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                        ;THIS SUB-PROGRAM ASSEMBLED WITH SYSTEM PARAMETER FILE - S.MAC(V414)
                                XLIST
                                LIST
                        TITLE   LPTSER - LINE PRINTER SERVICE ROUTINE FOR MULTIPLE LINE PRINTERS - V405
                        SUBTTL  T. M. MCMANUS /TNM   TS   20 MAY 69
                                XP VLPTSR,405                   ;DEFINE GLOBAL VERSION NUMBER FOR LOADER MAP

                        ;THE FOLLOWING EXTERNAL SYMBOLS ARE DEFINED IN COMMON:

                                EXTERNAL CPOPJ1, PION, PIOFF

                        ;THE FOLLOWING EXTERNAL SYMBOLS ARE DEFINED IN CLOCK1:

                                EXTERNAL SETIOD, WAIT1

                        ;THE FOLLOWING EXTERNAL SYMBOLS ARE DEFINED IN ERRCON:

                                EXTERNAL HNGSTP, ILLINP

                        ;THE FOLLOWING EXTERNAL SYMBOLS ARE DEFINED IN UUOCON:

                                EXTERNAL ADVREF, IOSET, OUT, SETACT, STOIOS


                        ;THE FOLLOWING SYMBOLS ARE REFERENCED OUTSIDE OF LPTSER:

                                INTERN LPTINT, LPTNXT, LPTECM, LPTDON, LPTDSP
                                ENTRY LPTSER

000000                  LPTSER:
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                                ;LINE PRINTER CONTROL REGISTER MNEMONIC DEFINITIONS

                    002000      LPTCLR=1B25                 ;CLEAR LINE PRINTER BUFFER
                    001000      LPTLOV=1B26                 ;LINE OVERFLOW FLAG (PDP-6 ONLY)
                    000400      LPTERR=1B27                 ;ERROR FLAG
                    000200      LPTBSY=1B28                 ;BUSY FLAG
                    000100      LPTDON=1B29                 ;DONE FLAG
                    000070      LPTECM=7B32                 ;ERROR CHANNEL MASK
                    000007      LPTDCM=7B35                 ;DONE CHANNEL MASK
                    000300      LPTBDM=LPTBSY+LPTDON        ;BUSY/DONE FLAG MASK


                                ;LINE PRINTER DEVICE DEPENDANT I/O STATUS MNEMONIC DEFINITIONS

                    000200      LPTEND=:(1B10)              ;CLOSE UUO HAS BEEN DONE
                    000100      LPTSYN=:(1B11)              ;CREF AFTER CLOSE UUO HAS BEEN SENT


                                ;LINE PRINTER DEVICE DATA BLOCK ADDRESSING MNEMONIC DEFINITIONS

          777777    777774      LPTCON=-4                   ;RH = SKIP CHAIN MASK REGISTER
                    000007      LPTPTR= 7                   ;BLOCK OUTPUT POINTER
                    000011      LPTCH= 11                   ;INTERRUPT CHANNEL ASSIGNMENTS
                    000012      LPTSVE=12                   ;DDB ROUTINE TO SAVE AC'S
                    000016      LPTEX1=16                   ;DDB EXIT ROUTINE IF AC'S NOT SAVED
                    000020      LPTSV2=20                   ;TEMP. SAVE LOCN. FOR TAC
                    000021      LPTECH=21                   ;CONS: LP?,LPTECM
                    000022      LPTDNE=22                   ;CONSO LP?,LPTDON
                    000023      LPTCSO=23                   ;CONSO LP?,(TAC)
                    000024      LPTCS:=24                   ;CONS: LP?,(TAC)
                    000025      LPTCNI=25                   ;CONI  LP?,TAC
                    000026      LPTCNO=26                   ;CONO  LP?,(TAC)
                    000027      LPTDTO=27                   ;DATAO LP?,(TAC)
                    000030      LPTBKO=30                   ;BLKO  LP?,LP?PTR


                                ;LINE PRINTER SERVICE DISPATCH TABLE

000000  254000      000007'     LPTDSP: JRST LPTINI         ;INITIALIZE
000001  254000      000006'             JRST LPTHNG         ;HUNG DEVICE ERROR
000002  254000      000006'             JRST LPTREL         ;RELEASE
000003  254000      000013'             JRST LPTCLS         ;CLOSE
000004  254000      000017'             JRST LPTOUT         ;OUTPUT
000005  254000      000000              JRST ILLINP         ;INPUT
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                        ;LINE PRINTER INITIALIZATION, HUNG DEVICE AND RELEASE CODE

                                ;LPTINI IS CALLED AT SYSTEM INITIALIZATION TIME FROM
                                ;IOGO IN SYSINI WITH THE DDB ADDRESS IN DEVDAT

                                ;LPTHNG IS CALLED FROM DEVCHK IN UUOCON (IOCSS) WITH
                                ;THE DDB ADDRESS IN DEVDAT WHENEVER A LINE PRINTER
                                ;HUNG DEVICE COUNT IS DECREMENTED TO ZERO

                                ;LPTREL IS CALLED FROM RELEA1 IN UUOCON WITH THE DDB
                                ;ADDRESS IN DEVDAT WHENEVER A RELEASE UUO IS EXECUTED
                                ;FOR A LINE PRINTER

                                ;EACH OF THE ABOVE ROUTINE MUST:
                                ;
                                ;       1.  CLEAR THE SPECIFIED LINE PRINTER
                                ;       2.  DEASSIGN BOTH THE ERROR AND DONE INTERRUPT
                                ;             CHANNELS FOR THAT LINE PRINTER
                                ;       3.  CLEAR THE SKIP CHAIN INTERRUPT MASK FLAGS
                                ;             FOR THAT LINE PRINTER

                                ;NOTE:  THE LPTINI CODE FORCES IOGO IN SYSINI TO INVOKE
                                ;       LPTINI FOR EACH LINE PRINTER ON THE SYSTEM RATHER
                                ;       THAN FOR THE NORMAL CASE WHERE IT INVOKES THE
                                ;       INITIALIZATION CODE ONCE FOR EACH DISPATCH TABLE.
                                ;
                                ;       THEREFORE, THE CORRECT OPERATION OF THE LPTINI CODE
                                ;       IS DEPENDANT UPON THE IOGO CODE WHICH SHOULD BE:
                                ;
                                ;               PUSHJ PDP,DINI(AC3)
                                ;               HRRZM AC3,SAVITM

000006                  LPTHNG:
000006                  LPTREL:
000006  370003  000000          SOS (PDP)                       ;COUNTERACT SKIP RETURN
000007  201040  002000  LPTINI: MOVEI TAC,LPTCLR                ;CLEAR THE LINE PRINTER
000010  256006  000026          XCT LPTCNO(DEVDAT)
000011  513006  777774          HLLZS LPTCON(DEVDAT)            ;CLEAR SKIP CHAIN MASK FLAGS
000012  254000  000000          JRST CPOPJ1                     ;SKIP RETURN IF ENTERED AT LPTINI
                                                                ; TO FORCE CALL FOR EACH LPT


                        ;LINE PRINTER CLOSE UUO ROUTINE

000013  661000  000200  LPTCLS: TLO IOS,LPTEND                  ;TURN ON THE END FLAG
000014  621000  000100          TLZ IOS,LPTSYN                  ;TURN OFF SYNCHRONIZATION FLAG
000015  202006  000022          MOVEM IOS,DEVIOS(DEVDAT)        ;SAVE IOS IN THE DDB
000016  254000  000000          JRST OUT                        ; AND RETURN TO UUOCON
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126                             ;LINE PRINTER OUTPUT UUO 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          MOVEI 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  254000  000017'         JRST LPTOUT                     ;TRY AGAIN WHEN USER TYPES "CONT"
135  000026  603000  000002          TLNE IOS,IOBEG                  ;IS THIS FIRST OUTPUT SINCE INIT?
136  000027  254000  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 DDB
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 UUOCON
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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                                ;LINE PRINTER INTERRUPT SERVICE ROUTINE

000047  256006  000021  LPTINT: XCT LPTECH(DEVDAT)           ;SKIP IF NO ERROR CHANNEL ASSIGNED
000050  256006  000322          XCT LPTDNE(DEVDAT)          ;SKIP IF DONE FLAG IS UP
000051  254000  000106'        JRST LPTER1                 ; BRANCH TO ERROR SERVICE ROUTINE
000052  331006  000007          SKIPL LPTPTR(DEVDAT)        ;BLKO COUNT TO 0 ON PREV. INTERRUPT?
000053  254006  000012          JRST LPTSVE(DEVDAT)         ; YES, GO SAVE ORIGINAL AC'S
000054  256006  000030          XCT LPTBKO(DEVDAT)          ; NO, SEND NEXT WORD FOR PRINTING
000055  254006  000016          JRST LPTEX1(DEVDAT)         ;LAST WORD SENT BUT INTERRUPT PENDING
000056  254006  000016          JRST LPTEX1(DEVDAT)         ;GO RESTORE DEVDAT AND RETURN

000057                  LPTNXT: ;ENTER HERE AFTER DDB ROUTINE SAVES
                                ; ORIGINAL AC'S IN PROPER CHANNEL
                                ; SAVE AREA AND SETS UP DEVDAT
                                ; TO POINT TO DDB AGAIN

000057  260140  000000          PUSHJ PDP,IOSET             ;SET AC PROG:= JOB AREA ADDRESS AND
                                ; AC IOS:= DEVIOS IN THE DDB
000060  623000  000002          TLZE IOS,IOBEG              ;FIRST BUFFER SINCE INIT?
000061  254000  000102'        JRST LPTBG1                 ; YES, GO OUTPUT A CREF
000062  260140  000000          PUSHJ PDP,ADVBFE            ; NO, ADVANCE TO NEXT BUFFER
000063  254000  000070'        JRST LPTOFF                 ;CANNOT ADVANCE, BUFFER UNAVAILABLE
000064  260140  000137'        PUSHJ PDP,LPTSET            ;SET UP NEW BLKO POINTER
000065  623000  000001  LPTWCK: TLZE IOS,IOW               ;IS JOB WAITING FOR I/O COMPLETION?
000066  260140  000000          PUSHJ PDP,SETIOD            ; YES, ARRANGE FOR JOB TO RUN AGAIN
000067  254000  000000  LPTEX2: JRST STOIOS               ;SAVE IOS, RESET HUNG DEVICE COUNT
                                ; AND DISMISS INTERRUPT

000070  607000  000200  LPTOFF: TLNN IOS,LPTEND           ;SKIP IF CLOSE HAS BEEN DONE
000071  254000  000075'        JRST LPTOF1                 ; GO TURN PRINTER OFF UNTIL NEXT OUTPUT
000072  667000  000100          TLON IOS,LPTSYN             ;HAS FINAL CREF BEEN OUTPUT?
000073  254000  000103'        JRST LPTBG2                 ; NO, SO GO DO IT
000074  621000  000200          TLZ IOS,LPTEND              ; YES, SO CLEAR END FLAG
000075  620000  010000  LPTOF1: TRZ IOS,IOACT              ;CLEAR I/O ACTIVE BIT
000076  400040  000000          SETZ TAC,                   ;CLEAR TAC AND
000077  256006  000026          XCT LPTCNO(DEVDAT)          ; TURN LPT OFF
000100  513006  777774          HLLZS LPTCON(DEVDAT)        ;CLEAR SKIP CHAIN MASK FLAGS
000101  254000  000065'        JRST LPTWCK                 ; AND BRANCH

000102  260140  000137' LPTBG1: PUSHJ PDP,LPTSET           ;SET UP INITIAL BLKO POINTER *******
000103  201040  000145' LPTBG2: MOVEI TAC,[EXP 15B6+14B13] ;SEND OUT A CREF
000104  256006  000027          XCT LPTDTO(DEVDAT)
000105  254000  000067'        JRST LPTEX2                 ;GO DISMISS ITERRUPT
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                                ;LINE PRINTER ERROR HANDLING ROUTINE
                        
000106  202046  000020  LPTER1: MOVEM TAC,LPTSV2(DEVDAT)          ;SAVE TAC IN DDB
000107  201040  001000          MOVEI TAC,LPTLOV                  ;GET LINE OVERFLOW ERROR MASK
000110  256006  000023          XCT LPTCSO(DEVDAT)                ;SKIP IF LINE OVERFLOW FLAG IS ON
000111  254000  000117'         JRST LPTER2                       ; GO CHECK IF PREVIOUS ERROR OCCURRED
000112  210040  000146'         MOVN TAC,[EXP 1000001]            ;DECREMENT BLK0 POINTER
000113  272046  000007          ADDM TAC,LPTPTR(DEVDAT)
000114  200040  000147'         MOVE TAC,[EXP 15B6+12B13]         ;PRINT CRLF
000115  256006  000027          XCT LPTDTO(DEVDAT)
000116  254000  000127'         JRST LPTER4
                        
000117  256006  000021  LPTER2: XCT LPTECH(DEVDAT)               ;SKIP IF ERROR INTERRUPT NOT ASSIGNED
000120  254000  000131'         JRST LPTER5                       ; ERROR CONDITION DETECTED
000121  200046  000011          MOVE TAC,LPTCH(DEVDAT)            ;GET INTERRUPT CHANNEL ASSIGNMENTS
000122  405040  000007          ANDI TAC,LPTDCM                   ;MASK OUT ERROR CHANNEL
000123  435040  000200          IORI TAC,LPTBSY                   ;SET THE BUSY FLAG
000124  256006  000026          XCT LPTCNO(DEVDAT)                ;SEND IT OUT TO THE LPT
000125  201040  001500          MOVEI TAC,LPTLOV+LPTERR+LPTDON    ;ENABLE FOR ALL INTERRUPTS
000126  542046  777774  LPTER3: HRRM TAC,LPTCON(DEVDAT)           ;SAVE SKIP CHAIN MASK FLAGS
000127  200046  000020  LPTER4: MOVE TAC,LPTSV2(DEVDAT)           ;RESTORE SAVED ACCUMULATOR
000130  254006  000016          JRST LPTEX1(DEVDAT)               ; AND GO DISMISS INTERRUPT
                        
000131  200046  000011  LPTER5: MOVE TAC,LPTCH(DEVDAT)            ;GET INTERRUPT CHANNEL ASSIGNMENTS
000132  405040  000007          ANDI TAC,LPTDCM                   ;MASK OUT ERROR CHANNEL ASSIGNMENT
000133  435040  000200          IORI TAC,LPTBSY                   ;SET BUSY FLAG
000134  256006  000026          XCT LPTCNO(DEVDAT)                ;SEND IT OUT TO THE LPT
000135  201040  000100          MOVEI TAC,LPTDON                  ;ENABLE FOR DONE FLAG ONLY
000136  254000  000126'         JRST LPTER3
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  226                           ;LINE PRINTER BLKO POINTER SETUP ROUTINE
  227
  228  000137  201066  000010  LPTSET: MOVEI TAC,@DEVOAD(DEVDAT)       ;GET ABS. ADDR. OF CURRENT BUFFER
  229  000140  210061  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 P,                         ; AND RETURN
  234
  235
  236                                   END
  237  000145  064300  000000
  238  000146  000001  000001
  239  000147  064240  000000

NO ERRORS DETECTED

PROGRAM BREAK IS 000150
```

SYMBOL TABLE

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ADVBFE | 000062' | EXT | CPOPJ1 | 000012' | EXT | DEVDAT | 000006 | INT |
| DEVIOS | 000002 | INT | DEVOAD | 000010 | INT | HNGSTP | 000024' | EXT |
| ILLINP | 000025' | EXT | IO | 000020 | INT | IOACT | 010000 | INT |
| IOREG | 000002 | INT | IOS | 000030 | INT | IOSET | 000057' | EXT |
| IOW | 000001 | INT | LPTBDM | 000300 | | LPTBG1 | 000102' | |
| LPTBG2 | 000103' | | 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 | | LPTDON | 000100 | INT | LPTDSP | 000002' | INT |
| LPTDTO | 000027 | | LPTECH | 000021 | | LPTECM | 000070 | INT |
| LPTEND | 000200 | | LPTER1 | 000106' | | LPTER2 | 000117' | |
| LPTER3 | 000126' | | LPTER4 | 000127' | | LPTER5 | 000131' | |
| LPTERR | 000400 | | LPTEX1 | 000016 | | LPTEX2 | 000067' | |
| LPTGO | 000031' | | LPTHNG | 000006' | | LPTINI | 000007' | |
| LPTINT | 000047' | INT | LPTLOV | 001000 | | LPTNEW | 000044' | |
| LPTNXT | 000057' | INT | LPTOF1 | 000075' | | LPTOFF | 000070' | |
| LPTOUT | 000017' | | LPTPTR | 000007 | | LPTREL | 000006' | |
| LPTSER | 000000' | INT | LPTSET | 000137' | | LPTSV2 | 000020 | |
| LPTSVE | 000012 | | LPTSYN | 000100 | | LPTWCK | 000065' | |
| OUT | 000016' | EXT | PDP | 000003 | INT | PIOFF | 000037' | EXT |
| PION | 000042' | EXT | SETACT | 000031' | EXT | SETIOD | 000066' | EXT |
| STOIOS | 000067' | EXT | TAC | 000001 | INT | TAC1 | 000002 | INT |
| VLPTSR | 000475 | INT | WAIT1 | 000000 | EXT | | | |

| | | |
|---|---|---|
| DR | 6# | 6 |
| DRL | 6# | 6 |
| DRN | 6# | 6 |
| DSER | 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 |
| DVLPT | 6# | 6 |
| DVMTA | 6# | 6 |
| DVOUT | 6# | 6 |
| DVPTP | 6# | 6 |
| DVPTR | 6# | 6 |
| DVTTY | 6# | 6 |
| | | |
| ENTRR | 6# | 6 |
| FBMERR | 6# | 6 |
| FNFERR | 6# | 6 |
| FRGSEG | 6# | 6 |
| FT2REL | 6# | |
| FTATTA | 6# | |
| FTCHEC | 6# | |
| FTEXAM | 6# | |
| FTFINI | 6# | |
| FTGETT | 6# | |
| FTHALT | 6# | |
| FTKCT | 6# | |
| FTMONP | 6# | |
| FTPRV | 6# | |
| FTRA10 | 6# | |
| FTRCHK | 6# | |
| FTREAS | 6# | |
| FTSLEE | 6# | |
| FTTALK | 6# | |
| FTTIME | 6# | |
| FTTRAC | 6# | |
| FTTRPS | 6# | |
| FTTTYS | 6# | |
| HNGSTP | 21 | 133 |
| HSAMSK | 6# | 6 |
| HSAPOS | 6# | 6 |
| HSASIZ | 6# | 6 |
| HUNGCT | 6# | 6 |
| HUNGST | 6# | 6 |
| I | 6# | 6 |
| IB | 6# | 6 |

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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#
LPTDTO      66#     195     206
LPTECH      60#     156     209
LPTECM      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     215
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#
LPTSER      31      33#
LPTSFT     137     176     193     228#
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#
OBUFB        6#      6
OCLOSB       6#      6
OUT         25     125
OUTBFB       6#      6
OUTPB        6#      6
```

| | | | |
|---|---|---|---|
| CODES | 6# | | |
| DISARL | 6# | | |
| ENABLE | 6# | | |
| NOSCHE | 6# | | |
| NOSHUF | 6# | | |
| QUEUES | 6# | | |
| SCHEDU | 6# | | |
| SHUFFL | 6# | | |
| STARTD | 6# | | |
| XP | 6# | 6 | 9 |