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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 LPTSER - LINE PRINTER SERVICE ROUTINE FOR MULTIPLE LINE PRINTERS - V405
8          SUBTTL T. N. MC MANUS /TNM TS 20 MAY 69
9          XP VLPTSR,405          ;DEFINE GLOBAL VERSION NUMBER FOR LOADER MAP
10
11         ;THE FOLLOWING EXTERNAL SYMBOLS ARE DEFINED IN COMMON:
12
13         EXTERNAL CPOPJ1, PION, PIOFF
14
15         ;THE FOLLOWING EXTERNAL SYMBOLS ARE DEFINED IN CLOCK1:
16
17         EXTERNAL SETIO0, WAIT1
18
19         ;THE FOLLOWING EXTERNAL SYMBOLS ARE DEFINED IN ERRCON:
20
21         EXTERNAL HNGSTP, ILLINP
22
23         ;THE FOLLOWING EXTERNAL SYMBOLS ARE DEFINED IN UOOCON:
24
25         EXTERNAL ADVRF0, IOSFT, OUT, SETACT, STOIOS
26
27
28         ;THE FOLLOWING SYMBOLS ARE REFERENCED OUTSIDE OF LPTSER:
29
30         INTERN LPTINT, LPTNXT, LPTECM, LPTD0N, LPTDSP
31         ENTRY LPTSER
32
33 LPTSER: 000000
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34          ;LINE PRINTER CONTROL REGISTER MNEMONIC DEFINITIONS
35
36          002000          LPTCLR=1R25          ;CLEAR LINE PRINTER BUFFER
37          001000          LPTLOV=1R26          ;LINE OVERFLOW FLAG (PDP-6 ONLY)
38          000400          LPTERR=1R27          ;ERROR FLAG
39          000200          LPTBSY=1R28          ;BUSY FLAG
40          000100          LPTDON=1R29          ;DONE FLAG
41          000070          LPTECM=7R32          ;ERROR CHANNEL MASK
42          000007          LPTDCM=7R35          ;DONE CHANNEL MASK
43          000300          LPTBDM=LPTBSY*LPTDON  ;BUSY/DONE FLAG MASK
44
45
46          ;LINE PRINTER DEVICE DEPENDANT I/O STATUS MNEMONIC DEFINITIONS
47
48          000200          LPTEND=Z(1R10)        ;CLOSE UO HAS BEEN DONE
49          000100          LPTSYN=Z(1R11)        ;CRFF AFTER CLOSE UO HAS BEEN SFNT
50
51
52          ;LINE PRINTER DEVICE DATA BLOCK ADDRESSING MNEMONIC DEFINITIONS
53
54          777777 777774          LPTCON=-4          ;RH = SKIP CHAIN MASK REGISTER
55          000007          LPTPTR= 7          ;BLOCK OUTPUT POINTER
56          000011          LPTCH= 11          ;INTERRUPT CHANNEL ASSIGNMENTS
57          000012          LPTSVE=12          ;DDB ROUTINE TO SAVE AC'S
58          000016          LPTEX1=16          ;DDB EXIT ROUTINE IF AC'S NOT SAVED
59          000020          LPTSV2=20          ;TEMP. SAVE LOCN. FOR TAC
60          000021          LPTTECH=21          ;CONSZ LP?,LPTECM
61          000022          LPTDNE=22          ;CONSO LP?,LPTDON
62          000023          LPTCSO=23          ;CONSO LP?,(TAC)
63          000024          LPTCSZ=24          ;CONSZ LP?,(TAC)
64          000025          LPTCNI=25          ;CONI LP?,TAC
65          000026          LPTCNO=26          ;CONO LP?,(TAC)
66          000027          LPTDIO=27          ;DATAO LP?,(TAC)
67          000030          LPTRKO=30          ;BLKO LP?,LP?PTR
68
69
70          ;LINE PRINTER SERVICE DISPATCH TABLE
71
72          000000 254000 000007'          JRST LPTINI          ;INITIALIZE
73          000001 254000 000006'          JRST LPTWNG          ;HUNG DEVICE ERROR
74          000002 254000 000006'          LPTDSP: JRST LPTREL          ;RELEASE
75          000003 254000 000013'          JRST LPTCLS          ;CLOSE
76          000004 254000 000017'          JRST LPTOUT          ;OUTPUT
77          000005 254000 000000'          JRST ILLINP          ;INPUT
    
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78          ;LINE PRINTER INITIALIZATION, HUNG DEVICE AND RELEASE CODE
79
80          ;LPTINI IS CALLED AT SYSTEM INITIALIZATION TIME FROM
81          ;IOGO IN SYSINI WITH THE DDB ADDRESS IN DEVDAT
82
83          ;LPTHNG IS CALLED FROM DEVCHK IN UUOCON (IOCSS) WITH
84          ;THE DDB ADDRESS IN DEVDAT WHENEVER A LINE PRINTER
85          ;HUNG DEVICE COUNT IS DECREMENTED TO ZERO
86
87          ;LPTREL IS CALLED FROM RFLA1 IN UUOCON WITH THE DDB
88          ;ADDRESS IN DEVDAT WHENEVER A RELEASE UOQ IS EXECUTED
89          ;FOR A LINE PRINTER
90
91          ;EACH OF THE ABOVE ROUTINE MUST:
92          ;
93          ;      1. CLEAR THE SPECIFIED LINE PRINTER
94          ;      2. REASSIGN BOTH THE ERROR AND DONE INTERRUPT
95          ;          CHANNELS FOR THAT LINE PRINTER
96          ;      3. CLEAR THE SKIP CHAIN INTERRUPT MASK FLAGS
97          ;          FOR THAT LINE PRINTER
98
99          ;NOTE: THE LPTINI CODE FORCES IOGO IN SYSINI TO INVOKE
100         ;      LPTINI FOR EACH LINE PRINTER ON THE SYSTEM RATHER
101         ;      THAN FOR THE NORMAL CASE WHERE IT INVOKES THE
102         ;      INITIALIZATION CODE ONCE FOR EACH DISPATCH TABLE.
103         ;
104         ;      THEREFORE, THE CORRECT OPERATION OF THE LPTINI CODE
105         ;      IS DEPENDANT UPON THE IOGO CODE WHICH SHOULD BE:
106         ;
107         ;          PUSHJ PDP,DINI(AC3)
108         ;          HRRZM AC3,SAVITM
109
110         000006          LPTHNG:
111         000006          LPTREL:
112         000006 370003 000000          SOS (PDP)          ;COUNTERACT SKIP RETURN
113         000007 201040 002000          LPTINI: MOVEI TAC,LPTCLR          ;CLEAR THE LINE PRINTER
114         000010 256006 000026          XCT LPTCNO(DEV DAT)
115         000011 513006 777774          HLLZS LPTCON(DEV DAT)          ;CLEAR SKIP CHAIN MASK FLAGS
116         000012 254000 000000          JRST CPOPJ1          ;SKIP RETURN IF ENTERED AT LPTINI
117                                     ; TO FORCE CALL FOR EACH LPT
118
119
120         ;LINE PRINTER CLOSE UOQ ROUTINE
121
122         000013 661000 000200          LPTCLS: TLO IOS,LPTEND          ;TURN ON THE END FLAG
123         000014 621000 000100          TLZ IOS,LPTSYN          ;TURN OFF SYNCHRONIZATION FLAG
124         000015 202006 000022          MOVEM IOS,DEVIDS(DEV DAT)          ;SAVE IOS IN THE DDB
125         000016 254000 000000          JRST OUT          ; AND RETURN TO UUOCON
    
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126                                     ;LINE PRINTER OUTPUT UOO ROUTINE
127
128 000017 400040 000000 LPTOUT: SETZ TAC,                ;CLEAR ALL POSSIBLE
129 000020 256006 000026      XCT LPTCNO(DEVDAT)          ; LINE PRINTER FLAGS
130 000021 201040 000400      MCVET TAC,LPTERR          ;SET MASK FOR ERROR FLAG
131 000022 256006 000023      XCT LPTCSO(DEVDAT)        ;SKIP IF ERROR FLAG IS ON
132 000023 254070 000026      JRST ,+3                          ; LPT IS NOT OFF, NOT ON LOCAL
133 000024 260140 000000      PUSHJ PDP,HNGSTP          ;STOP JOB AND PRINT REMINDER
134 000025 254070 000017      JRST LPTOUT              ;TRY AGAIN WHEN USER TYPES "CONT"
135 000026 603000 000002      TLNE IOS,IOBEG          ;IS THIS FIRST OUTPUT SINCE INIT?
136 000027 254070 000044      JRST LPTNEW              ; YES
137 000030 260140 000137      PUSHJ PDP,LPTSET          ; NO, SET UP BLKO POINTER
138 000031 260140 000000 LPTGO: PUSHJ PDP,SETACT          ;SET I/O ACTIVE BIT, STORE IOS
139                                     ; AND SET HUNG DEVICE COUNT
140 000032 200046 000011      MOVE TAC,LPTCH(DEVDAT)    ;GET CHANNEL ASSIGNMENTS FROM DDR
141 000033 603000 000002      TLNE IOS,IOBEG          ;IS THIS FIRST OUTPUT SINCE INIT?
142 000034 435040 002100      IORI TAC,LPTCLR+LPTDON ;SET LPTCLR IF IOBEG:=1, ELSE
143 000035 431040 000100      XORI TAC,LPTDON          ; SET LPTDON
144 000036 505040 001500      HRLI TAC,LPTLOV+LPTERR+LPTDON ;GET SKIP CHAIN MASK FLAGS
145 000037 700600 000000      CONO PI,PIOFF          ;TURN OFF PI TO PREVENT IMM. INT.
146 000040 256006 000026      XCT LPTCNO(DEVDAT)        ;SEND CONDITIONS OUT TO LPT
147 000041 546046 777774      HLRM TAC,LPTCON(DEVDAT) ;SAVE SKIP CHAIN MASK FLAGS
148 000042 700600 000000      CONO PI,PION           ;REENABLE ALL INTERRUPTS
149 000043 263140 000000      POPJ PDP,                ; AND RETURN TO UOOCON
150
151 000044 661000 000020 LPTNEW: TLO IOS,IO          ;SET I/O DIRECTION TO OUTPUT
152 000045 402006 000007      SETZM LPTPTR(DEVDAT)    ;CLEAR BLKO POINTER
153 000046 254000 000031      JRST LPTGO              ;RETURN TO MAINSTREAM
    
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154                                     ILINE PRINTER INTERRUPT SERVICE ROUTINE
155
156 000047 256006 000021 LPTINT: XCT LPTECH(DEV DAT)           ;SKIP IF NO ERROR CHANNEL ASSIGNED
157 000050 256006 000022           XCT LPTDNE(DFV DAT)           ;SKIP IF DONE FLAG IS UP
158 000051 254000 000106           JRST LPTER1              ; BRANCH TO ERROR SERVICE ROUTINE
159 000052 331006 000007           SKIPL LPTPTR(DEV DAT)       ;BLKO COUNT TO 0 ON PREV. INTERRUPT?
160 000053 254006 000012           JRST LPTSVE(DEV DAT)       ; YES, GO SAVE ORIGINAL AC'S
161 000054 256006 000030           XCT LPTBKO(DEV DAT)       ; NO, SEND NEXT WORD FOR PRINTING
162 000055 254006 000016           JRST LPTEX1(DEV DAT)       ;LAST WORD SENT BUT INTERRUPT PENDING
163 000056 254006 000016           JRST LPTFX1(DEV DAT)       ;GO RESTORE DEV DAT AND RETURN
164
165 000057                                     LPTNXT:
166                                     ;ENTER HERE AFTER DDB ROUTINE SAVES
167                                     ; ORIGINAL AC'S IN PROPER CHANNEL
168                                     ; SAVE AREA AND SETS UP DEV DAT
169                                     ; TO POINT TO DDB AGAIN
170 000057 260140 000000           PUSHJ PDP,I0SET           ;SET AC PROG:= JOB AREA ADDRESS AND
171                                     ; AC IOS:= DEVIOS IN THE DDB
172 000060 623000 000002           TLZE IOS,I0BEG           ;FIRST BUFFER SINCE INIT?
173 000061 254000 000102           JRST LPTBG1              ; YES, GO OUTPUT A CRFF
174 000062 260140 000000           PUSHJ PDP,ADVBF          ; NO, ADVANCE TO NEXT BUFFER
175 000063 254000 000070           JRST LPTOFF             ;CANNOT ADVANCE, BUFFER UNAVAILABLE
176 000064 260140 000137           PUSHJ PDP,LPTSET        ;SET UP NEW BLKO POINTER
177 000065 623000 000001 LPTWCK: TLZE IOS,I0W      ;IS JOB WAITING FOR I/O COMPLETION?
178 000066 260140 000000           PUSHJ PDP,SETIOD        ; YES, ARRANGE FOR JOB TO RUN AGAIN
179 000067 254000 000000 LPTEX2: JRST STOIOS       ;SAVE IOS, RESET HUNG DEVICE COUNT
180                                     ; AND DISMISS INTERRUPT
181
182 000070 607000 000200 LPTOFF: TLNN IOS,LPTEND   ;SKIP IF CLOSE HAS BEEN DONE
183 000071 254000 000075           JRST LPTOF1              ; GO TURN PRINTER OFF UNTIL NEXT OUTPUT
184 000072 667000 000100           TLOM IOS,LPTSYN         ;HAS FINAL CRFF BEEN OUTPUT?
185 000073 254000 000103           JRST LPTBG2              ; NO, SO GO DO IT
186 000074 621000 000200           TLZ IOS,LPTEND          ; YES, SO CLEAR END FLAG
187 000075 620000 010000 LPTOF1: TRZ IOS,I0ACT     ;CLEAR I/O ACTIVE BIT
188 000076 400040 000000           SETZ TAC,               ;CLEAR TAC AND
189 000077 256006 000026           XCT LPTCNO(DEV DAT)     ; TURN LPT OFF
190 000100 513006 777774           HLLZS LPTCON(DEV DAT)   ;CLEAR SKIP CHAIN MASK FLAGS
191 000101 254000 000065           JRST LPTWCK             ; AND BRANCH
192
193 000102 260140 000137 LPTBG1: PUSHJ PDP,LPTSET   ;SET UP INITIAL BLKO POINTER *****
194 000103 201040 000145 LPTBG2: MOVEI TAC,[EXP 15B6+14B13] ;SEND OUT A CRFF
195 000104 256006 000027           XCT LPTDIO(DEV DAT)
196 000105 254000 000067           JRST LPTEX2             ;GO DISMISS INTERRUPT
    
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197          ;LINE PRINTER ERROR HANDLING ROUTINE
198
199 000106 202046 000020 LPTER1: MOVEM TAC,LPTSV2(DEVDAT) ;SAVE TAC IN DDB
200 000107 201040 001000      MOVEI TAC,LPTLOV ;GET LINE OVERFLOW ERROR MASK
201 000110 256006 000023      XCT LPTCS0(DEVDAT) ;SKIP IF LINE OVERFLOW FLAG IS ON
202 000111 254000 000117      JRST LPTER2 ;GO CHECK IF PREVIOUS ERROR OCCURRED
203 000112 210040 000146      MOVN TAC,[EXP 1000001] ;DECREMENT BLK0 POINTER
204 000113 272046 000007      ADDM TAC,LPTPTR(DEVDAT)
205 000114 200040 000147      MOVE TAC,[EXP 1586+12813] ;PRINT CRLF
206 000115 256006 000027      XCT LPTD0(DEVDAT)
207 000116 254000 000127      JRST LPTER4
208
209 000117 256006 000021 LPTER2: XCT LPTECH(DEVDAT) ;SKIP IF ERROR INTERRUPT NOT ASSIGNED
210 000120 254000 000131      JRST LPTER5 ;ERROR CONDITION DETECTED
211 000121 200046 000011      MOVE TAC,LPTCH(DEVDAT) ;GET INTERRUPT CHANNEL ASSIGNMENTS
212 000122 405040 000007      ANDI TAC,LPTDCM ;MASK OUT ERROR CHANNEL
213 000123 435040 000200      IORI TAC,LPTRSY ;SET THE BUSY FLAG
214 000124 256006 000026      XCT LPTCNO(DEVDAT) ;SEND IT OUT TO THE LPT
215 000125 201040 001500      MOVEI TAC,LPTLOV+LPTERR+LPTDON ;ENABLE FOR ALL INTERRUPTS
216 000126 542046 777774 LPTER3: HRRM TAC,LPTCON(DEVDAT) ;SAVE SKIP CHAIN MASK FLAGS
217 000127 200046 000020 LPTER4: MOVE TAC,LPTSV2(DEVDAT) ;RESTORE SAVED ACCUMULATOR
218 000130 254006 000016      JRST LPTEX1(DEVDAT) ;AND GO DISMISS INTERRUPT
219
220 000131 200046 000011 LPTER5: MOVE TAC,LPTCH(DEVDAT) ;GET INTERRUPT CHANNEL ASSIGNMENTS
221 000132 405040 000007      ANDI TAC,LPTDCM ;MASK OUT ERROR CHANNEL ASSIGNMENT
222 000133 435040 000200      IORI TAC,LPTRSY ;SET BUSY FLAG
223 000134 256006 000026      XCT LPTCNO(DEVDAT) ;SEND IT OUT TO THE LPT
224 000135 201040 000100      MOVEI TAC,LPTDON ;ENABLE FOR DONE FLAG ONLY
225 000136 254000 000126      JRST LPTER3
    
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226                               ;LINE PRINTER BLKO POINTER SETUP ROUTINE
227
228 000137 201066 000010 LPTSET: MOVEI TAC,@DEVDAD(DEVDAT) ;GET ARS. ADDR. OF CURRENT BUFFER
229 000140 210191 000001      MOVN TAC1,1(TAC) ;GET NEGATIVE WORD COUNT
230 000141 504040 000002      HRL TAC,TAC1 ;COMBINE NEG. WORD COUNT AND ADDR.
231 000142 340040 000000      AOJ TAC, ;INCREMENT BUFFER ADDRESS TO FORM
232 000143 202046 000007      MOVEM TAC,LPTPTR(DEVDAT) ; LPTPTR:= -(WORD COUNT),(BUFF. ADDR. +1)
233 000144 263140 000000      POPJ PDP, ; AND RETURN
234
235
236                               END
237 000145 064300 000000
238 000146 000001 000001
239 000147 064240 000000
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NO ERRORS DETECTED

PROGRAM BREAK IS 000150

LPTSER - LINE PRINTER SERVICE ROUTINE FOR MULTIPLE LINE PRINTERS - V405 MACRO,V36 19:08 4-JUN-69 PAGE 20
 SYMBOL TABLE

ADVBFE	000062' EXT	CPOPJ1	000012' EXT	DEV DAT	000006 INT
DEVINS	000072 INT	DEV OAD	000010 INT	HNGSTP	000024' FXT
ILLINP	000025' EXT	IO	000020 INT	IOACT	010000 INT
IOREG	000072 INT	IOS	000070 INT	IOSET	000057' FXT
IOW	000001 INT	LPTBDM	000030	LPTBG1	000102'
LPTB02	000173' INT	LPTBKO	000030	LPTBSY	000200
LPTCH	000011	LPTCLR	002000	LPTCLS	000013'
LPTCNI	000025	LPTCNO	000026	LPTCON	777777 777774
LPTCSO	000023	LPTCSZ	000024	LPTDCM	000007
LPTDNE	000022	LPTDNN	000100 INT	LPTDSP	000002' INT
LPTDIO	000027	LPTDCH	000021	LPTECM	000070 INT
LPTEND	000200	LPTER1	000106'	LPTER2	000117'
LPTER3	000126'	LPTER4	000127'	LPTER5	000131'
LPTERR	000400	LPTEX1	000016	LPTEX2	000067'
LPTGC	000031'	LPTHNG	000006'	LPTINI	000007'
LPTINT	000047' INT	LPTLOW	001000	LPTNEW	000044'
LPTNXT	000057' INT	LPTOF1	000075'	LPTOFF	000070'
LPTOUT	000017'	LPTPTR	000007	LPTREL	000006'
LPTSER	000070' INT	LPTSET	000137'	LPTSV2	000020
LPTSVE	000012	LPTSYN	000100	LPTWCK	000065'
OUT	000016' EXT	PDP	000003 INT	PIOFF	000037' FXT
PION	000042' FXT	SETACT	000031' FXT	SETIOD	000066' FXT
STOIAS	000067' EXT	TAC	000071 INT	TAC1	000002 INT
VLPTSR	000045 INT	WAIT1	000000 FXT		

DR	6#	6
DRL	6#	6
DRN	6#	6
DSEB	6#	6
DSI	6#	6
DSKRLB	6#	6
DSO	6#	6
DVAVAL	6#	6
DVCDR	6#	6
DVDIR	6#	6
DVDIRI	6#	6
DVDIS	6#	6
DVDSK	6#	6
DVDTA	6#	6
DVIN	6#	6
DVLNG	6#	6
DVLPY	6#	6
DVMTA	6#	6
DVOUT	6#	6
DVPTP	6#	6
DVPTB	6#	6
DVTTY	6#	6
ENTRR	6#	6
FBMERR	6#	6
FNFERR	6#	6
FRGSEG	6#	6
FT2RFL	6#	
FTATTA	6#	
FTCHEC	6#	
FTEXAM	6#	
FTFINI	6#	
FTGETT	6#	
FTHALT	6#	
FTKCT	6#	
FTMONP	6#	
FTPRV	6#	
FTRA10	6#	
FTRCHK	6#	
FTRCAS	6#	
FTSLFE	6#	
FTTALK	6#	
FTTIME	6#	
FTTRAC	6#	
FTTRPS	6#	
FTTYS	6#	
HNGSTP	21	133
HSAMSK	6#	6
HSAPDS	6#	6
HSASIZ	6#	6
HUNGCT	6#	6
HUNGST	6#	6
I	6#	6
IB	6#	6

LPTCNI	64#							
LPTCNO	65#	114	129	146	189	214	223	
LPTCON	54#	115	147	190	216			
LPTCSO	62#	131	201					
LPTCSZ	63#							
LPTDCM	42#	212	221					
LPTDME	61#	157						
LPTDON	30	40#	43	142	143	144	215	224
LPTDSP	30	74#						
LPTDIO	66#	195	206					
LPTDCH	60#	156	209					
LPTDCM	30	41#						
LPTEND	48#	122	182	186				
LPTER1	158	199#						
LPTER2	202	209#						
LPTER3	216#	225						
LPTER4	207	217#						
LPTER5	210	220#						
LPTERR	38#	130	144	215				
LPTEX1	58#	162	163	218				
LPTEX2	179#	196						
LPTGO	138#	153						
LPTHNG	73	110#						
LPTINI	72	113#						
LPTINT	30	156#						
LPTLOV	37#	144	200	210				
LPTNEW	136	151#						
LPTNXT	30	165#						
LPTOF1	183	187#						
LPTOFF	175	182#						
LPTOUT	76	128#	134					
LPTPTR	55#	152	159	204	232			
LPTREL	74	111#						
LPTSFR	31	33#						
LPTSFT	137	176	193	220#				
LPTSV2	59#	199	217					
LPTSVE	57#	160						
LPTSYN	49#	123	184					
LPTWCK	177#	191						
MEDDLE	6#	6						
NECERR	6#	6						
NLEERR	6#	6						
NSDERR	6#	6						
NSFERR	6#	6						
NSHF	6#	6						
NSRBIT	6#	6						
NSWP	6#	6						
NXM	6#							
OBUFR	6#	6						
OCLOSB	6#	6						
OUT	25	125						
OUTBFB	6#	6						
OUTPR	6#	6						

CODES	6#		
DISARL	6#		
ENABLE	6#		
NOSCHE	6#		
NOSHUF	6#		
QUEUFS	6#		
SCHEDU	6#		
SHUFFL	6#		
STARTD	6#		
XP	6#	6	9