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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          IFNDEF T30,<T30=0>;ASSUME TYPE 30 DISPLAY IF T30 IS UNDEFINED
8          IFN T30,<
9          TITLE DIST30 - TYPE 30 DISPLAY SERVICE ROUTINES
10         ENTRY DIST30
11         DIST30:
12         >
13         IFE T30,<
14         TITLE DIS340 - TYPE 340 DISPLAY SERVICE ROUTINES
15         ENTRY DIS340
16         DIS340:
17         >
18         SUBTTL R. GRUEN/RCC TS 03 JUN 69 V004
19         XP          VDISSR,004*
20
21         ;          ;PUT VERSION NUMBER IN GLOB LISTING AND LOADER STORAGE MAP
22         ;          ; THESE ROUTINES HANDLE INTERRUPTS FROM THE DISPLAY DATA
23         ;          ; CHANNEL. THEY SEARCH THE COMMAND POINTER LIST SUPPLIED
24         ;          ; BY THE USER AND OUTPUT SECTIONS OF DATA AS SPECIFIED THEREIN.
25         ;          ; ALL OUTPUT IS DONE USING THE BLKO COMMAND,
26
27         ;          ; THE FORMAT OF THE COMMAND POINTER LIST IS AS FOLLOWS:
28
29         ;          RH=0          END OF COMMAND POINTER LIST
30
31         ;          RH=ADR LH=0   ADR IS ADDRESS OF THE NEXT SECTION OF THE
32         ;          ;          ; COMMAND POINTER LIST
33         ;          RH=L-1 LH=-N  OUTPUT TO THE DISPLAY THE N WORDS OF COMMANDS
34         ;          ;          ; BEGINNING AT LOCATION L.
35
36         ;          ; NOTE THAT THE CHECK FOR END OF LIST IS MADE FIRST,
37
38         ;          ; ALL ADDRESSES ARE CHECKED FOR VALIDITY (I.E., THEY MUST
39         ;          ;          ; BE WITHIN USER AREA) BEFORE ANY MEM REF IS MADE,
40
41         ;IF THE T30 SWITCH = 1 THIS IS THE ROUTINE FOR A DEC
42         ;TYPE 30 DISPLAY WITH A TYPE 340 INTERFACE.
43         ;OTHERWISE IT IS THE ROUTINE FOR A DEC TYPE 340.
44

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```
45
46          INTERNAL FTCHECK,FTMONP
47          IFN FTCHECK+FTMONP,<
48          EXTERNAL DISDOB,DISIOS,PENLOC,DISPNT,DISRKO,DISHI,DISONE,DISAV,OFFDIS
49          EXTERNAL DISAV1,DISREL,DISCON,DISNXT
50          INTERNAL DISNXT
51          >
52          IFE FTCHCK+FTMONP,<
53          ;DIS DEVICE DATA BLOCK
54          INTERN DISDOB
55          DISDOB: SIXBIT /DIS/
56          XWD      +D60+HUNGST,?
57          DISIOS: ?
58          EXP      DISDSP
59          XWD      DVOIS+DVOUT+DVIN+DVLNG,20000
60          ?
61          ?
62          XWD      PRG,0
63          ?
64          PENLOC: ?
65          DISPNT: ?
66          DISRKO: ?
67          DISHI: ?
68          DISONE: ?
69          DISAV: ?
70          DISAV1: ?
71          DISREL: XWD      TAC,?
72          XP      OFFDIS,0+
73          IFE T30,<
74          DISCON: EXP ONDIS>
75          IFN T30,<
76          DISCON: ?>
77
78          XP PENDDR,0
79          ;TO SATISFY A REQUEST IN COMMON,
80          ; THERE IS NOT REALLY A PEN DDB,
>
```

```
81
82           IFN T30,<
83           DIS=134           ;TYPE 30 DISPLAY DEVICE NUMBER
84           >
85           000100 DISTAR=100 ;CLOCK FINISHED BEFORE PICTURE
86           000200 DISWAT=200 ;PICTURE FINISHED BEFORE CLOCK
87           000400 DISCKR=400 ;CLOCK REQUEST IN CLOCK QUEUE
88           001000 DISUUI=1000
89
90           IFE T30,<
91           000077 DISBSY=77
92           007400 PENON=7400
93           >
94           IFN T30,<
95           DISBSY=20000
96           PENON=10000
97           >
98
99           EXTERN JOBPF1
100
101           EXTERN DISSAV,DISBLK,DISJSR,PENSAV
102           EXTERN DISCHN,PENCHN
103           EXTERN DISCHL,PFNCHL
104           EXTERN DISSAV,DISRET
105           EXTERN DISPON,DISPOF
106
107           EXTERN ADRERR,SETION
108           EXTERN PION,PIOFF,CLOCK
109           EXTERN CPOPJ1,UERROR,USRREL,STOTAC,JOB,JBTSTS,JBTADR,PJOBN
110           IFE T30,<           EXTERN ONDIS,NONDIS>
111
112           INTERN PENINT,DISINT,DISFIN
113           ENTRY DISDSP
114
115           DEFINE ADRCHK(A)
116           <
117           CAILE A,JOBPF1
118           CAMLE A,DISH1
119           JRST EXIT2
119           >
```

120	000022	254000	000043'	JRST	DISINI	INITIALIZATION
121	000023	263140	000000	POPJ	PDP,	PRINT ERROR AND STOP JOB
122	000024	254000	000045'	DISOSP: JRST	DISSTP	RELEASE
123	000025	254000	000045'	JRST	DISSTP	CLOSE
124	000026	265240	000000	JSP	DAT,UERROR	OUTPUT
125	000027	265240	000026'	JSP	DAT,UERROR	INPUT
126	000030	254000	000000	JRST	CPOPJ1	ENTER
127	000031	254000	000030'	JRST	CPOPJ1	LOOKUP
128	000032	254000	000245'	JRST	DISOUT	DUMP OUTPUT (THAT'S US)
129	000033	254000	000242'	JRST	DISIN	DUMP INPUT (AS IN PEN)
130	000034	263140	000000	POPJ	PDP,	SETO
131	000035	263140	000000	POPJ	PDP,	SFTI
132	000036	263140	000000	POPJ	PDP,	GETF
133	000037	254000	000031'	JRST	CPOPJ1	RENAME
134	000040	263140	000000	POPJ	PDP,	CLOSE INPUT
135	000041	263140	000000	POPJ	PDP,	DIRECTORY CLEAR
136	000042	263140	000000	POPJ	PDP,	MTAPE

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137 ;DISINI IS CALLED FOR RELEASE, CLOSE, AND SUNDRY ILLEGAL CONDITIONS
138 ; WHICH WANT TO TURN THE DISPLAY OFF. IT FIRST CONVINCES
139 ; THE INTERRUPT LEVEL ROUTINES TO GO BACK TO SLEEP AND THEN
140 ; TELLS THE MONITOR THAT THE DEVICE IS INACTIVE, LASTLY,
141 ; IT TURNS OFF THE INTERRUPT ASSIGNMENTS OF THE DISPLAY
142 ; AND THE PI CHANNEL ASSOCIATED WITH THE DIS BLKO. IT RETURNS
143 ; WITH A POPJ, SOMETIMES TO ITS CALLING ROUTINE AND SOMETIMES
144 ; TO THE CHANNEL'S DISMISS ROUTINE, THE ADDRESS OF WHICH
145 ; WAS CLEVERLY PLACED ON THE PUSHDOWN LIST WHEN AC'S
146 ; WERE SAVED, THUS IT CAN BE CALLED WITH EITHER A
147 ; PUSHJ PDP,DISINI OR A JRST DISINI.
148
149 000043 DISINI:
150 IFE T30,<
151 000043 713200 000100 CONO DIS,100 ;PARAMETER MODE>
152 IFN T30,<
153 MOVEI TAC,PENCHN ;SET UP CONO WORD WITH PROPER
154 ASH TAC,3 ; CHANNEL ASSIGNMENTS
155 ADDI TAC,DISCHN
156
157 TRO TAC,4000 ;SET DISPLAY READY BIT IN CONO WORD
158 000044 254000 000050' MOVEM TAC,DISCON>
159 JRST DISINI
160 000045 200200 000000 DISSTP: MOVE ITEM,JOB ;CLEAR NSHF SO JOB CAN BE SHUFFLED
161 MOVSI TAC,NSHF+NSWP ;CLEAR NSWP SO JOB CAN BE SWAPPED(IN CASE THIS
162 000046 205040 011000 IS A SWAPPING SYSTEM
163 000047 412044 000000 ANDCAM TAC,JBSTST(Item)
164
165 000050 476000 000011' DISINI: SETOM PENLOC
166 000051 205040 001200 MOVSI TAC,DISWAT+DISUI ;IGNORE FURTHER TRAPS
167 000052 541040 010000 HRRI TAC,IOACT ;INDICATE DEVICE INACTIVE
168 000053 412040 000002' ANDCAM TAC,DISIOS ;INTO DEVICE DATA BLOCK
169 000054 713200 000000 DISOFF: CONO DIS,OFFDIS ;REMOVE THE DISPLAY'S CHANNEL ASSIGNMENTS
170 000055 513000 000062' HLLZS PENINT ;DON'T EXPECT ANY ON LITE PEN
171 000056 700600 000000 CONO PI,DISPOF ;TURN OFF DISPLAY'S BLKO CHANNEL
172 000057 263140 000000 POPJ PDP,
173
174 000060 254000 000127' DISINT: JRST DISFIN
175 000061 254000 000060' JRST DISINT ;...

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176 ;PENINT RECEIEVES CONTROL ON INTERRUPTS ON THE DISPLAY NON-DATA
177 ; CHANNEL (SPECIAL CHANNEL), IT DECIDES IF THE INTERRUPT
178 ; WAS VALID, AND IF SO, TRANSFERS CONTROL TO AN APPROPRIATE ROUTINE
179
180 IFE T30,<
181 000062 713340 000070 PENINT: CONSO DIS,0 ;CHECK FOR CONI FLAGS
182 000063 254070 000062 JRST PENINT ;TO OTHER DEVICES ON SAME CHANNEL
183 000064 713370 000470 CONSZ DIS,400 ;STOP FLAG
184 000065 254000 000072 JRST STPFLG
185 000066 713300 002070 CONSZ DIS,2000 ;PEN FLAG?
186 000067 713040 000011 PENFLG: DATAI DIS,PENLOC ;STORE CURRENT LITE PEN LOC
187 000070 713200 000070 CONO DIS,NONDIS ;CLEAR FLAG
188 000071 254520 000000 JEN @PENCHL ;DISMISS INTERRUPT
189
190 ;STPFLG SERVICES STOP FLAGS (DISPLAY PROGRAMMED) BY DOING
191 ; A CLOSE ON THE DISPLAY
192
193 000072 264000 000000 STPFLG: JSR PENSAY ;STOP FLAG, SAVE AC'S AND SETUP RETURN
194 000073 254000 000025 JRST DISDSP+DCL ;DO A CLOSE AND DISMISS INTERRUPT
195 >
196
197 IFN T30,<
198 PENINT: CONSO DIS,0 ;CHECK FOR CONI FLAGS
199 JRST PENINT ;TO OTHER DEVICES ON SAME CHANNEL
200 DATAI DIS,PENLOC ;CLEAR PEN INTERRUPT
201 MOVEM TAC,PENLOC ;SAVE AC TAC
202 MOVE TAC,DISBK0 ;GET ABSOLUTE ADR OF NEXT DATA ELEMENT
203 SUR TAC,DISREL ;MAKE ADDRESS RELATIVE
204 HRRZS TAC ;CLEAR OUT GARBAGE IN THE LEFT HALF
205 EXCH TAC,PENLOC ;SAVE ADR IN PENLOC AND RESTORE TAC
206 JEN @PENCHL ;DISMIS THE INTERRUPT
207 >
208

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209 ;DISNXT IS CALLED WITH A JSR DISNXT, IT SETS UP THE NEXT
210 ; POINTER FOR THE DISPLAY'S BLKO BY INTERPRETING A
211 ; COMMAND LIST SUPPLIED BY THE USER. THIS COMMAND LIST
212 ; IS DESCRIBED AT THE BEGINNING OF THE PROGRAM. IF THE
213 ; DATA TO BE TRANSMITTED TO THE DISPLAY WOULD VIOLATE THE
214 ; MEMORY PROTECTION, THEN THE ROUTINE RETURNS TO THE
215 ; CALLING LOCATION +1, OTHERWISE, IF THERE
216 ; IS NO FURTHER DATA TO BE OUTPUT (AS INDICATED BY THE
217 ; USER'S COMMAND LIST) THE ROUTINE RETURNS TO THE CALLING
218 ; LOCATION +2. OTHERWISE, THE NEXT POINTER FOR THE BLKO
219 ; IS PLACED IN DISRKO AND THE ROUTINE RETURNS TO THE CALLING
220 ; LOCATION +3.
221
222 IFE FTCHK+FTMONP,<
223 000074 000000 000000 DISNXT: 0 ;JSR AT INTERRUPT OR UDO LEVELS
224 >
225 000075 354040 000012' DISNXT1: AOSA TAC,DISPNT ;GET NEXT POINTER FROM LIST
226 000076 552040 000012' ILUP: HRRZM TAC,DISPNT ;UPDATE POINTER POINTER
227 ADRCHK TAC+

228 000077 303040 000000 CAILE TAC,JOBPFI
229 000100 313040 000014' CAMLE TAC,DISHI
230 000101 254000 000124' JRST EXIT?
231 000102 200060 000020' MOVE TAC,@DISREL ;GET NEXT WORD IN POINTER LIST
232 000103 202040 000013' MOVEM TAC,DISBK0 ;PLACE IN BLKO POINTER
233 000104 566040 000017' HLR0M TAC,DISAV1 ;GET NEGATIVE WORD COUNT(MAKE LH NEG. TO0)
234 IFN T30,<
235 JUMPE TAC,EXIT1 ;END OF COMMAND LIST?
236 TRNN TAC,-1 ;INTENSITY?
237 JRST INTCHK ;YES>
238 IFE T30,<
239 000105 606040 777777 TRNN TAC,-1 ;END OF COMMAND LIST?
240 000106 254000 000123' JRST EXIT1 ;YES>
241 000107 627040 777777 TLZN TAC,-1 ;NO. POINTER TO NEW LIST?
242 000110 254000 000076' JRST ILUP ;YES.
243 000111 301040 000077' CAIL TAC,JOBPFI ;NO. ADDRESS IN BOUNDS?
244 000112 311040 000014' CAML TAC,DISHI
245 000113 254000 000124' JRST EXIT2 ;NO
246 000114 274040 000017' SUB TAC,DISAV1 ;YES, ADR. OF LAST WORD IN BLOCK.
247 ADRCHK TAC+
248 000115 303040 000111' CAILE TAC,JOBPFI
249 000116 313040 000014' CAMLE TAC,DISHI
250 000117 254000 000124' JRST EXIT?
251 000120 550040 000020' HRRZ TAC,DISREL ;FORM ABSOLUTE ADDR
252 000121 272040 000013' ADDM TAC,DISBK0 ;IN THE BLKO POINTER WORD
253 000122 350000 000074' AOS DISNXT ;RETURN 2,4
254 000123 350000 000074' EXIT1: AOS DISNXT
255 000124 200040 000016' EXIT2: MOVE TAC,DISAV
256 000125 713220 000021' CONO DIS,@DISCON ;SET UP DISPLAY STATUS WORD
257 000126 254120 000074' JRST 2,@DISNXT ;...
258
259 IFN T30,<
260 INTCHK: MOVSS TAC ;PLACE INTENSITY IN CONO WORD
261 DPB TAC,INTPNT

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DIS340 - TYPE 340 DISPLAY SERVICE ROUTINES MACRO.V36 19:03 4-JUN-69 PAGE 19-1
R. GRUEN/RCC TS 03 JUN 69 V004

262
263

 JRST DISNX1 IGET NEXT POINTER
INTPNT: POINT 3,DISCON,29>


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264 ;DISFIN RECEIVES CONTROL WHEN THE DISPLAY'S BLKO POINTER REACHES
265 ; ZERO. IT SAVES THE TWO AC'S WHICH DISNXT USES AND
266 ; DOES A JSR TO DISNXT. ON A NORMAL RETURN IT RESTORES THE
267 ; AC'S AND DISMISSES THE INTERRUPT. ON A "NO MORE DATA"
268 ; RETURN IT TRANSFERS CONTROL TO OVT2 FOR FURTHER
269 ; DECISION AS TO WHETHER OR NOT TO CONTINUE DISPLAYING.
270
271 000127 202040 000016' DISFIN: MOVEM TAC,DISAV ;SAVE AC'S
272 000130 264000 000074' JSR DISNXT ;SETUP NEXT BLKO POINTER
273 000131 254000 000236' JRST ADRER
274 000132 254000 000134' JRST OVT2 ;RETURN HERE IF NO NEXT POINTER
275 000133 254520 000000' JEN @DISCHL ;LET THE SCOPE DO THE REST
276
277 ;OVT2 RECEIVES CONTROL AT INTERRUPT LEVEL WHEN THE COMMAND LIST
278 ; (SUPPLIED BY THE USER) RUNS OUT. IT SAVES THE AC'S FOR
279 ; THIS CHANNEL AND IN THE PROCESS ENABLES RETURNS BY POPJ
280 ; AND SIMILAR GOOD THINGS SINCE IT ALSO STORES THE PC FROM
281 ; THE JSR IN THE GENERAL PC LOCATION FOR THIS CHANNEL
282 ; IF THE DISPLAY IS OFF, IT DOES NOT RESTART IT,
283 ;
284 ; IT CHECKS TO SEE IF THE CLOCK HAS RUN OUT BEFORE THE PICTURE;
285 ; IF SO, IT CALLS DISBEG TO RESTART THE DISPLAY WITH A NEW
286 ; COMMAND LIST. IT TURNS OFF THE IO ACTIVE BIT WHICH WAS
287 ; TURNED ON BY THE OUTPUT ROUTINE; THIS INSURES THAT ANY
288 ; OUTPUT COMMAND WILL DISPLAY AT LEAST ONE PICTURE. IF
289 ; THE JOB WAS IN AN IO-WAIT, IT IS RELEASED,
290
291 000134 264000 000000' OVT2: JSR DISSAV ;ASK EXEC TO SAVE AC'S
292 000135 201300 000000' MOVEI DEVDAT,DISDDR ;SETUP ACS
293 000136 205040 004000' MOVSI TAC,SHF
294 000137 205240 001000' MOVSI DAT,NSHF
295 000140 135200 000000' LDR ITEM,PJORN
296 000141 260140 000054' PUSHJ PDP,DISOFF
297 000142 205000 000200' MOVSI IOS,DISWAT ;INDICATE PICTURES FINISHED
298 000143 437000 000002' IOBH IOS,DISIOS ;...
299 000144 667000 001000' TLOH IOS,DISUUI ;RESUME DISPLAY, NEW UUI.
300 000145 254000 000164' JRST OVT6 ;YES, STAY IN IO WAIT
301 000146 612044 000047' TDNE TAC,JBTSTS(ITEM) ;DOES SYSTEM WANT TO SHUFFLE THIS JOB?
302 000147 254000 000153' JRST OVT4 ;YES
303 000150 603000 000100' TLNE IOS,DISAR ;HAS CLOCK TRIGGERED?
304 000151 260140 000167' PUSHJ PDP,DISBEG ;YES, RESTART DISPLAY
305 000152 254000 000156' JRST OVT3
306 000153 603000 000100' OVT4: TLNE IOS,DISAR ;DID CLOCK FINISH BEFORE PICTURE?
307 000154 260140 000204' PUSHJ PDP,CLKREQ ;YES, PUT IN CLOCK REQUEST.
308 000155 412244 000146' OVT5: ANDCAM DAT,JBTSTS(ITEM) ;TURN OFF NSHF SO JOB CAN BE SHUFFLED
309 000156 200000 000002' OVT3: MOVE IOS,DISIOS ;BIT FIDDLING TIME
310 000157 620000 010000' TRZ IOS,IOACT ;SIGNAL DISPLAY CAN BE CLOSED
311 000160 623000 000001' TLZE IOS,IOW ;IS DISPLAY CAUSING AN IO-WAIT?
312 000161 260140 000000' PUSHJ PDP,SETIOP ;UNWAIT THE JOB
313 000162 202000 000002' MOVEM IOS,DISIOS ;RESTORE IO CONTROL WORD
314 000163 254000 000000' JRST DISRET ;RESTORE AC'S AND DISMISS
315 000164 202000 000002' OVT6: MOVEM IOS,DISIOS
316 000165 260140 000167' PUSHJ PDP,DISRFG ;START NEW COMMAND LIST
317 000166 254000 000163' JRST DISRET

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```
317 ;DISREG IS CALLED WITH A PUSHJ PDP,DISREG. IT DISABLES THE
318 ; DISPLAY ITSELF (BY USING DISCOFF) AND ALSO DISABLES THE
319 ; CLOK RESTART AND RESPTS THE POINTER TO THE USER'S
320 ; COMMAND LIST TO THAT SPECIFIED ON THE LAST OUTPUT
321 ; MINUS ONE. IT ASKS DISNXT TO SET UP THE NEXT BLKO POINTER
322 ; IF DISNXT IS UNSUCCESSFUL (I.E., IF THE USER COMMAND LIST
323 ; IS NULL), THEN THE ROUTINE DOES A CLOSE. OTHERWISE, A
324 ; REQUEST IS ENTERED FOR A CLOCK INTERRUPT AT THE END OF
325 ; AT MOST TWO JIFFIES. THIS CLOCK QUEUE REQUEST IS ENTERED
326 ; ONLY IF THERE IS NONE ALREADY IN THE QUEUE. THE PI
327 ; CHANNELS FOR THE DISPLAY ARE TURNED ON AGAIN AND THE
328 ; DISPLAY IS INITIALIZED BY A CONO. IT SHOULD THEN REQUEST
329 ; DATA AS SOON AS THE PI CHANNEL FOR THE BLKO IS TURNED ON.
330 ; IT TURNS THIS CHANNEL ON AND RETURNS TO ITS CALLER.
331
332 000167 205000 000300 DISREG: MOVSI IOS,DISSTAR+DISWAT ;INDICATE FRESH DISPLAY
333 000170 412000 000002 ANDCAM IOS,DISIOS ;...
334 000171 550100 000215 HRRZ TAC1,DISONE ;GET POINTER LIST ADDR (-1)
335 000172 552100 000012 HRRZM TAC1,DISPNT ;RESET POINTER POINTER WITH IT
336 000173 264000 000074 JSR DISNXT ;ASK FOR FIRST WORD FOR BLKO
337 000174 254000 000237 JRST ADRR1
338 000175 254000 000045 JRST DISSTP ;NULL LIST, CLOSE
339 000176 260140 000204 PUSHJ PDP,CLKREQ ;ENTER CLOCK QUEUE REQUEST
340 000177 713200 000021 CONO DIS,DISCON ;INITIALIZE THE DISPLAY
341 000200 201040 007400 MOVEI TAC,PENON ;ALLOW SPECIAL PI INTERRUPTS
342 000201 542040 000062 HRRM TAC,PENINT ;...
343 000202 700600 000000 CONO PI,DISPON ;ALLOW BLKO INTERRUPTS
344 000203 263140 000000 POPJ PDP, ;RETURN
345
346 000224 205000 000400 CLKREQ: MOVSI IOS,DISCKR ;IF NO CLOCK INTERRUPT REQUESTED
347 000205 200040 000214 MOVE TAC,CLOKRT ;RESET TIMER
348 000206 700600 000000 CONO PI,PIOFF ;INHIBIT INTERRUPTS
349 000207 676000 000072 TDOA IOS,DISIOS ;ENTER ONLY A SINGLE CLOCK REQUEST
350 000210 136040 000000 YDPR TAC,CLOCK ;PLACE REQUEST IN QUEUE
351 000211 436000 000072 TORM IOS,DISIOS ;PROTECT AGAINST A DUPLICATE REQUEST
352 000212 700600 000000 CONO PI,PION ;INHIBIT INTERRUPTS
353 000213 263140 000000 POPJ PDP, ;RETURN
354
355 000214 000215 000072 CLOKRT: XWD CLOK,2 ;CONTROL FOR CLOCK QUEUE: 2 JIFFIES
356 ;TWO JIFFIES
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357 ;CLOCK IS CALLED AT THE CLOCK LEVEL IN RESPONSE TO A REQUEST
358 ; IN THE CLOCK QUEUE. A BIT IS SET TO INDICATE THAT THE
359 ; CLOCL PERIOD HAS ELAPSED, IF THE DISPLAY IS STILL IN
360 ; PROGRESS, CLOK RETURNS AT THIS POINT. OTHERWISE, CLOK
361 ; GOES TO DISBEG TO START UP THE DISPLAY, DISBEG RETURNS
362 ; WITH A POPJ PDP,
363
364 000215 205000 000400 CLOK: MOVSI IOS,DISCKR ;INDICATE CLOCK REQUEST SERVICED
365 000216 413000 000002' ANOCAB IOS,DISIOS ;...
366 000217 663000 001000 TLOE IOS,DISUUI
367 000220 205000 000100 MOVSI IOS,DISSTAR ;ASK DISPLAY TO RESTART
368 000221 437000 000002' IORB IOS,DISIOS ;...
369 000222 607000 000200 TLNN IOS,DISWAT ;HAS DISPLAY FINISHED?
370 000223 263140 000000 POPJ PDP, ;NO, WAIT FOR IT TO DO SO
371 000224 201300 000000' MOVEI DEVDAT,DISDDR
372 000225 205040 001000 MOVSI TAC,NSHF
373 000226 135200 000140' LDR ITEM,PJORN
374 000227 612044 000155' TDNE TAC,JBTSTS(ITEM) ;IS SHUFFLE LOCKED OUT?
375 000230 254000 000167' JRST DISBEG ;YES, RESTART DISPLAY AND RETURN

376 000231 436044 000227' IORM TAC,JBTSTS(ITEM) ;NO, LOCK IT OUT,
377 000232 200044 000000 MOVE TAC,JBTADR(ITEM) ;RESET DISHI AND DISREL AFTER SHUFFLING
378 000233 556040 000014' WLRZM TAC,DISHI
379 000234 542040 000020' HRRM TAC,DISREL
380 000235 254000 000167' JRST DISBEG ;RESART DISPLAY AND RETURN
381
382 ;ADRER SERVICES PROTECTION VIOLATIONS DISCOVERED BY DISNXT,
383 ; IT DOES A CLOSE AND THEN CALLS THE MONITOR'S ERROR PRINTING
384 ; ROUTINES TO INFORM THE USER.
385
386 000236 264000 000134' ADRER: JSR DISSAV ;SAVE AC'S AGAIN
387 000237 260140 000025' ADRER1: PUSHJ POP,DISDSP+DCL ;DO A CLOSE
388 000240 201300 000000' MOVEI DEVDAT,DISDDR ;TELL ERROR ROUTINE WHO'S UNHAPPY
389 000241 254000 000000' JRST ADRERR ;GO GRIPE
390
391 ;DISIN HANDLES LITE PEN UO (INPUT) IN A RUDIMENTARY FASHION
392 ; BY RETURNING (TO THE ADDR SPECIFIED BY THE ADDR FIELD
393 ; OF THE INPUT UO) THE LAST PEN COORDINATES SEEN,
394
394 000242 211040 000001 DISIN: MOVNI TAC,1
395 000243 250040 000011' EXCH TAC,PENLOC ;GET LATEST COORDINATES,
396 000244 254000 000000' JRST STOTAC ;STORE AND RETURN
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397 ;DISOUT DOES THE WORK OF THE OUTPUT U00, IT SETS A BIT TO
398 ; INDICATE THAT THE DEVICE IS ACTIVE AND INHIBITS
399 ; INTERRUPTS WHICH MAY STILL BE IN PROGRESS, SINCE THE
400 ; MONITOR CALLS WSYNCE BEFORE COMING HERE, THE USER IS
401 ; GUARANTEED AT LEAST ONE PICTURE/OUTPUT, THE USERS MEMORY
402 ; ROUNDS ARE STORED FOR QUICK USE AT INTERRUPT LEVEL W/O
403 ; SAVING AC'S, THE LOCATION OF THE COMMAND LIST (-1) IS
404 ; STORED FOR USE IN SETTING UP BLKO POINTERS, THE PI
405 ; LOCATIONS (40 + 2J) ARE INITIALIZED WITH A BLKO IN
406 ; THE EVEN LOCATION AND A JSR TO DISFIN IN THE ODD LOCATION,
407 ; THE NON-DATA CHANNEL CONSO IS SETUP TO BELIEVE IN THE
408 ; A POPJ POP, IT RETURNS ON BEHALF OF THE OUTPUT U00.
409
410 000245 661000 000220 DISOUT: TLO IOS,IO+DISWAT ;INDICATE OUTPUT; REQUEST START UP
411 000246 660000 010000 TRO IOS,IOACT ;INDICATE DEVICE ACTIVE
412 000247 275600 000001 SURJ U00,1 ;ALLOW FOR INCREMENT AT INTERRUPT
413 000250 200040 000265' MOVE TAC,BLKLIT ;FEEDS WORDS TO THE DISPLAY
414 000251 202040 000000 MOVEM TAC,DISBLK ;FROM EVEN NUMBERED INTERRUPT LOC
415 000252 200040 000266' MOVE TAC,JSRLIT ;SERVICE THE END OF BLKO
416 000253 202040 000000 MOVEM TAC,DISJSR ;FROM ODD INTERRUPT LOC
417 000254 201040 007400 MOVEI TAC,PENON ;SETUP CONSO BITS ON SPECIAL CHANNEL
418 000255 542040 000062' HRRM TAC,PENINT ;...
419 000256 437000 000002' IORB IOS,DISIOS ;SET IOACT ON; INDICATE OUTPUT
420 000257 552600 000015' HRRZM U00,DISONE ;SET NEW COMMAND LIST ORIGIN
421 000260 205000 001000 MOVSI IOS,DISUUI
422 000261 436000 000002' IORM IOS,DISIOS ;ALLOW DISPLAY
423 000262 713320 000021' CONSZ DIS,@DISCON ;DISPLAY ALREADY IN USE
424 000263 412000 000002' ANDCAM IOS,DISIOS
425 000264 254000 000204' JRST CLKREQ ;ENTER CLOCK QUEUE REQUEST AND POPJ
426
427 000265 713100 000013' BLKLIT: BLKO DIS,DISBKO
428 000266 264000 000133' JSRLIT: JSR DISCHL
429 END

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NO ERRORS DETECTED

PROGRAM BREAK IS 000267

ADRER	000236'	ADRER1	000237'	ADRERR	000241' FXT
BLKLIT	000265'	CLKREQ	000204'	CLOCK	000210' FXT
CLOK	000215'	CLOKRT	000214'	CPOPJ1	000037' FXT
DAT	000005 INT	DCL	000001 INT	DEVDAT	000006 INT
DIS340	000000' INT	DISAV	000016'	DISAV1	000017'
DISBFG	000167'	DISBKO	000013'	DISBLK	000251' FXT
DISBSY	000077'	DISCHL	000266' EXT	DISCHN	000000' FXT
DISCKR	000400'	DISCON	000021'	DISDDB	000000' INT
DISDSP	000024' INT	DISFIN	000127' INT	DISHI	000014'
DISIN	000242'	DISIN1	000050'	DISINI	000043'
DISINT	000060' INT	DISIOS	000002'	DISJSR	000253' FXT
DISNX1	000075'	DISNXT	000074'	DISOFF	000054'
DISONE	000015'	DISOUT	000245'	DISPNT	000012'
DISPOF	000056' EXT	DISPON	000202' EXT	DISREL	000020'
DISRET	000166' EXT	DISSAV	000276' EXT	DISSTP	000045'
DISTAR	000100'	DISUUI	001000'	DISWAT	000200'
DVOIS	002000 INT	DVIN	000002 INT	DVLNG	001000 INT
DVOUT	000001 INT	EXIT1	000123'	EXIT2	000124'
FTCHEC	000000 INT	FTMONP	000000 INT	HUNGST	000001 INT
ILUP	000076'	IO	000020 INT	IOACT	010000 INT
IOS	000000 INT	IOW	000001 INT	ITEM	000004 INT
JBTADR	000232' EXT	JBTSTS	000231' EXT	JOR	000045' FXT
JOBPFI	000115' EXT	JSRLIT	000266'	NONDIS	000070' FXT
NSHF	001000 INT	NSWP	010000 INT	OFFDIS	000000 INT
ONDIS	000021' EXT	OVT2	000134'	OVT3	000156'
OVT4	000153'	OVT5	000155'	OVT6	000164'
PDP	000023 INT	PENCHL	000071' EXT	PENCHN	000000 FXT
PENDDB	000000 INT	PENFLG	000067'	PENINT	000062' INT
PENLOC	000011'	PENON	007400'	PENSAV	000072' FXT
PIOFF	000206' EXT	PION	000212' EXT	PJOBN	000226' FXT
PROG	000007 INT	SETIOD	000161' EXT	SHF	004000 INT
STOTAC	000244' EXT	STPFLG	000072'	T30	000000
TAC	000001 INT	TAC1	000002 INT	UERROR	000277' FXT
USRREL	000000 EXT	UVO	000014 INT	VOISSR	000204 INT

A	6#	6				
AC1	6#	6				
AC2	6#	6				
AC3	6#	6				
ADRER	273	386#				
ADRER1	337	387#				
ADRERR	106	389				
AEFERR	6#	6				
AL	6#	6				
ASSCON	6#	6				
ASSPRG	6#	6				
B	6#	6				
BLKLIT	413	427#				
BUFNT	6#	6				
BUFWRD	6#	6				
CLKR	6#	6				
CLKRFQ	306	339	346#	425		
CLOCK	107	350				
CLOK	355	364#				
CLOKRT	347	355#				
CLSIN	6#	6				
CLSOUT	6#	6				
CMWB	6#	6				
CORCNT	6#	6				
CPOPJ1	108	126	127	133		
D	6#	6				
DAT	6#	6	124	125	293	307
DCL	6#	6	194	387		
DCLI	6#	6				
OCLO	6#	6				
DCLR	6#	6				
DDI	6#	6				
DDO	6#	6				
DEN	6#	6				
DEVADR	6#	6				
DEVBUF	6#	6				
DEVCHR	6#	6				
DEVCTR	6#	6				
DEVDAT	6#	6	291	371	388	
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				
DGF	6#	6				
DHNG	6#	6				
DIN	6#	6				

DVDIS	6#	6	59		
DVDSK	6#	6			
DVDTA	6#	6			
DVIN	6#	6	59		
DVLNG	6#	6	59		
DVLPY	6#	6			
DVMTA	6#	6			
DVCUT	6#	6	59		
DVPTP	6#	6			
DVPTR	6#	6			
DVTTY	6#	6			
ENTRP	6#	6			
EXIT1	240	254#			
EXIT2	230	245	250	25b#	
FBMERR	6#	6			
FNERR	6#	6			
FRGSFG	6#	6			
FT2RFL	6#				
FTATTA	6#				
FTCHEC	6#	46	47	52	222
FTEXAM	6#				
FTFINI	6#				
FTGETT	6#				
FTHALT	6#				
FTKCT	6#				
FTMONP	6#	46	47	52	222
FTRPV	6#				
FTRA10	6#				
FTRCHK	6#				
FTREAS	6#				
FTSLEE	6#				
FTTALK	6#				
FTTIME	6#				
FTTRAC	6#				
FTTRPS	6#				
FTTYS	6#				
HSAMSK	6#	6			
HSAPDS	6#	6			
HSASIZ	6#	6			
HUNGCT	6#	6			
HUNGST	6#	6	56		
I	6#	6			
IB	6#	6			
IBHFR	6#	6			
ICLOS	6#	6			
ILM	6#				
ILUERR	6#	6			
ILUP	226#	242			
INRFR	6#	6			
INITR	6#	6			
INPR	6#	6			
IO	6#	6	410		
IOACT	6#	6	167	379	411

OFFDJS	73#	73	169															
ONCIS	74	179																
OUTRFB	6#	6																
OUTP	6#	6																
OVT2	274	290#																
OVT3	324	348#																
OVT4	321	325#																
OVT5	327#																	
OVT6	299	314#																
PDP	6#	6	121	136	131	132	134	135	136	172	205	323	326	311				
	315	339	344	353	370	387												
PENCHL	172	188																
PENCHN	171																	
PENDOB	79#	79																
PENFLG	186#																	
PENINT	111	170	181#	182	342	418												
PENLOC	64#	165		186	395													
PENON	92#	341	417															
PENSAV	100	193																
PI	171	343	348	352														
PIOFF	177	348																
PION	177	352																
PJOBN	178	294	373															
POV	6#																	
PROG	6#	6	62															
PRTERR	6#	6																
PVSPYA	6#	6																
PVSPYM	6#	6																
PVTRPS	6#	6																
REMYR	6#	6																
RUN	6#	6																
RUNARL	6#	6																
RUNMSK	6#	6																
SD	6#	6																
SETI00	176	311																
SHF	6#	6	292															
SHRSEG	6#	6																
SLEVEL	6#	6																
SLICE	6#	6																
SNA	6#	6																
SPYSEG	6#	6																
STOPIO	6#	6																
STOTAC	178	396																
STPFLG	184	173#																
STTYR1	6#	6																
STTYR2	6#	6																
SWP	6#	6																
SWPCLR	6#	6																
SYSDPV	6#	6																
T30	7	8	13	73	75	82	90	94	109	150	152	180	197	234				
	238	259																
TAC	6#	6	71	161	163	166	167	168	225	226	228	229	231	232				
	233	239	241	243	244	246	248	249	251	252	255	271	292	322				

ADRCHK	115#	227	247		
CODES	6#				
DISARL	6#				
ENABLE	6#				
NOSCHE	6#				
NOSHUF	6#				
QUEUES	6#				
SCHEDU	6#				
SHUFFL	6#				
STARTD	6#				
XP	6#	6	19	72	78