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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 DSKINT - PDP-10 RC-10 DISK INTERRUPT SERVICE - V403S
8      SURTTL A. FRANTZ/TH TS 5 FEB 69
9      XP      VDSKIT,403*
10     ;PUT VERSION NUMBER IN GLOB LISTING AND LOADER STORAGE MAP
11
12     ENTRY RCXINT ;THIS SYMBOL IS SOLELY TO PERMIT SYSTEM
13     RCXINT:      ; BUILDER TO RETRIEVE THE CORRECT BINARY FILE.
14
15     INTERNAL     DSKINT,DFWRT,DFRED,DSKFDG,DISKUP,FTCHECK,FTMONP,FTRCHK
16
17     EXTERNAL     DSKCHN,DSKBIT,DSKSAV,DFINT,RCXIIOC,RCXCCW
18
19     000170 DSK=170 ;DEVICE NUMBER ASSIGNED TO THE MODEL RC-10 DISK SYNCHRONIZER.
20
21
22     ;CONI FORMAT FOR THE MODEL RC-10 DISK SYNCHRONIZER --
23
24     ;BITS 00 - 17 MAINTENANCE PANEL SWITCH SETTING INDICATORS --
25     ;BITS 00 - 04 UNUSED
26     010000 000000 MSS=1B5 ;SET INDICATES "MAINTENANCE SEGMENT SELECTED" (SEGMENT B1).
27     004000 000000 PLGSW=1B6 ;1 = WRITE-PROTECT EVERYTHING BELOW (LESS THAN) THE BOUNDARY,
28     ; 0 = WRITE-PROTECT EVERYTHING ABOVE (GREATER THAN) BOUNDARY.
29     ;THE CURRENT IMPLEMENTATION OF THE RC-10 DISK SYNCHRONIZER
30     ; DOES NOT PERMIT SENSING THE INCLUSION OF THE BOUNDARY.
31     ;BITS 07 - 17 THE WRITE-PROTECTION BOUNDARY (DISK AND TRACK NUMBER).
32     400000 DTIP=1B18 ;SET INDICATES DATA TRANSFER IN PROGRESS.
33     ;BITS 19 -29 ERROR CONDITION INDICATORS (ERROR WHEN SET) --
34     200000 SRCHE=1B19 ;SEARCH ERROR (DISK TIMING TRACK PROBLEMS!!)
35     100000 DDE=1B20 ;DISK DESIGNATION ERROR
36     040000 TSE=1B21 ;TRACK SELECT ERROR (OR EXCEEDS SYSTEM CAPACITY)
37     020000 MRDY=1B22 ;DISK NOT READY (OR NON-EXISTENT DISK REFERENCED)
38     010000 PSF=1B23 ;POWER SUPPLY FAILURE
39     004000 DPAR=1B24 ;DISK PARITY ERROR
40     002000 CHOPAR=1B25 ;CHANNEL DATA PARITY ERROR
41     001000 CHCPAR=1B26 ;CHANNEL CONTROL PARITY ERROR
42     000400 NXMEM=1B27 ;NON-EXISTENT MEMORY REFERENCED
43     000200 WRPE=1B28 ;ATTEMPTED TO WRITE IN PROTECTED DISK AREA (SEE BITS 06 - 17)
44     000100 OVR=1B29 ;OVERRUN, I.E., MEMORY DIDN'T RESPOND QUICKLY ENOUGH
45     ;BIT 30 CHANNEL CONTROL WORD WRITTEN IN MEMORY (THIS BIT IS
46     ;TURNED ON ON ALMOST ALL TERMINATIONS.)
47     000020 BUSYRT=1B31 ;BUSY (SYNCHRONIZER PERFORMING A COMMAND SEQUENCE)
48     000010 DONEFLG=1B32 ;DONE -- THIS ACTUALLY CAUSES THE INTERRUPT.
49     ;BITS 33 - 35 PI CHANNEL SELECTION BITS.
50
51     ;COMBINATIONS OF ERROR BITS GROUPED BY TYPE --
52     006000 DATERR=DPAR:CHOPAR ;DATA ERRORS.
53     211100 DEVERR=SRCHE!PSF!CHCPAR!OVR ;DEVICE ERRORS.
54     160400 SFTErr=ODE!TSE!NRDY!NXMEM ;SOFTWARE-PREVENTABLE ERRORS.
55     377700 ALLERR=DATERR!DEVERR!SFTErr!WRPE ;ALL POSSIBLE ERRORS.

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56          ;CONO FORMAT FOR THE MODEL RC-10 DISK SYNCHRONIZER --
57
58          ;BITS 00 - 17  UNUSED
59          ;BITS 18 - 19  SELECT DISK FOR SECTOR COUNTER READ-OUT (SEE DATA1 BITS 28-35)
60          ;BITS 20 - 29  RESET THE CORRESPONDING CONI ERROR BIT
61                      ;(BUT PSF MAY REFUSE TO RE RESET)
62          000040 WHCCWD=1030      ;WRITE THE CHANNEL CONTROL WORD INTO MEMORY (NOW!)
63          000020 STPB1T=1031      ;STOP -- IMMEDIATELY CEASE PRESENT I/O AND CLEAR THE CHANNEL.
64          000010 RESETB=1032      ;RESET THE DONE FLAG (CORRESPONDING CONI BIT) TO CLEAR INTERRUPT
65          ;BITS 33 - 35  PI CHANNEL SELECTION BITS
66
67
68          ;DATA1 FORMAT FOR THE MODEL RC-10 DISK SYNCHRONIZER --
69
70          ;BITS 00 - 17  UNUSED
71          ;BITS 18 - 23  PARITY REGISTER
72          ;BITS 24 - 25  UNUSED
73          ;BITS 26 - 27  DISK SELECTED BY BITS 18-19 OF LAST CONO
74          ;BITS 28 - 35  CURRENT SECTOR POSITION OF SELECTED DISK (FOR LATENCY OPTIMIZATION!)
75
76
77          ;DATA0 FORMAT FOR THE MODEL RC-10 DISK SYNCHRONIZER --
78
79          ;BITS 00 - 17  DISK ADDRESS SELECTION
80                      ;BITS 00 - 01  DISK SELECT
81                      ;BITS 02 - 10  TRACK SELECT (RCD, BUT FIRST CHAR IS JUST 1 BIT)
82                      ;BITS 11 - 17  SEGMENT SELECT (RCD, BUT FIRST CHAR HAS ONLY 3 BITS)
83          ;BITS 18 - 23  INITIAL PARITY REGISTER SETTING (ZERO EXCEPT FOR DIAGNOSTIC PROGRAMS)
84          004000 ODSKPE=1024      ;DISABLE DISK PARITY ERROR STOP
85          002000 OCHNPE=1025      ;DISABLE CHANNEL DATA PARITY ERROR STOP
86          001000 WRBIT=1026      ;SET MEANS WRITE ON DISK, RESET MEANS READ FROM DISK
87          ;BITS 27 - 34  ;CORRESPONDING BITS OF INITIAL CHANNEL CONTROL ADDRESS, HENCE,
88                      ; THIS ADDRESS MUST BE EVEN AND IN THE FIRST 1K OF CORE MEMORY!
89          ;BIT 35        ;WRITE EVEN PARITY DATA INTO MEMORY (DIAGNOSTICS ONLY!)

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DSKINT - PDP-10 RC-17 DISK INTERRUPT SERVICE - V403S
A. FRANTZ/TH TS 5 FEB 69

MACRO,V36 19:04 4-JUN-69 PAGE 15-1

143 000034 263140 000000

POPJ PDP,

ISUBROUTINE EXIT.,.,.,.,***

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90      ;SUBROUTINE "DFWRT" IS CALLED TO START UP A WRITE ON THE DISK,
91
92      ;CALLING SEQUENCE --
93      ;   PUSHJ   PDP,DFWRT
94      ;   RETURN  WHEN WRITE HAS BEEN STARTED.
95      ;ENTRY CONDITIONS --
96      ;   C(TAC 18-35) = LOGICAL BLOCK NUMBER AT WHICH TO START WRITING,
97      ;   C(TAC1) = IOWD, I,E.,
98      ;   C(TAC1 00-17) = 2'S COMPLEMENT OF WORD COUNT TO BE WRITTEN
99      ;   C(TAC1 18-35) = ADDRESS OF FIRST DATA WORD TO BE WRITTEN
100     ;EXIT CONDITIONS --
101     ;   THE REQUESTED WRITE HAS BEEN BEGUN
102     ;   TAC AND TAC1 HAVE BEEN DESTROYED
103
104     000000  717300  000020  DFWRT:  CONSZ  DSK,BUSYRT      ;FOR SAFETY SAKE BE SURE THE DISK IS
105     000001  254000  000000'      JRST   ,1          ; FREE NOW (THIS MAY BE A REDUNDANT CHECK),
106     000002  202100  000172'      MOVEM  TAC1,WRCHNL      ;SET UP CHANNEL COMMAND SEQUENCE.
107     000003  402000  000173'      SETZM  WRCHNL+1        ;MAKE SURE NEXT COMMAND IS 0, SO CHANNEL
108                                     ; WILL NOT WRITE ALL OVER DISK
109
110     IFN      FTRCHK,<
111     000004  201102  000001      EXTERN SATM2
112                                     MOVEI  TAC1,1(TAC1)    ;CLEAR LH AND COMPARE WITH
113     000005  307100  000000      CAIG  TAC1,SATM2        ; FIRST WORD AFFECTED
114                                     ;COMPARE ABS CORE ADDRESS TO BEGINNING
115     000006  254200  000006'      HALT   ,              ;OF SAT TABLE-2
116                                     ;HALT - DO NOT WRITE OUT MONITOR - CONTINUE
117                                     ;WILL LOOP
118
119     >
120     000007  201100  000172'      MOVEI  TAC1,WRCHNL
121     000010  202100  000000      MOVEM  TAC1,RCXI0C      ;RCXI0C IS MAGIC EVEN LOCATION IN FIRST 1K OF CORE,
122     000011  260140  000130'      PUSHJ  PDP,CNVBLK      ;CONVERT LOGICAL BLOCK NO. INTO PHYSICAL DISK ADDRESS.
123     000012  435040  001000      ORI    TAC,WRBIT       ;REQUEST WRITE (INSTEAD OF READ)
124     000013  435040  000010'      DFWRTC: ORI    TAC,RCXI0C
125     000014  202040  000201'      MOVEM  TAC,DFORDR      ;SAVE RC-10 DATA0 COMMAND
126     000015  551040  000000      DSKFDG: HRRZI  TAC,DSKCHN  ;THIS INSTRUCTION TEMPORARILY ALTERED DURING "ONCE".
127     000016  435040  377710      IORI   TAC,ALLERR:RESETR
128     000017  505040  000010      HRLI   TAC,DONEFLG      ;TO SET INTERRUPT CONDITIONS IN DSKCON.
129
130     ;READY THE DISK SYNCHRONIZER ---
131     000020  700600  000000      STARTDV DSK+EXTERNAL PIOFF,PION
132     000021  717201  000000      CONO  PI,PIOFF
133     000022  546040  000170'      CONO  DSK,(TAC)
134     000023  700600  000000      HLRM  TAC,DSKCON
135     000024  550060  000013'      CONO  PI,PION
136     000025  574120  000024'      HRRZ   TAC,@RCXI0C      ;COMPUTE AND SAVE THE VALUE WHICH THE
137     000026  274040  000002'      HLRE   TAC1,@RCXI0C     ; CHANNEL CONTROL WORD SHOULD CONTAIN UPON
138     000027  200100  000025'      SUB    TAC,TAC1        ; SUCCESSFUL COMPLETION OF THE DISK OPERATION.
139     000030  505042  000001'      MOVE   TAC1,RCXI0C
140     000031  202040  000177'      HRLI   TAC,1(TAC1)
141     000032  402000  000000      MOVEM  TAC,RCXFIN
142     000033  717140  000201'      SETZM  RCXCCH          ;ZERO THE LOCATION WHERE THE DISK SYNCHRONIZER WILL
143                                     ; STORE THE CHANNEL CONTROL WORD.
144                                     ;START UP DISK AND DATA CHANNEL.
145
146     000033  717140  000201'      DATA0 DSK,DFORDR

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;A ROUTINE CALLED DURING SYSTEM INITIALIZATION TO BE SURE DISK IS READY.
; NOTE: THIS ROUTINE DESTROYS ACCUMULATOR TAC.

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222 000120 717200 377710 DISKUP: CONO DSK,ALLERR!RESETB ;CLEAR THE DISK SYNCHRONIZER.
223 000121 717300 030030 CONS# DSK,NRDY!PSF!BUSYBT!DONEFLG ;ANYTHING AMISS OR STUCK ?
224 000122 254000 000120' JRST DISKUP ;IF SO, JUST HANG HERE IN A LOOP.
225 000123 717040 000001 DATAI DSK,TAC ;IS THE SECTOR COUNTER GOING ?
226 000124 322040 000123' JUMPE TAC,-1 ;IF NOT, JUST LOOP HERE,
227 ;*** THIS LOOP ABOVE WILL OCCUR DURING INITIALIZATION IF THE DISK IS OFF-LINE. ***
228 000125 551040 000000 HRRZI TAC,DSKBIT ;IF NOT, ENABLE DISK INTERRUPTS ON THE
229 000126 700601 002200 CONO PI,2200(TAC) ; APPROPRIATE PRIORITY INTERRUPT CHANNEL.
230 000127 263140 000000 POPJ PDP, ;SUBROUTINE EXIT.....***

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167                                     ;DISK INTERRUPTS COME HERE TO BE SERVICED --
168
169
170 000050 717360 000170' DSKINT: CONSO DSK,DSKCON ;*DID THE DISK SYNCHRONIZER CAUSE THE INTERRUPT ON
171 000051 254000 000050' JRST ,-1 ;* THIS CHANNEL? IF NOT, GO ON TO THE NEXT DEVICE ON
172                                     ;* THE SAME PRIORITY INTERRUPT CHANNEL.
173                                     ; NOTE: THE "JRST ,-1" IS ALTERED BY THE SYSTEM BUILDER PROGRAM.
174
175 000052 717240 000176' CONI DSK,DSKISV ;*SOLELY TO LEAVE FOOTPRINTS.
176 000053 264000 000000 JSR DSKSAV ;*SAVE ACCUMULATORS, ETC.
177 000054 403000 000170' SETZ IOS,DSKCON ;*CLEAR THE DSK I/O STATUS ACCUMULATOR, AND
178                                     ;* THE INTERRUPT ENABLED MARKER,
179 000055 717300 006000 CONSZ DSK,DATERR ;*SET APPROPRIATE ERROR BITS (IF
180 000056 660000 100000 TRO IOS,IODERR ;* ANY) IN ACCUMULATOR IOS FOR
181 000057 717300 371500 CONSZ DSK,DEVERR!SFERR ;* DEVICE INDEPENDENT ROUTINE TO HANDLE.
182 000060 660000 200000 TRO IOS,IODERR ;*
183 000061 717300 000200 CONSZ DSK,WRPE ;*
184 000062 660000 400000 TRO IOS,IOIMPM ;*
185                                     ;CLEAR OUT THE DISK SYNCHRONIZER AND LEAVE IT DETACHED FROM ITS INTERRUPT CHANNEL.
186
187 000063 717200 377710 CONO DSK,ALLERR!RESETR
188 MOVE TAC,RCXCCW ;*PICK UP THE FINAL VALUE OF THE CHANNEL CONTROL WORD.
189 000064 200040 000032'
190 000065 316040 000177' CAMN TAC,RCXFIN ;*DOES IT AGREE WITH THE SAVED VALUE WE EXPECTED ?
191 000066 254000 000000 JRST DFINT ;*YES, EXIT TO THE DEVICE INDEPENDENT INTERRUPT
192                                     ;* HANDLING ROUTINE IN "DSKSER".....
193 000067 200100 000176' MOVE TAC1,DSKISV ;*
194 000070 602100 001000 TRNE TAC1,CHCPAR ;*CHANNEL CONTROL WORD PARITY ERROR DETECTED ?
195 000071 254000 000100' JRST DSKNT2 ;*YES, SET ERROR BIT, EXIT TO DSKSER TO TRY 3 TIMES.
196 000072 550100 000177' HRRZ TAC1,RCXFIN ;*NO, STOP DEAD UNLESS THE LAST DATA ADDRESS
197 000073 305101 000000 CAIGE TAC1,(TAC) ;* REFERENCED WAS WITHIN THE RANGE OF THE REQUESTED
198 000074 254000 000102' JRST DSKNT1 ;* TRANSFER, IF IT WAS IN RANGE, SOME ERROR MUST
199 000075 550120 000045' HRRZ TAC1,@RCXIOC ;* HAVE ABORTED PART OF THE DATA TRANSFER, THUS, THE
200 000076 303101 000000 CAILE TAC1,(TAC) ;* "DEVICE ERROR" BIT SHOULD BE TURNED ON BEFORE
201 000077 254000 000102' JRST DSKNT1 ;* EXITING TO THE DEVICE INDEPENDENT ROUTINE.
202 000100 660000 200000 DSKNT2: TRO IOS,IODERR ;*
203 000101 254000 000066' JRST DFINT ;*
204
205 000102 332000 000064' DSKNT1: SKIPE RCXCCW ;*MAYBE CHANNEL WAS TURNED OFF ?
206 000103 254200 000103' HALT ;*NO--SERIOUS CHANNEL MALFUNCTION--CALL REPAIR MAN!
207 000104 261140 000004' PUSH POP,ITEM ;*
208 000105 201200 000000 MOVEI ITEM,0 ;*SEND ERROR MESSAGE TO OPERATOR CONSOLE
209 000106 265040 000000 JSP TAC,ERRPNT ;*
210 000107 422232 345500 ASCIIZ /DISK DATA CHANNEL TURNED ON ?
211 000110 422032 440500
212 000111 416210 147234
213 000112 426304 052252
214 000113 512350 542100
215 000114 476344 037432
216 000115 050000 000000 /
217 000116 262140 000004 POP POP,ITEM ;*
218 000117 254000 000100' JRST DSKNT2 ;*

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231                                     ;SUBROUTINE TO CONVERT LOGICAL BLOCK NUMBERS TO PHYSICAL DISK ADDRESSES
232
233                                     ;CALLING SEQUENCE --
234                                     ;      PUSHJ   PDP,CNVBLK
235                                     ;      NORMAL RETURN (ONE "IMPOSSIBLE" ERROR STOP COULD OCCUR)
236                                     ;ENTRY CONDITIONS--
237                                     ;      C(TAC) = RH IS THE LOGICAL BLOCK NUMBER TO BE CONVERTED; LH MAY BE NON-ZERO.
238                                     ;EXIT CONDITIONS--
239                                     ;      C(TAC) = C(DFORDR) = THE CORRESPONDING PHYSICAL DISK ADDRESS CORRECTLY
240                                     ;      POSITIONED FOR A DATA TO THE RC-10 DISK SYNCHRONIZER,
241
242                                     EXTERNAL      ERRPNT,ERRPTU
243
244 000130 202040 000200' CNVBLK: MOVEM TAC,SVLBLK ;ONLY FOR FOOTPRINTS IN CASE OF CRASH.
245 000131 621040 777777' TLZ TAC,-1 ;CLEAR NON-USEFUL LEFT HALF OF LOGICAL BLOCK NUMBER.
246
247 INTERNAL      FTRCHK
248 IFN FTRCHK, <
249     CAMLE TAC,LBHIGH ;IS LOGICAL BLOCK NUMBER IN RANGE ?
250     JRST CNVBK1 ;NO, BUT IF LBHIGH IS STILL 0 WE MUST STILL BE
251 ; DOING THE INITIALIZATION IN "ONCE", SO IT'S OKAY.
252 ;INTERNAL MONITOR ERROR IF DSKSER OR SCHEDU COMES HERE WITH A LOGICAL
253 ; DISK BLOCK NUMBER THAT IS OUT OF RANGE....
254 000135 254200 000136' HALT ,+1 ;HALT ON THIS IMPOSSIBLE ERROR
255 000136 262140 000176' POP PDP,DSKISV ;CORRECT PUSH DOWN POINTER AND LEAVE
256 ;INDICATOR
257 000137 201000 200000' MOVEI IOS,IODERR ;UPON CONTINUING PREDEND I/O COMPLETED
258 ;WITH DEVICE ERROR,
259 000141 CNVBK1: JRST DFINT
260 >
261 000141 261140 000002' PUSH PDP,TAC1 ;THIS RTN SAVES AND RESTORES TAC1,
262 000142 231040 007640' IDIVI TAC,+D4000 ;DETERMINE DISK NUMBER.
263 000143 241040 777776' ROT TAC,-2
264 000144 202040 000201' MOVEM TAC,DFORDR ;SAVE DISK NUMBER AWAY.
265 000145 200040 000002' MOVE TAC,TAC1
266 000146 231040 000024' IDIVI TAC,+D20 ;SELECT TRACK NUMBER.
267 000147 261140 000002' PUSH PDP,TAC1
268 000150 231040 000012' IDIVI TAC,+D10 ;CONVERT TRACK NUMBER TO BCD.
269 000151 301040 000012' CAIL TAC,+D10
270 000152 271040 000006' ADDI TAC,6 ;SHORT-CUT BECAUSE FIRST DIGIT IS 0 OR 1.
271 000153 242040 000004' LSH TAC,4
272 000154 434040 000002' OR TAC,TAC1
273 000155 241040 777765' ROT TAC,-+D11
274 000156 436040 000201' ORM TAC,DFORDR ;PUT TRACK NUMBER AWAY ALSO.
275 000157 262140 000001' POP PDP,TAC ;NOW RETRIEVE SEGMENT NUMBER.
276 000160 242040 000002' LSH TAC,2 ;MULTIPLY BY 4 (FOUR PHYSICAL
277 000161 231040 000012' IDIVI TAC,+D10 ; SEGMENTS PER LOGICAL BLOCK)
278 000162 242040 000004' LSH TAC,4
279 000163 434040 000002' OR TAC,TAC1 ;SEGMENT NUMBER MUST BE IN BCD ALSO.
280 000164 517000 000001' HRLZS TAC
281 000165 437040 000201' ORR TAC,DFORDR ;FINALLY, JOIN SEGMENT NUMBER TO
282 000166 262140 000002' POP PDP,TAC1 ; EARLIER CALCULATED PARTS OF ADDRESS,
283 000167 263140 000000' POPJ PDP, ;SUBROUTINE EXIT.....***

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284      IFN      FTCHECK+FTMONP, <
285      EXTERNAL  RCXDAT      ;TO CAUSE THE CORRECT COPY OF "DSKDAT" TO BE
286                        ; RETRIEVED BY THE SYSTEM BUILDER.
287      EXTERNAL  DSKCON,WRCHNL,RDCHNL,DSKISV,RCXFIN
288      EXTERNAL  SVLBLK,DFORDR
289      >
290      IFE      FTCHECK+FTMONP, <
291      INTERNAL  DSKCON,LBHIGH,WRCHNL,RDCHNL,DSKISV,RCXFIN,SVLBLK,DFORDR
292      000170  000000  000000  DSKCON: 0      ;ENABLED INTERRUPT CONDITIONS STORED HERE BY "STARTDV",
293      000171  000000  000000  LBHIGH: 0      ;HIGHEST LEGAL LOGICAL BLOCK NUMBER,
294      000172  000000  000000  WRCHNL: 0      ;CHANNEL CONTROL WORD OF LAST DISK WRITE,
295      000173  000000  000000          Z      ;CHANNEL TERMINATION WORD,
296      000174  000000  000000  RDCHNL: 0      ;CHANNEL CONTROL WORD OF LAST DISK READ,
297      000175  000000  000000          Z      ;ZERO WORD TO TERMINATE CHANNEL,
298      000176  000000  000000  DSKISV: 0      ;RESULT OF LAST CONI ON A DISK INTERRUPT,
299      000177  000000  000000  RCXFIN: 0      ;EXPECTED VALUE OF CHANNEL CONTROL WORD (RCXCCW) AT
300                                ; THE END OF THE CURRENT DISK TRANSFER,
301      000200  000000  000000  SVLBLK: 0      ;LAST LOGICAL BLOCK NUMBER CONVERTED,
302      000201  000000  000000  DFORDR: 0      ;ITS CORRESPONDING PHYSICAL DISK ADDRESS.
303      >
304      000202      DSKEND: END

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NO ERRORS DETECTED

PROGRAM BREAK IS 000202

DSKINT - PDP-10 RC-10 DISK INTERRUPT SERVICE - V403S MACRO,V36 19104 4-JUN-69 PAGE 20
SYMBOL TABLE

ALLERR	377700	BUSYRT	000020	CHCPAR	001000
CHDPAR	002000	CNVBK1	000141	CNVBLK	000130
DATERR	006000	DCHNPE	002000	DDE	100000
DDSKPE	004000	DEVERR	211100	DFINT	000140
DFORDR	000201	DFRED	000035	DFWRT	000000
DFWRTC	000013	DISKUP	000120	DONEFL	000010
DPAR	004000	DSK	000170	DSKBIT	000125
DSKCHN	000015	DSKCON	000170	DSKEND	000202
DSKFDG	000015	DSKINT	000050	DSKISV	000176
DSKNT1	000172	DSKNT2	000100	DSKSAV	000053
DTIP	400000	ERRPNT	000106	ERRPTU	000000
FTCHEC	000000	FTMONP	000000	FTRCHK	777777
IODERR	200000	IODTER	100000	IOIMPM	400000
IOS	000000	ITEM	000004	LBHIGH	000171
MSS	010000	NROY	720000	NXMEM	000400
OVR	000100	PDP	000003	PIOFF	000020
PION	000023	PLGSW	004000	PSF	010000
RCXCCW	000102	RCXFIN	000177	RCXINT	000000
RCXIOC	000075	RDCHNL	000174	RESETB	000010
SATM2	000042	SFTERK	160400	SRCHE	200000
STPBIT	000020	SVLBLK	000220	TAC	000001
TAC1	000002	TSE	040000	VDSKIT	000403
WRRIT	001000	WRCCAD	000040	WRCHNL	000172
WRPE	000200				

A	6#	6		
AC1	6#	6		
AC2	6#	6		
AC3	6#			
AEFERR	6#	6		
AL	6#	6		
ALLERR	55#	126	187	222
ASSCON	6#	6		
ASSPRG	6#	6		
B	6#	6		
BUFPNT	6#	6		
BUFWRD	6#	6		
BUSYBT	47#	104	149	223
CHCPAR	41#	53	194	
CHDPAR	40#	52		
CLKR	6#	6		
CLSIN	6#	6		
CLSOUT	6#	6		
CMWB	6#	6		
CNVBK1	250	259#		
CNVBLK	120	163	244#	
CORCNT	6#	6		
D	6#	6		
DAT	6#	6		
DATERR	52#	55	179	
DCHNPE	85#			
DCL	6#	6		
DCLI	6#	6		
DCLO	6#	6		
DCLR	6#	6		
DDE	35#	54		
DDI	6#	6		
DDO	6#	6		
DDSKPE	84#			
DEN	6#	6		
DEVADR	6#	6		
DEVBUF	6#	6		
DEVCHR	6#	6		
DEVCTR	6#	6		
DEVDAT	6#	6		
DEVERR	53#	55	181	
DEVEXT	6#	6		
DEVFIL	6#	6		
DEVIAD	6#	6		
DEVIOS	6#	6		
DEVLOG	6#	6		
DEVMOD	6#	6		
DEVNAM	6#	6		
DEVOAD	6#	6		
DEVPPN	6#	6		
DEVPTR	6#	6		
DEVSER	6#	6		
DFINT	17	191	203	258

[illegible]

FNFERR	6#	6					
FRGSEG	6#	6					
FT2REL	6#						
FTATTA	6#						
FTCHEC	6#	15	284	290			
FTEXAM	6#						
FTFINI	6#						
FTGETT	6#						
FTHALT	6#						
FTKCT	6#						
FTMONP	6#	15	284	290			
FTPRV	6#						
FTRA10	6#						
FTRCHK	6#	15	109	154	246	247	
FTREAS	6#						
FTSLFE	6#						
FTTALK	6#						
FTTIME	6#						
FTTRAC	6#						
FTTRPS	6#						
FTTYS	6#						
HSAMSK	6#	6					
HSAP0S	6#	6					
HSASIZ	6#	6					
HUNGCT	6#	6					
HUNGST	6#	6					
I	6#	6					
IB	6#	6					
IBUFR	6#	6					
ICLOSB	6#	6					
ILM	6#						
ILUERR	6#	6					
INRFB	6#	6					
INITR	6#	6					
INPB	6#	6					
IO	6#	6					
IOACT	6#	6					
IOBEG	6#	6					
IOBKTL	6#	6					
IOBOT	6#	6					
IOCON	6#	6					
IODEND	6#	6					
IODERR	6#	6	182	202	256		
IODTER	6#	6	180				
IOEND	6#	6					
IOFST	6#	6					
IOIMPM	6#	6	184				
IONRCK	6#	6					
IOPAR	6#	6					
IOS	6#	6	177	180	182	184	202
IOTEND	6#	6					256
IOUSE	6#	6					
IOW	6#	6					

[illegible]

[illegible]

CODES	6#		
DISABL	6#		
ENABLE	6#		
NOSCHE	6#		
NOSHUF	6#		
QUEUES	6#		
SCHEDU	6#		
SHUFFL	6#		
STARTD	6#	129	
XP	6#	6	9