

```
1          ;***COPYRIGHT 1969, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.***
2
3
4          ;THIS SUB-PROGRAM ASSEMBLED WITH SYSTEM PARAMETER FILE - S,MAC(V414)
5          YLIST
6          LIST
7          ;PARAMETER FILE FOR DISSER,MAC
8          ;USED ONLY TO ASSEMBLE DISSER TO MAKE TYPE 30 SERVICE INSTEAD OF TYPE 34?
9
10         000001 T30=1  ;FLAG THAT TYPE 30 IS WANTED
11
```

```

12          IFNDEF T30,<T30=0>;ASSUME TYPE 30 DISPLAY IF T30 IS UNDEFINED
13          IFN T30,<
14          TITLE DIST30 - TYPE 30 DISPLAY SERVICE ROUTINES
15          ENTRY DIST30
16          DIST30:
17          >
18          IFE T30,<
19          TITLE DIS340 - TYPE 340 DISPLAY SERVICE ROUTINES
20          ENTRY DIS340
21          DIS340:
22          >
23          SUBTTL R. GRUEN/RCC TS 03 JUN 69 V004
24          XP          VDISSR,004*
25          ;PUT VERSION NUMBER IN GLOB LISTING AND LOADER STORAGE MAP
26          ;          THESE ROUTINES HANDLE INTERRUPTS FROM THE DISPLAY DATA
27          ; CHANNEL. THEY SEARCH THE COMMAND POINTER LIST SUPPLIED
28          ; BY THE USER AND OUTPUT SECTIONS OF DATA AS SPECIFIED THEREIN.
29          ;          ALL OUTPUT IS DONE USING THE BLKO COMMAND.
30
31          ;          THE FORMAT OF THE COMMAND POINTER LIST IS AS FOLLOWS:
32
33          ;          RH=0          END OF COMMAND POINTER LIST
34          ;
35          ;          RH=ADR LH=0    ADR IS ADDRESS OF THE NEXT SECTION OF THE
36          ;          COMMAND POINTER LIST
37          ;          RH=L-1 LH=-N  OUTPUT TO THE DISPLAY THE N WORDS OF COMMANDS
38          ;          BEGINNING AT LOCATION L.
39
40          ;          NOTE THAT THE CHECK FOR END OF LIST IS MADE FIRST,
41
42          ;          ALL ADDRESSES ARE CHECKED FOR VALIDITY (I.E., THEY MUST
43          ;          BE WITHIN USER AREA) BEFORE ANY MEM REF IS MADE.
44
45          ;IF THE T30 SWITCH = 1 THIS IS THE ROUTINE FOR A DEC
46          ;TYPE 30 DISPLAY WITH A TYPE 340 INTERFACE.
47          ;OTHERWISE IT IS THE ROUTINE FOR A DEC TYPE 340.
48
49

```

```
50
51
52          INTERNAL FTCHECK,FTMONP
53          IFN FTCHECK+FTMONP,<
54          EXTERNAL DISDOB,DISIOS,PENLOC,DISPNT,DISBK0,DISHI,DISONE,DISAV,OFFDIS
55          EXTERNAL DISAV1,DISREL,DISCON,DISNXT
56          INTERNAL DISNX1
57          >
58          IFE FTCHECK+FTMONP,<
59          ;DIS DEVICE DATA BLOCK
60          INTERN DISDOB
61          DISDOB: SIXBIT /DIS/
62          XWD +D60+HUNGST,0
63          DISIOS: 0
64          EXP DISDSP
65          XWD DVDIS+DVOUT+DVIN+DVLNG,20000
66          0
67          0
68          XWD PROG,0
69          0
70          PENLOC: 0
71          DISPNT: 0
72          DISBK0: 0
73          DISH1: 0
74          DISONE: 0
75          DISAV: 0
76          DISAV1: 0
77          DISREL: XWD TAC,0
78          XP OFFDIS,0+
79          IFE T30,<
80          DISCON: EXP ONDIS>
81          IFN T30,<
82          DISCON: 0>
83          XP PENDDR,0
84          ;TO SATISFY A REQUEST IN COMMON,
85          ; THERE IS NOT REALLY A PEN DDR,
>
```

```
86
87
88         000134  DIS=134           ;TYPE 30 DISPLAY DEVICE NUMBER
89         >
90         000100  DISTAR=100       ;CLOCK FINISHED BEFORE PICTURE
91         000200  DISWAT=200       ;PICTURE FINISHED BEFORE CLOCK
92         000400  DISCKR=400       ;CLOCK REQUEST IN CLOCK QUEUE
93         001000  DISUUI=1000
94
95         IFE T30,<
96         DISBSY=77
97         PENON=7400
98         >
99         IFN T30,<
100        020000  DISBSY=20000
101        010000  PENON=10000
102        >
103
104        EXTERN JOBPFI
105        EXTERN DISSAV,DISBLK,DISJSR,PENSAV
106                EXTERN DISCHN,PENCHN
107                EXTERN DISCHL,PENCHL
108                EXTERN DISSAV,DISRET
109                EXTERN DISPON,DISPOF
110
111                EXTERN ADRERR,SETION
112                EXTERN PION,PIOFF,CLOCK
113                EXTERN CPOPJ1,UERROR,USRREL,STOTAC,JOB,JBTSTS,JBTADR,PJORN
114        IFE T30,<                EXTERN ONDIS,NONDIS>
115
116        INTERN PENINT,DISINT,DISFIN
117        ENTRY DISDSP
118
119        DEFINE ADRCHK(A)
120        <
121                CAILE  A,JOBPFI
122                CAMLE  A,DISHI
123                JRST   EXIT2
124        >
```

125	000022	254000	000043'	JRST	DISINI	INITIALIZATION
126	000023	263140	000000	POPJ	PDP,	PRINT ERROR AND STOP JOB
127	000024	254000	000051'	DISDSP: JRST	DISSTP	RELEASE
128	000025	254000	000051'	JRST	DISSTP	CLOSE
129	000026	265240	000000	JSP	DAT,UERROR	OUTPUT
130	000027	265240	000026'	JSP	DAT,UERROR	INPUT
131	000030	254000	000000	JRST	CPOPJ1	ENTER
132	000031	254000	000030'	JRST	CPOPJ1	LOOKUP
133	000032	254000	000255'	JRST	DISOUT	DUMP OUTPUT (THAT'S US)
134	000033	254000	000252'	JRST	DISIN	DUMP INPUT (AS IN PEN)
135	000034	263140	000000	POPJ	PDP,	SETO
136	000035	263140	000000	POPJ	PDP,	SETI
137	000036	263140	000000	POPJ	PDP,	GETF
138	000037	254000	000031'	JRST	CPOPJ1	RENAME
139	000040	263140	000000	POPJ	PDP,	CLOSE INPUT
140	000041	263140	000000	POPJ	PDP,	DIRECTORY CLEAR
141	000042	263140	000000	POPJ	PDP,	MTAPE

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142 ;DISINI IS CALLED FOR RELEASE, CLOSE, AND SUNDRY ILLEGAL CONDITIONS
143 ; WHICH WANT TO TURN THE DISPLAY OFF. IT FIRST CONVINCES
144 ; THE INTERRUPT LEVEL ROUTINES TO GO BACK TO SLEEP AND THEN
145 ; TELLS THE MONITOR THAT THE DEVICE IS INACTIVE. LASTLY,
146 ; IT TURNS OFF THE INTERRUPT ASSIGNMENTS OF THE DISPLAY
147 ; AND THE PI CHANNEL ASSOCIATED WITH THE DIS BLKO. IT RETURNS
148 ; WITH A POPJ, SOMETIMES TO ITS CALLING ROUTINE AND SOMETIMES
149 ; TO THE CHANNEL'S DISMISS ROUTINE, THE ADDRESS OF WHICH
150 ; WAS CLEVERLY PLACED ON THE PUSHDOWN LIST WHEN AC'S
151 ; WERE SAVED, THUS IT CAN BE CALLED WITH EITHER A
152 ; PUSHJ PDP,DISINI OR A JRST DISINI,
153
154 000043 DISINI:
155 IFE T30,<
156 CONO DIS,100 ;PARAMETER MODE>
157 IFN T30,<
158 000043 201040 000000 MOVEI TAC,PENCHN ;SET UP CONO WORD WITH PROPER
159 000044 240040 000003 ASH TAC,3 ; CHANNEL ASSIGNMENTS
160 000045 271040 000000 ADDI TAC,DISCHN
161 000046 660040 004000 TRO TAC,4000 ;SET DISPLAY READY BIT IN CONO WORD
162 000047 202040 000021' MOVEM TAC,DISCON>
163 000050 254000 000054' JRST DISINI
164
165 000051 200200 000000 DISSTP: MOVE ITEM,JOB ;CLEAR NSHF SO JOB CAN BE SHUFFLED
166 MOVSI TAC,NSHF+NSWP ;CLEAR NSWP SO JOB CAN BE SWAPPED (IN CASE THIS
167 000052 205040 011000 IS A SWAPPING SYSTEM
168 000053 412044 000000 ANDCAM TAC,JBTSTS(ITEM)
169
170 000054 476000 000011' DISINI: SETOM PENLOC
171 000055 205040 001200 MOVSI TAC,DISWAT+DISUI ;IGNORE FURTHER TRAPS
172 000056 541040 010000 HKPI TAC,IOACT ;INDICATE DEVICE INACTIVE
173 000057 412040 000002' ANDCAM TAC,DISIOS ;INTO DEVICE DATA BLOCK
174 000060 713000 000000 DISOFF: CONO DIS,OFFDIS ;REMOVE THE DISPLAY'S CHANNEL ASSIGNMENTS
175 000061 513000 000066' HLLZS PENINT ;DON'T EXPECT ANY ON LITE PEN
176 000062 700000 000000 CONO PI,DISPOF ;TURN OFF DISPLAY'S BLKO CHANNEL
177 000063 263140 000000 POPJ PDP,
178
179 000064 254000 000137' DISINT: JRST DISFIN
180 000065 254000 000064' JRST DISINT ;...

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181 ;PENINT RECEIVES CONTROL ON INTERRUPTS ON THE DISPLAY NON-DATA
182 ; CHANNEL (SPECIAL CHANNEL). IT DECIDES IF THE INTERRUPT
183 ; WAS VALID, AND IF SO, TRANSFERS CONTROL TO AN APPROPRIATE ROUTINE
184
185 IFF T30,<
186 PENINT: CONSO DIS,0 ;CHECK FOR CONI FLAGS
187 JRST PENINT ;TO OTHER DEVICES ON SAME CHANNEL
188 CONS? DIS,400 ;STOP FLAG
189 JRST STPFLG
190 CONS? DIS,2000 ;PEN FLAG?
191 PENFLG: DATAI DIS,PENLOC ;STORE CURRENT LITE PEN LOC
192 CONO DIS,NONDIS ;CLEAR FLAG
193 JEN @PENCHL ;DISMISS INTERRUPT
194
195 ;STPFLG SERVICES STOP FLAGS (DISPLAY PROGRAMMED) BY DOING
196 ; A CLOSE ON THE DISPLAY
197
198 STPFLG: JSR PENSAB ;STOP FLAG, SAVE AC'S AND SETUP RETURN
199 JRST DISDSP+DCL ;DO A CLOSE AND DISMISS INTERRUPT
200
201 >
202 IFN T30,<
203 000066 713740 000000 PENINT: CONSO DIS,0 ;CHECK FOR CONI FLAGS
204 000067 254070 000066 JRST PENINT ;TO OTHER DEVICES ON SAME CHANNEL
205 000070 713440 000011 DATAI DIS,PENLOC ;CLEAR PEN INTERRUPT
206 000071 202040 000011 MOVE TAC,PENLOC ;SAVE AC TAC
207 000072 200040 000013 MOVE TAC,DISRKO ;GET ABSOLUTE ADR OF NEXT DATA ELEMENT
208 000073 274040 000020 SUR TAC,DISREL ;MAKE ADDRESS RELATIVE
209 000074 553000 000001 HRRZS TAC ;CLEAR OUT GARRAGE IN THE LEFT HALF
210 000075 250040 000011 EXCH TAC,PENLOC ;SAVE ADR IN PENLOC AND RESTORE TAC
211 000076 254520 000000 JEN @PENCHL ;DISMISS THE INTERRUPT
212
213 >
  
```

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214 ;DISNXT IS CALLED WITH A JSR DISNXT, IT SETS UP THE NEXT
215 ; POINTER FOR THE DISPLAY'S BLKO BY INTERPRETING A
216 ; COMMAND LIST SUPPLIED BY THE USER, THIS COMMAND LIST
217 ; IS DESCRIBED AT THE BEGINNING OF THE PROGRAM, IF THE
218 ; DATA TO BE TRANSMITTED TO THE DISPLAY WOULD VIOLATE THE
219 ; MEMORY PROTECTION, THEN THE ROUTINE RETURNS TO THE
220 ; CALLING LOCATION +1, OTHERWISE, IF THERE
221 ; IS NO FURTHER DATA TO BE OUTPUT (AS INDICATED BY THE
222 ; USER'S COMMAND LIST) THE ROUTINE RETURNS TO THE CALLING
223 ; LOCATION +2, OTHERWISE, THE NEXT POINTER FOR THE BLKO
224 ; IS PLACED IN DISBKO AND THE ROUTINE RETURNS TO THE CALLING
225 ; LOCATION +3,
226
227 IFE FTCHECK+FTMONP,<
228 000077 000000 000000 DISNXT: 0 ;JSR AT INTERRUPT OR UOO LEVELS
229 >
230 000100 354040 000012' DISNX1: AOSA TAC,DISPNT ;GET NEXT POINTER FROM LIST
231 000101 552040 000012' ILUP: HRRZM TAC,DISPNT ;UPDATE POINTER POINTER
232 ADRCHK TAC+
233 000102 303040 000000 CAMLE TAC,JOBPFI
234 000103 313040 000014' CAMLE TAC,DISHI
235 000104 254000 000130' JRST EXIT?
236 000105 200060 000020' MOVE TAC,@DISREL ;GET NEXT WORD IN POINTER LIST
237 000106 202040 000013' MOVEM TAC,DISBKO ;PLACE IN BLKO POINTER
238 000107 566040 000017' HLROM TAC,DISAV1 ;GET NEGATIVE WORD COUNT(MAKE LH NEG. TON)
239 IFN T30,<
240 000110 322040 000127' JUMPE TAC,EXIT1 ;END OF COMMAND LIST?
241 000111 606040 777777 TRNN TAC,-1 ;INTENSITY?
242 000112 254000 000133' JRST INTCHK ;YES>
243 IFE T30,<
244 TRNN TAC,-1 ;END OF COMMAND LIST?
245 JRST EXIT1 ;YES>
246 000113 627040 777777 TLZN TAC,-1 ;NO. POINTER TO NEW LIST?
247 000114 254000 000101' JRST ILUP ;YES.
248 000115 301040 000102' CAIL TAC,JOBPFI ;NO. ADDRESS IN BOUNDS?
249 000116 311040 000014' CAML TAC,DISHI
250 000117 254000 000130' JRST EXIT? ;NO
251 000120 274040 000017' SUR TAC,DISAV1 ;YES, ADR, OF LAST WORD IN BLOCK.
252 ADRCHK TAC+
253 000121 303040 000115' CAMLE TAC,JOBPFI
254 000122 313040 000014' CAMLE TAC,DISHI
255 000123 254000 000130' JRST EXIT?
256 000124 550040 000020' HRRZ TAC,DISREL ;FORM ABSOLUTE ADDR
257 000125 272040 000013' ADDM TAC,DISBKO ;IN THE BLKO POINTER WORD
258 000126 350000 000077' AOS DISNXT ;RETURN 2,4
259 000127 350000 000077' EXIT1: AOS DISNXT
260 000130 200040 000016' EXIT2: MOVE TAC,DISAV
261 000131 713620 000021' CONO DIS,@DISCON ;SET UP DISPLAY STATUS WORD
262 000132 254120 000077' JRST 2,@DISNXT ;...
263
264 IFN T30,<
265 000133 207000 000001 INTCHK: MOVSS TAC ;PLACE INTENSITY IN CONO WORD
266 000134 137040 000136' DPR TAC,INTPNT

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DIST30 - TYPE 30 DISPLAY SERVICE ROUTINES
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267 000135 254000 000100' JRST DISNX1 IGET NEXT POINTER
268 000136 060300 000021' INTPNT: POINT 3,DISCON,29>

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269 ;DISFIN RECEIVES CONTROL WHEN THE DISPLAY'S BLKO POINTER REACHES
270 ; ZERO. IT SAVES THE TWO AC'S WHICH DISNXT USES AND
271 ; DOES A JSR TO DISNXT. ON A NORMAL RETURN IT RESTORES THE
272 ; AC'S AND DISMISSES THE INTERRUPT. ON A "NO MORE DATA"
273 ; RETURN IT TRANSFERS CONTROL TO OVT2 FOR FURTHER
274 ; DECISION AS TO WHETHER OR NOT TO CONTINUE DISPLAYING.
275
276 000137 202040 000016' DISFIN: MOVEM TAC,DISAV ;SAVE AC'S
277 000140 264000 000077' JSR DISNXT ;SETUP NEXT BLKO POINTER
278 000141 254000 000246' JRST ADRER
279 000142 254000 000144' JRST OVT2 ;RETURN HERE IF NO NEXT POINTER
280 000143 254520 000000 JEN @DISCHL ;LET THE SCOPE DO THE REST
281
282 ;OVT2 RECEIVES CONTROL AT INTERRUPT LEVEL WHEN THE COMMAND LIST
283 ; (SUPPLIED BY THE USER) RUNS OUT. IT SAVES THE AC'S FOR
284 ; THIS CHANNEL AND IN THE PROCESS ENABLES RETURNS BY POPJ
285 ; AND SIMILAR GOOD THINGS SINCE IT ALSO STORES THE PC FROM
286 ; THE JSR IN THE GENERAL PC LOCATION FOR THIS CHANNEL
287 ; IF THE DISPLAY IS OFF, IT DOES NOT RESTART IT.
288 ; IT CHECKS TO SEE IF THE CLOCK HAS RUN OUT BEFORE THE PICTURE;
289 ; IF SO, IT CALLS DISBEG TO RESTART THE DISPLAY WITH A NEW
290 ; COMMAND LIST. IT TURNS OFF THE IO ACTIVE BIT WHICH WAS
291 ; TURNED ON BY THE OUTPUT ROUTINE; THIS INSURES THAT ANY
292 ; OUTPUT COMMAND WILL DISPLAY AT LEAST ONE PICTURE. IF
293 ; THE JOB WAS IN AN IO-WAIT, IT IS RELEASED.
294
295 000144 264000 000000 OVT2: JSR DISSAV ;ASK EXEC TO SAVE AC'S
296 000145 201300 000000' MOVEI DEVDAT,DISDDB ;SETUP ACS
297 000146 205040 004000 MOVSI TAC,SHF
298 000147 205240 001000 MOVSI DAT,NSHF
299 000150 135200 000000 LDR ITEM,PJORN
300 000151 260140 000060' PUSHJ PDP,DISOFF
301 000152 205000 000200 MOVSI IOS,DISWAT ;INDICATE PICTURES FINISHED
302 000153 437000 000002' IORB IOS,DISIOS ;...
303 000154 667000 001000 TLRN IOS,DISUUI ;RESUME DISPLAY, NEW UOQ.
304 000155 254000 000174' JRST OVT6 ;YES, STAY IN IO WAIT
305 000156 612044 000053' TDNE TAC,JBSTSTS(ITEM) ;DOES SYSTEM WANT TO SHUFFLE THIS JOB?
306 000157 254000 000163' JRST OVT4 ;YES
307 000160 603000 000100 TLRN IOS,DISTAR ;HAS CLOCK TRIGGERED?
308 000161 260140 000177' PUSHJ PDP,DISBEG ;YES, RESTART DISPLAY
309 000162 254000 000166' JRST OVT3
310 000163 603000 000100 OVT4: TLRN IOS,DISTAR ;DID CLOCK FINISH BEFORE PICTURE?
311 000164 260140 000214' PUSHJ PDP,CLKREQ ;YES, PUT IN CLOCK REQUEST.
312 000165 412244 000156' OVT5: ANDCAM DAT,JBSTSTS(ITEM) ;TURN OFF NSHF SO JOB CAN BE SHUFFLED
313 000166 200000 000002' OVT3: MOVE IOS,DISIOS ;BIT FIDDLING TIME
314 000167 620000 010000 TRZ IOS,IOACT ;SIGNAL DISPLAY CAN BE CLOSED
315 000170 623000 000001 TLRZ IOS,IOW ;IS DISPLAY CAUSING AN IO-WAIT?
316 000171 260140 000000 PUSHJ PDP,SETIOD ;UNWAIT THE JOB
317 000172 202000 000002' MOVEM IOS,DISIOS ;RESTORE IO CONTROL WORD
318 000173 254000 000000' JRST DISRET ;RESTORE AC'S AND DISMISS
319 000174 202000 000002' OVT6: MOVEM IOS,DISIOS
320 000175 260140 000177' PUSHJ PDP,DISBEG ;START NEW COMMAND LIST
321 000176 254000 000173' JRST DISRET

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322 ;DISBEG IS CALLED WITH A PUSHJ PDP,DISBEG. IT DISABLES THE
323 ; DISPLAY ITSELF (BY USING DISOFF) AND ALSO DISABLES THE
324 ; CLOK RESTART AND RESETS THE POINTER TO THE USER'S
325 ; COMMAND LIST TO THAT SPECIFIED ON THE LAST OUTPUT
326 ; MINUS ONE. IT ASKS DISNXT TO SET UP THE NEXT BLKO POINTER
327 ; IF DISNXT IS UNSUCCESSFUL (I.E., IF THE USER COMMAND LIST
328 ; IS NULL), THEN THE ROUTINE DOES A CLOSE. OTHERWISE, A
329 ; REQUEST IS ENTERED FOR A CLOCK INTERRUPT AT THE END OF
330 ; AT MOST TWO JIFFIES. THIS CLOCK QUEUE REQUEST IS ENTERED
331 ; ONLY IF THERE IS NONE ALREADY IN THE QUEUE. THE PI
332 ; CHANNELS FOR THE DISPLAY ARE TURNED ON AGAIN AND THE
333 ; DISPLAY IS INITIALIZED BY A CONO. IT SHOULD THEN REQUEST
334 ; DATA AS SOON AS THE PI CHANNEL FOR THE BLKO IS TURNED ON.
335 ; IT TURNS THIS CHANNEL ON AND RETURNS TO ITS CALLER.
336
337 000177 205000 000300 DISREG: MOVSI IOS,DISAR+DISWAT ;INDICATE FRESH DISPLAY
338 000200 412000 000002' ANDCAM IOS,DISIOS ;...
339 000201 550100 000015' HRRZ TAC1,DISONE ;GET POINTER LIST ADDR (-1)
340 000202 552100 000012' HRRZM TAC1,DISPNT ;RESET POINTER WITH IT
341 000203 264000 000077' JSR DISNXT ;ASK FOR FIRST WORD FOR BLKO
342 000204 254000 000247' JRST ADRR1
343 000205 254000 000051' JRST DISSTP ;NULL LIST, CLOSE
344 000206 260140 000214' PUSHJ PDP,CLKREQ ;ENTER CLOCK QUEUE REQUEST
345 000207 713620 000021' CONO DIS,@DISCON ;INITIALIZE THE DISPLAY
346 000210 201040 010000' MOVEI TAC,PENON ;ALLOW SPECIAL PI INTERRUPTS
347 000211 542040 000066' HRRM TAC,PENINT ;...
348 000212 700600 000000' CONO PI,DISPON ;ALLOW BLKO INTERRUPTS
349 000213 263140 000000' POPJ PDP, ;RETURN
350
351 000214 205000 000400 CLKREQ: MOVSI IOS,DISCKR ;IF NO CLOCK INTERRUPT REQUESTED
352 000215 200040 000224' MOVE TAC,CLKRT ;RESET TIMER
353 000216 700600 000000' CONO PI,PIOFF ;INHIBIT INTERRUPTS
354 000217 676000 000002' TDON IOS,DISIOS ;ENTER ONLY A SINGLE CLOCK REQUEST
355 000220 136040 000000' IDPB TAC,CLOCK ;PLACE REQUEST IN QUEUE
356 000221 436000 000002' IORM IOS,DISIOS ;PROTECT AGAINST A DUPLICATE REQUEST
357 000222 700600 000000' CONO PI,PION ;INHIBIT INTERRUPTS
358 000223 263140 000000' POPJ PDP, ;RETURN
359
360 000224 000225' 000002 CLOKRT: XWD CLOK,2 ;CONTROL FOR CLOCK QUEUE: 2 JIFFIES
361 ;TWO JIFFIES

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362 ;CLOCK IS CALLED AT THE CLOCK LEVEL IN RESPONSE TO A REQUEST
363 ; IN THE CLOCK QUEUE. A BIT IS SET TO INDICATE THAT THE
364 ; CLOCL PERIOD HAS ELAPSED. IF THE DISPLAY IS STILL IN
365 ; PROGRESS, CLOK RETURNS AT THIS POINT. OTHERWISE, CLOK
366 ; GOES TO DISBEG TO START UP THE DISPLAY. DISBEG RETURNS
367 ; WITH A POPJ PDP,
368
369 000225 205000 000400 CLOK: MOVSI IOS,DISCKR ;INDICATE CLOCK REQUEST SERVICED
370 000226 413000 000002' ANDCAB IOS,DISIOS ;...
371 000227 663000 001000 TLOE IOS,DISUUI
372 000230 205000 000100 MOVSI IOS,DISSTAR ;ASK DISPLAY TO RESTART
373 000231 437000 000002' IORB IOS,DISIOS ;...
374 000232 607000 000200 TLNN IOS,DISWAT ;HAS DISPLAY FINISHED?
375 000233 263140 000000 POPJ PDP, ;NO, WAIT FOR IT TO DO SO
376 000234 201300 000000' MOVEI DEVDAT,DISDDP
377 000235 205000 001000 MOVSI TAC,NSWF
378 000236 135200 000150' LDR ITEM,PJOBN
379 000237 612044 000165' TDNE TAC,JBTSTS(ITEM) ;IS SHUFFLE LOCKED OUT?
380 000240 254000 000177' JKST DISBEG ;YES, RESTART DISPLAY AND RETURN
381 000241 436044 000237' IORM TAC,JBTSTS(ITEM) ;NO, LOCK IT OUT.
382 000242 200044 000000' MOVE TAC,JBTADR(ITEM) ;RESET DISH1 AND DISREL AFTER SHUFFLING
383 000243 556040 000014' HLRZM TAC,DISH1
384 000244 542040 000020' HRRM TAC,DISREL
385 000245 254000 000177' JRST DISBEG ;RESART DISPLAY AND RETURN
386
387 ;ADRER SERVICES PROTECTION VIOLATIONS DISCOVERED BY DISNXT,
388 ; IT DOES A CLOSE AND THEN CALLS THE MONITOR'S ERROR PRINTING
389 ; ROUTINES TO INFORM THE USER.
390
391 000246 264000 000144' ADRER: JSR DISSAV ;SAVE AC'S AGAIN
392 000247 260140 000025' ADRER1: PUSHJ PDP,DISDSP+DCL ;DO A CLOSE
393 000250 201300 000000' MOVEI DEVDAT,DISDDP ;TELL ERROR ROUTINE WHO'S UNHAPPY
394 000251 254000 000000 JRST ADRERR ;GO GRIPE
395 ;DISIN HANDLES LITE PEN UUD (INPUT) IN A RUDIMENTARY FASHION
396 ; BY RETURNING (TO THE ADDR SPECIFIED BY THE ADDR FIELD
397 ; OF THE INPUT UUD) THE LAST PEN COORDINATES SEEN.
398
399 000252 211040 000001 DISIN: MOVNI TAC,1
400 000253 250040 000011' EXCH TAC,PENLOC ;GET LATEST COORDINATES.
401 000254 254000 000000 JRST STOTAC ;STORE AND RETURN

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402 ;DISOUT DOES THE WORK OF THE OUTPUT U00. IT SETS A BIT TO
403 ; INDICATE THAT THE DEVICE IS ACTIVE AND INHIBITS
404 ; INTERRUPTS WHICH MAY STILL BE IN PROGRESS. SINCE THE
405 ; MONITOR CALLS WSYNCE BEFORE COMING HERE, THE USER IS
406 ; GUARANTEED AT LEAST ONE PICTURE/OUTPUT, THE USERS MEMORY
407 ; BOUNDS ARE STORED FOR QUICK USE AT INTERRUPT LEVEL W/0
408 ; SAVING AC'S. THE LOCATION OF THE COMMAND LIST (-1) IS
409 ; STORED FOR USE IN SETTING UP BLKO POINTERS. THE PI
410 ; LOCATIONS (40 + 2J) ARE INITIALIZED WITH A BLKO IN
411 ; THE EVEN LOCATION AND A JSR TO DISFIN IN THE ODD LOCATION,
412 ; THE NON-DATA CHANNEL CONSO IS SETUP TO BELIEVE IN THE
413 ; A POPJ PDP, IT RETURNS ON BEHALF OF THE OUTPUT U00.
414
415 000255 661000 000220 DISOUT: TLO IOS,10+DISWAT ;INDICATE OUTPUT; REQUEST START UP
416 000256 660000 010000 TRO IOS,IOACT ;INDICATE DEVICE ACTIVE
417 000257 275600 000001 SUBI U00,1 ;ALLOW FOR INCREMENT AT INTERRUPT
418 000260 200040 000275' MOVE TAC,BLK LIT ;FEEDS WORDS TO THE DISPLAY
419 000261 202040 000000 MOVEM TAC,DISBLK ;FROM EVEN NUMBERED INTERRUPT LOC
420 000262 200040 000276' MOVE TAC,JSRLIT ;SERVICE THE END OF BLKO
421 000263 202040 000000 MOVEM TAC,DISJSR ;FROM ODD INTERRUPT LOC
422 000264 201040 017000 MOVEI TAC,PENON ;SETUP CONSO BITS ON SPECIAL CHANNEL
423 000265 542040 000066' WRRM TAC,PENINT ;...
424 000266 437000 000002' JORB IOS,DISIOS ;SET IOACT ON; INDICATE OUTPUT
425 000267 552600 000015' HRRZM U00,DISONE ;SET NEW COMMAND LIST ORIGIN
426 000270 205000 001000 MOVSI IOS,DISUII
427 000271 436000 000002' JORM IOS,DISIOS ;ALLOW DISPLAY
428 000272 713700 000021' CONS# DIS,@DISCON ;DISPLAY ALREADY IN USE
429 000273 412000 000002' ANDCAM IOS,DISIOS
430 000274 254000 000214' JRST CLKREQ ;ENTER CLOCK QUEUE REQUEST AND POPJ
431
432 000275 713500 000013' BLKLIT: BLKO DIS,DISBKO
433 000276 264000 000143' JSRLIT: JSR DISCHL
434 END

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NO ERRORS DETECTED

PROGRAM BREAK IS 000277

ADRER	000246'	ADRER1	000247'	ADRERR	000251' FXT
BLKLIT	000275'	CLKREQ	000214'	CLOCK	000220' FXT
CLOCK	000225'	CLOCKRT	000224'	CPOPJ1	000237' FXT
DAT	000005' INT	DCL	000001' INT	DEV DAT	000006' INT
DIS	000134'	DISAV	000016'	DISAV1	000017'
DISBEG	000177'	DISBK0	000013'	DISBLK	000261' FXT
DISBSY	000000'	DISCHL	000276' FXT	DISCHN	000045' FXT
DISCKR	000400'	DISCON	000021'	DISDOB	000000' INT
DISDSP	000024' INT	DISFIN	000137' INT	DISHI	000014'
DISIN	000252'	DISIN1	000054'	DISINI	000043'
DISINT	000064' INT	DISIOS	000002'	DISJSR	000263' FXT
DISNX1	000100'	DISKXT	000077'	DISOFF	000060'
DISONE	000015'	DISOUT	000255'	DISPNT	000012'
DISPOF	000062' EXT	DISPON	000212' EXT	DISREL	000020'
DISRET	000176' EXT	DISSAV	000246' EXT	DISSTP	000051'
DIST30	000000' INT	DISTAR	000100'	DISUUI	001000'
DISWAT	000200'	DVDIS	000200' INT	OVIN	000002' INT
DVLNG	001000' INT	DVOUT	000001' INT	EXIT1	000127'
EXIT2	000130'	FTCHEC	000000' INT	FTMONP	000000' INT
HUNGST	000001' INT	FLUP	000101'	INTCHK	000133'
INTPNT	000136'	IO	000020' INT	IOACT	010000' INT
IOS	000000' INT	IOW	000001' INT	ITEM	000004' INT
JBTAOR	000242' EXT	JBTSTS	000241' FXT	JOB	000051' FXT
JOBPFI	000101' FXT	JSRLIT	000276'	NSHF	001000' INT
NSWP	010000' INT	OFFDIS	000000' INT	OVT2	000144'
OVT3	000166'	OVT4	000163'	OVT5	000165'
OVT6	000174'	PDP	000003' INT	PENCHL	000076' FXT
PENCHN	000043' EXT	PENDOB	000000' INT	PENINT	000066' INT
PENLOC	000011'	PENON	010000'	PENSAV	000000' FXT
PIOFF	000216' EXT	PION	000222' EXT	PJOBN	000236' FXT
PROG	000007' INT	SETIOD	000171' FXT	SHF	004000' INT
STOTAC	000254' EXT	T30	000001'	TAC	000001' INT
TAC1	000002' INT	TERROR	000027' EXT	USRREL	000000' FXT
UUD	000014' INT	VCISSR	000004' INT		

A	6#	6				
AC1	6#	6				
AC2	6#	6				
AC3	6#					
ADRER	278	391#				
ADRER1	342	392#				
ADRERR	111	394				
AEFERR	6#	6				
AL	6#	6				
ASSCON	6#	6				
ASSPRG	6#	6				
B	6#	6				
BLKLIT	418	432#				
BUFNT	6#	6				
BUFWD	6#	6				
CLKR	6#	6				
CLKREQ	311	344	351#	430		
CLOCK	112	355				
CLOK	360	369#				
CLOKRT	352	360#				
CLSIN	6#	6				
CLSOUT	6#	6				
CMWB	6#	6				
CORCNT	6#	6				
CPOPJ1	113	131	132	138		
D	6#	6				
DAT	6#	6	129	130	298	312
DCL	6#	6	392			
DCLI	6#	6				
DCL0	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				
DEV0AT	6#	6	296	376	393	
DEVEXT	6#	6				
DEVFIL	6#	6				
DEVIAD	6#	6				
DEVI0S	6#	6				
DEVLOG	6#	6				
DEVMOD	6#	6				
DEVNAM	6#	6				
DEV0AD	6#	6				
DEVPPN	6#	6				
DEVPTR	6#	6				
DEVSER	6#	6				
DGF	6#	6				
DHNG	6#	6				
DIN	6#	6				

DVDIS	6#	6	64		
DVDSK	6#	6			
DVDTA	6#	6			
DVIN	6#	6	64		
DVLNC	6#	6	64		
DVLP	6#	6			
DVMTA	6#	6			
DVOUT	6#	6	64		
DVPTP	6#	6			
DVPTR	6#	6			
DVTTY	6#	6			
ENTRR	6#	6			
EXIT1	240	259#			
EXIT2	235	250	255	260#	
FBMERR	6#	6			
FNERR	6#	6			
FRGSEG	6#	6			
FT2RFL	6#				
FTATTA	6#				
FTCHEC	6#	51	52	57	227
FTEXAM	6#				
FTFINI	6#				
FTGETT	6#				
FTHALT	6#				
FTKCT	6#				
FTMONP	6#	51	52	57	227
FTPRV	6#				
FTRA10	6#				
FTRCHK	6#				
FTREAS	6#				
FTSLEE	6#				
FTTALK	6#				
FTTIME	6#				
FTTRAC	6#				
FTTRPS	6#				
FTTTY	6#				
HSAMSK	6#	6			
HSAPOS	6#	6			
HSASIZ	6#	6			
HUNGCT	6#	6			
HUNGST	6#	6	61		
J	6#	6			
IB	6#	6			
IBUFR	6#	6			
ICLOSB	6#	6			
ILM	6#				
ILUERR	6#	6			
ILUP	231#	247			
INBFR	6#	6			
INITP	6#	6			
INPB	6#	6			
INTCHK	242	265#			
INTPNT	266	268#			

OCLOSB	6#	6																		
OFFDIS	78#	78	174																	
OUTBFB	6#	6																		
OUTPB	6#	6																		
OVT2	279	295#																		
OVT3	309	313#																		
OVT4	306	310#																		
OVT5	312#																			
OVT6	304	319#																		
PDP	6#	6	126	135	136	137	139	140	141	177	300	308	311	316						
	320	344	349	358	375	392														
PENCHL	107	211																		
PENCHN	106	158																		
PENDDB	84#	84																		
PENINT	116	175	203#	204	347	423														
PENLOC	69#	170	205	206	210	400														
PENON	101#	346	422																	
PENSAV	105																			
PI	176	348	353	357																
PIOFF	112	353																		
PION	112	357																		
PJOBN	113	299	378																	
POV	6#																			
PROG	6#	6	67																	
PRTERR	6#	6																		
PVSPYA	6#	6																		
PVSPYM	6#	6																		
PVTRPS	6#	6																		
RENMB	6#	6																		
RUN	6#	6																		
RUNABL	6#	6																		
RUNMSK	6#	6																		
SD	6#	6																		
SETIOD	111	316																		
SHF	6#	6	297																	
SHRSEG	6#	6																		
SLEVEL	6#	6																		
SLICE	6#	6																		
SNA	6#	6																		
SPYSEG	6#	6																		
STOPIO	6#	6																		
STOTAC	113	401																		
STTYB1	6#	6																		
STTYBF	6#	6																		
SWP	6#	6																		
SWPCLR	6#	6																		
SYSDEV	6#	6																		
T30	10#	12	13	18	78	80	87	95	99	114	155	157	185	202						
TAC	239	243	264																	
	6#	6	76	158	159	160	161	162	166	168	171	172	173	206						
	207	208	209	210	230	231	233	234	236	237	238	240	241	246						
	248	249	251	253	254	256	257	260	265	266	276	297	305	346						
	347	352	355	377	379	381	382	383	384	399	400	418	419	420						

TAC1	421	422	423	
TEM	6#	6	339	340
TRNERR	6#	6		
TTYATC	6#	6		
TTYBIU	6#	6		
TTYUSE	6#	6		
UCHN	6#	6		
UERROR	113	129	130	
UIOMOD	6#	6		
USRMOD	6#	6		
USRREL	113			
UUO	6#	6	417	425
UWP	6#	6		
UWPOFF	6#	6		
VDISSR	25#	25		
WTMASK	6#	6		

ADCHK	120#	232	252		
CODES	6#				
DISARL	6#				
ENABLE	6#				
NOSCHE	6#				
NOSHUF	6#				
QUEUES	6#				
SCHEDU	6#				
SHUFFL	6#				
STARTD	6#				
XP	6#	6	24	77	83