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0001  MUM04
                ;                                       RCSL:   43-GL4083
                ;                                       AUTHOR:   DHA
                ;                                       EDITED:   77.05.21

                ;                       MUM04

                ; KEYWORDS: MUS, MONITOR, LISTING.

                ; ABSTRACT: MULTIPROGRAMMING UTILITY SYSTEM
                ;           MONITOR PROCEDURES.
                ;
                ; ASCII PAPER TAPE:   RCSL  43-GL4082
                ; REL. BINARY PAPER TAPE: RCSL  43-GL4084
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000000 INTER=0      ; INTERRUPT MASK

       .NREL        ; RELOCATABLE MODULE
       .TITL MUM04
000012 .RDX  10     ; DECIMAL THROUGHOUT
000001 .TXTM 1      ; LEFT TO RIGHT TEXT PACKING

       ; CONTENTS:
       ;   FORMAT DEFINITIONS
       ;   FUNCTION ENTRIES
       ;   MONITOR PROCESS DESCRIPTOR:
       ;     MONITOR TABLE
       ;     INTERRUPT RESPONSE
       ;     MONITOR UTILITY PROCEDURES
       ;     MONITOR FUNCTIONS
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^ 0003  MUM04
                ;    ******    FORMAT DEFINITIONS    ******
                                                ; ITEM:
        000000 . DUSR NEXT= 0                   ;   NEXT ITEM IN A QUEUE OF ITEMS
        000001 . DUSR PREV= NEXT+1              ;   PREVIOUS ITEM IN A QUEUE OF ITEMS
        000002 . DUSR CHAIN=PREV+1              ;   NEXT ITEM IN A CHAIN OF ITEMS
        000003 . DUSR SIZE= CHAIN+1             ;   SIZE OF THE ITEM
        000004 . DUSR NAME= SIZE+1              ;   NAME OF THE ITEM (THREE WORDS)

                                                ; PROCESS DESCRIPTOR:
                ;       NEXT                    ;   NEXT PROCESS IN A QUEUE OF PROCESSES
                ;       PREV                    ;   PREVIOUS PROCESS IN A QUEUE OF PROCES
                ;       CHAIN                   ;   NEXT PROCESS IN THE PROCESS CHAIN
                ;       SIZE                    ;   SIZE OF THE PROCESS DESCRIPTOR
                ;       NAME                    ;   NAME OF THE PROCESS (THREE WORDS)
        000007 . DUSR EVENT=NAME+3              ;   EVENT QUEUE HEAD (TWO WORDS)
        000011 . DUSR BUFFE=EVENT+2             ;   FREE MESSAGE BUFFER CHAIN HEAD
        000012 . DUSR PROG= BUFFE+1             ;   PROGRAM ADDRESS
        000013 . DUSR STATE=PROG+1              ;   STATE OF PROCESS
        000014 . DUSR TIMER=STATE+1             ;   TIMER COUNT
        000015 . DUSR PRIOR=TIMER+1             ;   PRIORITY
        000016 . DUSR BREAD=PRIOR+1             ;   BREAK ADDRESS
        000017 . DUSR AC0=   BREAD+1            ;   SAVED AC0
        000020 . DUSR AC1=   AC0+1              ;   SAVED AC1
        000021 . DUSR AC2=   AC1+1              ;   SAVED AC2
        000022 . DUSR AC3=   AC2+1              ;   SAVED AC3
        000023 . DUSR PSW=   AC3+1              ;   PSW (PROCESS STATUS WORD)
        000024 . DUSR SAVE=  PSW+1              ;   SAVED LINK
        000025 . DUSR O=     SAVE+1             ; OPTIONAL WORDS:

                ;  INTERPRETER PROCESSES
        000025 . DUSR SAVE1=O                   ; WORK LOC.
        000026 . DUSR SAVE2=SAVE1+1             ;   -
        000027 . DUSR SAVE3=SAVE2+1             ;   -
        000030 . DUSR SAVE4=SAVE3+1             ;   -
        000031 . DUSR SAVE5=SAVE4+1             ;   -
        000032 . DUSR R=     SAVE5+1            ; PSEUDO ACCUMOLATOR
        000033 . DUSR PC=    R+1                ; PSEUDO PC
        000034 . DUSR OP=    PC+1               ; OPERATOR MESSAGE
        000035 . DUSR . OPER=OP+1               ; OPERATOR NAME ADDRESS
        000041 . DUSR ZN=. OPER+4               ; FIRST FILE DESCR.  ENTRY ADDRESS

                ;  DRIVER PROCESSES
        000025 . DUSR BUF=   O                  ;   SAVED MESSAGE BUFFER ADDRESS
        000026 . DUSR ADDRE=BUF+1               ;   CURRENT VALUE OF ADDRESS
        000027 . DUSR COUNT=ADDRE+1             ;   CURRENT VALUE OF COUNT
        000030 . DUSR RESER=COUNT+1             ;   RESERVER
        000031 . DUSR CONVT=RESER+1             ;   CONVERSION TABLE ADDRESS
        000032 . DUSR CLINT=CONVT+1             ;   CLEAR DEVICE INTERRUPT
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                ;  COROUTINE PROCESSES
000041 .DUSR CCOROUT=ZN         ;  CURRENT COROUTINE
000042 .DUSR LATIME=CCORO+1     ;  LATEST ACTIVATION TIME
000043 .DUSR HACTIVE=LATIM+1    ;  HEAD OF ACTIVE QUEUE
000044 .DUSR HANSWER=HACTI+1    ;  HEAD OF ANSWER QUEUE
000045 .DUSR HDELAY=HANSW+1     ;  HEAD OF DELAY QUEUE
000046 .DUSR TRETURN=HDELA+1    ;  RETURN FROM TEST
000047 .DUSR TRECORD=TRETU+1    ;  TEST RECORD START
000050 .DUSR CDEVICE= TRECO+1   ;  DEVICE NUMBER
000051 .DUSR MSEM=CDEVIC+1      ;  MESSAGE SEM
000052 .DUSR MCOROUT=MSEM+1     ;  MESSAGE COROUTINE
000053 .DUSR CUDEX=MCOROUT+1    ;  USER DEFINED EXIT
000054 .DUSR CBUFFER=CUDEX+1    ;  COROUTINE BUFFER

                                ;  MESSAGE BUFFER:
                ;       NEXT    ;    NEXT BUFFER IN A QUEUE OF BUFFERS
                ;       PREV    ;    PREVIOUS BUFFER IN A QUEUE OF BUFFERS
                ;       CHAIN   ;    NEXT BUFFER IN A CHAIN OF BUFFERS
                ;       SIZE    ;    SIZE OF THE MESSAGE BUFFER
000004 .DUSR SENDE=SIZE+1       ;    SENDER PROCESS DESCRIPTOR
000005 .DUSR RECEI=SENDE+1      ;    RECEIVER PARAMETER
000006 .DUSR MESS0=RECEI+1      ;    0. MESSAGE
000007 .DUSR MESS1=MESS0+1      ;    1. MESSAGE
000010 .DUSR MESS2=MESS1+1      ;    2. MESSAGE
000011 .DUSR MESS3=MESS2+1      ;    3. MESSAGE
000012 .DUSR BSIZE=MESS3+1      ;    SIZE OF MESSAGE BUFFER

                                ;  PROGRAM DESCRIPTOR:
000000 .DUSR PSPEC=0            ;    SPECIFICATION OF PROGRAM:
                                ;      B0: OWN
                                ;      B1: REENTRANT
                                ;      B2: PAGE ZERO USER
                                ;      B3: RESERVABLE
                                ;      B(8:15) PROCESS COUNT
000001 .DUSR PSTAR=PSPEC+1      ;    START ADDRESS
                ;       CHAIN   ;    NEXT PROGRAM IN A CHAIN OF PROGRAMS
                ;       SIZE    ;    SIZE OF THE PROGRAM AREA
                ;       NAME    ;    NAME OF THE PROGRAM (THREE WORDS)

                ;               ;  COROUTINE DESCRIPTOR:
177777 .DUSR CIDENT=NEXT-1      ;    IDENTIFICATION
177776 .DUSR OPMASK=CIDENT-1    ;  WAIT MASK
                ;       NEXT    ;    LINK TO NEXT COROUTINE
000001 .DUSR CEXIT=NEXT+1       ;    SAVED EXIT ADDRESS
000002 .DUSR CLATOP=CEXIT+1     ;    SAVED OPERATION
000003 .DUSR CRETUR=CLATO+1     ;    SAVED RETURN
000004 .DUSR CAC1S=CRETU+1      ;    SAVED AC1

000036 .DUSR TLENGTH=30         ;  LENGTH OF TEST RECORD
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                                        ; ZONE DESCRIPTOR:
000000 . DUSR ZNAME=0                   ;   NAME (THREE WORDS)
       ;      SIZE                      ;   SIZE OF THE ZONE DESCRIPTOR
000004 . DUSR ZMODE=SIZE+1              ;   MODE OF OPERATION
000005 . DUSR ZKIND=ZMODE+1             ;   KIND OF DOCUMENT
000006 . DUSR ZMASK=ZKIND+1             ;   MASK FOR GIVE UP
000007 . DUSR ZGIVE=ZMASK+1             ;   GIVE UP ADDRESS
000010 . DUSR ZFILE=ZGIVE+1             ;   FILE COUNT
000011 . DUSR ZBLOC=ZFILE+1             ;   BLOCK COUNT
000012 . DUSR ZCONV=ZBLOC+1             ;   CONVERSION TABLE ADDRESS
000013 . DUSR ZBUFF=ZCONV+1             ;   BUFFER ADDRESS
000014 . DUSR ZSIZE=ZBUFF+1             ;   SIZE OF BUFFER
000015 . DUSR ZFORM=ZSIZE+1             ;   FORMAT OF RECORD
000016 . DUSR ZLENG=ZFORM+1             ;   LENGTH OF RECORD
000017 . DUSR ZFIRS=ZLENG+1             ;   FIRST OF RECORD (BYTE ADDRESS)
000020 . DUSR ZTOP= ZFIRS+1             ;   TOP OF RECORD (BYTE ADDRESS)
000021 . DUSR ZUSED=ZTOP+1              ;   USED SHARE
000022 . DUSR ZSHAR=ZUSED+1             ;   SHARE LENGTH (IN BYTES)
000023 . DUSR ZREM= ZSHAR+1             ;   REMAINING BYTES IN SHARE
                                        ; AUXILLIARY WORDS:
000024 . DUSR Z0=   ZREM+1              ;   AUX 0
000025 . DUSR Z1=   Z0+1                ;   AUX 1
000026 . DUSR Z2=   Z1+1                ;   AUX 2
000027 . DUSR Z3=   Z2+1                ;   AUX 3
000030 . DUSR Z4=   Z3+1                ;   AUX 4
000031 . DUSR Z5=   Z4+1                ;   AUX 5
000006 . DUSR ZAUX= 6                   ;   NUMBER OF AUXILLIARY WORDS
000032 . DUSR Z=    Z0+ZAUX             ; OPTIONAL WORDS:

                                        ; SHARE DESCRIPTOR:
000000 . DUSR SOPER=0                   ;   OPERATION (0. MESSAGE)
000001 . DUSR SCOUN=SOPER+1             ;   COUNT (1. MESSAGE)
000002 . DUSR SADDR=SCOUN+1             ;   ADDRESS (2. MESSAGE)
000003 . DUSR SSPEC=SADDR+1             ;   SPECIAL (3. MESSAGE)
000004 . DUSR SNEXT=SSPEC+1             ;   NEXT SHARE
000005 . DUSR SSTAT=SNEXT+1             ;   STATE OF SHARE
000006 . DUSR SFIRS=SSTAT+1             ;   FIRST SHARED (BYTE ADDRESS)
000007 . DUSR SSIZE=SFIRS+1             ;   SIZE OF SHARE DESCRIPTOR

       ;    ******   END OF FORMAT DEFINITIONS   ******
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^ 0006  MUM04
                ;    ******   MONITOR FUNCTION ENTRIES   ******

        000000 .LOC  0      ; MONITOR START IN WORD 0

  00000 000000        0     ;  0: SAVED PC AT INTERRUPT, ALSO WORK CELL
 U00001 000000        A0    ;  1: INTERRUPT RESPONSE ADDRESS

                F2:          ;  2: WAIT , (START OF MUI MODULE RESTORED BY MUI )
        000003 .LOC .+1
 U00003 000000 F3:   A20     ;  3: WAIT INTERRUPT
 U00004 000000 F4:   A20     ;  4: SEND MESSAGE
  00005 000000 F5:   0       ;  5: WAIT ANSWER ( RESTORED BY MUI MODULE)
 U00006 000000 F6:   A20     ;  6: WAIT EVENT
 U00007 000000 F7:   A20     ;  7: SEND ANSWER
 U00010 000000 F8:   A20     ;  8: SEARCH ITEM
 U00011 000000 F9:   A20     ;  9: CLEAN PROCESS
 U00012 000000 F10:  A20     ; 10: BREAK PROCESS
 U00013 000000 F11:  A20     ; 11: STOP PROCESS
 U00014 000000 F12:  A20     ; 12: START PROCESS
 U00015 000000 F13:  A20     ; 13: RECHAIN
  00016 000000 WORK: 0       ; 14: PAGE ZERO LOCATION
  00017 000000 LINK: 0       ; 15: PAGE ZERO LOCATION

                FUNCTION:    ; MONITOR FUNCTION ENTRIES:
  00020 000000        0      ; 16: AUTO-INCREMENTING LOCATION
  00021 000000        0      ; 17: AUTO-INCREMENTING LOCATION
 U00022 000000        A22    ; 18: WAIT(DELAY, DEVICE, FIRST, SECOND, BUF)
 U00023 000000        A23    ; 19: WAIT INTERRUPT(DEVICE, DELAY)
 U00024 000000        A24    ; 20: SEND MESSAGE(ADDR, NAME ADDR, BUF)
 U00025 000000        A25    ; 21: WAIT ANSWER(FIRST, SECOND, BUF)
 U00026 000000        A26    ; 22: WAIT EVENT(FIRST, SECOND, BUF)
 U00027 000000        A27    ; 23: SEND ANSWER(FIRST, SECOND, BUF)
 U00030 000000        A28    ; 24: SEARCH ITEM(CHAIN, NAME ADDR, ITEM)
 U00031 000000        A29    ; 25: CLEAN PROCESS(PROC)
 U00032 000000        A30    ; 26: BREAK PROCESS(PROC, ERROR NUMBER)
 U00033 000000        A31    ; 27: STOP PROCESS(PROC)
 U00034 000000        A32    ; 28: START PROCESS(PROC)
 U00035 000000        A33    ; 29: RECHAIN(OLD, NEW, ELEM)
  00036 000000        0      ; 30: AUTO-DECREMENTING LOCATION
  00037 000000        0      ; 31: AUTO-DECREMENTING LOCATION

        006002 .DUSR WAIT=              JSR@   F2
        006003 .DUSR WAITINTERRUPT=     JSR@   F3
        006004 .DUSR SENDMESSAGE=       JSR@   F4
        006005 .DUSR WAITANSWER=        JSR@   F5
        006006 .DUSR WAITEVENT=         JSR@   F6
        006007 .DUSR SENDANSWER=        JSR@   F7
        006010 .DUSR SEARCHITEM=        JSR@   F8
        006011 .DUSR CLEANPROCESS=      JSR@   F9
        006012 .DUSR BREAKPROCESS=      JSR@   F10
        006013 .DUSR STOPPROCESS=       JSR@   F11
        006014 .DUSR STARTPROCESS=      JSR@   F12
        006015 .DUSR RECHAIN=           JSR@   F13

                ;    ******   END OF MONITOR FUNCTION ENTRIES   ******
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                ;    ******   MONITOR PROCESS DESCRIPTOR   ******

                ; THE MONITOR PROCESS DESCRIPTOR HOLDS THE MONITOR TABLE, THE
                ; MONITOR CODE, THE SYSTEM UTILITY PROCEDURES, AND THE INPUT/
                ; OUTPUT UTILITY PROCEDURES.

                ;    ******   MONITOR TABLE   ******

        000040 .DUSR M=     .       ; MONITOR PROCESS DESCRIPTOR:
        000040 .DUSR CUR=   .       ;
  00040 000040              CUR     ;  NEXT: FIRST PROCESS IN RUNNING QUEUE
  00041 000040              CUR     ;  PREV: LAST PROCESS IN RUNNING QUEUE
                                    ;        HEAD OF RUNNING QUEUE AND HEAD OF
                                    ;        PROCESS CHAIN.

  00042 000000              0       ; CHAIN: PROCESS DESCRIPTOR OF FIRST
                                    ;        PROCESS IN PROCESS CHAIN.
  00043 000000 WORK1:       0       ;   SIZE: MONITOR WORK
  00044 000000 WORK2:       0       ;   NAME: MONITOR WORK
  00045 000046 .DUSR TABLE=DEVTA    ;    +1: DEVICE TABLE
                                    ;        CONTAINS A WORD FOR EACH DEVICE
                                    ;        NUMBER HOLDING PROCESS DESCRIPTORS
                                    ;        FOR INTERRUPT REQUESTING PROCESSES.
        000046 .DUSR TOPTA=.
  00046 000464              TOPDE ;    +2: TOP OF DEVICE TABLE
                          DFIRS:
  00047 000047              DFIRS ; EVENT: FIRST PROCESS IN DELAY QUEUE
  00050 000047              DFIRS ;    +1: LAST PROCESS IN DELAY QUEUE
                                    ;        HEAD OF DELAY QUEUE
 U00051 000000 R301:        A301  ; BUFFER: POINT
        000052 .DUSR PFIRS=.
  00052 000000              0       ;  PROG: FIRST IN PROGRAM CHAIN

  00053 000000              0       ; STATE: MONITOR STATE: ALWAYS ZERO
        000054 .DUSR RUNNI=.
  00054 000040              CUR     ; TIMER: RUNNING QUEUE
        000054 .DUSR PROCE=RUNNI    ;        REFERENCE TO HEAD OF RUNNING QUEUE F
        000054 .DUSR MONIT=RUNNI    ;        HEAD OF PROCESS CHAIN: MONITOR PROCE

  00055 000000              0       ; PRIOR: MONITOR PRIORITY: LOWEST POSSIBLE: Z
        000056 .DUSR EXIT=.
 U00056 000000              A1      ; BREAD: MONITOR EXIT
        000057 .DUSR EFIRS=.
  00057 000000              0       ;   AC0: FIRST IN FREE CORE
        000060 .DUSR FFIRS=.
  00060 000367              247     ;   AC1: LAST IN FREE CORE
        000061 .DUSR DELAY=.
  00061 000047              DFIRS   ;   AC2: DELAY QUEUE
  00062 000062              JMP .   ;   AC3: PC.MONITOR: JMP .+0
  00063 000144              .-1*2   ;   PSW: PSW.MONITOR: PC.MONITOR*2
        000064 .DUSR AREAP=.        ;   HEAD OF AREA PROCESS CHAIN
  00064 000063            AFIRS-CHAIN ;
        000065 .DUSR AFIRS=.        ;   FIRST IN AREA PROCESS CHAIN
  00065 000000            0
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                ; PAGE ZERO VARIABLES:

        000066 .DUSR FREQU=.        ; FREQUENCY OF RTC:
  00066 000000               0      ;   0: 50 HZ, 1: 10 HZ, 2: 100 HZ, 3: 1000 HZ
        000067 .DUSR MASK= .        ;
  00067 000000               INTER  ; INTERRUPT MASK
        000070 .DUSR CORES=.        ;
  00070 000000               0      ; CORE SIZE
        000071 .DUSR PROGR=.        ;
  00071 000050         PFIRS-CHAIN  ; REFERENCE TO HEAD OF PROGRAM CHAIN
U00072 000000         A360         ; CLINT: CLEARDEVICE
U00073 000000         A2           ; CLINT.RTC: REAL TIME CLOCK
        000074 .DUSR RTIME=.        ; REAL TIME COUNT (DOUBLE WORD)
  00074 000000               0      ;
  00075 000000               0      ;
        000076 .DUSR POWIN=.        ;   POWER INTERRUPT COUNT
  00076 000000               0      ;
        000077 .DUSR CDUMP=.        ;  CORE DUMP ENTRY
  00077 000000               0      ;  NOT USED
  00100 000000               0      ;

                ; PAGE ZERO CONSTANTS:

  00101 100000 B1B0:    1B0
  00102 040000 B1B1:    1B1
  00103 020000 B1B2:    1B2
  00104 010000 B1B3:    1B3
  00105 004000 B1B4:    1B4
  00106 002000 B1B5:    1B5
  00107 001000 B1B6:    1B6
  00110 000400 B1B7:    1B7
  00111 000200 B1B8:    1B8
  00112 000100 B1B9:    1B9
  00113 000040 B1B10:   1B10
  00114 000020 B1B11:   1B11
  00115 000010 B1B12:   1B12
  00116 000004 B1B13:   1B13
  00117 000002 B1B14:   1B14
  00120 000001 B1B15:   1B15

        000101 .DUSR  BIT=    B1B0
        000101 .DUSR .1B0=    B1B0
        000102 .DUSR .1B1=    B1B1
        000103 .DUSR .1B2=    B1B2
        000104 .DUSR .1B3=    B1B3
        000105 .DUSR .1B4=    B1B4
        000106 .DUSR .1B5=    B1B5
        000107 .DUSR .1B6=    B1B6
        000110 .DUSR .1B7=    B1B7
        000111 .DUSR .1B8=    B1B8
        000112 .DUSR .1B9=    B1B9
        000113 .DUSR .1B10=   B1B10
        000114 .DUSR .1B11=   B1B11
        000115 .DUSR .1B12=   B1B12
        000116 .DUSR .1B13=   B1B13
        000117 .DUSR .1B14=   B1B14
        000120 .DUSR .1B15=   B1B15
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^ 0010  MUM04
                ; STATUS BITS:

        000101 .DUSR SDISC=.1B0      ; DISCONNECTED
        000102 .DUSR SOFFL=.1B1      ; OFF LINE
        000103 .DUSR SBUSY=.1B2      ; BUSY
        000104 .DUSR SDEV1=.1B3      ; DEVICE MODE 1
        000105 .DUSR SDEV2=.1B4      ; DEVICE MODE 2
        000106 .DUSR SDEV3=.1B5      ; DEVICE MODE 3
        000107 .DUSR SILLE=.1B6      ; ILLEGAL
        000110 .DUSR SEOF= .1B7      ; EOF
        000111 .DUSR SBLOC=.1B8      ; BLOCK ERROR
        000112 .DUSR SDATA=.1B9      ; DATA LATE
        000113 .DUSR SPARI=.1B10     ; PARITY ERROR
        000114 .DUSR SEM=  .1B11     ; END MEDIUM
        000117 .DUSR STIME=.1B14     ; TIMER

                ; CONTROL BITS:

        000111 .DUSR CERAS=.1B8      ; ERASURE
        000112 .DUSR CDISC=.1B9      ; DISCONNECT
        000113 .DUSR CPOSI=.1B10     ; POSITIONING
        000114 .DUSR CTERM=.1B11     ; TERMINATION
        000115 .DUSR CCONV=.1B12     ; CONVERSION
        000116 .DUSR CRESE=.1B13     ; RESERVATION

  00121 000003 C3:      3
  00122 000005 C5:      5
  00123 000006 C6:      6
  00124 000007 C7:      7
  00125 000011 C9:      9
  00126 000012 C10:     10
  00127 000014 C12:     12
  00130 000015 C13:     13
  00131 000017 C15:     15
  00132 000030 C24:     24
  00133 000031 C25:     25
  00134 000050 C40:     40
  00135 000060 C48:     48
  00136 000070 C56:     56
  00137 000074 C60:     60
  00140 000077 C63:     63
  00141 000170 C120:    120
  00142 000177 C127:    127
  00143 000377 C255:    255
  00144 177775 CM3:    -3
  00145 177774 CM4:    -4
  00146 177760 CM16:   -16
  00147 177400 CM256:  -256
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^ 0011  MUM04
        000055 .DUSR .0=       PRIORITY+M
        000120 .DUSR .1=      .1B15
        000117 .DUSR .2=      .1B14
        000121 .DUSR .3=       C3
        000116 .DUSR .4=      .1B13
        000122 .DUSR .5=       C5
        000123 .DUSR .6=       C6
        000124 .DUSR .7=       C7
        000115 .DUSR .8=      .1B12
        000125 .DUSR .9=       C9
        000126 .DUSR .10=      C10
        000127 .DUSR .12=      C12
        000130 .DUSR .13=      C13
        000131 .DUSR .15=      C15
        000114 .DUSR .16=     .1B11
        000132 .DUSR .24=      C24
        000133 .DUSR .25=      C25
        000113 .DUSR .32=     .1B10
        000134 .DUSR .40=      C40
        000135 .DUSR .48=      C48
        000136 .DUSR .56=      C56
        000137 .DUSR .60=      C60
        000140 .DUSR .63=      C63
        000112 .DUSR .64=     .1B9
        000141 .DUSR .120=     C120
        000142 .DUSR .127=     C127
        000111 .DUSR .128=    .1B8
        000143 .DUSR .255=     C255
        000110 .DUSR .256=    .1B7
        000107 .DUSR .512=    .1B6
        000106 .DUSR .1024=   .1B5
        000105 .DUSR .2048=   .1B4
        000104 .DUSR .4096=   .1B3
        000103 .DUSR .8192=   .1B2
        000102 .DUSR .16384=  .1B1
        000101 .DUSR .32768=  .1B0
        000144 .DUSR .M3=      CM3
        000145 .DUSR .M4=      CM4
        000146 .DUSR .M16=     CM16
        000147 .DUSR .M256=    CM256

        000116 .DUSR .NAME=.4     ; NAME.PROC
        000124 .DUSR .EVEN=.7     ; EVENT.PROC
        000124 .DUSR .EDOC=.EVEN  ; DOCUMENT.ENTRY
        000123 .DUSR .MESS=.6     ; MESS.BUF
        000124 .DUSR .SSIZ=.7     ; SIZE OF SHARE DESCRIPTOR
        000150 .DUSR .Z=    .     ;
  00150 000032               Z    ; OPTIONAL.ZONE
        000127 .DUSR .RTC= .12    ; RTC DEVICE NUMBER
        000126 .DUSR .NL=  .10    ;
        000126 .DUSR .LF=  .10    ;
        000130 .DUSR .CR=  .13    ;
        000127 .DUSR .FF=  .12    ;
        000112 .DUSR CUR2=.64     ; MONITOR PROCESS*2
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^ 0012  MUM04
                ; REFERENCES:

  U00151 000000 R00:   A00    ; INTERRUPT ACCEPT
  U00152 000000 R6:    A6     ; POWER RESTART POINT
  U00153 000000 R100:  A100   ; REMOVE PROCESS(CUR,STATE)
  U00154 000000 R10:   A10    ; REMOVE PROCESS(STATE)
  U00155 000000 R11:   A11    ; REMOVE(ELEM)
  U00156 000000 R12:   A12    ; LINK PROCESS(PROC)
  U00157 000000 R13:   A13    ; LINK(HEAD,ELEM)
  U00160 000000 R14:   A14    ; RECHAIN(OLD,NEW,ELEM)
  U00161 000000 R15:   A15    ; SEARCH(CHAIN,NAME ADDR,ITEM)
  U00162 000000 R160:  A160   ; SETBUF(CUR,BUF)
  U00163 000000 R17:   A17    ; DELIVER ANSWER(BUF)

                ; REFERENCES TO REENTRANT SYSTEM UTILITY PROCEDURES:

   00164 000000 R34:   0      ; NEXT OPERATION(MODE,COUNT,BUF)
   00165 000000 R35:   0      ; RETURN ANSWER(STATUS)
  U00166 000000 R36:   A36    ; CLEAR(DEVICE)
   00167 000000 R340:  0      ; WAIT OPERATION
  U00170 000000 R361:  A361   ; SETINTERRUPT(DEVICE)
   00171 000000 R37:   0      ; SET RESERVATION(MODE)
   00172 000000 R38:   0      ; SET CONVERSION(MODE)
   00173 000000 R39:   0      ; CONBYTE(BYTE)
   00174 000000 R40:   0      ; GETBYTE(ADDR,BYTE)
   00175 000000 R41:   0      ; PUTBYTE(ADDR,BYTE)
   00176 000000 R42:   0      ; MULTIPLY(OP1,OP2,RESULT)
   00177 000000 R43:   0      ; DIVIDE(DIVIDEND,DIVISOR,QUOTIENT,REMAINDER)

          006164 .DUSR NEXTOPERATION=    JSR@   R34
          006167 .DUSR WAITOPERATION=    JSR@   R340
          006165 .DUSR RETURNANSWER=     JSR@   R35
          006170 .DUSR SETINTERRUPT=     JSR@   R361
          006171 .DUSR SETRESERVATION=   JSR@   R37
          006172 .DUSR SETCONVERSION=    JSR@   R38
          006173 .DUSR CONBYTE=          JSR@   R39
          006174 .DUSR GETBYTE=          JSR@   R40
          006175 .DUSR PUTBYTE=          JSR@   R41
          006176 .DUSR MULTIPLY=         JSR@   R42
          006177 .DUSR DIVIDE=           JSR@   R43

          002164 .DUSR .NEXTOPERATION=   JMP@   R34
          002165 .DUSR .RETURNANSWER=    JMP@   R35
          002166 .DUSR .CLEARDEVICE=     JMP@   R36
          100166 .DUSR CLEAR= @R36
          002170 .DUSR .SETINTERRUPT=    JMP@   R361
          002171 .DUSR .SETRESERVATION=  JMP@   R37
          002172 .DUSR .SETCONVERSION=   JMP@   R38
          002173 .DUSR .CONBYTE=         JMP@   R39
          002174 .DUSR .GETBYTE=         JMP@   R40
          002175 .DUSR .PUTBYTE=         JMP@   R41
          002176 .DUSR .MULTIPLY=        JMP@   R42
          002177 .DUSR .DIVIDE=          JMP@   R43
```

```
^ 0013  MUM04
        006000 .DUSR GOS=    JSR@   0
        002000 .DUSR GOT=    JMP@   0
        102414 .DALC SEQ=    SUB#   0,0 SZR        ; SKIP IF S=D
        102415 .DALC SNE=    SUB#   0,0 SNR        ; SKIP IF S<>D
        102033 .DALC SLS=    ADCZ#  0,0 SNC        ; SKIP IF S<D
        102433 .DALC SNG=    SUBZ#  0,0 SNC        ; SKIP IF S<=D
        102032 .DALC SNL=    ADCZ#  0,0 SZC        ; SKIP IF S>=D
        102432 .DALC SGR=    SUBZ#  0,0 SZC        ; SKIP IF S>D
        102414 .DALC INE=    SEQ    0,0            ; IF S<>D THEN EXECUTE
        102415 .DALC IEQ=    SNE    0,0            ; IF S=D THEN EXECUTE
        102033 .DALC INL=    SLS    0,0            ; IF S>=D THEN EXECUTE
        102433 .DALC IGR=    SNG    0,0            ; IF S>D THEN EXECUTE
        102032 .DALC ILS=    SNL    0,0            ; IF S<D THEN EXECUTE
        102432 .DALC ING=    SGR    0,0            ; IF S<=D THEN EXECUTE
```

```
^ 0014  MUM04
                ; REFERENCES TO REENTRANT INPUT/OUTPUT UTILITY PROCEDURES:

  00200 000000 R50:   0      ; GETREC(ZONE,BYTES,ADDR,SPAN)
  00201 000000 R51:   0      ; PUTREC(ZONE,BYTES,ADDR,SPAN)
  00202 000000 R52:   0      ; WAIT TRANSFER(ZONE)
  00203 000000 R528:  0      ; REPEATSHARE(ZONE)
  00204 000000 R53:   0      ; TRANSFER(ZONE,OP,LENGTH)
  00205 000000 R54:   0      ; INBLOCK(ZONE)
  00206 000000 R55:   0      ; OUTBLOCK(ZONE)
  00207 000000 R56:   0      ; INCHAR(ZONE,CHAR)
  00210 000000 R57:   0      ; FREESHARE(ZONE)
  00211 000000 R580:  0      ; OUTSPACE(ZONE)
  00212 000000 R58:   0      ; OUTCHAR(ZONE,CHAR)
  00213 000000 R590:  0      ; OUTNL(ZONE)
  00214 000000 R59:   0      ; OUTEND(ZONE,CHAR)
  00215 000000 R60:   0      ; OUTTEXT(ZONE,ADDR)
  00216 000000 R61:   0      ; OUTOCTAL(ZONE,VALUE)
  00217 000000 R70:   0      ; SETPOSITION(ZONE,FILE,BLOCK)
  00220 000000 R71:   0      ; CLOSE(ZONE,RELEASE)
  00221 000000 R72:   0      ; OPEN(ZONE,OP)
  00222 000000 R700:  0      ; WAITZONE(ZONE)
  00223 000000 R82:   0      ; INNAME(ZONE,NAMEADDR);
  00224 000000 R83:   0      ; MOVE(PARAMADDR)
  00225 000000 R84:   0      ; INTPRETE
  00226 002227 R85:   JMP@ .+1;  INTGIVEUP
  00227 000000        0      ;
  00230 002231 R86:   JMP@ .+1;  INTBREAK
  00231 000000        0      ;
  00232 000000 R90:   0      ; BINDEC(WORD,ADDR,CUR);
  00233 000000 R91:   0      ; DECBIN(ADDR,WORD,CUR);

        006232 .DUSR BINDEC=          JSR@   R90
        006233 .DUSR DECBIN=          JSR@   R91
        006200 .DUSR GETREC=          JSR@   R50
        006201 .DUSR PUTREC=          JSR@   R51
        006202 .DUSR WAITTRANSFER=    JSR@   R52
        006204 .DUSR TRANSFER=        JSR@   R53
        006205 .DUSR INBLOCK=         JSR@   R54
        006206 .DUSR OUTBLOCK=        JSR@   R55
        006207 .DUSR INCHAR=          JSR@   R56
        006210 .DUSR FREESHARE=       JSR@   R57
        006211 .DUSR OUTSPACE=        JSR@   R580
        006212 .DUSR OUTCHAR=         JSR@   R58
        006213 .DUSR OUTNL=           JSR@   R590
        006214 .DUSR OUTEND=          JSR@   R59
        006215 .DUSR OUTTEXT=         JSR@   R60
        006216 .DUSR OUTOCTAL=        JSR@   R61
        006217 .DUSR SETPOSITION=     JSR@   R70
        006220 .DUSR CLOSE=           JSR@   R71
        006221 .DUSR OPEN=            JSR@   R72
        006223 .DUSR INNAME=          JSR@   R82
        006222 .DUSR WAITZONE=        JSR@   R700
        006224 .DUSR MOVE=            JSR@   R83
        006225 .DUSR INTPRETE=        JSR@   R84
```

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^ 0015  MUM04
        002200 . DUSR . GETREC=          JMP@   R50
        002201 . DUSR . PUTREC=          JMP@   R51
        002202 . DUSR . WAITTRANSFER=    JMP@   R52
        002203 . DUSR . REPEATSHARE=     JMP@   R528
        002204 . DUSR . TRANSFER=        JMP@   R53
        002205 . DUSR . INBLOCK=         JMP@   R54
        002206 . DUSR . OUTBLOCK=        JMP@   R55
        002210 . DUSR . FREESHARE=       JMP@   R57
        002207 . DUSR . INCHAR=          JMP@   R56
        002211 . DUSR . OUTSPACE=        JMP@   R580
        002212 . DUSR . OUTCHAR=         JMP@   R58
        002213 . DUSR . OUTNL=           JMP@   R590
        002214 . DUSR . OUTEND=          JMP@   R59
        002215 . DUSR . OUTTEXT    =     JMP@   R60
        002216 . DUSR . OUTOCTAL=        JMP@   R61
        002217 . DUSR . SETPOSITION=     JMP@   R70
        002220 . DUSR . CLOSE=           JMP@   R71
        002221 . DUSR . OPEN=            JMP@   R72

        000226 . DUSR INTGIVEUP=                R85
        000230 . DUSR INTBREAK=                 R86

        000234 . DUSR MZSTART=.                 ;  INTERPRETER PAGE ZERO START:
        000100 . BLK 64                         ; RESERVED FOR INTERPRETER

                ;  COROUTINE MONITOR ENTRIES
                ;
  00334 000000 CR0:   0       ; DELAY(TIME);
  00335 000000 CR1:   0       ; WAITSEM(SEMAPHORE);
  00336 000000 CR2:   0       ; WAITCHAINED(SEMAPHORE);
  00337 000000 CR3:   0       ; WAITANSWER(BUF);
  00340 000000 CR4:   0       ; TESTOUT REGISTERS;
  00341 000000 CR5:   0       ; TESTOUT(RECORD);
  00342 000000 CR6:   0       ; TESTGENERAL;
  00343 000000 CR7:   0       ; SIGNAL(SEMAPHORE);
  00344 000000 CR8:   0       ; SIGNAL CHAINED(SEMAPHORE);
  00345 000000 CR9:   0       ; PASS;

        000017 . DUSR COROU=LINK                ; CURRENT COROUTINE
        006334 . DUSR CDELAY=JSR@    CR0        ;
        006335 . DUSR WAITSE=JSR@    CR1        ;
        006336 . DUSR WAITCH=JSR@    CR2        ;
        006337 . DUSR CWANSW=JSR@    CR3        ;
        006340 . DUSR CTEST =JSR@    CR4        ;
        006341 . DUSR CPRINT=JSR@    CR5        ;
        006342 . DUSR CTOUT =JSR@    CR6        ;
        006343 . DUSR SIGNAL=JSR@    CR7        ;
        006344 . DUSR SIGCH =JSR@    CR8        ;
        006345 . DUSR CPASS =JSR@    CR9        ;
```

```
^ 0016  MUM04
                ; FILE SYSTEM ENTRIES
  00346 000000 FS0:   0      ; CREATEENTRY(ZONE,TYPE,SIZE);
  00347 000000 FS1:   0      ; LOOKUPENTRY(ZONE,ADDRESS);
  00350 000000 FS2:   0      ; CHANGEENTRY(ZONE,ADDRESS);
  00351 000000 FS3:   0      ; REMOVE ENTRY(ZONE);
  00352 000000 FS4:   0      ; INIT CATALOG(ZONE,INITKIND,DRIVENO);
  00353 000000 FS5:   0      ; SETENTRY(ZONE,ADDRESS);

        006346 .DUSR CREATEENTRY=JSR@ FS0  ;
        006347 .DUSR LOOKUPENTRY=JSR@ FS1  ;
        006350 .DUSR CHANGEENTRY=JSR@ FS2  ;
        006351 .DUSR REMOVEENTRY=JSR@ FS3  ;
        006352 .DUSR INITCATALOG=JSR@ FS4  ;
        006353 .DUSR SETENTRY=  JSR@ FS5  ;

                ; PAGE SYSTEM ENTRIES
  00354 000000 PS0:   0     ; COROUTINE MONITOR CALL(COROUTINECALL)
  00355 000000 PS1:   0     ; CALL(POINT)
  00356 000000 PS2:   0     ; GOTO(POINT)
  00357 000000 PS3:   0     ; GETADR(POINT)
  00360 000000 PS4:   0     ; GETPOINT(ADR)

        006354 .DUSR COMON    = JSR@ PS0
        006355 .DUSR CALL     = JSR@ PS1
        006356 .DUSR GOTO     = JSR@ PS2
        006357 .DUSR GETADR   = JSR@ PS3
        006360 .DUSR GETPOINT= JSR@ PS4
        000014 .DUSR PWSIZE   = 12    ; NO OF WORKING LOCATIONS PR PROGRAM
        000006 .DUSR PCWSIZE =  6    ; NO OF WORKING LOCATIONS PR COROUTINE

                ; HEAD OF CORE CHAIN
        000361 .DUSR CORE     =  .
  00361 000000         0
        000362 .DUSR COMLIST =   .      ; ADDR OF PROC XCOMX ENTRYLIST
  00362 000000         0
        000363 .DUSR COMNO    =  .      ; NO OF ENTRYS IN COMLIST
  00363 000000         0


                ; EXTENDED COROUTINE MONITOR ENTRIES
                ;

  00364 000000 CR10: 0       ; CSENDMESSAGE
  00365 000000 CR11: 0       ; SIGNAL GENEREL
  00366 000000 CR12: 0       ; WAITGENEREL
  00367 000000 CR13: 0       ; COROUTINE TESTOUTPUT FUNCTION
                ;
                ;
        006364 .DUSR CSENDM=JSR@    CR10   ;
        006365 .DUSR SIGGEN=JSR@    CR11   ;
        006366 .DUSR WAITGE=JSR@    CR12   ;
        006367 .DUSR CTOP  =JSR@    CR13   ;
```

```
        000376 .LOC 254                         ;
  00376 063530        SKPBZ       24            ; WHILE(BUSY MT0) DO;
  00377 000376        JMP         .-1           ; GOTO SYSTEM START;
  00400 002002        JMP@        2             ;
  00401 000000        0                         ;

                ; DEVICE TABLE:
                ; THIS TABLE IS USED TO SELECT THE PROPER PROCESS DESCRIPTOR
                ; WHEN A DEVICE ISSUES AN INTERRUPT.  THE TABLE IS CLEARED BY
                ; THE MONITOR INITIALIZATION.

                .NREL
        000370 .DUSR DEVTA=256-8                ; DEVICE TABLE:
        000464 .DUSR TOPDE=DEVTA+63-3           ; TOP OF DEVICE TABLE:
        000067 .BLK  63-8                       ;

                ;    ******   END OF MONITOR TABLE   ******
```

^ 0018 MUM04

. END

```
  0019  MUM04
A0      000000U
A00     000000U
A1      000000U
A10     000000U
A100    000000U
A11     000000U
A12     000000U
A13     000000U
A14     000000U
A15     000000U
A160    000000U
A17     000000U
A2      000000U
A20     000000U
A22     000000U
A23     000000U
A24     000000U
A25     000000U
A26     000000U
A27     000000U
A28     000000U
A29     000000U
A30     000000U
A301    000000U
A31     000000U
A32     000000U
A33     000000U
A36     000000U
A360    000000U
A361    000000U
A6      000000U
B1B0    000101
B1B1    000102
B1B10   000113
B1B11   000114
B1B12   000115
B1B13   000116
B1B14   000117
B1B15   000120
B1B2    000103
B1B3    000104
B1B4    000105
B1B5    000106
B1B6    000107
B1B7    000110
B1B8    000111
B1B9    000112
C10     000126
C12     000127
C120    000141
C127    000142
C13     000130
C15     000131
C24     000132
C25     000133
C255    000143
C3      000121
C40     000134
C48     000135
```

```
  0020  MUM04
C5      000122
C56     000136
C6      000123
C60     000137
C63     000140
C7      000124
C9      000125
CM16    000146
CM256   000147
CM3     000144
CM4     000145
CR0     000334
CR1     000335
CR10    000364
CR11    000365
CR12    000366
CR13    000367
CR2     000336
CR3     000337
CR4     000340
CR5     000341
[illegible]  000342
CR7     000343
CR8     000344
CR9     000345
DFIRS   000047
F10     000012
F11     000013
F12     000014
F13     000015
F2      000002
F3      000003
F4      000004
F5      000005
F6      000006
F7      000007
F8      000010
F9      000011
FS0     000346
FS1     000347
FS2     000350
FS3     000351
FS4     000352
FS5     000353
FUNCT   000020
INTER   000000
LINK    000017
PS0     000354
PS1     000355
PS2     000356
PS3     000357
PS4     000360
R00     000151
R10     000154
R100    000153
R11     000155
R12     000156
R13     000157
R14     000160
```

```
  0021  MUM04
R15     000161
R160    000162
R17     000163
R301    000051
R34     000164
R340    000167
R35     000165
R36     000166
R361    000170
R37     000171
R38     000172
R39     000173
R40     000174
R41     000175
R42     000176
R43     000177
R50     000200
R51     000201
R52     000202
R528    000203
R53     000204
R54     000205
R55     000206
R56     000207
R57     000210
R58     000212
R580    000211
R59     000214
R590    000213
R6      000152
R60     000215
R61     000216
R70     000217
R700    000222
R71     000220
R72     000221
R82     000223
R83     000224
R84     000225
R85     000226
R86     000230
R90     000232
R91     000233
WORK    000016
WORK1   000043
WORK2   000044
```