 000333 513000 000002' AORJA TAC1, .+1 ;WD CNT
349 000334 270100 000602' HLLZS TAC1 ;CLR RT HALF
350 000335 546101 000001' ADD TAC1,DCWRD ;ADD CURRENT COUNT=NO, OF WDS
351 000336 260140 000000' HLRM TAC1,1(TAC) ;STORE AT WORD COUNT
352 000337 254000 000347' PUSHJ PDP,ADVBF
353 000340 254000 000436' JRST MTEND1 ;NEXT BUFFER FULL
354
355 000341 607000 000020' JRST MTCON ;CONTINUE MODE
356 000342 336000 000577' MTPDUN: TLNN IOS,IO
357 000343 254000 000346' SKIPM MTEOFF
358 000344 664000 020000' JRST MTEOF+1
359
360 000345 661000 000040' TROA IOS,IODEND
361 000346 400000 000577' MTEOF: TLO IOS,IOEND
362 SETM MTEOFF ;CLEAR EOF FLAG
363 ;AND FALL INTO MTEND1
    
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378 000361 210040 000607' MTNIO1: MOVN TAC,MTRCDD ;REPPAT COUNTER
379 000362 572040 000605' WRREM TAC,MTRCEN
380 000363 335000 000606' SKIPGE MTRERN ;IS ANY OTHER UNIT REWINDING AND
381 ;A SECOND COMMAND HELD UP?
382 000364 263140 000200 POPJ PDP, ;NO, DISMISS INTERRUPT
383
384 ;SOME UNIT IS REWINDING AND HAS HAD ANOTHER COMMAND HELD UP,
385 ;CHECK ALL UNITS
386
387 EXTERNAL SETIO0
388
389 000365 476000 000606' MTRERW: SETCV MTRERN ;SET COUNT TO NO. UNITS IN REW WAIT
390 000366 261140 000000 PUSH PDP,DEVDAT
391 000367 201340 000000 MOVEI DEVDAT,MTCDDR ;GET BEGINNING OF MT DATA BLOCK CHAIN
392
393 000370 200006 000002 REWLP: MOVE IOS,DEVIOS(DEVDAT)
394 000371 325000 000405' JUMPE IOS,REW2 ;IS UNIT IN A REW WAIT?
395 000372 260140 000212' PUSHJ PDP,REWCK ;YES,SEE IF FINISHED REW.
396 000373 254000 000376' JRST .+3 ;HAS FINISHED
397 000374 254000 000404' JRST REW1 ;OFF- LET HUNG LOGIC TAKE CARE OF IT
398 000375 254000 000403' JRST REW2 ;STILL REWINDING
399 000376 630000 000722' TDZ IOS,[XWD IOREW,I0ACT];GET JOB OUT OF IO WAIT
400 000377 623000 000001 TLZE IOS,I0W
401 000400 260140 000355' PUSHJ PDP,SETIO0 ;START JOB UP AGAIN
402 000401 202006 000002 MOVEI IOS,DEVIOS(DEVDAT)
403 000402 254000 000405' JRST REW2
404
405 000403 260140 000205' REW0: PUSHJ PDP,STOIOS ;RESET HUNG COUNT IF STILL REWINDING
406 000404 350000 000606' REW1: ACS MTRERN ;INCREMENT COUNT OF REW WAIT UNITS
407 000405 554306 000303' REW2: HLRZ DEVDAT,DEVSER(DEVDAT) ;DEVDAT TO NEXT DDR
408 000406 320300 000412' JUMPE DEVDAT,REW3 ;LAST ONE?
409 000407 554246 000200 HLRZ DAT,DEVNAM(DEVDAT) ;NO,GET LH OF NAME
410 000410 306240 556441' CAIN DAT,(SIXBIT /MTA/); ;STILL A MAGTAPE?
411 000411 254000 000370' JRST REWLP ;YES, CONTINUE
412 000412 262140 000000 REW3: PCP PDP,DEVDAT
413 000413 263140 000200 POPJ PDP, ;YES, DISMISS INTERRUPT OR RETURN TO MTC OK
414
415 000414 722700 010000 ETCHK: COMS7 MTS1,10000 ;EOT SEEN?
416 000415 660000 402000 TR0 IOS,I0IMPM+I0TEND ;YES-SET FLAGS
417 000416 630000 000703' TDZ IOS,[XWD IOREW,I0BOT]; ;NO LONGER REWINDING
418 000417 722700 024000 COMS7 MTS1,24002 ;UNLESS
419 000420 660000 004000 TR0 IOS,I0ROT ;IS REALLY REWINDING
420 000421 263140 000200 POPJ PDP, ;EXIT
421
    
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422 ;ROUTINE CALLED AT CLOCK LEVEL TO SEE IF ANY UNITS WHICH ARE IN A
423 ;REW WAIT HAVE FINISHED REWIND,
424
425 INTERNAL MTCLOCK
426
427 000422 335000 000175' MTCLOCK: SKIPGE MTREQ ;IS ANY JOB USING ANY UNIT NOW?
428 000423 260140 000365' PUSHJ PDP,MTREWW ;NO, CHECK ALL MAG TAPE
;UNITS TO SEE IF JUST FINISHED
429 ;REWINDING(WHICH WERE IN REW WAIT)
430 ;YES,ARE ANY UNITS STILL IN REW WAIT?
431 000424 335000 000606' SKIPGE MTREWW ;NO, RETURN TO CLOCK ROUTINE WITHOUT
432 000425 263140 000000' POPJ PDP, ;PUTTING IN CLOCK REQUEST
433
434 ;ROUTINE TO PUT IN A CLOCK REQUEST
435
436 EXTERNAL JIFSC2
437
438
439 000426 201120 000000' MTCCLK: MOVEI TAC1,JIFSC2 ;CHECK EVERY HALF SECOND
440 000427 505100 000422' HRLI TAC1,MTCLK ;DISPATCH ADDRESS
441 000430 700600 000400' CONO PI,400 ;TURN OFF PI
442 000431 136100 000000' ICPB TAC1,CLOCK ;STORE CLOCK REQUEST
443 000432 700600 000200' CONO PI,200 ;TURN ON PI
444 000433 263140 000000' POPJ PDP,

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445	000434	260140	000000	MTN01:	PUSHJ PDP,ADVBF	IWRITING
446	000435	254000	000347		JRST MTEND1	
447	000436	722700	010000	MTCON:	CONSZ 224,10000	IEND OF TAPE?
448	000437	254000	000347		JRST MTEND1	IYES - B/SP , EOF & EXIT
449	000440	722200	000000		CONC DC,E	ICLEAR DATA CONTROL
450	000441	623000	000001		TLZE IOS,10W	
451	000442	260140	000400		PUSHJ PDP,SETI00	
452	000443	202000	000002		MOVEM IOS,DEVI0S(DEVPAT)	
453	000444	210040	000627		MOVN TAC,MTREDD	
454	000445	572040	000605		HRREM TAC,MTERRN	
455	000446	607000	000020		TLNN IOS,10	IINPUT OR OUTPUT?
456	000447	254000	000127		JRST MTIN1	ICALL INPUT SUBROUTINE
457	000450	254000	000227		JRST MTOUT1	ICALL OUTPUT SUBROUTINE
458	000451	554040	000600	MTN102:	HLRZ TAC,MTDEV	ICOMMAND
459	000452	405040	007400		ANDI TAC,7400	
460	000453	302040	003000		CATE TAC,3000	I NO. SPACING ONE RECORD?
461	000454	254000	000354		JRST MTN10	IYES, EXIT
462	000455	722700	000400		CONSZ 224, 400	IEOF?
463	000456	670000	000724		T00 IOS,[XWD I0SE0F,I0END0]	
464	000457	254000	000354		JRST MTN10	IEXIT
465						
466						

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467 000460 201040 000004 MTEOR: MOVEI TAC,ERF
468 000461 722740 000004 CONSO 224,ERF ;END OF RECORD FLAG ON?
469 000462 254000 000545' JRST MTIGN1 ;NO. WAIT FOR IT.
470 000463 720300 010000 CONSO DC,10000 ;DATA MISSED
471 000464 476000 000604' SETOM MISSED ;YES
472 000465 720340 160000 CONSO DC,16000 ;ANY CHARS. LEFT?
473 000466 254000 000506' JRST MTEOR1 ;NO
474 000467 200200 000602' MOVE T,DCWRD ;GET IOWD
475 000470 607000 000020 TLNN IOS,I0 ;I/O?
476 000471 332000 000604' SKIPM MISSED ;NO, DATA MISSED
477 000472 254000 000514' JRST MTEOR2 ;YES
478 000473 720240 000002 CONI DC,TAC1 ;FETCH DC STATUS BITS
479 000474 242100 777763 LSH TAC1,-15 ;SHIFT CHARACTER COUNT TO LSRITS
480 000475 221100 777772 ;NO OF BITS TOO FAR RIGHT
481 000476 720220 000603' CONO DC,@MDCSAV ;?? IF DON SAYS SO, WELL, OK (JUST)
482 000477 720040 000001 DATA DC,TAC ;FETCH LAST PART-WORD OF DATA
483 000500 720200 000000 CONO DC,0 ;SHUT DOWN DC
484 000501 242042 000044 LSH TAC,44(TAC1) ;SHIFT LAST CHARACTERS TO LEFT END
485 000502 327200 000506' JUMPG T,MTEOR1

486 000503 253200 000504' AORJN T,#+1 ;BUMP DATA POINTER
487 000504 202044 000000 MOVEI TAC,(T) ;STORE LAST WORD
488 000505 202200 000602' MOVEI T,DCWRD ;AND BUMPED POINTER
489
490 000506 722700 400130 MTEOR1: CONSO 224,LPE:CPPE:400100 ;IF END OF RECORD, CHECK
491 ;PARITY,DATA MISSED, AND ILLEGAL FLAG
492 000507 254000 000514' JRST MTEOR2 ;IF ERROR CAUSE INTERRUPT TO
493 ;ERROR ROUTIF VIA TCF
494 000510 722700 000400 MTECON: CONSO 224, 400 ;EOF?
495 000511 476000 000577' SETOM MTEOFF ;SET EOF FLAG
496 000512 350006 000012 AOS @TBKCN(DEVDAT) ;COUNT NO. OF BLKS READ OR WRITTEN
497 ;INCLUDING RETRIES
498 000513 254020 000612' JRST @MTIDSP ;YES.
499
500 000514 370000 000612' MTEOR2: SOS MTIDSP ;POINT TO ERROR ROUTINE
501 000515 201200 000000 MOVEI T,0
502 000516 722700 000020 CONSO MTS1,20 ;LONGITUDINAL PARITY ERROR?
503 000517 661200 001000 TLO T,1000 ;YES, COUNT IN QUARTER 1
504 000520 722700 000010 CONSO MTS1,10 ;LATERAL PARITY ERROR?
505 000521 661200 000001 TLO T,1 ;YES, COUNT IN QUARTER 2
506 000522 722700 400000 CONSO MTS1,400000 ;ILLEGAL OP?
507 000523 660200 001000 TRQ T,1000 ;YES, COUNT IN QUARTER 3
508 000524 722740 000100 CONSO MTS1,100
509 000525 332000 000604' SKIPM MISSED ;DATA MISSED?
510 000526 660200 000001 TRQ T,1 ;YES, COUNT IN QUARTER 4
511 000527 272206 000011 ADDM T,MTECNT(DEVDAT) ;ADD TO ERROR COUNTS FOR THIS DRIVE
512 000530 254000 000510' JRST MTECON ;CHECK EOF
    
```

```

513
514 000531 554040 000670' MTERR: HLRZ TAC,MTDEV          ICOMMAND
515 000532 405040 000740'      ANDI TAC,7400
516 000533 602000 000170'      TRNE IOS,IORRCK
517 000534 254000 000550'      JRST MTERR2
518 000535 353100 000605'      AOSLE TAC1,MTERRCN
519 000536 301100 000003'      CAIL TAC1,3
520 000537 254000 000550'      JRST MTERR2
521 000540 554040 000670'      HLRZ TAC,MTDEV          ICOMMAND
522 000541 405040 770377'      ANDI TAC,770377
523 000542 722001 000340'      CONO 220,3400(TAC)     I8SP
524 000543 370000 000612'      SOS MTIDSP
525 000544 201040 000001'      MTIGN: MOVEI TAC,TCF
526 000545 722001 000000'      MTIGN1: CONO 224,(TAC)
527 000546 552040 000611'      HRRZM TAC,MTCCON
528 000547 254000 000000'      JRST MTCRET
529
530 000550 722740 400100'      MTERR2: CONSO 224,400100
531 000551 332000 000604'      SKIPE MISSED          ISET IODERR IF ILLEG OR MISSED CHAR FLAGS
532 000552 660000 200000'      TRO IOS,IODERR       ISET IODERR IF DATA MISSED
533 000553 722700 000000'      CONSZ 224,30
534 000554 660000 100000'      TRO IOS,IODTER       ISET IODTER IF LONG OR LAT PARITY
535 000555 254000 000317'      JRST MTPUN
536
537 000556 200040 000601'      MTRSP: MOVE TAC,MTCCON  I POINTER
538 000557 202040 000602'      MOVEM TAC,DCWRD      I RESET POINTER WORD
539 000560 554040 000600'      HLRZ TAC,MTDEV       I COMMAND
540 000561 722740 040000'      CONSO 224,XNC        I WAIT FOR XNC
541 000562 254000 000561'      JRST ,-1             I SHOULD ADD A COUNT(RUNAWAY TAPE TURNED OFF)
542 000563 333100 000605'      SKIPE TAC1,MTERRCN
543 000564 254000 000570'      JRST MTBSP3
544 000565 660000 010000'      MTRSP2: TRO IOS,IOACT
545 000566 505040 000004'      HRLI TAC,ERF
546 000567 254000 000106'      JRST MTG03
547 000570 606040 001000'      MTRSP3: TRNN TAC,1000  I READING
548 000571 644040 100000'      TRCA TAC,100000     I YES-CHANGE SLICE LEVEL
549 000572 606100 000001'      TRNN TAC1,1         I NO
550 000573 254000 000565'      JRST MTBSP2
551 000574 722001 004400'      CONO 220,4400(TAC)  I WRITE BLANK TAPE
552 000575 350000 000605'      AOS MTERRCN
553 000576 254000 000544'      JRST MTIGN
    
```



```

554
555          000220  MTC=220          ;MAG TAPE CONTROL DEVICE NUMRER
556
557          000224  MTS1=224          ;MAG TAPE CONTROL STATUS REG 1
558          040000  XNC=40000        ;TRANSFER NEW COMMAND
559          000002  MTOC=2           ;MAG TAPE DATA CONTROL DEVICE NO.
560          000001  TCF=1           ;TAPE CONTROL FREE
561          000004  ERF=4           ;END OF RECORD FLAG
562          000020  LPE=20          ;LONG. PARITY ERROR
563          000010  CPE=10          ;CHAR. PARITY ERPR
564          000002  SEL=2           ;UNIT TO COMMAND BUFFER
565          004000  IOSEOF=4000      ;SPACING ONE RECORD FORWARD FOUND EOF
566          002000  IOTEND=2000     ;EOT INDICATION
567          000100  IONRCK=100       ;DO NOT RE-TRY ON ERRORS
568          004000  IOROT=4000       ;TAPE AT LOAD POINT
569          010000  IODT=10000       ;A 1 FOR A DATA TRANSFER TYPE COMMAND
570          020000  IOSLIC=20000     ;A 1 IF SLICE LEVEL IS 1, OTHERWISE 0.
571          040000  HASMT=40000      ;IF A 1, THIS JOB HAS THE MAG TAPE CONTROL
572          400000  IOREW=400000     ;A 1 IF UNIT IS REWINDING AND ANOTHER OPERATION
                                     ;IS ATTEMPTED ON SAME UNIT. MUST BE SIGN BIT.

573
574
575
576          EXTERNAL ADVRF,ADVBFE,DCREQ,MTCSAV,SETACT,CLRACT,ORACT,GETDCMT
577          EXTERNAL MTCRET, DCAVAL, MTAVAL, MTCCHN, MTRFQ
578          EXTERNAL MTHAIT,OUT,SETIOD,CLOCK,HNGSTP,MTSIZ
579          EXTERNAL WSYNC,USRREL,WAIT1,ADREPR,PUNIT,PIOMOD,PJOBH
580          EXTERNAL JOBPD1,JOBSAV
581          EXTERNAL JBTADR,JOBPF1,STDENS,CPOPJ1,CPOPJ2,UOERR
582          EXTERNAL DCTCHN,DCLOC,DCLOC1,DCOFF,DCON,STOIOS,TPOPJ
583
584          INTERNAL MTCINT,DETMDC,DETOC
585
586          IFN FTCHCK+FTMNP,<
587          EXTERNAL MTEOFF,MTDEV,MTDCCN,DCWRD,MDCSAV,MISSED,MTERCN
588          EXTERNAL MTRFWN,MTCMDP,SVCNTR,MTCCON,MTIOSP,MTDCND
589          INTERNAL MTDCN1,MTPCUN
590          >
591          IFE FTCHCK+FTMNP,<
592          ;CONTROL DATA
593          >
594          000577  000000  000000  MTEOFF: 0          ;EOF FLAG
595          000600  000000  000000  MTDEV: 0          ;XWD COMMAND,DEVICE DATA BLOCK
596          000601  000000  000000  MTDCCN: 0         ;BLK I/O POINTER FOR REDO
597          000602  000000  000000  DCWRD: 0          ;BLK I/O POINTER FOR DC
598          000603  000000  000000  MDCSAV: 0         ;DC COMMAND
599          000604  000000  000000  MISSED: 0         ;-1 IF DC CONTAINS PARTIAL WORD
600          000605  000000  000000  MTERCN: 0         ;ERROR COUNTER
601          000606  000000  000000  MTRFWN: 0         ;NO. OF MAG TAPE UNITS-1 IN IO WAIT DOING REWINDS
602          ;BECAUSE THEY REQUESTED OTHER OPERATIONS BEFORE REW
603          ;FINISHED. -J MEANS NONE, 0 MEANS 1 IN QUEUE
604          000607  000000  000000  MTCMDP: 0         ;DUMP COMMAND LIST POINTER
605          000610  000000  000000  SVCNTR: 0         ;DUMP COMMAND IOWD NEGATIVE WORD COUNT
606          000611  000000  000000  MTCCON: 0         ;INTERRUPT FLAGS
    
```

MTCSR6 - MAGNETIC TAPE ROUTINES FOR 516 CONTROL MACRO.V36 19:08 4-JUN-69 PAGE 29-1  
C.WHITE 27-APR-69 V426

677 000612 254000 000317' MTIDSP: JRST MTPRUN  
608  
679 >

```

610
611
612 000613 201200 000007 MLEOT: MOVEI T,7 ;BACKSPACE
613 000614 260140 000044' PUSHJ PDP,MTAPE2
614 000615 260140 000144' PUSHJ PDP,MTCHK2 ;CALL INTERLOCK, PICKUP IOS
615 ;AFTER PREVIOUS TASK FINISHED.
616 000616 201200 000016 MTEOT2: MOVEI T,16 ;SPACE ONE FILE
617 000617 260140 000044' PUSHJ PDP,MTAPE2
618 000620 201200 000006 MOVEI T,6 ;SPACE ONE RECORD
619 000621 260140 000043' PUSHJ PDP,MTAPE
620 000622 260140 000144' PUSHJ PDP,MTCHK2 ;CALL INTERLOCK, RETURN WHEN
621 ;SPACING FINISHED WITH NEW IOS
622 000623 607000 004000 TLMN IOS, IOEOF ;WAS EOF DETECTED?
623 000624 254000 000616' JRST MTEOT2 ;NO, RESUME SPACING.
624 000625 201200 000007 MOVEI T,7 ;PREPARE FOR BACKSPACE MTAPE
625 000626 254000 000044' JRST MTAPE2 ;BACKSPACE, LOGICAL EOT FOUND
626 ;RETURN TO MAIN PROGRAM
627 000627 000000 000012 MTREND: 12 ;NUMBER OF TIMES TO RE-EXECUTE
    
```



```
681
682 000710 260140 000347' MTOMP2: PUSHJ PDP.MTEND1
683 000711 254000 000000 JRST ADRERR
684
685
686                                     END
687 000712 014000 010000
688 000713 040300 000004
689 000714 070300 000000
690 000715 140300 000004
691 000716 000002 000001
692 000717 720000 004020
693 000720 720100 003420
694 000721 264000 000276'
695 000722 400000 010000
696 000723 400000 004000
697 000724 004000 020000
```

NO ERRORS DETECTED

PROGRAM BREAK IS 000725

MTCSRP6 - MAGNETIC TAPE ROUTINES FOR 516 CONTROL MACRO.V36 19:08 4-JUN-69 PAGE 32  
 SYMBOL TABLE

AC1	000015	INT	AC2	000016	INT	ADRERR	000711	FXT
ADVBFE	000434	EXT	ADVBFF	000336	EXT	CHKLOK	000253	
CLOCK	000431	EXT	CLRACT	000360	EXT	CODES	145713	
CPE	000010		CPOPJ1	000030	EXT	CPOPJ2	000217	FXT
DAT	000005	INT	CAVAL	000204	EXT	DCLOC	000243	FXT
DCLOC1	000245	EXT	COFF	000277	EXT	DCON	000114	FXT
DCREQ	000203	EXT	CTCHN	000236	EXT	DCWRD	000602	
DETDC	000177	INT	DETMC	000172	INT	DEVDAT	000006	INT
DEVIAD	000007	INT	DEVIOS	000002	INT	DEVNAM	000000	INT
DEVOAD	000010	INT	DEVSER	000003	INT	DMPDUN	000341	
DVIN	000002	INT	DVLNG	000100	INT	DMTA	000020	INT
DVOUT	000001	INT	FRF	000004		ETCHK	000414	
FTCHEC	000000	INT	FTMONP	000000	INT	GETDCM	000135	FXT
HASMT	040000		HNGSTP	000170	EXT	HUNGST	000001	INT
IO	000020	INT	IOACT	010000	INT	IOREG	000002	INT
IOROT	004000	INT	IUDEND	020000	INT	IODERR	200000	INT
IOPT	010000		IODTER	100000	INT	IOEND	000040	INT
IOIMPM	400000	INT	IONRCK	000100	INT	IOREW	400000	
IOS	000000	INT	IOSEOF	004000		IOSLIC	020000	
IOEND	002000	INT	IOW	000001	INT	ITEM	000004	INT
JBTADR	000310	EXT	JDAT	000007	INT	JIFSC2	000426	FXT
JORP01	000671	EXT	JOBPF1	000670	EXT	JOBPAV	000673	FXT
LPE	000020		MDCSAV	000603		MISSED	000604	
MTAPE	000043		MTAPE2	000044		MTAVAL	000176	FXT
MTRKCN	000012	INT	MTBSP	000556		MTBSP2	000565	
MTRSP3	000570		MTC	000220		MTCCHN	000120	FXT
MTCOON	000611		MTCDOB	000000	INT	MTCDDS	000013	INT
MTCOSP	000015	INT	MTCHEK	000135		MTCHEK2	000144	
MTCHK4	000152		MTCINI	000273		MTCINT	000303	INT
MTCLK	000426		MTCLOK	000422	INT	MTCLSO	000257	
MTCMDP	000607		MTCON	000436		MTCRET	000547	FXT
MTCSAV	000305	EXT	MTCR6	000000	INT	MTDC	000002	
MTDCCN	000601		MTDCN1	000277		MTDCND	000276	
MTDEV	000600		MTDMP1	000636		MTDMP2	000710	
MTDMP1	000677		MTDMP0	000630		MTDPI1	000700	
MTDPO1	000631		MTECNT	000011	INT	MTECON	000510	
MTEND1	000347		MTEOF	000345		MTEOFF	000577	
MTFOR	000460		MTEOR1	000506		MTEOR2	000514	
MTEOT2	000616		MTERCN	000605		MTEOR	000531	
MTERR2	000550		MTFIN	000354		MTG00	000070	
MTG01	000071		MTG02	000115		MTG03	000106	
MTHUNG	000172		MTIDSP	000612		MTIGN	000544	
MTIGN1	000545		MTIN	000125		MTIN1	000127	
MTIN2	000133		MTINDC	000235		MTLEOT	000613	
MTNIO	000354		MTNIO1	000361		MTNIO2	000451	
MTNUTI	000434		MTOUT	000225		MTOUT1	000227	
MTOUT2	000233		MTP0	000171		MTPDUN	000317	
MTREND	000627		MTREQ	000422	EXT	MTREWN	000606	
MTREWN	000365		MTS1	000224		MTSIZ	000000	FXT
MTHAIT	000145	EXT	MWLEOT	000265		NOSET	000052	
ORACT	000163	EXT	OUT	000263	EXT	OUTPB	004000	INT
PDP	000003	INT	PIOFF	000116	EXT	PIOMOD	000662	FXT
PION	000121	EXT	PJOBN	000307	EXT	PROG	000007	INT

MTCSR6 - MAGNETIC TAPE ROUTINES FOR 516 CONTROL MACRO.V36 19:08 4-JUN-69 PAGE 32-1  
 SYMBOL TABLE

PUNIT	000212' EXT	QSTAT	000167'	RELCON	000206'
REW0	000403'	REW1	000424'	REW2	000405'
REW3	000412'	REWCK	000212'	REWLP	000370'
SAVCHK	000670'	SEL	000002'	SETACT	000000' EXT
SETIAD	000442' EXT	SLEVEL	000000' INT	SLICE	000040' INT
STDEMS	000075' EXT	STOIOS	000403' EXT	SVCNTR	000610'
T	000004'	TAC	000001' INT	TACL	000002' INT
TCF	000001'	TPOPJ	000701' EXT	USRMOD	010000' INT
USRREL	000650' EXT	UUN	000014' INT	UUGERR	000036' EXT
VMTCSR	000406' INT	WAIT1	000657' EXT	WSYNC	000166' EXT
XNC	040000'	ZZ	000000'		





DEVFIL	6#	6						
DEVIAD	6#	6	147	148	345			
DEVIOS	6#	6	157	165	330	393	472	452
DEVLOG	6#	6						
DEVMOD	6#	6						
DEVNAM	6#	6	479					
DEVOAD	6#	6	264					
DEVPPN	6#	6						
DEVPTR	6#	6						
DEVSER	6#	6	407					
DGF	6#	6						
DHNG	6#	6						
DIN	6#	6						
DINI	6#	6						
DLK	6#	6						
DMPDUN	340	355#						
DMT	6#	6						
DNAERR	6#	6						
DOU	6#	6						
DR	6#	6						
DRL	6#	6						
DRN	6#	6						
DSFR	6#	6						
DSI	6#	6						
DSKRLB	6#	6						
DSD	6#	6						
DVAVAL	6#	6						
DVCDP	6#	6						
DVDIR	6#	6						
DVDIRI	6#	6						
DVDIS	6#	6						
DVDSK	6#	6						
DVDTA	6#	6						
DVIN	6#	6	30					
DVLNG	6#	6	30					
DVLPF	6#	6						
DVMTA	6#	6	30					
DVPUT	6#	6	30					
DVPTP	6#	6						
DVPTP	6#	6						
DVTTY	6#	6						
ENTRR	6#	6						
ERF	280	281	467	468	545	561#		
ETCHK	366	374	415#					
FBMERR	6#	6						
FNERR	6#	6						
FRGSEF	6#	6						
FT2RFL	6#	6						
FTATTA	6#	6						
FTCHEC	6#	14	15	18	314	586	591	
FTEXAM	6#	6						
FTFINI	6#	6						
FTGETT	6#	6						



IOUSE	6#	6							
IOW	6#	6	371	400	450				
IOMC	6#	6							
IPPERR	6#	6							
ITFM	6#	6	46						
JACCT	6#	6							
JBFADR	6#	6							
JBFCTR	6#	6							
JBFPTR	6#	6							
JBTADR	329	541							
JBUF	6#	6							
JDAT	6#	6	664						
JERR	6#	6							
JIFSC2	437	439							
JLOG	6#	6							
JNA	6#	6							
JORPD1	580	664							
JORPFI	581	663							
JOBSAV	580	666							
JRD	6#	6							
JWPOS	6#	6							
JWSIZ	6#	6							
JXPB	6#	6							
LISTSN	6								
LOOKR	6#	6							
LPE	490	562#							
MDCSAV	132	273	481	598#					
MIDDLE	6#	6							
MISSED	134	319	471	476	529	531	599#		
MTAPE	87#	320	322	324	619				
MTAPE2	88#	613	617	625					
MTAVAL	213	577							
MTRKCN	42#	42	496						
MTBSP	334	537#							
MTBSP2	544#	550							
MTRSP3	543	547#							
MTC	137	236	555#						
MTCCHN	120	577							
MTCGON	138	224	324	527	626#				
MTCDOB	20	26#	391						
MTCOOS	44#	44							
MTCOSP	20	29	52#						
MTCHK	145	155#	161	262	631	674			
MTCHK2	82	87	163#	168	195	614	622	660	
MTCHK4	160	167	170#						
MTCINI	49	327#							
MTCINT	324#	534							
MTCLK	182	439#							
MTCLK	425	427#	440						
MTCLSO	53	293#							
MTCMDP	604#	637	648	650	651				
MTCOM	353	447#							
MTCRET	528	577							







CODES	6#					
DISARL	6#					
ENABLE	6#					
MTAPES	70#	74				
NOSCHE	6#					
NOSHIF	6#					
QUEUFS	6#					
SCHEDU	6#					
SHUFFL	6#					
STARTD	6#	135				
XP	6#	6	9	35	41	43