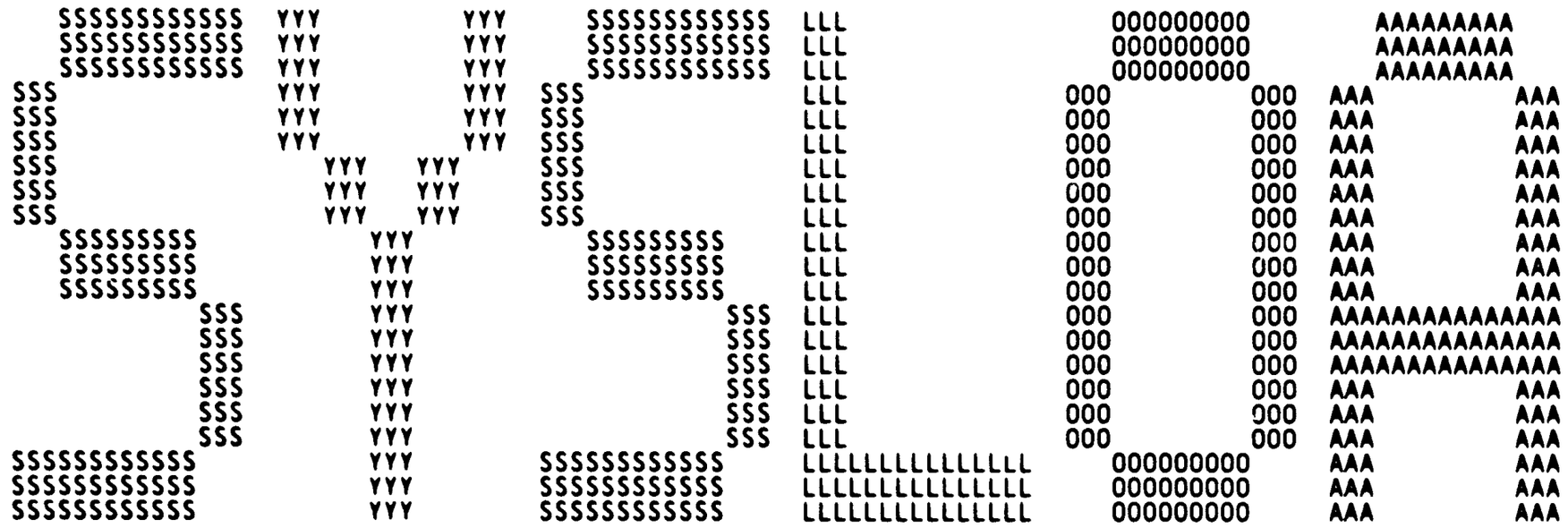
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SSSSSSSSSSS YYY YYY SSSSSSSSSSS LLL 000000000 AAAAAAAAA
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SSS YYY YYY SSS LLL 000 000 AAA AAA
SSS YYY YYY SSS LLL 000 000 AAA AAA
SSS YYY YYY SSS LLL 000 000 AAA AAA
SSS YYY YYY SSS LLL 000 000 AAA AAA
SSS YYY YYY SSS LLL 000 000 AAA AAA
SSS YYY YYY SSS LLL 000 000 AAA AAA
SSSSSSSSS YYY SSSSSSSSS LLL 000 000 AAA AAA
SSSSSSSSS YYY SSSSSSSSS LLL 000 000 AAA AAA
SSSSSSSSS YYY SSSSSSSSS LLL 000 000 AAA AAA
SSS YYY SSS LLL 000 000 AAAAAAAAAAAAAAA
SSS YYY SSS LLL 000 000 AAAAAAAAAAAAAAA
SSS YYY SSS LLL 000 000 AAAAAAAAAAAAAAA
SSS YYY SSS LLL 000 000 AAA AAA
SSS YYY SSS LLL 000 000 AAA AAA
SSS YYY SSS LLL 000 000 AAA AAA
SSSSSSSSSSS YYY SSSSSSSSSSS LLLLLLLLLLLLLLL 000000000 AAA AAA
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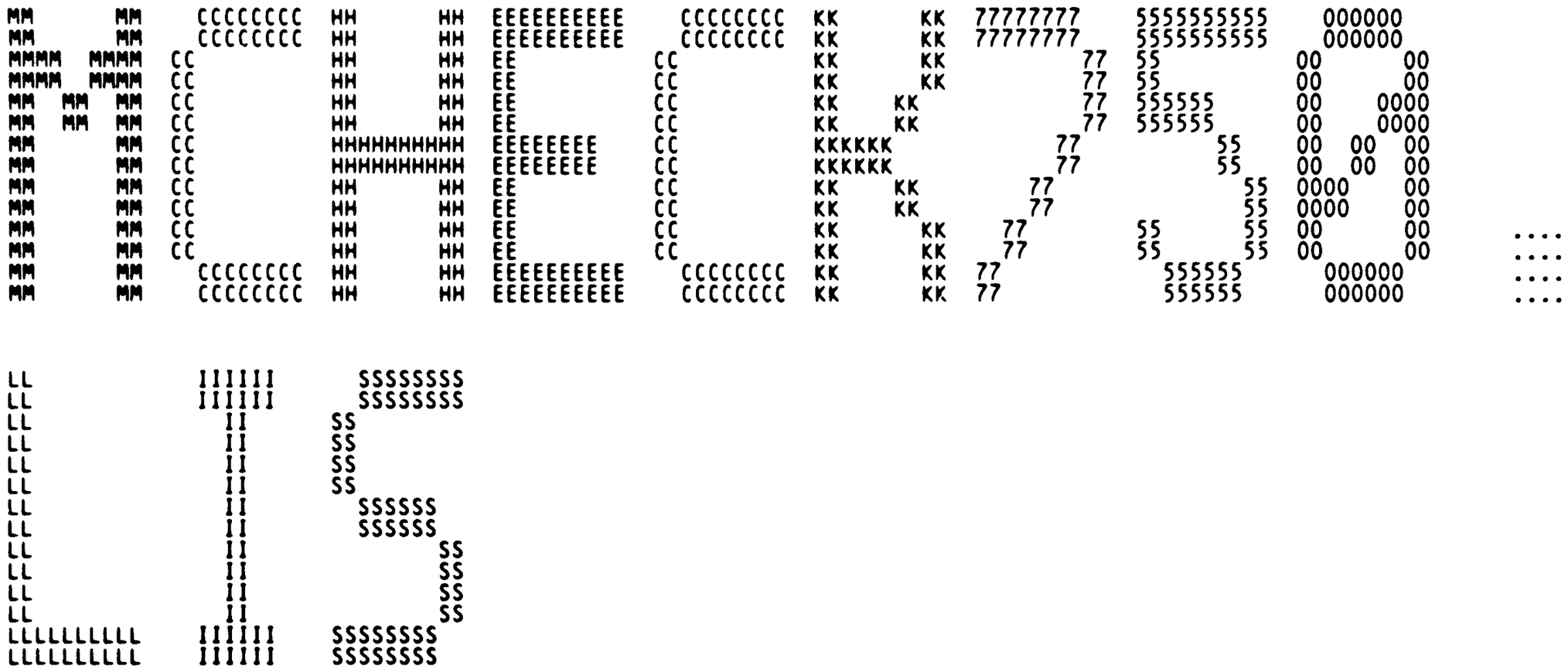
SSSSSSSSSSS YYY SSSSSSSSSSS LLLLLLLLLLLLLLL 000000000 AAA AAA


MM MM CCCCCCCC HH HH EEEEEEEEEE CCCCCCCC KK KK 77777777 5555555555 000000
MM MM CCCCCCCC HH HH EEEEEEEEEE CCCCCCCC KK KK 77777777 5555555555 000000
MMMM MMMM CC HH HH EE CC KK KK 77 55 00 00
MMMM MMMM CC HH HH EE CC KK KK 77 55 00 00
MM MM MM CC HH HH EE CC KK KK 77 555555 00 0000
MM MM MM CC HH HH EE CC KK KK 77 555555 00 0000
MM MM CC HHHHHHHHHH EEEEEEEE CC KKKKKK 77 55 00 00 00
MM MM CC HHHHHHHHHH EEEEEEEE CC KKKKKK 77 55 00 00 00
MM MM CC HH HH EE CC KK KK 77 55 0000 00
MM MM CC HH HH EE CC KK KK 77 55 0000 00
MM MM CC HH HH EE CC KK KK 77 55 55 00 00 ....
MM MM CC HH HH EE CC KK KK 77 55 55 00 00 ....
MM MM CCCCCCCC HH HH EEEEEEEEEE CCCCCCCC KK KK 77 555555 000000 ....
MM MM CCCCCCCC HH HH EEEEEEEEEE CCCCCCCC KK KK 77 555555 000000 ....
LL IIIIII SSSSSSSS
LL IIIIII SSSSSSSS
LL II SS
LL II SS
LL II SS
LL II SSSSSS
LL II SSSSSS
LL II SS
LL II SS
LL II SS
LL II SS
LLLLLLLLLL IIIIII SSSSSSSS
LLLLLLLLLL IIIIII SSSSSSSS

```
0000     1          .TITLE  MCHECK750 - VAX 11/750 MACHINE CHECK HANDLER
0000     2          .IDENT  'V04-000'
0000     3 ;
0000     4 ;*****************************************************************************
0000     5 ;*                                                                           *
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0000    22 ;*  SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.                  *
0000    23 ;*                                                                           *
0000    24 ;*                                                                           *
0000    25 ;*****************************************************************************
0000    26 ;
0000    27 ;++
0000    28 ;
0000    29 ; FACILITY:
0000    30 ;
0000    31 ;       EXECUTIVE, ERROR HANDLING
0000    32 ;
0000    33 ; ABSTRACT:
0000    34 ;
0000    35 ;       MACHINE CHECK INTERRUPT AND ABORT HANDLER, MEMORY ECC ERROR LOGGER.
0000    36 ;       LOGS ERRORS AND ATTEMPTS TO CONTINUE IF POSSIBLE.
0000    37 ;
0000    38 ; ENVIRONMENT:
0000    39 ;
0000    40 ;       INTERRUPT STACK AT IPL 31 UNTIL ERROR IS IDENTIFIED.  IPL SYNCH TO
0000    41 ;       LOG ERRORS.
0000    42 ;
0000    43 ; SIDE EFFECTS:
0000    44 ;
0000    45 ;       IF ERROR IS UNRECOVERABLE OR ERROR IS RESULT OF INSTRUCTION EXECUTION
0000    46 ;       IN EXECUTIVE OR KERNAL MODE, THEN A FATAL BUG-CHECK IS TAKEN.
0000    47 ;
0000    48 ; AUTHOR:
0000    49 ;
0000    50 ;       C. SAMUELSON, APRIL, 1979
0000    51 ;
0000    52 ; MODIFIED BY:
0000    53 ;
0000    54 ;       V03-008 WMC0001         Wayne Cardoza           14-Jun-1984
0000    55 ;               Preserve cache state from boot.
0000    56 ;
0000    57 ;       V03-007 RLRSBICONF      Robert L. Rappaport     22-Mar-1984
```

```
0000     58 ;               Test MMG$GL_SBICONF array elements for valid system
0000     59 ;               virtual address (high bit set) before using.
0000     60 ;
0000     61 ;       V03-006 KPL0100         Peter Lieberwirth       10-Feb-1984
0000     62 ;               Change to use CONFREGL.
0000     63 ;
0000     64 ;       V03-005 KDM0053         Kathleen D. Morse       11-Jul-1983
0000     65 ;               Replace cpu-dependent IPR references with new
0000     66 ;               $PR750DEF symbols.
0000     67 ;
0000     68 ;       V03-004 MSH0002         Maryann Hinden          23-Nov-1982
0000     69 ;               Add entry MCHK$GL_LOG to LOGGER.  Delete EXE$UBAERR_INT.
0000     70 ;
0000     71 ;       V03-003 KTA3018         Kerbey T. Altmann       01-Nov-1982
0000     72 ;               Change name of data psect.
0000     73 ;
0000     74 ;       V03-002 MSH0001         Maryann Hinden          24-Sep-1982
0000     75 ;               Change EXE$DW780_INT entry to EXE$UBAERR_INT.
0000     76 ;
0000     77 ;       V03-001 TCM0001         Trudy C. Matthews       5-Apr-1982
0000     78 ;               Altered table of resumable instructions to make all the
0000     79 ;               interlocked queue and the "reserved to DIGITAL" instructions
0000     80 ;               non-resumable.
0000     81 ;
0000     82 ;--
```

```
                        .SBTTL  LOCAL SYMBOL DEFFINITIONS AND LOCAL DATA STORAGE
                ;++
                ; MACHINE CHECK INTERRUPT STACK OFFSETS
                ;--
                        $DEFINI MCK
$DEF    MCK_LENGTH      .BLKL   1       ;LENGTH OF MACHINE CHECK STACK FRAME
$DEF    MCK_CODE        .BLKL   1       ;MACHINE CHECK ERROR CODE
$DEF    MCK_VA          .BLKL   1       ;VIRTUAL ADDRESS OF LAST FETCH/STORE
$DEF    MCK_ERROR_PC    .BLKL   1       ;PROGRAM COUNTER AT TIME OF ABORT
$DEF    MCK_MDR         .BLKL   1       ;MEMEORY DATA OF LAST FETCH/STORE
$DEF    MCK_SMR         .BLKL   1       ;SAVED MODE REGISTER
                        $VIELD  SMR,0,<-                ;BITS DEFINED IN SAVED MODE REGISTER
                                <MODE,2,M>-             ;ACCESS MODE AT TIME OF ABORT
                                <PV,,M>,-               ;PHYSICAL/VIRTUAL FLAG
                        >
$DEF    MCK_RLT         .BLKL   1       ;READ LOCK TIMEOUT - WRITE VECTOR OCCURED
                        $VIELD  RLT,0,<-                ;BITS DEFINED IN READ LOCK TIMEOUT REGISTER
                                <VMDR,,M>,-             ;VECTOR IN MDR IF 1
                        >
$DEF    MCK_TBP         .BLKL   1       ;TRANSLATION BUFFER PARITY ERROR
                        $VIELD  TBP,0,<-                ;BITS IN TB PARITY REGISTER
                                <GRP0D,,M>-             ;GROUP 0 DATA ERROR
                                <GRP1D,,M>-             ;GROUP 1 DATA ERROR
                                <GRP0T,,M>-             ;GROUP 0 TAG ERROR
                                <GRP1T,,M>-             ;GROUP 1 TAG ERROR
                        >
$DEF    MCK_CER         .BLKL   1       ;CACHE ERROR REGISTER
                        $VIELD  CER,0,<-                ;BITS IN CACHE ERROR REGISTER
                                <HIT,,M>-               ;HIT IF 1
                                <LOST,,M>-              ;LOST ERROR
                                <DATA,,M>-              ;DATA ERROR
                                <TAG,,M>-               ;TAG ERROR
                        >
$DEF    MCK_BER         .BLKL   1       ;BUS ERROR REGISTER
                        $VIELD  BER,0,<-                ;BITS IN BUS ERROR REGISTER
                                <CD,,M>-                ;CORRECTED DATA
                                <LOST,,M>-              ;LOST ERROR
                                <UCD,,M>-               ;UNCORRECTED DATA
                                <NEX,,M>-               ;NON EXISTANT MEMORY
                        >
$DEF    MCK_ESR         .BLKL   1       ;ERROR SUMMARY REGISTER
                        $VIELD  ESR,0,<-                ;BITS IN SUMMARY REG
                                <XB,,M>-                ;INSTRUCTION BUFFER IF 1
                                <,,M>-
                                <TB,,M>-                ;TRANSLATION BUFFER ERROR
                                <CMI,,M>-               ;CMI BUS ERROR
                        >
$DEF    MCK_PC          .BLKL   1       ;PC OF ABORTED OP-CODE
$DEF    MCK_PSL         .BLKL   1       ;PSL AT TIME OF ABORT
                        $DEFEND MCK

                ;
                ; BITS DEFINED IN OTHER MEMORY CONTROL AND STATUS REGISTERS
                ;
                        $VIELD  TBDR,0,<-               ;TB DISABLE REGISTER
                                <DG0,,M>-               ;DISABLE GROUP 0
                                <DG1,,M>-               ;DISABLE GROUP 1
```

```
0000   142                     <GRDP,,M>-              ;REPLACE GROUP (0=GROUP 0,1=GROUP 1)
0000   143                     <REPL,,M>-              ;REPLACE
0000   144             >
0000   145             $VIELD  CADR,0,<-               ;CACHE DISABLE REGISTER
0000   146                     <DIS,,M>-               ;DISABLE CACHE
0000   147             >
0000   148 ;
0000   149 ; 11/750 MEMORY CONTROLLER REGISTER DEFFINITIONS
0000   150 ;
0000   151             $DEFINI MEM
0000   152 $DEF        MEM$L_CSR0      .BLKL   1       ;MEMORY CSR ZERO
0004   153             $VIELD  CSR0,0,<-               ;BITS IN CSR0
0004   154                     <SYN,7,M>-              ;ERROR SYNDROME
0004   155                     <,2,M>-
0004   156                     <PAGE,15,M>-            ;PAGE WHERE ERROR OCCURED
0004   157                     <,5,>-
0004   158                     <COREF,,M>-             ;CORRECTABLE ERROR FLAG
0004   159                     <EILOS,,M>-             ;ERROR INFORMATION LOST FLAG
0004   160                     <UNCER,,M>-             ;UNCORRECTABLE ERROR FLAG
0004   161             >
0004   162 $DEF        MEM$L_CSR1      .BLKL   1       ;MEMORY CSR 1
0008   163             $VIELD  CSR1,0,<-               ;BITS IN MEMORY CSR 1
0008   164                     <CHCK,7,M>-             ;DIAGNOSTIC CHECK BITS
0008   165                     <,2,>-
0008   166                     <PMA,15,M>-             ;PAGE MODE ADDRESS
0008   167                     <,1,>-
0008   168                     <ECCD,,M>-              ;ECC DISABLE MODE
0008   169                     <DIAG,,M>-              ;DIAGNOSTIC CHECK MODE
0008   170                     <PMOD,,M>-              ;DIAGNOSTIC PAGE MODE
0008   171                     <IERP,,M>-              ;INHIBIT CORRECTABLE ECC ERROR REPORTS
0008   172                     <,3,>-
0008   173             >
0008   174 $DEF        MEM$L_CSR2      .BLKL   1       ;MEMORY PRESENT MAP
000C   175             $DEFEND MEM
0000   176 ;
0000   177 ; INCLUDED SYSTEM SYMBOL DEFFINITIONS
0000   178 ;
0000   179             $EMBDEF <MC>                    ;DEFINE EMB OFFSETS AND VALUES
0000   180             $IPLDEF                         ;DEFINE PROCESSOR INTERRUPT LEVELS
0000   181             $MCHKDEF                        ;DEFINE RECOVERY BLOCK MASK BITS
0000   182             $MPMDEF                         ;MULTIPORT MEMORY
0000   183             $PCBDEF                         ;DEFINE PROCESS CONTROL BLOCK
0000   184             $PFNDEF                         ;DEFINE PFN DATABASE
0000   185             $PRDEF                          ;DEFINE PROCESSOR REGISTERS
0000   186             $PR750DEF                       ;DEFINE 750-SPECIFIC PROCESSOR REGISTERS
0000   187             $PSLDEF                         ;DEFINE PSL
0000   188             $PTEDEF                         ;DEFINE PTE SYMBOLS
0000   189             $RPBDEF                         ;DEFINE RPB
0000   190
0000   191
0000   192 ;
0000   193 ; LOCAL DATA STORAGE
0000   194 ;
00000000   195             .PSECT  MCHK$DATA,QUAD,WRT
0000   196
0000000A  0000   197 TB_THRESHOLD = 10                  ;ALLOWABLE TIME BETWEEN TB ERRORS
0000000A  0000   198 CH_THRESHOLD = 10                  ;ALLOWABLE TIME BETWEEN CACHE ERRORS
```

```
00000003  0000   199 CRDINTMAX = 3                          ;NO. OF CORRECTED MEMORY ERRORS TO LOG
00000006  0000   200 CRDWATCHMAX = 6                       ;NO. OF ERRORS TO LOG IN REENABLE TIME
0000003C  0000   201 SOMETIME = 60                         ;SCAN FOR NON INTERRUPT ERRORS EVER 60 SECON
00000384  0000   202 REENABTIME = 60*15                    ;RENENABLE INTERRUPT ERROR LOGGING TIME
          0000   203
          0000   204 ; THE FOLLOWING SYMBOL IS DEFINED FOR A TRANSFER VECTOR IN SYSLOAVEC.
          0000   205 ; IT IS  N O T  J U M P E D  T O O !!!   IT IS USED TO DEFINE A GLOBAL
          0000   206 ; SYMBOL IN THE SYSTEM MAP (SYS.MAP) TO LOCATE THESE COUNTERS.
          0000   207
          0000   208 EXE$MCHK_ERRCNT::
00000000  0000   209 EXE$GL_TB1AOLD::        .LONG   0       ;TIME OF LAST TB ERROR, GROUP 0
00000000  0004   210 EXE$GL_TB2AOLD::        .LONG   0       ;TIME OF NEXT TO LAST TB ERROR, GROUP 0
00000000  0008   211 EXE$GL_TB1BOLD::        .LONG   0       ;TIME OF LAST TB ERROR, GROUP 1
00000000  000C   212 EXE$GL_TB2BOLD::        .LONG   0       ;TIME OF NEXT TO LAST TB ERROR, GROUP 1
00000020  0010   213 ECC$AB_MEMERR:: .BLKB   16              ;MEMORY ERROR COUNTERS FOR 16 SLOTS
          0020   214
00000000  0020   215 EXE$GL_CH1OLD:: .LONG   0               ;TIME OF LAST CACHE ERROR
00000000  0024   216 EXE$GL_CH2OLD:: .LONG   0               ;TIME OF NEXT TO LAST CACHE ERROR
00000000  0028   217 EXE$GL_CHSTATE::.LONG   0               ;CURRENT STATE OF CACHE
          002C   218                                       ; 1 = DISABLED, 0 = ENABLED
     0000 002C   219 ECC$GW_WATCH::  .WORD   0              ;SCAN MEMEORY CONTROLLER TIMER
     0000 002E   220 ECC$GW_REENAB:: .WORD   0              ;REENABLE TIMER
00000000  0030   221 MMG$GL_CRDCNT:: .LONG   0              ;COUNT OF CORRECTED MEMORY ERRORS
          0034   222 EXE$GL_BADTIMOUT::
00000000  0034   223                 .LONG   0              ;TIME SINCE LAST BAD MCHK CODE
          0038   224 EXE$GL_VECTIMOUT::
00000000  0038   225                 .LONG   0              ;TIME SINCE LAST UNDEFINED VECTOR INT
```

```
                                                    K 7
                     003C   227          .SBTTL  MACHINE CHECK ENTRY POINTS
                 00000000   228          .PSECT  WIONONPAGED,QUAD,RD,WRT
                     0000   229 ;++
                     0000   230 ; ALL MACHINE CHECK ABORTS ARE VECTORED HERE.  11/750
                     0000   231 ; MACHINE CHECK FOR ALL CONDITIONS RESULTS IN THE SAME STACK FRAME.  THUS
                     0000   232 ; WE CAN DISPATCH FROM HERE ACCORDING TO THE ERROR CODE.
                     0000   233 ; ENTRY IPL=31=^X1F FOR ABORTS
                     0000   234 ;--
                     0000   235
                     0000   236          .ALIGN  LONG
                     0000   237
                     0000   238 EXE$MCHK::                               ;MACHINE CHECK EXCEPTION
                     0000   239
                     0000   240          INVALID                         ;INVALIDATE TRANSLATION BUFFER
0028'CF    25    DB  0003   241          MFPR    #PR750$_CADR,W^EXE$GL_CHSTATE ;SAVE CACHE STATE
      25    01    DA  0008   242          MTPR    #CADR$M_DIS,#PR750$_CADR ;DISABLE CACHE
            01    DD  000B   243          PUSHL   #MCHK$M_LOG             ;MASK FOR PRTCTEST
              30  AE  DF  000D   244          PUSHAL  MCK_PC+4(SP)            ;PC,PSL POINTER FOR PRTCTEST
      103F  8F    BB  0010   245          PUSHR   #^M<R0,R1,R2,R3,R4,R5,AP> ;GET SOME WORKING REGISTERS
5C    5E    24    C1  0014   246          ADDL3   #<9*4>,SP,AP            ;POINT AP TO MACHINE CHECK LOG FRAME
                     0018   247                                          ;EXTRACT ERROR CODE FIELD FROM STACK
                     0018   248          CASE    MCK_CODE(AP),<-         ;DISPATCH ON ERROR TYPE CODE
                     0018   249                  BAD_TYPE,-              ;NO CODE 0
                     0018   250                  CS_PARITY,-             ;CONTROL STORE PARITY ERROR
                     0018   251                  TB_BUS,-                ;TB ERROR, BUS ERROR (UNCORRECTED READ)
                     0018   252                  BAD_TYPE,-              ;NO CODE 3 (USED TO BE CACHE PARITY)
                     0018   253                  BAD_TYPE,-              ;NO CODE 4 (USED TO BE CRD)
                     0018   254                  BAD_TYPE,-              ;NO CODE 5 (USED TO BE AWE)
                     0018   255                  FUBAR,-                 ;NOT SUPPOSED TO BE HERE - CS LOCATION
                     0018   256                  IRD_SLOT>, TYPE=B       ;UNUSED IRD ROM SLOT
                     002D   257 BAD_TYPE:                                ;UNDEFINED EXCEPTION ERROR CODE
25    0028'CF    DA  002D   258          MTPR    W^EXE$GL_CHSTATE,#PR750$_CADR ;RE-ENABLE THE CACHE
  FC  AC    02    C8  0032   259          BISL    #MCHK$M_MCK,-4(AP)      ;MASK FOR PRTCTEST
      53    02    3C  0036   260          MOVZWL  #EMB$K_MC,R3            ;LOG TYPE FOR ERROR REPORTING
      0034'CF     DD  0039   261          PUSHL   W^EXE$GL_BADTIMOUT      ;TIME OF LAST BAD CODE MCHK
0034'CF     1B    DB  003D   262          MFPR    #PR750$_TODR,W^EXE$GL_BADTIMOUT ;SET TIME OF THIS ONE
0034'CF     8E    D1  0042   263          CMPL    (SP)+,W^EXE$GL_BADTIMOUT ;COMMING TOO FAST?
            03    13  0047   264          BEQL    100$                    ;YES, SOMETHING IS WRONG
          0247    31  0049   265          BRW     TRYRESUME               ;LOG IT, CONTINUE AND HOPE FOR THE BEST
                     004C   266 100$:
      103F  8F    BA  004C   267          POPR    #^M<R0,R1,R2,R3,R4,R5,AP>       ;RESTORE REGISTERS
00000000'GF       16  0050   268          JSB     G^EXE$MCHK_BUGCHK       ;RECOVERY BLOCK IN EFFECT?
                     0056   269                                          ;RECOVERY FROM THIS TYPE OF MACHINE
                     0056   270                                          ;CHECK IS VERY DUBIOUS - SOMETHING
                     0056   271                                          ;MUST BE BROAKEN TO KEEP GETTING THIS
                     0056   272
                     0056   273          BUG_CHECK       BADMCKCOD,FATAL ;BAD MACHINE CHECK CODE
                     005A   274
                     005A   275 ;
                     005A   276 ; THE FOLLOWING VECTORS ARE VESTIGAL FROM THE 11/780 SBI
                     005A   277 ; THEY ARE NOT DEFINED IN COMET.
                     005A   278 ; IF WE VECTOR HERE, EITHER THE HARDWARE GLITCHED OR SOMETHING
                     005A   279 ; IS VERY BROAKEN.  THUS, IGNORE INTERRUPTS IF THEY DON'T COME
                     005A   280 ; VERY FAST.  ELSE, CRASH - AND CALL YOUR LOCAL REPAIR MAN.
                     005A   281 ;
                     005A   282
                     005A   283          .ALIGN  LONG                    ;VECTORED TO
```

```
                        005C   284
                        005C   285 EXE$LOGSBF::                            ;SBI FAULT
                        005C   286 EXE$LOGSBA::                            ;SBI ALERT
                        005C   287 EXE$INT58::
                        005C   288 EXE$INT5C::
                        005C   289 EXE$RH780_INT::                         ;DEFINED FOR SYSLOAVEC, NOT USED IN 750
                        005C   290
            02   DD     005C   291          PUSHL   #MCHK$M_MCK             ;MASK FOR PRTCTEST
          04 AE  DF     005E   292          PUSHAL  4(SP)                   ;PC,PSL POINTER FOR PRTCTEST
            3F   BB     0061   293          PUSHR   #^M<R0,R1,R2,R3,R4,R5>  ;SAVE SOME REGISTERS
      0038'CF    DD     0063   294          PUSHL   W^EXE$GL_VECTIMOUT      ;TIME SINCE LAST ERROR
0038'CF   1B     DB     0067   295          MFPR    #PR750$_TODR,W^EXE$GL_VECTIMOUT ;SAVE TIME OF THIS ERROR
0038'CF   8E     D1     006C   296          CMPL    (SP)+,W^EXE$GL_VECTIMOUT ;ERRORS COMMING TOO FAST?
            0C   12     0071   297          BNEQ    200$                    ;NO, TRY AND CONTINUE
                        0073   298
            3F   BA     0073   299          POPR    #^M<R0,R1,R2,R3,R4,R5>  ;RESTORE REGISTERS
00000000'GF      16     0075   300          JSB     G^EXE$MCHK_BUGCHK       ;RECOVERY BLOCK IN EFFECT?
                        007B   301          BUG_CHECK BADMCKCOD,FATAL       ;NO, CRASH
                        007F   302
                        007F   303 200$:
 51   18 AE     7D     007F   304          MOVQ    <6*4>(SP),R1            ;SET UP TO LOG THE ERROR
    53   0A     3C     0083   305          MOVZWL  #EMB$K_SI,R3            ;UNEXPECTED INTERRUPT
    54   08     D0     0086   306          MOVL    #<2*4>,R4               ;LOG PC,PSL
 55   20 AE     DE     0089   307          MOVAL   <8*4>(SP),R5            ;POINT TO LOG ENTRY
      03A1      30     008D   308          BSBW    LOGGER                  ;LOG THE ERROR
00000000'GF      16     0090   309          JSB     G^EXE$MCHK_TEST         ;RECOVERY BLOCK IN EFFECT?
      06 50      E8     0096   310          BLBS    R0,201$                 ;YES, DO NOT LOG THIS ERROR
00000000'GF      D6     0099   311          INCL    G^EXE$GL_MCHKERRS       ; BUMP THE GLOBAL MACHINE CHECK COUNTER
            3F   BA     009F   312 201$:    POPR    #^M<R0,R1,R2,R3,R4,R5>  ;RESTORE REGISTERS
    5E   08     C0     00A1   313          ADDL    #<2*4>,SP               ;REMOVER PRTCTEST STUFF
                02     00A4   314          REI                             ;LETS HOPE THINGS ARE OK
```

```
                                00A5   317          .SBTTL  CONTROL STORE PARITY ERRORS
                                00A5   318 ;
                                00A5   319 ; CONTROL STORE PARITY ERROR ABORT
                                00A5   320 ; NOT SUPPOSED TO BE HERE - UNUSED C/S LOCATION
                                00A5   321 ; UNUSED IRD ROM SLOT ABORT
                                00A5   322 ;
                                00A5   323 ; LOG THE ERROR
                                00A5   324 ; IF ERROR WAS IN KERNAL OR EXECUTIVE MODE, DECLARE A FATAL BUG-CHECK
                                00A5   325 ; IF ERROR WAS IN USER OR SUPERVISOR MODE, PASS EXCEPTION TO PROCESS
                                00A5   326 ;
                                00A5   327
                                00A5   328 CS_PARITY:                                   ;CONTROL STORE PARITY ERROR ABORT
                                00A5   329 FUBAR:                                       ;NOT SUPPOSED TO BE HERE ABORT
                                00A5   330 IRD_SLOT:                                    ;UNUSED IRD ROM SLOB ABORT
                                00A5   331
  25   0028'CF    DA            00A5   332          MTPR    W^EXE$GL_CHSTATE,#PR750$_CADR ;CACHE OK, ENABLE IT
    FC AC    02   C8            00AA   333          BISL    #MCHK$M_MCK,-4(AP)          ;MASK FOR PRTCTEST
2A AC    2C BC    9B            00AE   334          MOVZBW  @MCK_PC(AP),MCK_ESR+2(AP)   ;SAVE OP-CODE THAT FAULTED
       53    02   3C            00B3   335          MOVZWL  #EMB$K_MC,R3                ;SET ERROR TYPE IN R3
          035D   30            00B6   336          BSBW    LOGIT                       ;LOG ERROR
          01D7   31            00B9   337          BRW     TRYRESUME                   ;CONTINUE IF POSSIBLE
                                00BC   338 ;
                                00BC   339 ;
```

```
                        00BC    342          .SBTTL  ASYNCHRONOUS WRITE ERROR INTERRUPT
                        00BC    343 ;
                        00BC    344 ; THIS ERROR IS CAUSED WHEN CMI WRITE OPERATION DID NOT COMPLETE SUCCESSFULLY.
                        00BC    345 ; THERE COULD BE ANY NUMBER OF REASONS FOR THIS.  THE CMI COULD BE BROAKEN
                        00BC    346 ; (UNLIKELY, SINCE WE WOULDN'T HAVE GOTTEN THIS FAR) OR AN ADAPTER ON THE CMI
                        00BC    347 ; COULD BE BROAKEN.  THERE IS NO SPECIFIC CODE HERE TO LOOK FOR A BROAKEN
                        00BC    348 ; DEVICE.  SUSPECTED DEVICES COULD BE MEMORY, DR750, MA750, OR ICCS.
                        00BC    349 ; ANOTHER CAUSE IS WRITE TO NON-EXISTANT ADDRESS.
                        00BC    350 ;
                        00BC    351
                        00BC    352          .ALIGN  LONG
                        00BC    353
                        00BC    354 EXE$LOGAWE::
                        00BC    355 EXE$INT60::
      5E    28    C2    00BC    356          SUBL    #<10*4>,SP                      ; KLUDGE UP STACK TO LOOK LIKE MACHINE CHECK
      6E    05    9A    00BF    357          MOVZBL  #5,(SP)                         ; THIS IS THE TYPE - REST OF FRAME GARBAGE
      7E    28    9A    00C2    358          MOVZBL  #^X28,-(SP)                     ; LENGTH OF MACHINE CHECK ERROR FRAME
                  07    DD    00C5    359          PUSHL   #MCHK$M_LOG!MCHK$M_MCK!MCHK$M_NEXM ;MASK FOR PRTCTEST
            30    AE    DF    00C7    360          PUSHAL  MCK_PC+4(SP)                    ; AND PC POINTER
      103F    8F    BB    00CA    361          PUSHR   #^M<R0,R1,R2,R3,R4,R5,AP> ; SAVE REGISTERS
5C    5E    24    C1    00CE    362          ADDL3   #<9*4>,SP,AP                    ; POINT AP TO FAKE MACHINE CHECK LOG
      53    07    3C    00D2    363          MOVZWL  #EMB$K_AW,R3                    ; ERROR TYPE
      54    08    9A    00D5    364          MOVZBL  #<2*4>,R4                       ; SIZE OF LOG ENTRY (PC,PSL)
55    2C    AC    9E    00D8    365          MOVAB   MCK_PC(AP),R5                   ; ADDRESS OF LOG ENTRY (ON STACK)
          0352    30    00DC    366          BSBW    LOGGER                          ; LOG THE ERROR
00000000'GF       16    00DF    367          JSB     G^EXE$MCHK_TEST                 ;RECOVERY BLOCK IN EFFECT?
        06    50    E8    00E5    368          BLBS    R0,10$                          ;YES, DO NOT LOG THIS ERROR
00000000'GF       D6    00E8    369          INCL    G^EXE$GL_MCHKERRS               ; BUMP THE GLOBAL MACHINE CHECK COUNTER
          0456    31    00EE    370 10$:     BRW     REFLECTCHK                      ; CONTINUE IF USER OR SUPER MODE
```

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                                                B 8
00F1   373          .SBTTL  TB, BUS, CACHE PARITY
00F1   374 ;
00F1   375 ; TRANSLATION BUFFER ERROR ABORT
00F1   376 ; CMI BUS ERROR ABORT (UNCORRECTED READ)
00F1   377 ; CACHE PARITY ERRORS
00F1   378 ;
00F1   379 ; LOG ERROR
00F1   380 ;
00F1   381 ; HANDLE TRANSLATION BUFFER ERROR AS FOLLOWS
00F1   382 ;
00F1   383 ;       INVALIDATE TB
00F1   384 ;       IF MANY RECENT TB ERRORS, DISABLE HALF OF TB
00F1   385 ;       IF THIS RESULTS IN BOTH HALVES DISABLED, BUG CHECK
00F1   386 ;       ELSE IF THE INSTRUCTION IS RESUMABLE, TRY TO RESTART IT
00F1   387 ;       ELSE IF THE ABORT WAS IN EXEC OR KERNAL MODE, BUG CHECK
00F1   388 ;       ELSE REFLECT ERROR TO USER OR SUPERVISOR AS EXCEPTION
00F1   389 ;
00F1   390 ;
00F1   391 ; HANDLE BUS ERRORS AS FOLLOWS
00F1   392 ;
00F1   393 ;       IF THE INSTRUCTION WAS RESUMABLE, TRY AND RESTART
00F1   394 ;       ELSE IF THE ABORT WAS IN EXEC OR KERNAL MODE, BUG CHECK
00F1   395 ;       ELSE REFLECT ERROR TO USER OR SUPERVISOR MODE AS EXCEPTION
00F1   396 ;
00F1   397 ; HANDLE CACHE ERRORS AS FOLLOWS
00F1   398 ;
00F1   399 ;       IF MANY RECENT CACHE ERRORS, DISABLE CACHE
00F1   400 ;       IF ERROR WAS IN USER OR SUPERVISOR MODE, REFLECT ERROR TO PROCESS
00F1   401 ;       ELSE ISSUE A FATAL BUG-CHECK
00F1   402 ;
00F1   403          .ENABLE LSB
00F1   404
00F1   405 TB_BUS:
00F1   406
   26   28 AC   DA  00F1   407          MTPR    MCK_ESR(AP),#PR750$_MCESR       ;CLEAR PROCESSOR ERROR BITS
69 28   AC   02   E1  00F5   408          BBC     #ESR$V_TB,MCK_ESR(AP),BUS_CACHE ;BRANCH IF NOT TB ERROR
 25   0028'CF   DA  00FA   409          MTPR    W^EXE$GL_CHSTATE,#PR750$_CADR ;CACHE PROBABLY OK, ENABLE IT
   FC AC   02   C8  00FF   410          BISL    #MCHK$M_MCK,-4(AP)      ;MASK FOR PRTCTEST
                    0103   411
                    0103   412 ; TRANSLATION BUFFER ERRORS HANDLED HERE
                    0103   413
       53   02   3C  0103   414          MOVZWL  #EMB$K_MC,R3            ;PLACE ERROR TYPE IN R3 FOR LOGGER
       50   1B   DB  0106   415          MFPR    #PR750$_TODR,R0         ;CURRENT TIME IN 10MS TICKS
       51   24   DB  0109   416          MFPR    #PR750$_TBDR,R1         ;GET TB DISABLE REGISTER
                    010C   417
                    010C   418 ; DISCOVER WHICH HALF OF TB THE ERROR IS IN
                    010C   419
    05   1C AC   D3  010C   420          BITL    MCK_TBP(AP),#<TBP$M_GRP0D!TBP$M_GRP0T>
                    0110   421                                          ;HANDLE EACH HALF SEPARATELY
            25   13  0110   422          BEQLU   20$                     ;ERROR IN SECOND HALF
                    0112   423
                    0112   424 ; ERROR IS IN FIRST HALF OF TB
                    0112   425
52  50   0000'CF   C3  0112   426          SUBL3   W^EXE$GL_TB1AOLD,R0,R2  ;HOW LONG SINCE LAST ERROR?
            0A   52   D1  0118   427          CMPL    R2,#TB_THRESHOLD        ;ERRORS COMMING TOO FAST?
                 0B   1A  011B   428          BGTRU   10$                     ;NO, CONTINUE
                    011D   429
```

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                                                C 8
                                011D    430 ; DISABLE FIRST HALF OF TB
                                011D    431
          3B 51    01    E0     011D    432         BBS     #TBDR$V_DG1,R1,TB_BAD   ;BOTH HALVES BAD, FATAL ERROR
             24    0D    DA     0121    433         MTPR    #<TBDR$M_DG0!TBDR$M_GRDP!TBDR$M_REPL>,#PR750$_TBDR ;DISABLE
                                0124    434                                         ;AND FORCE REPLACEMENT IN OTHER GROUP
          1E AC    01    9B     0124    435         MOVZBW  #TBDR$M_DG0,MCK_TBP+2(AP) ;LOG THAT WE DID IT
                                0128    436
                                0128    437 ; REMEMBER HISTORY OF GROUP 0 TB ERRORS
                                0128    438
0004'CF   0000'CF    D0        0128    439 10$:    MOVL    W^EXE$GL_TB1AOLD,W^EXE$GL_TB2AOLD ;TIME OF LAST TO NEXT TO LAST
     0000'CF    50    D0        012F    440         MOVL    R0,W^EXE$GL_TB1AOLD     ;TIME OF THIS TO TIME OF LAST
              015C    31        0134    441         BRW     TRYRESUME               ;TRY TO RECOVER
                                0137    442
                                0137    443 ; ERROR IS IN SECOND HALF OF TB
                                0137    444
52   50   0008'CF    C3        0137    445 20$:    SUBL3   W^EXE$GL_TB1BOLD,R0,R2  ;TIME SINCE LAST ERROR IN 2nd HALF
          0A    52    D1        013D    446         CMPL    R2,#TB_THRESHOLD        ;ERRORS COMMING TOO FAST?
                0B    1A        0140    447         BGTRU   25$                     ;NO, CONTINUE
                                0142    448
                                0142    449 ; DISABLE 2ND HALF OF TB
                                0142    450
          16 51    00    E0     0142    451         BBS     #TBDR$V_DG0,R1,TB_BAD   ;BRANCH IF OTHER HALF BAD ALSO
             24    0A    DA     0146    452         MTPR    #<TBDR$M_DG1!TBDR$M_REPL>,#PR750$_TBDR ;DISABLE 2ND HALF
          1E AC    02    9B     0149    453         MOVZBW  #TBDR$M_DG1,MCK_TBP+2(AP) ;LOG THAT WE DID IT
                                014D    454
                                014D    455 ; REMEMBER HISTORY OF GROUP 1 TB ERRORS
                                014D    456
000C'CF   0008'CF    D0        014D    457 25$:    MOVL    W^EXE$GL_TB1BOLD,W^EXE$GL_TB2BOLD ;TIME OF LAST TO NEXT TO LAST
     0008'CF    50    D0        0154    458         MOVL    R0,W^EXE$GL_TB1BOLD     ;TIME OF THIS TO TIME OF LAST
              0137    31        0159    459         BRW     TRYRESUME               ;TRY TO RECOVER
                                015C    460
                                015C    461 ; BOTH HALVES OF TB BAD, LOG ERROR AND CRASH
                                015C    462
                                015C    463 TB_BAD:
          02B7    30            015C    464         BSBW    LOGIT                   ;LOG THE ERROR
                                015F    465         BUG_CHECK MACHINECHK,FATAL      ;FATAL ERROR - BOTH HALVES OF TB BAD
                                0163    466
                                0163    467 ; CMI BUS ERRORS HANDLED HERE
                                0163    468
                                0163    469 ; EXAMINE BUS ERROR REGISTER TO FIND OUT WHAT HAPPENED
                                0163    470
                                0163    471 BUS_CACHE:
05 20 AC    02    E0            0163    472         BBS     #CER$V_DATA,MCK_CER(AP),26$ ;BRANCH IF CACHE DATA ERROR
03 20 AC    03    E1            0168    473         BBC     #CER$V_TAG,MCK_CER(AP),27$ ;BRANCH IF NOT CACHE TAG ERROR
          014C    31            016D    474 26$:    BRW     CH_PARITY               ; HANDLE CACHE PARITY ERRORS
                                0170    475
1A 24 AC    02    E0            0170    476 27$:    BBS     #BER$V_UCD,MCK_BER(AP),UCD ;BRANCH IF UNCORRECTED DATA
03 24 AC    03    E0            0175    477         BBS     #BER$V_NEX,MCK_BER(AP),BUS ;BRANCH IF NON-EXISTANT REFFERENCE
          FEB0    31            017A    478         BRW     BAD_TYPE                ; CANNOT IDENTIFY ERROR TYPE
                                017D    479
                                017D    480 ; THE ERROR WAS CAUSED BY NON-EXISTANT MEMORY ON A READ
                                017D    481
                                017D    482 BUS:
 25   0028'CF    DA            017D    483         MTPR    W^EXE$GL_CHSTATE,#PR750$_CADR ;CACHE PROBABLY OK, ENABLE IT
   FC AC    06    C8            0182    484         BISL    #MCHK$M_NEXM!MCHK$M_MCK,-4(AP) ;MASK FOR PRTCTEST
      53    02    3C            0186    485         MOVZWL  #EMB$K_MC,R3            ;HANDLE AS A MACHINE CHECK
          028A    30            0189    486         BSBW    LOGIT                   ;LOG THE ERROR
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                03B8   31  018C   487          BRW     REFLECTCHK              ;CONTINUE IF USER OR SUPER MODE
                       018F   488
                       018F   489
                       018F   490 ;++
                       018F   491 ; UNCORRECTED MEMORY READ ERROR (READ DATA SUBSTITUTE)
                       018F   492 ; ATTEMPT TO REPLACE PAGE WITH A GOOD ONE
                       018F   493 ; PAGE CAN BE REPLACED IF
                       018F   494 ;       FAULT OCCURED AT PAGEABLE PRIORITY
                       018F   495 ;       PAGE WAS VALID FOR THE ACCESSING PROCESS
                       018F   496 ;       PAGE WAS NOT MODIFIED OR IS READ-ONLY
                       018F   497 ;       INSTRUCTION CAUSING PROBLEM IS RESUMABLE
                       018F   498 ;       NO I/O WAS IN PROGRESS FOR THE PAGE
                       018F   499 ;       PAGE IS SYSTEM OR PROCESS PRIVATE
                       018F   500 ; BAD PAGE IS PLACED ON BAD PAGE LIST
                       018F   501 ;--
                       018F   502
                       018F   503 UCD:
          25   0028'CF   DA  018F   504          MTPR    W^EXE$GL_CHSTATE,#PR750$_CADR ;CACHE PROBABLY OK, ENABLE IT
            FC AC    02   C8  0194   505          BISL    #MCHK$M_MCK,-4(AP)      ;MASK FOR PRTCTEST      **************
50   30 AC    05   10   EF  0198   506          EXTZV   #PSL$V_IPL,#PSL$S_IPL,MCK_PSL(AP),R0 ;GET IPL
                02   50   D1  019E   507          CMPL    R0,#IPL$_ASTDEL         ;ARE WE AT NON-PAGEABLE PRIORITY?
                     5C   14  01A1   508          BGTR    NO_RESUME               ;NO, NOTHING WE CAN DO
                       01A3   509
           52   08 AC   D0  01A3   510          MOVL    MCK_VA(AP),R2           ;GET VIRTUAL ADDRESS OF ERROR
      54   00000000'GF   D0  01A7   511          MOVL    G^SCH$GL_CURPCB,R4      ;CURRENT USER'S PCB ADDRESS
           55   6C A4   D0  01AB   512          MOVL    PCB$L_PHD(R4),R5        ;PROCESS HEADER ADDRESS
           00000000'GF   16  01B2   513          JSB     G^MMG$SVAPTECHK         ;TURN VA INTO VA OF PTE
                50   63   D0  01B8   514          MOVL    (R3),R0                 ;GET THE PTE WHICH MAPS THE BAD PAGE
                     0E   19  01BB   515          BLSS    28$                     ;BRANCH IF PAGE VALID FOR THIS PROCESS
                       01BD   516
                       01BD   517
                       01BD   518 ; PROCESS EXECUTED A READ TO A NON VALID PAGE, CRASH
                       01BD   519
                       01BD   520 RDSNONRES:
                       01BD   521
            103F 8F    BA  01BD   522          POPR    #^M<R0,R1,R2,R3,R4,R5,AP> ;RESTORE REGISTERS
        00000000'GF    16  01C1   523          JSB     G^EXE$MCHK_BUGCHK       ;RECOVERY BLOCK IN EFFECT?
                       01C7   524
                       01C7   525          BUG_CHECK RDSNONRES,FATAL       ;FATAL BUG-CHECK
                       01CB   526
                       01CB   527
                       01CB   528          ASSUME  PTE$V_PFN EQ 0
                       01CB   529
                       01CB   530 28$:
          30 50    15   E0  01CB   531          BBS     #PTE$V_WINDOW,R0,NO_RESUME
                       01CF   532                                              ;BRANCH IF PAGE IS PFN-MAPPED
50   50    15   00   EF  01CF   533          EXTZV   #PTE$V_PFN,#PTE$S_PFN,R0,R0
                       01D4   534                                              ;ISOLATE PAGE FRAME NUMBER IN PTE
 00000000'GF    50   D1  01D4   535          CMPL    R0,G^MMG$GL_MAXPFN      ;PFN DATA BASE FOR THIS PAGE?
                22   1A  01DB   536          BGTRU   NO_RESUME               ;NO, CANNOT CONTINUE
 7E    00000000'GF   D0  01DD   537          MOVL    G^PFN$AB_TYPE,-(SP)     ;GET ADDRESS OF PFN TYPE ARRAY *******
          9E40   20   88  01E4   538          BISB    #PFN$M_BADPAG,@(SP)+[R0];MARK PAGE BAD          **************
                 51   D4  01E8   539          CLRL    R1                      ;CLEAR MODIFY BIT FLAG
          04 63  1A   E5  01EA   540          BBCC    #PTE$V_MODIFY,(R3),30$  ;TEST AND CLEAR MODIFY BIT IN PTE
          51   80 8F   9A  01EE   541          MOVZBL  #PFN$M_MODIFY,R1        ;SET MODIFY BIT FLAG
 7E    00000000'GF   D0  01F2   542 30$:     MOVL    G^PFN$AB_STATE,-(SP)    ;ADDRESS OF PFN STATE   **************
          9E40   51   88  01F9   543          BISB    R1,@(SP)+[R0]           ;SET MODIFY BIT FLAG IN PFN DATABASE **
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                                01FD   544
                                01FD   545          ASSUME  PFN$M_MODIFY EQ 128
                                01FD   546
                     0F   18    01FD   547          BGEQ    33$                     ;PAGE NOT MODIFIED, CONTINUE
                                01FF   548
                                01FF   549
                                01FF   550 ; FOR ANY OF THE VARIOUS REASONS, CANNONT TRY TO RESUME INSTRUCTION STREAM
                                01FF   551
                                01FF   552 NO_RESUME:
                  53    08    9A  01FF   553          MOVZBL  #EMB$K_HE,R3            ;ERROR TYPE FOR ERROR LOGGER
                      0257    30  0202   554          BSBW    EXE$LOGMEM              ;LOG THE MEMORY ERROR
                  53    02    3C  0205   555          MOVZWL  #EMB$K_MC,R3            ;LOG A MACHINE CHECK ERROR
                     020B    30  0208   556          BSBW    LOGIT
                     0339    31  020B   557          BRW     REFLECTCHK              ;CONTINUE ONLY IF USER OR SUPER MODE
                                020E   558
               7E    2C BC    9A  020E   559 33$:     MOVZBL  @MCK_PC(AP),-(SP)       ;GET OPCODE FOR RESUMEABILITY CHECK
        E7 0583'CF    8E    E1  0212   560          BBC     (SP)+,W^RESUMABLE,NO_RESUME ;BRANCH IF CANNOT RESUME INSTRUCTION
                                0218   561
      7E    00000000'GF    D0  0218   562          MOVL    G^PFN$AW_REFCNT,-(SP)   ;GET ADDRESS OF PFN REFCNT ARRAY ******
              01    9E40    B1  021F   563          CMPW    @(SP)+[R0],#1           ;CHECK FOR I/O IN PROGRESS ************
                    DA    1A  0223   564          BGTRU   NO_RESUME               ;IF SO, DON'T MESS WITH PAGE
                                0225   565
      7E    00000000'GF    D0  0225   566          MOVL    G^PFN$AB_TYPE,-(SP)     ;ADDRESS OF PFN TYPE ARRAY  *********
01    9E40    03    00    EC  022C   567          CMPV    #PFN$V_PAGTYP,#PFN$S_PAGTYP,@(SP)+[R0],#PFN$C_SYSTEM ;*****
                                0232   568                                          ;CHECK TO SEE IF SYSTEM OR GLOBAL PAGE
                                0232   569
                                0232   570          ASSUME  PFN$C_SYSTEM EQ 1
                                0232   571          ASSUME  PFN$C_PROCESS EQ 0
                                0232   572
                    CB    1A  0232   573          BGTRU   NO_RESUME               ;BRANCH IF GLOBAL PAGE
                                0234   574
                    52    D5  0234   575          TSTL    R2                      ;TEST THE VIRTUAL ADDRESS
                    0B    14  0236   576          BGTR    35$                     ;BRANCH IF PAGE IS PROCESS PRIVATE
54    00000000'GF    9E  0238   577          MOVAB   G^MMG$AL_SYSPCB,R4      ;SYSTEM WORKING SET LIST
      55    6C A4    D0  023F   578          MOVL    PCB$L_PHD(R4),R5
      00 63    1F    E5  0243   579 35$:     BBCC    #PTE$V_VALID,(R3),40$   ;CLEAR VALID BIT FROM PTE
                                0247   580 40$:     INVALID R2                      ;INVALIDATE TRANSLATION BUFFER OF VA
7E    00000000'GF    D0  024A   581          MOVL    G^PFN$AW_REFCNT,-(SP)   ;ADDRESS OF PFN REFCNT ARRAY  *******
            9E40    B7  0251   582          DECW    @(SP)+[R0]              ;DECREMENT REFERENCE COUNT FOR PAGE ****
              06    18  0254   583          BGEQ    50$
      00000000'GF    16  0256   584          JSB     G^MMG$REFCNTNEG
                                025C   585 50$:
7E    00000000'GF    D0  025C   586          MOVL    G^PFN$Ax_WSLX,-(SP)     ;ADDRESS OF WORK SET LIST  **********
                                0263   587                                  PFN_REFERENCE   -
                                0263   588          MOVZWL  <@(SP)+[R0],R1>,-               ;WORKING SET LIST INDEX FOR PAGE ***
                                0263   589                                  LONG_OPCODE=MOVL,-
                                0263   590                                  IMAGE=SYSLOA750.EXE
      00000000'GF    16  0275   591          JSB     G^MMG$DELWSLEX          ;DELETE PAGE FROM WORKING SET
      00000000'GF    16  027B   592          JSB     G^MMG$DELCONPFN         ;DELETE PAGE FROM PAGE TABLE
          52    02    9A  0281   593          MOVZBL  #PFN$C_BADPAGLST,R2
      00000000'GF    16  0284   594          JSB     G^MMG$INSPFNT           ;PUT PAGE ON BAD PAGE LIST
                                028A   595
          53    08    3C  028A   596          MOVZWL  #EMB$K_HE,R3            ;PLACE ERROR TYPE IN R3
              01CC    30  028D   597          BSBW    EXE$LOGMEM              ;LOG MEMORY ERROR
          53    02    3C  0290   598          MOVZWL  #EMB$K_MC,R3            ;LOG MACHINE CHECK
                                0293   599
                                0293   600 ;
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                                0293   601 ; TRYRESUME - TRY TO RESTART AN INSTRUCTION AFTER A FAULT
                                0293   602 ;
                                0293   603 ;       IF PROCESSOR MODE WAS NOT CHANGED DURING EXECUTION OF INSTRUCION
                                0293   604 ;       IF INSTRUCTION IS LISTED AS RETRIABLE IN TABLE
                                0293   605 ;       IF INSTRUCIION IS SINGLE BYTE INSTRUCTION
                                0293   606 ;    THEN - RESTART
                                0293   607 ;
                                0293   608 ; INPUTS - R3 CONTAINS ERROR TYPE FOR ERROR LOGGING
                                0293   609 ;
                                0293   610
                                0293   611 TRYRESUME:                                    ; TRY TO RESUME DEPENDING ON OP-CODE
                                0293   612
                     0180   30  0293   613         BSBW    LOGIT                       ;MACHINE CHECK ERROR LOGGER
        55   14 AC   02   00   EF  0296   614         EXTZV   #SMR$V_MODE,#SMR$S_MODE,MCK_SMR(AP),R5
                                029C   615                                             ;GET MODE AT TIME OF FAULT
        55   30 AC   02   18   ED  029C   616         CMPZV   #PSL$V_CURMOD,#PSL$S_CURMOD,MCK_PSL(AP),R5
                                02A2   617                                             ;COMPARE WITH MODE WHEN FAULT WAS DISCOVERED
                        15   12  02A2   618         BNEQU   70$                         ;IF NOT EQUAL, DON'T TRY TO RESUME
                   55   2C BC   9A  02A4   619         MOVZBL  @MCK_PC(AP),R5              ;FETCH OP-CODE
              0B 0583'CF   55   E1  02A8   620         BBC     R5,W^RESUMABLE,70$          ;LOOK UP OP-CODE IN TABLE
                                02AE   621
                    103F 8F   BA  02AE   622         POPR    #^M<R0,R1,R2,R3,R4,R5,AP>   ;IF BIT IS SET, RETRY INSTRUCTION
                    5E   08   C0  02B2   623         ADDL    #<2*4>,SP                   ;REMOVE PRTCTEST STUFF
                    5E   8E   C0  02B5   624         ADDL    (SP)+,SP                    ;CLEAR LOG OFF STACK
                                02B8   625         REI
                                02B9   626
                                02B9   627 70$:
                         028B   31  02B9   628         BRW     REFLECTCHK                  ;ELSE CONTINUE DEPENDING ON ACCESS MODE
                                02BC   629
                                02BC   630         .DSABL  LSB
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                                02BC    633          .SBTTL  CACHE PARITY ERRORS
                                02BC    634 ;
                                02BC    635 ; CACHE PARITY ERROR HANDLER
                                02BC    636 ;
                                02BC    637 ; LOG ERROR
                                02BC    638 ;
                                02BC    639 ; IF MANY RECENT CACHE ERRORS, DISABLE CACHE
                                02BC    640 ; IF ERROR WAS IN USER OR SUPERVISOR MODE, REFLECT ERROR TO PROCESS
                                02BC    641 ; ELSE ISSUE A FATAL BUG-CHECK
                                02BC    642 ;
                                02BC    643
                                02BC    644 CH_PARITY:                                  ;CACHE PARITY ERROR HANDLER
                                02BC    645
          53    02    3C      02BC    646          MOVZWL  #EMB$K_MC,R3                    ;PLACE ERROR TYPE IN R3 FOR LOGING
        FC AC   02    C8      02BF    647          BISL    #MCHK$M_MCK,-4(AP)              ;MASK FOR PRTCTEST
          50    1B    DB      02C3    648          MFPR    #PR750$_TODR,R0                 ;CURRENT TIME IN 10MS TICKS
51  50    0020'CF     C3      02C6    649          SUBL3   W^EXE$GL_CH1OLD,R0,R1          ;TIME SINCE LAST ERROR
          0A    51    D1      02CC    650          CMPL    R1,#CH_THRESHOLD                ;ERRORS COMING TOO FAST?
                09    1A      02CF    651          BGTRU   30$                             ;NO, CONTINUE
                              02D1    652
                              02D1    653 ;
                              02D1    654 ; TOO MANY CACHE ERRORS IN TIME INTERVAL, DISABLE CACHE PERMANENTLY
                              02D1    655 ;
          22 AC   01    9B      02D1    656          MOVZBW  #CADR$M_DIS,MCK_CER+2(AP) ;LOG THAT WE DISABLED CACHE
        0028'CF   01    9A      02D5    657          MOVZBL  #CADR$M_DIS,W^EXE$GL_CHSTATE ;RESET CURRENT CACHE STATE
                              02DA    658
                              02DA    659 ;
                              02DA    660 ; LOG ERROR - CONTINUE IF IN USER OR SUPERVISOR MODE
                              02DA    661 ;
                              02DA    662
                              02DA    663 30$:
      25    0028'CF   DA      02DA    664          MTPR    W^EXE$GL_CHSTATE,#PR750$_CADR ;RE-ENABLE CACHE IF OK
0024'CF     0020'CF   D0      02DF    665          MOVL    W^EXE$GL_CH1OLD,W^EXE$GL_CH2OLD ;SAVE TIME OF LAST ERROR
    0020'CF     50    D0      02E6    666          MOVL    R0,W^EXE$GL_CH1OLD              ;SAVE TIME OF THIS ERROR
      27    20 AC   DA      02EB    667          MTPR    MCK_CER(AP),#PR750$_CAER        ;CLEAR ERROR BITS
                A2    11      02EF    668          BRB     TRYRESUME                       ;TRY TO RESUME DEPENDING ON OP-CODE
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                        02F1    671          .SBTTL  CORRECTED MEMORY DATA INTERRUPTS
                        02F1    672 ;
                        02F1    673 ; CM_DATA - CORRECTED MEMORY DATA INTERRUPT HANDLER
                        02F1    674 ;
                        02F1    675 ; LOG ALL INTERRUPTS
                        02F1    676 ; IF TOO MANY INTERRUPTS ARE RECEIVED, THE MEMORY ERROR LOGGER WILL TURN
                        02F1    677 ; OFF THE CRD INTERRUPT BIT.
                        02F1    678 ;
                        02F1    679 ; CONTINUE ALWAYS
                        02F1    680 ;
                        02F1    681
                        02F1    682          .ALIGN  LONG                       ;VECTORED TO
                        02F4    683
                        02F4    684 EXE$LOGCRD::                               ;CORRECTED MEMORY DATA INTERRUPT
                        02F4    685 EXE$INT54::
                        02F4    686
            3F  BB      02F4    687          PUSHR   #^M<R0,R1,R2,R3,R4,R5>
0030'CF     D6      02F6    688          INCL    W^MMG$GL_CRDCNT               ;COUNT CORRECTED MEMORY ERRORS
53      06  3C      02FA    689          MOVZWL  #EMB$K_SE,R3                  ;SOFT ERROR
        015C    30      02FD    690          BSBW    EXE$LOGMEM                    ;LOG A MEMORY ERROR
            3F  BA      0300    691          POPR    #^M<R0,R1,R2,R3,R4,R5>
            02      0302    692          REI                                   ;AND RETURN
                        0303    693
                        0303    694 ;
                        0303    695 ; ECC$REENABLE - TIMER CALL FROM SYSTEM CLOCK ROUTINE
                        0303    696 ;
                        0303    697 ; THIS ROUTINE SCANS ALL MEMEORY CONTROLLERS FOR CORRECTED ECC ERRORS
                        0303    698 ; WHICH HAVE EITHER BEEN CAUSED BY A READ ISSUED FROM AN I/O DEVICE OR
                        0303    699 ; WHICH HAVE OCCURED WHEN CRD INTERRUPTS ARE TURNED OFF.  IF A MEMORY
                        0303    700 ; ERROR HAS OCCURED, ALL MEMORY CSR'S ARE LOGGED.
                        0303    701 ;
                        0303    702 ECC$REENABLE::                             ;RE-ENABLE CORRECTED MEMORY DATA INTERRUPTS
                        0303    703
002C'CF     B7      0303    704          DECW    W^ECC$GW_WATCH                ;TIME TO SCAN MEMORY CONTROLLER?
            7E      14      0307    705          BGTR    50$                           ;NOT YET IF GTR
            007F    8F      BB      0309    706          PUSHR   #^M<R0,R1,R2,R3,R4,R5,R6>       ;SAVE WORKING REGISTERS
            56      0F      D0      030D    707          MOVL    #15,R6                ;R0 INDEXES AND COUNTS SLOTS
53      00000000'GF     D0      0310    708          MOVL    G^EXE$GL_CONFREGL,R3  ;ARRAY OF NEXUS DEVICE TYPE CODES
55      00000000'GF     D0      0317    709          MOVL    G^MMG$GL_SBICONF,R5   ;ARRAY OF ADAPTER VA'S
                        031E    710          DSBINT                        ;DO SCAN AT IPL 31
    002C'CF     3C      B0      0324    711          MOVW    #SOMETIME,W^ECC$GW_WATCH ;RESET SCAN TIMER
                        0329    712 10$:
        52      6346    D0      0329    713          MOVL    (R3)[R6],R2           ;GET ADAPTER TYPE
                4E      13      032D    714          BEQL    40$                   ;NO ADAPTER IN THIS SLOT
        51      6546    D0      032F    715          MOVL    (R5)[R6],R1           ;GET VA OF NEXT CMI SLOT
                48      18      0333    716          BGEQ    40$                   ;GEQ IMPLIES NO VALID SYSTEM VA.
        52      E0 8F   93      0335    717          BITB    #^B11100000,R2        ;LOCAL MEMORY?
                27      13      0339    718          BEQL    20$                   ;YES IF EQL
                        033B    719
        40 8F   52      91      033B    720          CMPB    R2,#^X40              ;MULTI-PORT MEMORY?
                3C      1F      033F    721          BLSSU   40$                   ;NO IF TYPE LSS 40
        43 8F   52      91      0341    722          CMPB    R2,#^X43
                36      1A      0345    723          BGTRU   40$                   ;NO IF TYPE GTR 43
                        0347    724
                        0347    725          $PRTCTINI W^15$,#<MCHK$M_LOG!MCHK$M_NEXM>
                        0354    726
        54      10 A1   D0      0354    727          MOVL    MPM$L_ERR(R1),R4      ;GET MULTI-PORT ERROR REGISTER
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                                0358   728
                                0358   729          $PRTCTEND 15$
                     21 50   E9 0359   730          BLBC    R0,40$                  ;NO MA750 ANY MORE
                                035C   731
                  1D 54   1C   E1 035C   732          BBC     #MPM$V_ERR_ELR,R4,40$   ;NO ERROR HERE
                          07   11 0360   733          BRB     30$                     ;ERROR, SEE IF WE SHOULD LOG IT
                                0362   734
                     54   61   D0 0362   735 20$:     MOVL    MEM$L_CSR0(R1),R4               ;LOCAL MEMORY CSR
                  14 54   1D   E1 0365   736          BBC     #CSR0$V_COREF,R4,40$    ;CORRECTED ECC ERROR IN THIS MEMORY?
                                0369   737 30$:
                     0030'CF   D6 0369   738          INCL    W^MMG$GL_CRDCNT         ;COUNT TOTAL CRD ERRORS IN SYSTEM
               0010'CF46   06   91 036D   739          CMPB    #CRDWATCHMAX,W^ECC$AB_MEMERR[R6] ;LOGGED ENOUGH ERRORS HERE?
                          08   1B 0373   740          BLEQU   40$                     ;YES
                     53   06   3C 0375   741          MOVZWL  #EMB$K_SE,R3            ;ERROR TYPE IN R3
                        00E1   30 0378   742          BSBW    EXE$LOGMEM              ;LOG MEMORY ERRORS
                          03   11 037B   743          BRB     45$                     ;LOGGER LOGS ALL MEMORIES
                                037D   744
                     A9 56   F4 037D   745 40$:     SOBGEQ  R6,10$                  ;LOOP THROUGH ALL POSSIBLE SLOT NOS.
                                0380   746 45$:     ENBINT                          ;RE-ENABLE INTERRUPTS
                     007F 8F   BA 0383   747          POPR    #^M<R0,R1,R2,R3,R4,R5,R6>       ;RESTORE REGS
                                0387   748
                                0387   749
                                0387   750 50$:                                     ;CHECK IF TIME TO REENABLE CRD INTS
                     002E'CF   B7 0387   751          DECW    W^ECC$GW_REENAB         ;REEANABLE TIME ELAPSED
                          01   15 038B   752          BLEQ    52$                     ;YES
                               05 038D   753          RSB                             ;NO, RETURN
            002E'CF   0384 8F   B0 038E   754 52$:     MOVW    #REENABTIME,W^ECC$GW_REENAB ;RESET REENABLE TIMER
                      007F 8F   BB 0395   755          PUSHR   #^M<R0,R1,R2,R3,R4,R5,R6>       ;SAVE WORKING REGISTERS
    10  00  00000010'EF   00   2C 0399   756          MOVC5   #0,ECC$AB_MEMERR,#0,#16,ECC$AB_MEMERR ;RESET ERROR COUNTERS TO ZERO
              00000010'EF         03A2
                        56   0F   D0 03A7   757          MOVL    #15,R6                  ;R0 INDEXES SLOT NOS.
            53  00000000'GF   D0   D0 03AA   758          MOVL    G^EXE$GL_CONFREGL,R3    ;ARRAY OF NEXUS DEVICE TYPE CODES
            55  00000000'GF   D0   D0 03B1   759          MOVL    G^MMG$GL_SBICONF,R5     ;ARRAY OF ADAPTER VA'S
                                03B8   760 55$:
                       52   6346   D0 03B8   761          MOVL    (R3)[R6],R2             ;ADAPTER TYPE CODE
                            50   13 03BC   762          BEQL    65$                     ;NO ADAPTER IN THIS SLOT
                       51   6546   D0 03BE   763          MOVL    (R5)[R6],R1             ;VA OF ADAPTER
                              4A   18 03C2   764          BGEQ    65$                     ;GEQ IMPLIES NO VALID SYSTEM VA.
                       52   E0 8F   93 03C4   765          BITB    #^B11100000,R2          ;LOCAL MEMORY?
                            30   13 03C8   766          BEQL    60$                     ;YES IF EQL
                       40 8F   52   91 03CA   767          CMPB    R2,#^X40                ;MULTIPORT MEMORY?
                              3E   1F 03CE   768          BLSSU   65$
                       43 8F   52   91 03D0   769          CMPB    R2,#^X43
                              38   1A 03D4   770          BGTRU   65$
                                03D6   771
                                03D6   772 ; HANDLE MA750 ECC INTERRUPT ENABLE
                                03D6   773
    30 00000000'GF   00'   E1 03D6   774          BBC     S^#EXE$V_CRDENABL,G^EXE$GL_FLAGS,65$
                                03DE   775                                          ;BRANCH IF CRD INTERRUPTS NOT WANTED
                                03DE   776
                                03DE   777          $PRTCTINI W^58$,#<MCHK$M_LOG!MCHK$M_NEXM>
                                03EB   778
                       52   10 A1   D0 03EB   779          MOVL    MPM$L_ERR(R1),R2        ;GET MA750 ERROR REGISTER
                       00 52   1E   E2 03EF   780          BBSS    #MPM$V_ERR_ICRD,R2,57$  ;RE-ENABLE MA750 CRD INTERRUPTS
                       10 A1   52   D0 03F3   781 57$:     MOVL    R2,MPM$L_ERR(R1)
                                03F7   782
                                03F7   783          $PRTCTEND 58$
```

```
                                03F8   784
                     14   11    03F8   785          BRB     65$
                                03FA   786
                                03FA   787 ; HANDLE MAIN MEMORY ECC INTERRUPT ENABLE
                                03FA   788
                                03FA   789 ; ***** NOTE *****
                                03FA   790 ;        IF ECC INTERRUPT BIT IS NOT SET (A SYSGEN PARAMATER), THEN NO
                                03FA   791 ;        SOFT ECC ERROR REPORTING WILL TAKE PLACE, EVEN WHEN ECC$REENABLE
                                03FA   792 ;        SCANS THE MAIN MEMORY CONTROLLER.  THIS IS DIFFERENT THAN IN THE
                                03FA   793 ;        11/780 WHERE THE MEMORY CSR ERROR REPORTING BITS ARE SET WHETHER
                                03FA   794 ;        OR NOT INTERRUPTS ARE ENABLED.
                                03FA   795
OC 00000000'GF    00'   E1      03FA   796 60$:     BBC     S^#EXE$V_CRDENABL,G^EXE$GL_FLAGS,65$
                                0402   797                                         ;BRANCH IF CRD INTERRUPTS NOT WANTED
          52    04 A1   D0      0402   798          MOVL    MEM$L_CSR1(R1),R2      ;GET LOCAL MEMORY CSR
          00 52   1C    E2      0406   799          BBSS    #CSR1$V_IERP,R2,62$    ;SET INTERRUPT ENABLE
          04 A1   52    D0      040A   800 62$:     MOVL    R2,MEM$L_CSR1(R1)      ;WRITE BACK TO MEMORY CSR
                                040E   801
              A7 56     F4      040E   802 65$:     SOBGEQ  R6,55$                 ;LOOP THROUGH ALL POSSIBLE SLOTS
           007F 8F      BA      0411   803          POPR    #^M<R0,R1,R2,R3,R4,R5,R6>
                        05      0415   804 70$:     RSB                            ;RETURN AT LAST
                                0416   805
```

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                                                K 8
                     0416    808          .SBTTL  ERROR LOGGING ROUTINES
                     0416    809 ;
                     0416    810 ; LOGIT - ERROR LOGGING FOR MACHINE CHECKS
                     0416    811 ;
                     0416    812 ; COMMON ERROR LOGGING CODE FOR NON MEMORY MACHINE CHECKS
                     0416    813 ;
                     0416    814 ; INPUT:
                     0416    815 ;
                     0416    816 ;       R3 = ERROR LOG TYPE CODE
                     0416    817 ;       0(SP) = RETURN ADDRESS
                     0416    818 ;       4(SP) TO 28(SP) SAVED REGISTERS 0-5,AP
                     0416    819 ;       32(SP) -40(SP) MASK, PC-PSL POINTER FOR PRTCTEST
                     0416    820 ;       (AP) = LENGTH OF HARDWARE ERROR LOG FRAME (28 HEX)
                     0416    821 ;       4(AP) TO 44(AP) HARDWARE ERROR LOG INFORMATION
                     0416    822 ;       48(AP) = INTERRUPT PC
                     0416    823 ;       52(AP) = INTERRUPT PSL
                     0416    824 ;
                     0416    825
                     0416    826 LOGIT:                                          ;LOG MACHINE CHECK ERRORS
   51    F8 AC   7D  0416    827          MOVQ    -8(AP),R1                      ;MASK AND PC,PSL POINTER OF PRTCTEST
54    08    6C   C1  041A    828          ADDL3   MCK_LENGTH(AP),#<2*4>,R4       ;# OF BYTES TO LOG + PC&PSL
  55    04 AC   9E  041E    829          MOVAB   MCK_CODE(AP),R5                ;GET ADDRESS OF LOG
 00000000'GF   16  0422    830          JSB     G^EXE$MCHK_TEST                ;RECOVERY BLOCK IN EFFECT?
       06 50   E8  0428    831          BLBS    R0,20$                         ;YES, DO NOT LOG THIS ERROR
 00000000'GF   D6  042B    832          INCL    G^EXE$GL_MCHKERRS              ;BUMP THE GLOBAL MACHINE CHECK COUNTER
                     0431    833 20$:                                           ;FALL THROUGH TO ERROR LOG ROUTINE
                     0431    834
                     0431    835 ;
                     0431    836 ; LOGGER - MACHINE CHECK ERROR LOGGER
                     0431    837 ;       ALLOCATE ERROR LOG BUFFER
                     0431    838 ;       SET ENTRY TYPE IN LOG
                     0431    839 ;       MOVE LOG INTO ERROR LOG BUFFER
                     0431    840 ;       RELEASE ERROR LOG BUFFER
                     0431    841 ;
                     0431    842 ; INPUTS:
                     0431    843 ;
                     0431    844 ;       R1 = PC,PSL POINTER FOR PRTCTEST
                     0431    845 ;       R2 = MASK FOR PRTCTEST
                     0431    846 ;       R3 = ERROR TYPE
                     0431    847 ;       R4 = NUMBER OF BYTES TO LOG
                     0431    848 ;       R5 = ADDRESS OF INFORMATION TO PLACE INTO LOG
                     0431    849 ;
                     0431    850 ; OUTPUTS:
                     0431    851 ;
                     0431    852 ;       ERROR LOG IS INSERTED INTO ERROR LOG BUFFER
                     0431    853 ;
                     0431    854 ;
                     0431    855
                     0431    856 LOGGER:
 00000000'GF   16    0431    857          JSB     G^EXE$MCHK_TEST                ;RECOVERY BLOCK IN EFFECT?
       21 50   E8    0437    858          BLBS    R0,EXIT                        ;YES, DO NOT LOG THIS ERROR
                     043A    859
                     043A    860 MCHK$GL_LOG::
51    54    10  C1  043A    861          ADDL3   #EMB$B_MC_SUMCOD,R4,R1         ;SPACE FOR LOG HEADER
 00000000'GF   16    043E    862          JSB     G^ERL$ALLOCEMB                 ;GET ERROR LOGGING BUFFER
       14 50   E9    0444    863          BLBC    R0,EXIT                        ;FAILED TO GET BUFFER
          52   DD    0447    864          PUSHL   R2                             ;SAVE BUFFER ADDRESS
```

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                04 A2    53   B0  0449    865          MOVW    R3,EMB$W_MC_ENTRY(R2)    ;SET ENTRY TYPE IN LOG
            10 A2    65   54   28  044D    866          MOVC3   R4,(R5),EMB$B_MC_SUMCOD(R2) ;TRANSFER STACK TO LOG
                52    8E   D0  0452    867          MOVL    (SP)+,R2                 ;RETRIEVE BUFFER ADDRESS
                00000000'GF   16  0455    868          JSB     G^ERL$RELEASEMB          ;RELEASE BUFFER TO LOGGER
                             045B    869 EXIT:
                             05  045B    870          RSB                              ;EXIT
                             045C    871 ;
                             045C    872 ; EXE$LOGMEM - ERROR LOGGING FOR MEMORY CONTROLLERS
                             045C    873 ;
                             045C    874 ; ERROR LOGGING FOR PROCESSOR MEMORY
                             045C    875 ; MEMORIES CAN INCLUDE LOCAL AND MULTIPORT
                             045C    876 ;
                             045C    877 ; INPUTS:
                             045C    878 ;
                             045C    879 ;       R3 = ERROR LOG TYPE CODE
                             045C    880 ;       0(SP) = RETURN ADDRESS
                             045C    881 ;
                             045C    882 ; OUTPUTS:
                             045C    883 ;
                             045C    884 ;       ALL MEMORY CONTROLLERS ARE EXAMINED
                             045C    885 ;       THEIR CSR'S ARE READ AND LOGGED TO THE ERRORLOGGER
                             045C    886 ;       R0 = SUCCESS OR FAILURE INDICATION
                             045C    887 ;               SUCCESS = .TRUE. - THE MEMORY CSR'S WERE LOGGED
                             045C    888 ;               FAILURE = .FALSE. - NO DYNAMIC MEMORY AVAILABLE FOR LOG BUFFER
                             045C    889 ;       R1-R5 ARE DESTROYED
                             045C    890 ;
                             045C    891
                             045C    892 EXE$LOGMEM::
                             045C    893
      00000000'GF    D6      045C    894          INCL    G^EXE$GL_MEMERRS         ;BUMP THE GLOBAL MEMORY ERROR COUNTER
          07C0 8F    BB      0462    895          PUSHR   #^M<R6,R7,R8,R9,R10>     ;SAVE MORE REGISTERS
56    00000000'GF    D0      0466    896          MOVL    G^EXE$GL_CONFREGL,R6     ;ARRAY OF NEXUS DEVICE TYPE CODES
5A    00000000'GF    D0      046D    897          MOVL    G^MMG$GL_SBICONF,R10     ;ARRAY OF ADAPTER VA'S
                54    7C      0474    898          CLRQ    R4                       ;COUNTER FOR NO. OF BYTES TO LOG
             58    0F    D0      0476    899          MOVL    #15,R8                   ;INDEX INTO CMI SLOTS
                             0479    900 10$:
           52    6648    D0      0479    901          MOVL    (R6)[R8],R2              ;ADAPTER TYPE
                 03    12      047D    902          BNEQ    12$                      ;PROCEED IF ADAPTER PRESENT
               00A2    31      047F    903          BRW     60$
                             0482    904 12$:
           51    6A48    D0      0482    905          MOVL    (R10)[R8],R1             ;VA OF ADAPTER REGISTER
                 63    18      0486    906          BGEQ    160$                     ;GEQ IMPLIES NO VALID SYSTEM VA.
           52    E0 8F   93      0488    907          BITB    #^B11100000,R2           ;MEMORY (BITS 5:7 ARE 0) ?
                 66    13      048C    908          BEQL    20$                      ;YES
                             048E    909
        40 8F    52    91      048E    910          CMPB    R2,#^X40                 ;MULTI-PORT MEMORY (3F<TYPE<44) ?
                 57    1F      0492    911          BLSSU   160$                     ;NO
        43 8F    52    91      0494    912          CMPB    R2,#^X43
                 51    1A      0498    913          BGTRU   160$                     ;NO
             57    07    9A      049A    914          MOVZBL  #7,R7
             59    5E    D0      049D    915          MOVL    SP,R9                    ;MARK STACK IN R9
             5E    20    C2      04A0    916          SUBL    #<8*4>,SP                ;SPACE FOR MA750 LOG
                             04A3    917
                             04A3    918          $PRTCTINI W^100$,#<MCHK$M_LOG!MCHK$M_NEXM>
                             04B0    919
           79    6147    D0      04B0    920 15$:     MOVL    (R1)[R7],-(R9)           ;PUSH REGISTERS ON STACK
                F9 57    F4      04B4    921          SOBGEQ  R7,15$                   ;LOOP THROUGH ALL
```

```
                                  04B7   922
                                  04B7   923 ;
                                  04B7   924 ; CLEAR ERRORS FROM MA750
                                  04B7   925 ;
                                  04B7   926
04 A1    FF000000 8F    C8        04B7   927          BISL    #^XFF000000,MPM$L_CR(R1) ;CLEAR PORT INTERFACE CONTROL REG
08 A1    D000C000 8F    C8        04BF   928          BISL    #^XD000C000,MPM$L_SR(R1) ;CLEAR PORT CONTROLER STATUS REG
                                  04C7   929
          57    10 A1    D0      04C7   930          MOVL    MPM$L_ERR(R1),R7         ;READ MULTIPORT ERROR REGISTER
          4D 57    1C    E1      04CB   931          BBC     #MPM$V_ERR_ELR,R7,30$    ;IF CLEAR, NO ERRORS TO LOG NOW
           0010'CF48      96      04CF   932          INCB    W^ECC$AB_MEMERR[R8]      ;ACCOUNT AN ERROR
      0010'CF48    03      91      04D4   933          CMPB    #CRDINTMAX,W^ECC$AB_MEMERR[R8] ;TOO MANY ERRORS?
                   08      1A      04DA   934          BGTRU   18$                      ;NO, KEEP LOGGING THEM
          00 57    1E    E2      04DC   935          BBSS    #MPM$V_ERR_ICRD,R7,17$   ;SET INHIBIT LOGGING BIT
          10 A1    57    D0      04E0   936 17$:     MOVL    R7,MPM$L_ERR(R1)         ;WRITE IT BACK
                                  04E4   937 18$:
                                  04E4   938
                                  04E4   939          $PRTCTEND 100$
                                  04E5   940
            05 50    E8          04E5   941          BLBS    R0,110$                  ;BRANCH IF MA750 STILL HERE
       5E    1C    C0            04E8   942          ADDL    #<7*4>,SP                ;REMOVE LOG SPACE FROM STACK
             37    11            04EB   943 160$:    BRB     60$                      ;CONTINUE TO LOOK FOR SLOTS
       54    24    C0            04ED   944 110$:    ADDL    #<9*4>,R4                ;COUNT NO OF BYTES TO LOG
             2A    11            04F0   945          BRB     30$
                                  04F2   946
             85    11            04F2   947 19$:     BRB     10$
       54    10    C0            04F4   948 20$:     ADDL    #<4*4>,R4                ;MEMORY, LOG 3 LONGWORDS + SLOT INDEX
       57    02    9A            04F7   949          MOVZBL  #2,R7
          6147    DD            04FA   950 25$:     PUSHL   (R1)[R7]                 ;PUSH REGISTERS ON STACK
          FA 57    F4           04FD   951          SOBGEQ  R7,25$
       61    6E    D0            0500   952          MOVL    (SP),(R1)                ;WRITE BACK TO CLEAR MEMORY CSR
        0010'CF48    96          0503   953          INCB    W^ECC$AB_MEMERR[R8]      ;ACCOUNT ERROR TO THIS CONTROLLER
  0010'CF48    03    91          0508   954          CMPB    #CRDINTMAX,W^ECC$AB_MEMERR[R8] ;TOO MANY ERRORS FOR THIS MEMORY?
               0C    1A          050E   955          BGTRU   30$                      ;NOT YET, KEEP LOGGING
    57    04 A1    D0            0510   956          MOVL    MEM$L_CSR1(R1),R7        ;DISABLE LOGGING OF CORRECTED ERRORS
    00 57    1C    E5            0514   957          BBCC    #CSR1$V_IERP,R7,28$      ;CLEAR CONDITIONAL LOG BIT IN CSR 1
    04 A1    57    D0            0518   958 28$:     MOVL    R7,MEM$L_CSR1(R1)        ;WRITE BACK TO MEMORY CSR 1
                                  051C   959
             58    DD            051C   960 30$:     PUSHL   R8                       ;SAVE SLOT INDEX
    02 AE    52    9B            051E   961          MOVZBW  R2,2(SP)                 ;SAVE ADAPTOR TYPE
             55    D6            0522   962          INCL    R5                       ;COUNT NUMBER OF ENTRIES PUSHED
                                  0524   963
          CB 58    F4            0524   964 60$:     SOBGEQ  R8,19$                   ;LOOP THROUGH ALL 16 POSSIBLE SLOTS
             55    DD            0527   965          PUSHL   R5                       ;SAVE COUNT OF NUMBER OF ENTRIES
       54    04    C0            0529   966          ADDL    #<4*1>,R4
       55    5E    D0            052C   967          MOVL    SP,R5                    ;POINT TO LOG INFO
             54    DD            052F   968          PUSHL   R4                       ;SAVE LOG SIZE
             7E    DC            0531   969          MOVPSL  -(SP)                    ;GET CURRENT PSL FOR PRTCTEST
    51    FC AE    DE            0533   970          MOVAL   -4(SP),R1                ;ADDRESS OF PC,PSL PAIR (AFTER BSB)
             52    D4            0537   971          CLRL    R2                       ;ALWAYS LOG MEMORY ERRORS
           FEF5    30            0539   972          BSBW    LOGGER                   ;PUT INFO INTO ERROR LOG
       5E    04    C0            053C   973          ADDL    #<1*4>,SP                ;CLEAR PSL
       5E    8E    C0            053F   974          ADDL    (SP)+,SP                 ;CLEAN UP THE STACK
       07C0 8F     BA            0542   975          POPR    #^M<R6,R7,R8,R9,R10>     ;RESTORE REGISTERS
                   05            0546   976          RSB                              ;RETURN
                                 0547   977 ;
```

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                                0547   980          .SBTTL  REFLECT EXCETION TO USER
                                0547   981 ;
                                0547   982 ; REFLECT ERROR TO USER
                                0547   983 ;
                                0547   984 ; IF CURRENT MODE WAS USER OR SUPERVISOR MODE, SET UP EXCEPTION ON
                                0547   985 ; USERS KERNEL STACK AND REI TO IT
                                0547   986 ;
                                0547   987 ; IF CURRENT MODE WAS KERNEL OR EXECUTIVE MODE, ISSUE A FATAL BUG-CHECK
                                0547   988 ;
                                0547   989
                                0547   990 REFLECTCHK:                                ;REFLECT EXCEPTION TO CURRENT ACCESS MODE
                                0547   991
      0E 30 AC    19    E0    0547   992          BBS     #PSL$V_CURMOD+1,MCK_PSL(AP),20$ ;USER OR SUPER MODE?
                                054C   993
           103F 8F    BA    054C   994          POPR    #^M<R0,R1,R2,R3,R4,R5,AP>       ;RESTORE REGISTERS
     00000000'GF    16    0550   995          JSB     G^EXE$MCHK_BUGCHK               ;RECOVERY BLOCK IN EFFECT?
                                0556   996
                                0556   997          BUG_CHECK MACHINECHK,FATAL      ;BUG-CHECK IN EXEC OR KERNAL MODE
                                055A   998
                                055A   999 20$:
           50    00    DB    055A  1000          MFPR    #PR$_KSP,R0             ;GET KERNEL MODE STACK POINTER
                                055D  1001                                        ;FOR CURRENT PROCESS
        70    2C AC    7D    055D  1002          MOVQ    MCK_PC(AP),-(R0)        ;MOVE INTERRUPT PC AND PSL OF MACHINE
                                0561  1003                                        ;CHECK TO PROCESS'S KERNEL STACK
           00    50    DA    0561  1004          MTPR    R0,#PR$_KSP             ;REPLACE NEW KERNAL STACK POINTER
           103F 8F    BA    0564  1005          POPR    #^M<R0,R1,R2,R3,R4,R5,AP> ;RESTORE REGISTERS SAVED AT BEGINNING
           5E    08    C0    0568  1006          ADDL    #<2*4>,SP               ;REMOVE PRTCTEST STUFF
           5E    8E    C0    056B  1007          ADDL    (SP)+,SP                ;POP HARDWARE MACHINE CHECK LOG FROM STACK
                                056E  1008 ;
                                056E  1009 ; THIS IS A SLIGHT PIECE OF MAGIC - NOTHING SPECTACULAR
                                056E  1010 ; IF YOU HAVE RETRIEVED THE PIRATE'S CHEST, THEN THIS SHOULD BE EASY
                                056E  1011 ;
                                056E  1012 ; WE ARE NOW EXECUTING ON THE SYSTEM INTERRUPT STACK AT IPL 31
                                056E  1013 ; THE PC AND PSL FROM THIS MACHINE CHECK IS PLACED ON THE CURRENT PROCESS'S
                                056E  1014 ; KERNEL STACK.
                                056E  1015 ; THE PC AND PSL FROM THIS MACHINE CHECK ON THE INTERRUPT STACK IS REPLACED
                                056E  1016 ; BY A PC WHICH POINTS INTO THE MODULE "EXCEPTION".  THE PSL IS REPLACED
                                056E  1017 ; WITH A PSL INDICATING A KERNEL MODE EXCEPTION.
                                056E  1018 ; WHEN THE FOLLOWING REI IS EXECUTED, WE END EXECUTING ON THE KERNEL
                                056E  1019 ; STACK OF THE CURRENT PROCESS IN THE SYSTEM EXCEPTION INTERRUPT HANDLER.
                                056E  1020 ; THE CODE THERE REPORTS AN EXCEPTION TO THE CURRENT PROCESS AND REI'S BACK
                                056E  1021 ; TO WHERE THE ORIGONAL MACHINE CHECK HAPPENED.
                                056E  1022 ; IF THE CURRENT PROCESS HAS AN EXCEPTION HANDLER FOR MACHINE CHECK'S THEN
                                056E  1023 ; SOME KIND OF FORWARD ERROR RECOVERY CAN BE ENVOKED.  IF NOT, THE SYSTEM
                                056E  1024 ; LAST CHANCE HANDLER WILL END UP DELEATING THE PROCESS.
                                056E  1025 ;
        6E    00000000'GF    9E    056E  1026          MOVAB   G^EXE$MCHECK,(SP)       ;WITH MIRRORS - SET UP A PC AND
                                0575  1027                                        ;PSL FOR EXCEPTION
  04 AE    04 AE    02    18    EF    0575  1028          EXTZV   #PSL$V_CURMOD,#PSL$S_CURMOD,4(SP),4(SP) ;GET MODE WE WERE IN
     04 AE    04 AE    16    9C    057C  1029          ROTL    #PSL$V_PRVMOD,4(SP),4(SP) ;CREATE A PSL OF CURRENT TO BE
                                0582  1030                                        ;KERNAL WITH CORRECT PREVIOUS MODE
                          02    0582  1031          REI                             ;GET TO EXCEPTION HANDLER
```

```
                     0583  1035          .SBTTL  TABLE OF RESUMABLE INSTRUCTIONS.
                     0583  1036 ;       EACH BIT IN THE TABLE IS A 1 IF THE INSTRUCTION IS RESUMABLE,
                     0583  1037 ;       AND A 0 IF IT IS NOT.
                     0583  1038
                     0583  1039 RESUMABLE:
0F6B                 0583  1040          .WORD   ^B0000111101101011      ;REI,RET,SVPCTX,PROBEx,INSQUE,REMQUE
FFBF                 0585  1041          .WORD   ^B1111111110111111      ;JSB
FFFF                 0587  1042          .WORD   ^B1111111111111111
FFFF                 0589  1043          .WORD   ^B1111111111111111
FFFF                 058B  1044          .WORD   ^B1111111111111111
002F                 058D  1045          .WORD   ^B0000000000101111      ;EMODF,CVTFD,INTERLOCKED INSTRUCTIONS
0F00                 058F  1046          .WORD   ^B0000111100000000      ;DOUBLE PRECISION FLOATING POINT
C14A                 0591  1047          .WORD   ^B1100000101001010      ;MORE DOUBLE PREC/QUAD, EMUL, EDIV
FFFF                 0593  1048          .WORD   ^B1111111111111111
FFFF                 0595  1049          .WORD   ^B1111111111111111
FFFF                 0597  1050          .WORD   ^B1111111111111111
03FF                 0599  1051          .WORD   ^B0000001111111111      ;PUSHR,POPR,CHMK,CHME,CHMS,CHMU
FFFF                 059B  1052          .WORD   ^B1111111111111111
FFFF                 059D  1053          .WORD   ^B1111111111111111
FFFF                 059F  1054          .WORD   ^B1111111111111111
01FF                 05A1  1055          .WORD   ^B0000000111111111      ;CVTLP,CALLG,CALLS,XFC,ESCD,ESCE,EXCF
                     05A3  1056
```

```
05A3  1058          .END
```

```
BAD_TYPE                        0000002D R      03
BER$V_NEX                   =   00000003
BER$V_UCD                   =   00000002
BUG$_BADMCKCOD                  ********    X   03
BUG$_MACHINECHK                 ********    X   03
BUG$_RDSNONRES                  ********    X   03
BUS                             0000017D R      03
BUS_CACHE                       00000163 R      03
CADR$M_DIS                  =   00000001
CADR$V_DIS                  =   00000000
CER$V_DATA                  =   00000002
CER$V_TAG                   =   00000003
CH_PARITY                       000002BC R      03
CH_THRESHOLD                =   0000000A
CRDINTMAX                   =   00000003
CRDWATCHMAX                 =   00000006
CSR0$V_COREF                =   0000001D
CSR1$V_IERP                 =   0000001C
CS_PARITY                       000000A5 R      03
ECC$AB_MEMERR                   00000010 RG     02
ECC$GW_REENAB                   0000002E RG     02
ECC$GW_WATCH                    0000002C RG     02
ECC$REENABLE                    00000303 RG     03
EMB$B_MC_SUMCOD             =   00000010
EMB$K_AW                    =   00000007
EMB$K_HE                    =   00000008
EMB$K_MC                    =   00000002
EMB$K_SE                    =   00000006
EMB$K_SI                    =   0000000A
EMB$W_MC_ENTRY              =   00000004
ERL$ALLOCEMB                    ********    X   03
ERL$RELEASEMB                   ********    X   03
ESR$V_TB                    =   00000002
EXE$GL_BADTIMOUT                00000034 RG     02
EXE$GL_CH1OLD                   00000020 RG     02
EXE$GL_CH2OLD                   00000024 RG     02
EXE$GL_CHSTATE                  00000028 RG     02
EXE$GL_CONFREGL                 ********      X 03
EXE$GL_FLAGS                    ********    X   03
EXE$GL_MCHKERRS                 ********    X   03
EXE$GL_MEMERRS                  ********    X   03
EXE$GL_TB1AOLD                  00000000 RG     02
EXE$GL_TB1BOLD                  00000008 RG     02
EXE$GL_TB2AOLD                  00000004 RG     02
EXE$GL_TB2BOLD                  0000000C RG     02
EXE$GL_VECTIMOUT                00000038 RG     02
EXE$INT54                       000002F4 RG     03
EXE$INT58                       0000005C RG     03
EXE$INT5C                       0000005C RG     03
EXE$INT60                       000000BC RG     03
EXE$LOGAWE                      000000BC RG     03
EXE$LOGCRD                      000002F4 RG     03
EXE$LOGMEM                      0000045C RG     03
EXE$LOGSBA                      0000005C RG     03
EXE$LOGSBF                      0000005C RG     03
EXE$MCHECK                      ********      X 03
EXE$MCHK                        00000000 RG     03
EXE$MCHK_BUGCHK                 ********    X   03
EXE$MCHK_ERRCNT                 00000000 RG     02
EXE$MCHK_PRTCT                  ********    X   03
EXE$MCHK_TEST                   ********    X   03
EXE$RH780_INT                   0000005C RG     03
EXE$V_CRDENABL                  ********    X   03
EXIT                            0000045B R      03
FUBAR                           000000A5 R      03
IPL$_ASTDEL                 =   00000002
IRD_SLOT                        000000A5 R      03
LOGGER                          00000431 R      03
LOGIT                           00000416 R      03
MCHK$GL_LOG                     0000043A RG     03
MCHK$M_LOG                  =   00000001
MCHK$M_MCK                  =   00000002
MCHK$M_NEXM                 =   00000004
MCK_BER                         00000024
MCK_CER                         00000020
MCK_CODE                        00000004
MCK_ERROR_PC                    0000000C
MCK_ESR                         00000028
MCK_LENGTH                      00000000
MCK_MDR                         00000010
MCK_PC                          0000002C
MCK_PSL                         00000030
MCK_RLT                         00000018
MCK_SMR                         00000014
MCK_TBP                         0000001C
MCK_VA                          00000008
MEM$L_CSR0                      00000000
MEM$L_CSR1                      00000004
MEM$L_CSR2                      00000008
MMG$AL_SYSPCB                   ********    X   03
MMG$DEL_CONPFN                  ********    X   03
MMG$DELWSLEX                    ********    X   03
MMG$GL_CRDCNT                   00000030 RG     02
MMG$GL_MAXPFN                   ********    X   03
MMG$GL_SBICONF                  ********    X   03
MMG$GW_BIGPFN                   ********    X   03
MMG$INSPFNT                     ********    X   03
MMG$REFCNTNEG                   ********    X   03
MMG$SVAPTECHK                   ********    X   03
MPM$L_CR                    =   00000004
MPM$L_ERR                   =   00000010
MPM$L_SR                    =   00000008
MPM$V_ERR_ELR               =   0000001C
MPM$V_ERR_ICRD              =   0000001E
NO_RESUME                       000001FF R      03
PCB$L_PHD                   =   0000006C
PFN$AB_STATE                    ********    X   03
PFN$AB_TYPE                     ********    X   03
PFN$AW_REFCNT                   ********    X   03
PFN$AX_WSLX                     ********    X   03
PFN$C_BADPAGLST             =   00000002
PFN$C_PROCESS               =   00000000
PFN$C_SYSTEM                =   00000001
PFN$M_BADPAG                =   00000020
```

```
PFN$M_MODIFY                    = 00000080
PFN$S_PAGTYP                    = 00000003
PFN$V_PAGTYP                    = 00000000
PR$_IPL                         = 00000012
PR$_KSP                         = 00000000
PR$_TBIA                        = 00000039
PR$_TBIS                        = 0000003A
PR750$_CADR                     = 00000025
PR750$_CAER                     = 00000027
PR750$_MCESR                    = 00000026
PR750$_TBDR                     = 00000024
PR750$_TODR                     = 0000001B
PSL$S_CURMOD                    = 00000002
PSL$S_IPL                       = 00000005
PSL$V_CURMOD                    = 00000018
PSL$V_IPL                       = 00000010
PSL$V_PRVMOD                    = 00000016
PTE$S_PFN                       = 00000015
PTE$V_MODIFY                    = 0000001A
PTE$V_PFN                       = 00000000
PTE$V_VALID                     = 0000001F
PTE$V_WINDOW                    = 00000015
RDSNONRES                         000001BD R      03
REENABTIME                      = 00000384
REFLECTCHK                        00000547 R      03
RESUMABLE                         00000583 R      03
SCH$GL_CURPCB                     ******** X    03
SIZ...                          = 00000003
SMR$S_MODE                      = 00000002
SMR$V_MODE                      = 00000000
SOMETIME                        = 0000003C
TBDR$M_DGO                      = 00000001
TBDR$M_DG1                      = 00000002
TBDR$M_GRDP                     = 00000004
TBDR$M_REPL                     = 00000008
TBDR$V_DGO                      = 00000000
TBDR$V_DG1                      = 00000001
TBDR$V_GRDP                     = 00000002
TBDR$V_REPL                     = 00000003
TBP$M_GRPOD                     = 00000001
TBP$M_GRPOT                     = 00000004
TB_BAD                            0000015C R      03
TB_BUS                            000000F1 R      03
TB_THRESHOLD                    = 0000000A
TRYRESUME                         00000293 R      03
UCD                               0000018F R      03
```

+----------------+
! Psect synopsis !
+----------------+

PSECT name	Allocation		PSECT No.	Attributes
. ABS .	00000000	(0.)	00 (0.)	NOPIC USR CON ABS LCL NOSHR NOEXE NORD NOWRT NOVEC BYTE
ABS	00000034	(52.)	01 (1.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE
MCHK$DATA	0000003C	(60.)	02 (2.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC QUAD
WIONONPAGED	000005A3	(1443.)	03 (3.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC QUAD

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	29	00:00:00.06	00:00:00.49
Command processing	111	00:00:00.34	00:00:02.69
Pass 1	308	00:00:07.24	00:00:25.85
Symbol table sort	0	00:00:00.87	00:00:03.97
Pass 2	195	00:00:02.07	00:00:10.20
Symbol table output	19	00:00:00.11	00:00:00.20
Psect synopsis output	2	00:00:00.01	00:00:00.01
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	666	00:00:10.71	00:00:43.41

The working set limit was 1650 pages.
61858 bytes (121 pages) of virtual memory were used to buffer the intermediate code.
There were 50 pages of symbol table space allocated to hold 844 non-local and 52 local symbols.
1058 source lines were read in Pass 1, producing 22 object records in Pass 2.
34 pages of virtual memory were used to define 32 macros.

Macro library statistics

Macro library name	Macros defined
_255DUA28:[SYS.OBJ]LIB.MLB;1	19
_255DUA28:[SYSLIB]STARLET.MLB;2	8
TOTALS (all libraries)	27

888 GETS were required to define 27 macros.

There were no errors, warnings or information messages.

```
MACRO/LIS=LIS$:MCHECK750/OBJ=OBJ$:MCHECK750 MSRC$:MCHECK750/UPDATE=(ENH$:MCHECK750)+EXECML$/LIB
```

LIOSUB750
LIS

MCHECKUV1
LIS

MCHECK730
LIS

MCHECK750
LIS

LIOSUB730
LIS

LIOSUB790
LIS

MCHECK780
LIS

MCF790
LIS

MCHECK790
LIS

LIOSUB780
LIS

LIOSUBUV1
LIS