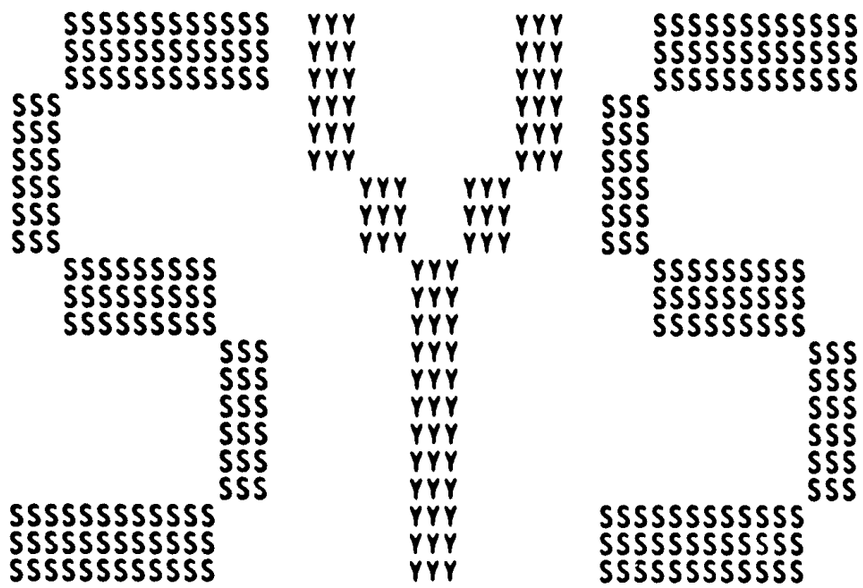

```
EEEEEEEEEE  XX      XX    CCCCCCCC  EEEEEEEEEE  PPPPPPPP    TTTTTTTTTT    IIIIII      OOOOOO    NN      NN
EEEEEEEEEE  XX      XX    CCCCCCCC  EEEEEEEEEE  PPPPPPPP    TTTTTTTTTT    IIIIII      OOOOOO    NN      NN
EE          XX      XX  CC          EE          PP      PP      TT        II      OO      OO  NN      NN
EE          XX      XX  CC          EE          PP      PP      TT        II      OO      OO  NN      NN
EE            XX  XX    CC          EE          PP      PP      TT        II      OO      OO  NNNN    NN
EE            XX  XX    CC          EE          PP      PP      TT        II      OO      OO  NNNN    NN
EEEEEEEE        XX      CC          EEEEEEEE    PPPPPPPP        TT        II      OO      OO  NN  NN  NN
EEEEEEEE        XX      CC          EEEEEEEE    PPPPPPPP        TT        II      OO      OO  NN  NN  NN
EE            XX  XX    CC          EE          PP              TT        II      OO      OO  NN    NNNN
EE            XX  XX    CC          EE          PP              TT        II      OO      OO  NN    NNNN
EE          XX      XX  CC          EE          PP              TT        II      OO      OO  NN      NN
EE          XX      XX  CC          EE          PP              TT        II      OO      OO  NN      NN
EEEEEEEEEE  XX      XX    CCCCCCCC  EEEEEEEEEE  PP              TT      IIIIII      OOOOOO    NN      NN
EEEEEEEEEE  XX      XX    CCCCCCCC  EEEEEEEEEE  PP              TT      IIIIII      OOOOOO    NN      NN

LL            IIIIII      SSSSSSSS
LL            IIIIII      SSSSSSSS
LL              II      SS
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
```

Table of contents

```
0000     1          .TITLE  EXCEPTION - EXCEPTION HANDLING
0000     2          .IDENT  'V04-000'
0000     3
0000     4  ;
0000     5  ;******************************************************************************
0000     6  ;*                                                                            *
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0000    24  ;*                                                                            *
0000    25  ;*                                                                            *
0000    26  ;******************************************************************************
0000    27  ;
0000    28  ; D. N. CUTLER 6-JUL-76
0000    29  ;
0000    30  ; MODIFIED BY:
0000    31  ;
0000    32  ;       V03-007 WMC0002         Wayne Cardoza           28-Aug-1984
0000    33  ;               Mask spurious accvio caused by 780/785 hardware bug.
0000    34  ;
0000    35  ;       V03-006 LY00B2          Larry Yetto             10-FEB-1984 09:56
0000    36  ;               Fix truncation error
0000    37  ;
0000    38  ;       V03-005 LJK0260         Lawrence J. Kenah       5-Feb-1984
0000    39  ;               Allow exception dispatching to take a detour through an
0000    40  ;               instruction emulator so that the exception parameters can
0000    41  ;               be modified to describe an exception at the site of the
0000    42  ;               emulated instruction rather than inside the emulator.
0000    43  ;               Correct errors that appeared in comments.
0000    44  ;
0000    45  ;       V03-004 ACG0393         Andrew C. Goldstein,    20-Jan-1984  1:38
0000    46  ;               Fix FP validation in condition handler search; also
0000    47  ;               call EXE$UNWIND directly to avoid P1 vectors
0000    48  ;
0000    49  ;       V03-003 WMC0001         Wayne Cardoza           28-Oct-1983
0000    50  ;               Change mode to user or supervisor handlers should not get
0000    51  ;               control in privileged modes.
0000    52  ;
0000    53  ;       V03-002 ACG0348         Andrew C. Goldstein,    4-Aug-1983  17:01
0000    54  ;               Fix unwinding to frame of exception
0000    55  ;
0000    56  ;       V03-001 ACG0310         Andrew C. Goldstein,    31-Jan-1983  13:44
0000    57  ;               Fix probing of stack after expansion
```

```
                     0000     58 ;
                     0000     59 ;
                     0000     60 ; HARDWARE EXCEPTION HANDLING
                     0000     61 ;
                     0000     62 ;****************************************************************************
                     0000     63 ;
                     0000     64 ; FAIR WARNING!! THE EXCEPTION REFLECTION AND CONDITION HANDLING CODE IN
                     0000     65 ; THIS MODULE CRAWLS WITH ASSUMPTIONS ABOUT THE FORMAT OF THE STACK AND
                     0000     66 ; ARGUMENT LISTS, AS DOCUMENTED IN VARIOUS COMMENTS THROUGHOUT. SINCE
                     0000     67 ; THE STACK POINTER MOVES FREQUENTLY, NO ATTEMPT HAS BEEN MADE TO USE
                     0000     68 ; SYMBOLIC OFFSETS FOR STACK RELATIVE REFERENCES. CHANGES TO THE STACK
                     0000     69 ; FORMAT SHOULD BE MADE ONLY AFTER THOROUGH INSPECTION AND UNDERSTANDING
                     0000     70 ; OF THE CODE (NOT TO MENTION APPENDIX C OF THE ARCHITECTURE HANDBOOK).
                     0000     71 ; NOTE ALSO THAT LIB$SIGNAL MUST TRACK THE STACK FORMATS USED HERE.
                     0000     72 ;
                     0000     73 ;****************************************************************************
                     0000     74 ;
                     0000     75 ; MACRO LIBRARY CALLS
                     0000     76 ;
                     0000     77
                     0000     78         $CHFDEF                         ;DEFINE CONDITION HANDLING ARGLIST OFFSETS
                     0000     79         $IPLDEF                         ;DEFINE INTERRUPT PRIORITY LEVELS
                     0000     80         $MCHKDEF                        ;DEFINE MACHINE CHECK RECOVERY BITS
                     0000     81         $PCBDEF                         ;DEFINE PCB OFFSETS
                     0000     82         $PHDDEF                         ;DEFINE PHD OFFSETS
                     0000     83         $PRDEF                          ;DEFINE PROCESSOR REGISTERS
                     0000     84         $PSLDEF                         ;DEFINE PROCESSOR STATUS FIELDS
                     0000     85         $SSDEF                          ;DEFINE SYSTEM STATUS VALUES
                     0000     86         $STSDEF                         ;DEFINE STATUS CODE FIELDS
                     0000     87         $VADEF                          ;DEFINE VIRTUAL ADDRESS FIELDS
                     0000     88
                     0000     89 ;
                     0000     90 ; LOCAL SYMBOLS
                     0000     91 ;
                     0000     92 ; CALL FRAME OFFSET DEFINITIONS
                     0000     93 ;
                     0000     94
00000000             0000     95 HANDLER=0                               ;CONDITION HANDLER ADDRESS
00000004             0000     96 SAVPSW=4                                ;SAVED PSW FROM CALL
00000006             0000     97 SAVMSK=6                                ;REGISTER SAVE MASK
00000008             0000     98 SAVAP=8                                 ;SAVED AP REGISTER IMAGE
0000000C             0000     99 SAVFP=12                                ;SAVED FP REGISTER IMAGE
00000010             0000    100 SAVPC=16                                ;SAVED PC REGISTER IMAGE
00000014             0000    101 SAVRG=20                                ;OTHER SAVED REGISTER IMAGES
                     0000    102
                     0000    103 ;
                     0000    104 ; LOCAL DATA
                     0000    105 ;
                     0000    106
                00000000     107         .PSECT  YEXEPAGED1,LONG
                     0000    108
00000000             0000    109 FINAL_IDX       = 0                     ;INDICES TO FETCH MESSAGE ADDRESSES
00000001             0000    110 ATTCONSTO_IDX   = 1
00000002             0000    111 BADHANDLER_IDX  = 2
00000003             0000    112 BADAST_IDX      = 3
                     0000    113
                     0000    114 MSG_VECTOR:
```

```
                                00000010'  0000    115          .ADDRESS        FINALMSG
                                00000033'  0004    116          .ADDRESS        ATTCONSTO_MSG
                                00000052'  0008    117          .ADDRESS        BADHANDLER_MSG
                                00000083'  000C    118          .ADDRESS        BADAST_MSG
                                           0010    119
                                           0010    120 FINALMSG:                                ;FINAL EXCEPTION MESSAGE
72 6F 20 6B 63 61 74 73 20 64 61 62        0010    121          .ASCIZ  /bad stack or no handler specified./ ;
20 72 65 6C 64 6E 61 68 20 6F 6E 20        001C
   00 2E 64 65 69 66 69 63 65 70 73        0028
                                           0033    122 ATTCONSTO_MSG:                           ;ATTEMPT TO CONTINUE FROM STOP MESSAGE
63 20 6F 74 20 74 70 6D 65 74 74 61        0033    123          .ASCIZ  /attempt to continue from STOP./
6D 6F 72 66 20 65 75 6E 69 74 6E 6F        003F
                  00 2E 50 4F 54 53 20     004B
                                           0052    124 BADHANDLER_MSG:                          ;BAD CONDITION HANDLER MESSAGE ADDRESS
64 6E 6F 63 20 64 69 6C 61 76 6E 69        0052    125          .ASCIZ  /invalid condition handler address or entry mask./
65 6C 64 6E 61 68 20 6E 6F 69 74 69        005E
72 6F 20 73 73 65 72 64 64 61 20 72        006A
2E 6B 73 61 6D 20 79 72 74 6E 65 20        0076
                              00           0082
                                           0083    126 BADAST_MSG:                              ;BAD AST MESSAGE ADDRESS
20 54 53 41 20 64 69 6C 61 76 6E 69        0083    127          .ASCIZ  /invalid AST address or entry mask./
65 20 72 6F 20 73 73 65 72 64 64 61        008F
   00 2E 6B 73 61 6D 20 79 72 74 6E        009B
```

```
                                00A6   129          .SBTTL  ACCESS VIOLATION FAULT
                                00A6   130 ;+
                                00A6   131 ; EXE$ACVIOLAT - ACCESS VIOLATE FAULT
                                00A6   132 ;
                                00A6   133 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN AN ACCESS VIOLATION IS
                                00A6   134 ; DETECTED. THE STATE OF THE STACK ON ENTRY IS:
                                00A6   135 ;
                                00A6   136 ;       00(SP) = ACCESS VIOLATION REASON MASK.
                                00A6   137 ;       04(SP) = ACCESS VIOLATION VIRTUAL ADDRESS.
                                00A6   138 ;       08(SP) = EXCEPTION PC.
                                00A6   139 ;       12(SP) = EXCEPTION PSL.
                                00A6   140 ;
                                00A6   141 ; ACCESS VIOLATION REASON MASK FORMAT IS:
                                00A6   142 ;
                                00A6   143 ;       BIT 0 = TYPE OF ACCESS VIOLATION.
                                00A6   144 ;               0 = PTE ACCESS CODE DID NOT PERMIT INTENTED ACCESS.
                                00A6   145 ;               1 = P0LR, P1LR, OR S0LR LENGTH VIOLATION.
                                00A6   146 ;       BIT 1 = PTE REFERENCE.
                                00A6   147 ;               0 = SPECIFIED VIRTUAL ADDRESS NOT ACCESSIBLE.
                                00A6   148 ;               1 = ASSOCIATED PAGE TABLE ENTRY NOT ACCESSIBLE.
                                00A6   149 ;       BIT 2 = INTENDED ACCESS TYPE.
                                00A6   150 ;               0 = READ.
                                00A6   151 ;               1 = MODIFY.
                                00A6   152 ;
                                00A6   153 ; THE EXCEPTION NAME FOLLOWED BY THE NUMBER OF EXCEPTION ARGUMENTS ARE
                                00A6   154 ; PUSHED ON THE STACK. FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                                00A6   155 ;-
                                00A6   156
                             00000000  157          .PSECT  $AEXENONPAGED,LONG
                                0000   158          .ALIGN  LONG
                                0000   159 EXE$ACVIOLAT::                        ;ACCESS VIOLATION FAULTS
03   0C AE    02    18    ED  0000   160          CMPZV   #PSL$V_CURMOD,#PSL$S_CURMOD,12(SP),#PSL$C_USER ; CHECK FOR USER
                          17  12  0006   161          BNEQ    20$                 ;NO, REALLY AN ACCESS VIOLATION
                          0F  BB  0008   162          PUSHR   #^M<R0,R1,R2,R3>    ;SAVE WORKING REGISTERS
          52    14 AE     D0  000A   163          MOVL    <4+<4*4>>(SP),R2    ;GET BASE ADDRESS FOR EXTEND
      0000041A'EF         16  000E   164          JSB     EXE$EXPANDSTK       ;EXPAND STACK
              06 50       E9  0014   165          BLBC    R0,10$              ;BR IF CANT EXTEND
                          0F  BA  0017   166          POPR    #^M<R0,R1,R2,R3>    ;RESTORE REGISTERS
          5E    08        C0  0019   167 5$:      ADDL    #8,SP               ;CLEAN EXCEPTION PARAMETERS FROM STACK
                          02  001C   168          REI                         ;AND RETURN TO RETRY INSTRUCTION
                          0F  BA  001D   169 10$:     POPR    #^M<R0,R1,R2,R3>    ;RESTORE REGISTERS
                              001F   170 20$:
                              001F   171 ;+
                              001F   172 ; THE FOLLOWING SECTION OF CODE IS USED TO MASK A SPURIOUS ACCESS VIOLATION
                              001F   173 ; WHICH IS SEEN ON THE 780/785.  AT THIS TIME THE EXACT CAUSE IS UNKNOWN.  IT IS
                              001F   174 ; ASSUMED TO BE EITHER HARDWARE OR MICROCODE.
                              001F   175 ;
                              001F   176 ; THE SPURIOUS ACCVIO ONLY OCCURS WHEN AN INSTRUCTION STARTS ON THE LAST BYTE
                              001F   177 ; OF A PAGE.  THE EXACT CIRCUMSTANCES ARE UNKNOWN SINCE IT CANNOT BE RELIABLY
                              001F   178 ; REPRODUCED.
                              001F   179 ;-
    04 AE    01FF 8F    B3  001F   180          BITW    #^X1FF,4(SP)            ; WAS FIRST BYTE OF PAGE REFERENCED
                          3C  12  0025   181          BNEQ    ACVIOLAT            ; NO
                          6E  D5  0027   182          TSTL    (SP)                ; WAS IT READ ACCESS
                          38  12  0029   183          BNEQ    ACVIOLAT            ; NO
7E  04 AE     08 AE    C3  002B   184          SUBL3   8(SP),4(SP),-(SP)       ; GET DIFFERENCE BETWEEN PC, REFERENCE
              01   8E    D1  0031   185          CMPL    (SP)+,#1                ; ARE THEY ADJACENT
```

```
                     2D   12  0034   186          BNEQ    ACVIOLAT                ; NO
                          01  0036   187          NOP                             ; LEAVE ROOM FOR AN INVALID IF WE NEED IT
                          01  0037   188          NOP
                          01  0038   189          NOP
                          01  0039   190          NOP
                          01  003A   191          NOP
                          01  003B   192          NOP
           04 BE    01    00   CC  003C   193          PROBER  #0,#1,@4(SP)            ; IS IT SPURIOUS
                          20   13  0041   194          BEQL    ACVIOLAT                ; NO
00000000'EF    00000000'EF   D1  0043   195          CMPL    EXE$GL_ABSTIM,EXE$GL_BADACV_T ; ARE THEY COMING FAST
                          13   13  004E   196          BEQL    ACVIOLAT                ; YES
00000000'EF    00000000'EF   D0  0050   197          MOVL    EXE$GL_ABSTIM,EXE$GL_BADACV_T ; SAVE TIME OF THIS ONE
               00000000'EF   D6  005B   198          INCL    EXE$GL_BADACV_C         ; COUNT THEM
                          B6   11  0061   199          BRB     5$                      ; GO RFTRY
                               0063   200 ACVIOLAT:                                 ;
                     7E    0C   3C  0063   201          MOVZWL  #SS$_ACCVIO,-(SP)       ;SET EXCEPTION NAME
                        00EE   31  0066   202          BRW     EX5ARG                  ;
```

```
                     0069   204          .SBTTL  ARITHMETIC TRAPS
                     0069   205 ;+
                     0069   206 ; EXE$ARITH - ARITHMETIC TRAPS
                     0069   207 ;
                     0069   208 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN AN ARITHMETIC TRAP IS
                     0069   209 ; DETECTED AT THE END OF AN INSTRUCTION. THE STATE OF THE STACK ON ENTRY
                     0069   210 ; IS:
                     0069   211 ;
                     0069   212 ;       00(SP) = ARITHMETIC EXCEPTION CODE.
                     0069   213 ;       04(SP) = EXCEPTION PC.
                     0069   214 ;       08(SP) = EXCEPTION PSL.
                     0069   215 ;
                     0069   216 ; POSSIBLE ARITHMETIC EXCEPTION CODES ARE:
                     0069   217 ;
                     0069   218 ;       0 = UNDEFINED.
                     0069   219 ;       1 = INTERGER OVERFLOW.
                     0069   220 ;       2 = INTEGER DIVIDE BY ZERO.
                     0069   221 ;       3 = FLOATING OVERFLOW.
                     0069   222 ;       4 = FLOATING OR DECIMAL DIVIDE BY ZERO.
                     0069   223 ;       5 = FLOATING UNDERFLOW.
                     0069   224 ;       6 = DECIMAL STRING OVERFLOW.
                     0069   225 ;       7 = SUBSCRIPT RANGE TRAP IN INDEX INSTRUCTION.
                     0069   226 ;       8 = FLOATING OVERFLOW FAULT.
                     0069   227 ;       9 = FLOATING DIVIDE BY ZERO FAULT.
                     0069   228 ;      10 = FLOATING UNDERFLOW FAULT.
                     0069   229 ;
                     0069   230 ; THE EXCEPTION NAME FOLLOWED BY THE NUMBER OF EXCEPTION ARGUMENTS ARE
                     0069   231 ; PUSHED ON THE STACK. FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                     0069   232 ;-
                     0069   233
                     0069   234          .ALIGN  LONG
                     006C   235 EXE$ARITH::                              ;ARITHMETIC TRAPS
          6E    08   C4   006C   236          MULL    #8,(SP)            ;CALCULATE EXCEPTION NAME OFFSET
     6E   0474 8F   A0   006F   237          ADDW    #SS$_ARTRES,(SP)   ;CALCULATE ACTUAL EXCEPTION NAME
              0104   31   0074   238          BRW     EX3ARG             ;
```

```
                     0077   240          .SBTTL  AST DELIVERY STACK FAULT
                     0077   241 ;+
                     0077   242 ; EXE$ASTFLT - AST DELIVERY STACK FAULT
                     0077   243 ;
                     0077   244 ; THIS ROUTINE IS ENTERED VIA A JMP FROM THE AST DELIVERY MODULE
                     0077   245 ; WHEN AN INVALID STACK IS DETECTED WHILE ATTEMPTING TO DELIVER AN
                     0077   246 ; AST.  THE STATE OF THE STACK ON ENTRY IS:
                     0077   247 ;
                     0077   248 ;       00(SP) = SP VALUE AT FAULT (UNMODIFIED BY AST DELIVERY).
                     0077   249 ;       04(SP) = AST PARAMETER OF FAILED AST.
                     0077   250 ;       08(SP) = PC AT AST DELIVERY INTERRUPT.
                     0077   251 ;       12(SP) = PSL AT AST DELIVERY INTERRUPT.
                     0077   252 ;       16(SP) = PC TO WHICH AST WOULD HAVE BEEN DELIVERED.
                     0077   253 ;       20(SP) = PSL AT WHICH AST WOULD HAVE BEEN DELIVERED.
                     0077   254 ;
                     0077   255 ; THE EXCEPTION NAME FOLLOWED BY THE NUMBER OF ARGUMENTS ARE PUSHED
                     0077   256 ; ON THE STACK.  FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                     0077   257 ;
                     0077   258 ; NOTE THAT THE PREVIOUS MODE FIELD IN THE PSL IS KERNEL MODE IN THIS
                     0077   259 ; ENTRY POINT, SINCE AST'S (AND AST FAULTS) RESULT FROM INTERRUPTS, AS
                     0077   260 ; OPPOSED TO ALL OTHER EXCEPTIONS WHICH RESULT FROM FAULTS OR TRAPS.
                     0077   261 ; SINCE THE EXCEPTION MAIN BODY EXPECTS PREVIOUS MODE TO BE THE MODE
                     0077   262 ; IN WHICH THE EXCEPTION OCCURRED, AND THE MODE TO WHICH IT WILL BE
                     0077   263 ; REPORTED, WE MUST FIX IT UP ACCORDINGLY.
                     0077   264 ;-
                     0077   265
                     0077   266 EXE$ASTFLT::                                ;AST DELIVERY STACK FAULT
          7E  040C 8F    3C  0077   267          MOVZWL  #SS$_ASTFLT,-(SP)       ;PUSH EXCEPTION CODE
                07       DD  007C   268          PUSHL   #7                      ;AND COUNT OF ARGUMENTS
7E  1C AE   FF3FFFFF 8F    CB  007E   269          BICL3   #^C<PSL$M_PRVMOD>,28(SP),-(SP) ;CONSTRUCT PROPER PSL
               018F'CF     9F  0087   270          PUSHAB  W^EXE$EXCEPTION         ;AND EXCEPTION ENTRY POINT
                           02  008B   271          REI                             ;SET PSL AND ENTER COMMON EXCEPTION CODE
```

```
                     008C   273          .SBTTL  BREAKPOINT FAULT
                     008C   274 ;+
                     008C   275 ; EXE$BREAK - BREAKPOINT FAULT
                     008C   276 ;
                     008C   277 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN A BREAKPOINT
                     008C   278 ; INSTRUCTION IS EXECUTED. THE STATE OF THE STACK ON ENTRY IS:
                     008C   279 ;
                     008C   280 ;       00(SP) = EXCEPTION PC.
                     008C   281 ;       04(SP) = EXCEPTION PSL.
                     008C   282 ;
                     008C   283 ; THE EXCEPTION NAME FOLLOWED BY THE NUMBER OF EXCEPTION ARGUMENTS ARE
                     008C   284 ; PUSHED ON THE STACK. FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                     008C   285 ;-
                     008C   286
                     008C   287          .ALIGN  LONG
                     008C   288 EXE$BREAK::                                ;BREAKPOINT FAULT
7E   0414 8F   3C    008C   289          MOVZWL  #SS$_BREAK,-(SP)          ;SET EXCEPTION NAME
        00E7   31    0091   290          BRW     EX3ARG                    ;
```

```
                                                H 7
                     0094   292          .SBTTL  CHANGE MODE TO SUPERVISOR TRAP
                     0094   293 ;+
                     0094   294 ; EXE$CMODSUPR - CHANGE MODE TO SUPERVISOR TRAP
                     0094   295 ;
                     0094   296 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN A CHANGE MODE TO SUPER-
                     0094   297 ; VISOR INSTRUCTION IS EXECUTED. THE STATE OF THE STACK ON ENTRY IS:
                     0094   298 ;
                     0094   299 ;       00(SP) = CHANGE MODE CODE.
                     0094   300 ;       04(SP) = EXCEPTION PC.
                     0094   301 ;       08(SP) = EXCEPTION PSL.
                     0094   302 ;
                     0094   303 ; IF THE PROCESS HAS DECLARED A CHANGE MODE TO SUPERVISOR HANDLER, THEN THE
                     0094   304 ; EXCEPTION IS DIRECTLY VECTORED TO THE SPECIFIED HANDLER. ELSE THE EXCEPTION
                     0094   305 ; NAME FOLLOWED BY THE NUMBER OF EXCEPTION ARGUMENTS ARE PUSHED ON THE STACK.
                     0094   306 ; FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                     0094   307 ;-
                     0094   308
                     0094   309          .ALIGN  LONG
                     0094   310 EXE$CMODSUPR::                                ;CHANGE MODE TO SUPERVISOR TRAP
7E   041C 8F   3C    0094   311          MOVZWL  #SS$_CMODSUPR,-(SP)         ;SET EXCEPTION NAME
     02   18   ED    0099   312          CMPZV   #PSL$V_CURMOD,#PSL$S_CURMOD,-
  02   0C AE         009C   313                  12(SP),#PSL$C_SUPER         ;WERE WE IN USER OR SUPER MODE
          08   19    009F   314          BLSS    20$                         ;NO - DON'T GIVE CONTROL TO HANDLER
00000000'9F    DD    00A1   315          PUSHL   @#CTL$GL_CMSUPR             ;GET CONTENTS OF CHANGE MODE VECTOR
          16   11    00A7   316          BRB     EXCCMD                      ;
        00DB   31    00A9   317 20$:     BRW     EXSSXT
```

```
                     00AC   319          .SBTTL  CHANGE MODE TO USER TRAP
                     00AC   320 ;+
                     00AC   321 ; EXE$CMODUSER - CHANGE MODE TO USER TRAP
                     00AC   322 ;
                     00AC   323 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN A CHANGE MODE TO USER
                     00AC   324 ; INSTRUCTION IS EXECUTED. THE STATE OF THE STACK ON ENTRY IS:
                     00AC   325 ;
                     00AC   326 ;       00(SP) = CHANGE MODE CODE.
                     00AC   327 ;       04(SP) = EXCEPTION PC.
                     00AC   328 ;       08(SP) = EXCEPTION PSL.
                     00AC   329 ;
                     00AC   330 ; IF THE PROCESS HAS DECLARED A CHANGE MODE TO USER HANLDER, THEN THE EXCEPTION
                     00AC   331 ; IS VECTORED DIRECTLY TO THE SPECIFIED HANDLER. ELSE THE EXCEPTION NAME FOLLOWED
                     00AC   332 ; BY THE NUMBER OF ARGUMENTS ARE PUSHED ON THE STACK. FINAL PROCESSING IS ACCOM-
                     00AC   333 ; PLISHED IN COMMON CODE.
                     00AC   334 ; IF THIS CODE IS ENTERED IN OTHER THAN USER MODE, IT IS TREATED AS THOUGH NO
                     00AC   335 ; USER HANDLER WERE DELARED.
                     00AC   336 ;-
                     00AC   337
                     00AC   338          .ALIGN  LONG
                     00AC   339          .ENABL  LSB
                     00AC   340 EXE$CMODUSER::                               ;CHANGE MODE TO USER TRAP
7E   0424 8F    3C   00AC   341          MOVZWL  #SS$_CMODUSER,-(SP)        ;SET EXCEPTION NAME
     02   18    ED   00B1   342          CMPZV   #PSL$V_CURMOD,#PSL$S_CURMOD,-
  03   0C AE         00B4   343                  12(SP),#PSL$C_USER         ;WERE WE IN USER MODE
          0F    12   00B7   344          BNEQ    20$                        ;NO - DON'T GIVE CONTROL TO HANDLER
00000000'9F     DD   00B9   345          PUSHL   @#CTL$GL_CMUSER            ;GET CONTENTS OF CHANGE MODE VECTOR
          04    13   00BF   346 EXCCMD: BEQL    10$                        ;IF EQL NO DISPATCHER SPECIFIED
          6E 8ED0     00C1   347          POPL    (SP)                       ;REMOVE EXCEPTION NAME FROM STACK
                05    00C4   348          RSB                                ;
     5E   04   C0   00C5   349 10$:    ADDL    #4,SP                      ;CLEAN STACK
        00BC   31   00C8   350 20$:    BRW     EXSSX1                     ;
                     00CB   351          .DSABL  LSB
```

```
                        00CB    353          .SBTTL  COMPATIBILITY MODE FAULTS
                        00CB    354 ;+
                        00CB    355 ; EXE$COMPAT - COMPATIBILITY MODE FAULT
                        00CB    356 ;
                        00CB    357 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN A COMPATIBILITY MODE
                        00CB    358 ; EXCEPTION IS DETECTED. THE STATE OF THE STACK ON ENTRY IS:
                        00CB    359 ;
                        00CB    360 ;       00(SP) = COMPATIBILITY EXCEPTION CODE.
                        00CB    361 ;       04(SP) = EXCEPTION PC.
                        00CB    362 ;       08(SP) = EXCEPTION PSL.
                        00CB    363 ;
                        00CB    364 ; POSSIBLE COMPATIBILITY EXCEPTION CODES ARE:
                        00CB    365 ;
                        00CB    366 ;       0 = RESERVED INSTRUCTION EXECUTION.
                        00CB    367 ;       1 = BPT INSTRUCTION EXECUTION.
                        00CB    368 ;       2 = IOT INSTRUCTION EXECUTION.
                        00CB    369 ;       3 = EMT INSTRUCTION EXECUTION.
                        00CB    370 ;       4 = TRAP INSTRUCTION EXECUTION.
                        00CB    371 ;       5 = ILLEGAL INSTRUCTION EXECUTION.
                        00CB    372 ;       6 = ODD ADDRESS FAULT.
                        00CB    373 ;       7 = TBIT TRAP.
                        00CB    374 ;
                        00CB    375 ; THE EXCEPTION NAME FOLLOWED BY THE NUMBER OF EXCEPTION ARGUMENTS ARE
                        00CB    376 ; PUSHED ON THE STACK. FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                        00CB    377 ;-
                        00CB    378
                        00CB    379          .ALIGN  LONG
                        00CC    380 EXE$COMPAT::                                ;COMPATIBILITY MODE FAULTS
00000000'9F   50   7D   00CC    381          MOVQ    R0,@#CTL$AL_CMCNTX      ;SAVE R0,R1 IN COMPATIBILITY CONTEXT REGION
50  00000008'9F   DE   00D3    382          MOVAL   @#CTL$AL_CMCNTX+8,R0    ;GET ADDRESS OF COMPATIBILITY CONTEXT AREA
          80   52   7D   00DA    383          MOVQ    R2,(R0)+                ;SAVE R2,R3
          80   54   7D   00DD    384          MOVQ    R4,(R0)+                ;SAVE R4,R5
          80   56   D0   00E0    385          MOVL    R6,(R0)+                ;SAVE R6
          80   8E   D0   00E3    386          MOVL    (SP)+,(R0)+             ;SAVE EXCEPTION CODE AND REMOVE FROM STACK
          60   8E   7D   00E6    387          MOVQ    (SP)+,(R0)              ;SAVE PC AND PSL AND REMOVE FROM STACK
03C00000   8F   DD   00E9    388          PUSHL   #<PSL$C_USER@PSL$V_PRVMOD>!<PSL$C_USER@PSL$V_CURMOD> ;FABRICATE PSL
00000000'9F   DD   00EF    389          PUSHL   @#CTL$GL_CMHANDLR               ;COMPATIBILITY MODE HANDLER ADDRESS
          01   13   00F5    390          BEQL    20$                             ;BRANCH IF NONE SPECIFIED
               02   00F7    391          REI                                     ;JUMP TO COMPATIBILITY HANDLER
                    00F8    392
                    00F8    393 ;
                    00F8    394 ; NO COMPATIBILITY MODE HANDLER WAS DECLARED.  RESTORE THE STACK AND
                    00F8    395 ; SAVED REGISTER, AND CONTINUE THROUGH NORMAL EXCEPTION CODE.  R0 NOW
                    00F8    396 ; POINTS TO THE SAVED PC IN THE COMPATIBILITY CONTEXT AREA.
                    00F8    397 ;
                    00F8    398
     6E   60   7D   00F8    399 20$:     MOVQ    (R0),(SP)                       ;RESTORE EXCEPTION PC AND PSL
          70   DD   00FB    400          PUSHL   -(R0)                           ;PUSH EXCEPTION CODE AGAIN
   50     E4   A0   D0   00FD    401          MOVL    -28(R0),R0              ;RESTORE R0 FROM TOP OF CONTEXT AREA
7E   042C   8F   3C   0101    402          MOVZWL  #SS$_COMPAT,-(SP)       ;SET EXCEPTION NAME
          04   DD   0106    403 EX4ARG:  PUSHL   #4                              ;SET NUMBER OF SIGNAL ARGUMENTS
        0084   31   0108    404          BRW     EXE$EXCEPTION                   ;FINISH IN COMMON CODE
```

```
010B   406          .SBTTL  KERNEL STACK NOT VALID FAULT
010B   407 ;+
010B   408 ; EXE$KERSTKNV - KERNEL STACK NOT VALID FAULT
010B   409 ;
010B   410 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN A KERNEL STACK NOT
010B   411 ; VALID IS DETECTED DURING A CHANGE MODE INSTRUCTION, DURING AN REI
010B   412 ; INSTRUCTION, OR DURING AN ATTEMPT TO PUSH EXCEPTION INFORMATION ON
010B   413 ; THE KERNEL STACK. THIS EXCEPTION RUNS ON THE INTERRUPT STACK. THE
010B   414 ; STATE OF THE STACK ON ENTRY IS:
010B   415 ;
010B   416 ;       00(SP) = EXCEPTION PC.
010B   417 ;       04(SP) = EXCEPTION PSL.
010B   418 ;
010B   419 ; A FATAL KERNEL STACK NOT VALID BUGCHECK IS DECLARED.
010B   420 ;-
010B   421
010B   422          .ALIGN  LONG
010C   423 EXE$KERSTKNV::                            ;KERNEL STACK NOT VALID FAULT
010C   424          BUG_CHECK KRNLSTAKNV,FATAL       ;KERNEL STACK NOT VALID
```

```
                     0110   426          .SBTTL  SIGNAL UNRECOVERABLE MACHINE CHECK
                     0110   427 ;+
                     0110   428 ; EXE$MCHECK - SIGNAL UNRECOVERABLE MACHINE CHECK
                     0110   429 ;
                     0110   430 ; THIS ROUTINE IS ENTERED FROM THE MACHINE CHECK HANDLER TO SIGNAL
                     0110   431 ; THE ERROR BACK TO EITHER USER OR SUPERVISOR MODE.  IF THE MACHINE
                     0110   432 ; CHECK OCCURRED IN EXEC OR KERNEL MODE CONTROL DOES NOT COME HERE
                     0110   433 ; AND INSTEAD THE MACHINE CHECK HANDLER BUGCHECKS.
                     0110   434 ; STATE OF THE STACK ON ENTRY IS:
                     011C   435 ;
                     0110   436 ;       00(SP) = EXCEPTION PC
                     0110   437 ;       04(SP) = EXCEPTION PSL
                     0110   438 ;
                     0110   439 ; POSSIBLE CODES ARE:
                     0110   440 ;
                     0110   441 ;
                     0110   442 ; NO ALIGNMENT IS NECESSARY HERE, REI GETS US HERE
                     0110   443 ;-
                     0110   444
                     0110   445 EXE$MCHECK::
7E   02BC 8F   3C    0110   446          MOVZWL  #SS$_MCHECK,-(SP)       ;SET EXCEPTION NAME
          64   11    0115   447          BRB     EX3ARG                  ;FINISH IN COMMON CODE
```

```
                     0117   449          .SBTTL  OPCODE RESERVED TO CUSTOMER FAULT
                     0117   450 ;+
                     0117   451 ; EXE$OPCCUS - OPCODE RESERVED TO CUSTOMER FAULT
                     0117   452 ;
                     0117   453 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN AN OPCODE THAT IS RESERVED
                     0117   454 ; TO CUSTOMERS IS EXECUTED. THE STATE OF THE STACK ON ENTRY IS:
                     0117   455 ;
                     0117   456 ;       00(SP) = EXCEPTION PC.
                     0117   457 ;       04(SP) = EXCEPTION PSL.
                     0117   458 ;
                     0117   459 ; THE EXCEPTION NAME FOLLOWED BY THE NUMBER OF EXCEPTION ARGUMENTS ARE
                     0117   460 ; PUSHED ON THE STACK. FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                     0117   461 ;-
                     0117   462
                     0117   463          .ALIGN  LONG
                     0118   464 EXE$OPCCUS::                                ;OPCODE RESERVED TO CUSTOMERS FAULT
7E   0434 8F   3C    0118   465          MOVZWL  #SS$_OPCCUS,-(SP)          ;SET EXCEPTION NAME
          5C   11    011D   466          BRB     EX3ARG                     ;
```

```
                                                N 7
                     011F   468          .SBTTL  OPCODE RESERVED TO DIGITAL FAULT
                     011F   469 ;+
                     011F   470 ; EXE$OPCDEC - OPCODE RESERVED TO DIGITAL FAULT
                     011F   471 ;
                     011F   472 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN AN OPCODE THAT IS RESERVED
                     011F   473 ; TO DIGITAL IS EXECUTED. THE STATE OF THE STACK ON ENTRY IS:
                     011F   474 ;
                     011F   475 ;       00(SP) = EXECPTION PC.
                     011F   476 ;       04(SP) = EXCEPTION PSL.
                     011F   477 ;
                     011F   478 ; THE EXCEPTION NAME FOLLOWED BY THE NUMBER OF EXCEPTION ARGUMENTS ARE
                     011F   479 ; PUSHED ON THE STACK. FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                     011F   480 ;-
                     011F   481
                     011F   482          .ALIGN  LONG
                     0120   483 EXE$OPCDEC::                             ;OPCODE RESERVED TO DIGITAL FAULT
00 BE    FF 8F   91  0120   484          CMPB    #^XFF,@(SP)             ;POSSIBLY A BUG CHECK?
              07   13  0125   485          BEQL    20$                     ;IF EQL YES
 7E   043C 8F   3C  0127   486 10$:       MOVZWL  #SS$_OPCDEC,-(SP)       ;SET EXCEPTION NAME
              4D   11  012C   487          BRB     EX3ARG                  ;
              6E   DD  012E   488 20$:     PUSHL   (SP)                    ;COPY ADDRESS OF INSTRUCTION
              6E   D6  0130   489          INCL    (SP)                    ;CALCULATE ADDRESS OF NEXT BYTE
                   0132   490          IFNORD  #1,@(SP),40$            ;CAN NEXT BYTE BE READ?
00 BE    FE 8F   91  0139   491          CMPB    #^XFE,@(SP)             ;BUGCHECK WORD?
              08   13  013E   492          BEQL    30$                     ;IF EQL YES
   9E    FD 8F   91  0140   493          CMPB    #^XFD,@(SP)+            ;BUGCHECK LONG?
              E1   12  0144   494          BNEQ    10$                     ;IF NEG NO
              7E   D5  0146   495          TSTL    -(SP)                   ;ADJUST STACK POINTER
              8E   D5  0148   496 30$:     TSTL    (SP)+                   ;REMOVE INSTRUCTION ADDRESS FROM STACK
            FEB3'  31  014A   497          BRW     EXE$BUG_CHECK           ;
              00   DD  014D   498 40$:     PUSHL   #0                      ;SET REASON FOR ACCESS VIOLATION
            FEAE   31  014F   499          BRW     EXE$ACVIOLAT            ;
```

```
                     0152   501          .SBTTL  PAGE READ FAULT
                     0152   502 ;+
                     0152   503 ; EXE$PAGRDERR - PAGE READ FAULT
                     0152   504 ;
                     0152   505 ; THIS ROUTINE IS ENTERED VIA A JUMP FROM THE TRANSLATION NOT VALID
                     0152   506 ; EXCEPTION ROUTINE WHEN A READ ERROR OCCURS IN TRYING TO MAKE THE
                     0152   507 ; DESIRED PAGE VALID.  THE STATE OF THE STACK ON ENTRY IS:
                     0152   508 ;
                     0152   509 ;       00(SP) = TRANSLATION NOT VALID REASON MASK.
                     0152   510 ;       04(SP) = TRANSLATION NOT VALID VIRTUAL ADDRESS.
                     0152   511 ;       08(SP) = EXCEPTION PC.
                     0152   512 ;       12(SP) = EXCEPTION PSL.
                     0152   513 ;
                     0152   514 ; TRANSLATION NOT VALID REASON MASK FORMAT IS:
                     0152   515 ;
                     0152   516 ;       BIT 0 = 0 (USED ONLY FOR ACCESS VIOLATION).
                     0152   517 ;       BIT 1 = PTE REFERENCE.
                     0152   518 ;               0 = SPECIFIED VIRTUAL ADDRESS NOT VALID.
                     0152   519 ;               1 = ASSOCIATED PAGE TABLE ENTRY NOT VALID.
                     0152   520 ;       BIT 2 = INTENDED ACCESS TYPE.
                     0152   521 ;               0 = READ.
                     0152   522 ;               1 = MODIFY.
                     0152   523 ;
                     0152   524 ; THE EXCEPTION NAME FOLLOWED BY THE NUMBER OF EXCEPTION ARGUMENTS ARE
                     0152   525 ; PUSHED ON THE STACK. FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                     0152   526 ;-
                     0152   527
                     0152   528 EXE$PAGRDERR::                               ;PAGE READ ERROR
7E   0444 8F    3C   0152   529          MOVZWL  #SS$_PAGRDERR,-(SP)         ;SET EXCEPTION NAME
        05      DD   0157   530 EXSARG:  PUSHL   #5                          ;SET NUMBER OF SIGNAL ARGUMENTS
      0033      31   0159   531          BRW     EXE$EXCEPTION               ;FINISH IN COMMON CODE
```

```
                     015C   533          .SBTTL  RESERVED ADDRESSING MODE FAULT
                     015C   534 ;+
                     015C   535 ; EXE$RADRMOD - RESERVED ADDRESSING MODE FAULT
                     015C   536 ;
                     015C   537 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN AN ATTEMPT TO USE A
                     015C   538 ; RESERVED ADDRESSING MODE IS DETECTED. THE STATE OF THE STACK ON ENTRY
                     015C   539 ; IS:
                     015C   540 ;
                     015C   541 ;       00(SP) = EXCEPTION PC.
                     015C   542 ;       04(SP) = EXCEPTION PSL.
                     015C   543 ;
                     015C   544 ; THE EXCEPTION NAME FOLLOWED BY THE NUMBER OF EXCEPTION ARGUMENTS ARE
                     015C   545 ; PUSHED ON THE STACK. FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                     015C   546 ;-
                     015C   547
                     015C   548          .ALIGN  LONG
                     015C   549 EXE$RADRMOD::                            ;RESERVED ADDRESSING MODE FAULT
7E   044C 8F   3C    015C   550          MOVZWL  #SS$_RADRMOD,-(SP)      ;SET EXCEPTION NAME
          18   11    0161   551          BRB     EX3ARG                  ;
```

```
                     0163   553          .SBTTL  RESERVED OPERAND FAULT
                     0163   554 ;+
                     0163   555 ; EXE$ROPRAND - RESERVED OPERAND FAULT
                     0163   556 ;
                     0163   557 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN AN ATTEMPT TO USE A
                     0163   558 ; RESERVED OPERAND IS DETECTED. THE STATE OF THE STACK ON ENTRY IS:
                     0163   559 ;
                     0163   560 ;       00(SP) = EXCEPTION PC.
                     0163   561 ;       04(SP) = EXCEPTION PSL.
                     0163   562 ;
                     0163   563 ; THE EXCEPTION NAME FOLLOWED BY THE NUMBER OF EXCEPTION ARGUMENTS ARE
                     0163   564 ; PUSHED ON THE STACK. FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                     0163   565 ;-
                     0163   566
                     0163   567          .ALIGN  LONG
                     0164   568 EXE$ROPRAND::                           ;RESERVED OPERAND FAULT
7E   0454 8F    3C  0164   569          MOVZWL  #SS$_ROPRAND,-(SP)      ;SET EXCEPTION NAME
           10    11  0169   570          BRB     EX3ARG                  ;
```

```
                     016B   572          .SBTTL  TBIT PENDING TRAP
                     016B   573 ;+
                     016B   574 ; EXE$TBIT - TBIT PENDING TRAP
                     016B   575 ;
                     016B   576 ; THIS ROUTINE IS AUTOMATICALLY VECTORED TO WHEN A TBIT PENDING EXCEPTION
                     016B   577 ; IS DETECTED AT THE END OF AN INSTRUCTION. THE STATE OF THE STACK ON ENTRY
                     016B   578 ; IS:
                     016B   579 ;
                     016B   580 ;       00(SP) = EXCEPTION PC.
                     016B   581 ;       04(SP) = EXCEPTION PSL.
                     016B   582 ;
                     016B   583 ; IF THE TRAP OCCURED FROM COMPATIBILITY MODE, THEN THE CODE FOR COMPATIBILITY
                     016B   584 ; MODE TBIT TRAP (7) IS PUSHED ON THE STACK AND AN EXIT IS MADE THROUGH
                     016B   585 ; THE COMPATIBILITY MODE EXCEPTION ROUTINE. ELSE THE TBIT EXCEPTION NAME
                     016B   586 ; FOLLOWED BY THE NUMBER OF EXCEPTION ARGUMENTS ARE PUSHED ON THE STACK.
                     016B   587 ; FINAL PROCESSING IS ACCOMPLISHED IN COMMON CODE.
                     016B   588 ;-
                     016B   589
                     016B   590          .ALIGN  LONG
                     016C   591 EXE$TBIT::                                ;TBIT PENDING TRAP
           07   DD   016C   592          PUSHL   #7                       ;ASSUME TRAP FROM COMPATIBILITY MODE
03 08 AE    1F   E1   016E   593          BBC     #PSL$V_CM,8(SP),10$      ;IF CLEAR, NOT FROM COMPATIBILITY MODE
      FF56   31   0173   594          BRW     EXE$COMPAT               ;IF SET, GO TO COMPATIBILITY MODE CODE
 6E   045D 8F   A0   0176   595 10$:     ADDW    #SS$_TBIT-7,(SP)         ;ADJUST NAME TO THAT FOR TBIT
           03   DD   017B   596 EX3ARG: PUSHL   #3                       ;SET NUMBER OF SIGNAL ARGUMENTS
         000F   31   017D   597          BRW     EXE$EXCEPTION            ;
```

```
                     0180   599          .SBTTL  SYSTEM SERVICE FAILURE EXCEPTION
                     0180   600 ;+
                     0180   601 ; EXE$SSFAIL - SYSTEM SERVICE FAILURE EXCEPTION
                     0180   602 ;
                     0180   603 ; THIS ROUTINE IS JUMPED TO FROM THE SYSTEM SERVICE CHANGE MODE DISPATCHER
                     0180   604 ; WHEN THE RETURN STATUS FROM A SYSTEM SERVICE INDICATES FAILURE, THE
                     0180   605 ; PREVIOUS MODE WAS USER, AND THE CURRENT PROCESS IS ENABLED FOR SYSTEM
                     0180   606 ; SERVICE FAILURE EXCEPTIONS. THE STATE OF THE STACK ON ENTRY IS:
                     0180   607 ;
                     0180   608 ;       00(SP) = CHANGE MODE PC.
                     0180   609 ;       04(SP) = CHANGE MODE PSL.
                     0180   610 ;
                     0180   611 ; WITH:
                     0180   612 ;
                     0180   613 ;       R0 = FINAL SYSTEM SERVICE STATUS.
                     0180   614 ;-
                     0180   615
                     0180   616 EXE$SSFAIL::                                ;SYSTEM SERVICE FAILURE EXCEPTION
           50    DD  0180   617          PUSHL   R0                          ;PUSH REASON FOR SERVICE FAILURE
      7E   045C 8F    3C  0182   618          MOVZWL  #SS$_SSFAIL,-(SP)           ;SET EXCEPTION NAME
                     0187   619
                     0187   620 ;
                     0187   621 ; THE FOLLOWING EXCEPTIONS CONVERGE TO THIS POINT:
                     0187   622 ;
                     0187   623 ;       CHANGE MODE TO SUPERVISOR,
                     0187   624 ;       CHANGE MODE TO USER, AND
                     0187   625 ;       SYSTEM SERVICE FAILURE.
                     0187   626 ;
                     0187   627
           04    DD  0187   628 EXSSXT: PUSHL   #4                          ;SET NUMBER OF SIGNAL ARGUMENTS
 000000A6'EF    17  0189   629          JMP     EXE$REFLECT                 ;REFLECT EXCEPTION TO PREVIOUS MODE
```

```
                        018F    631          .SBTTL  REFLECT EXCEPTION FROM MODE OTHER THAN KERNEL
                        018F    632 ;+
                        018F    633 ; EXE$REFLECT - REFLECT EXCEPTION FROM MODE OTHER THAN KERNEL
                        018F    634 ;
                        018F    635 ; THIS ROUTINE IS JUMPED TO REFLECT AN EXCEPTION FROM A MODE OTHER THAN KERNEL.
                        018F    636 ; THE SIGNAL ARGUMENTS ARE ASSUMED TO BE SET UP PROPERLY ON THE STACK.
                        018F    637 ; NOTE THAT THE PREVIOUS MODE FIELD OF THE PSL CONTAINS THE ACCESS MODE
                        018F    638 ; OF THE EXCEPTION.
                        018F    639 ;-
                        018F    640
                 000000A6    641          .PSECT  YEXEPAGED1
                     00A6    642 EXE$REFLECT::                           ;REFLECT EXCEPTION
          01    DD   00A6    643          PUSHL   #1                     ;SAVE CODE INDICATING SIGNAL
          03    BB   00A8    644          PUSHR   #^M<R0,R1>             ;SAVE REGISTERS R0 AND R1
    7E    03    CE   00AA    645          MNEGL   #3,-(SP)               ;SET INITIAL FRAME DEPTH
          5D    DD   00AD    646          PUSHL   FP                     ;SET INITIAL HANDLER ESTABLISHER FRAME
          04    DD   00AF    647          PUSHL   #4                     ;SET NUMBER OF MECHANISM ARGUMENTS
                     00B1    648
                     00B1    649 ;
                     00B1    650 ; AT THIS POINT THE STACK HAS THE FOLLOWING FORMAT:
                     00B1    651 ;
                     00B1    652 ;       00(SP) = NUMBER OF MECHANISM ARGUMENTS (ALWAYS 4).
                     00B1    653 ;       04(SP) = FP OF HANDLER ESTABLISHER FRAME (TENTATIVE).
                     00B1    654 ;       08(SP) = FRAME DEPTH (ALWAYS -3).
                     00B1    655 ;       12(SP) = SAVED R0.
                     00B1    656 ;       16(SP) = SAVED R1.
                     00B1    657 ;       20(SP) = FLAGS LONGWORD
                     00B1    658 ;       24(SP) = NUMBER OF SIGNAL ARGUMENTS.
                     00B1    659 ;       28(SP) = EXCEPTION NAME (INTEGER VALUE).
                     00B1    660 ;       32(SP) = FIRST EXCEPTION PARAMETER (IF ANY).
                     00B1    661 ;       36(SP) = SECOND EXCEPTION PARAMETER (IF ANY).
                     00B1    662 ;              .
                     00B1    663 ;              .
                     00B1    664 ;              .
                     00B1    665 ;       28+N*4(SP) = N'TH EXCEPTION PARAMETER (IF ANY).
                     00B1    666 ;       28+N*4+4(SP) = EXCEPTION PC.
                     00B1    667 ;       28+N*4+8(SP) = EXCEPTION PSL.
                     00B1    668 ;
                     00B1    669
          50    DC   00B1    670          MOVPSL  R0                     ;READ CURRENT PSL
51  50    02    18   EF 00B3    671          EXTZV   #PSL$V_CURMOD,#PSL$S_CURMOD,R0,R1 ;CURRENT MODE KERNEL?
          69    13   00B8    672          BEQL    30$                    ;IF EQL YES
51  50    02    16   ED 00BA    673          CMPZV   #PSL$V_PRVMOD,#PSL$S_PRVMOD,R0,R1 ;IS CURRENT EQL PREVIOUS?
          68    13   00BF    674          BEQL    40$                    ;IF EQL YES
                     00C1    675
                     00C1    676 ;
                     00C1    677 ; ADJUST PREVIOUS MODE STACK POINTER USING SYSTEM SERVICE
                     00C1    678 ;
                     00C1    679
          1C    BB   00C1    680          PUSHR   #^M<R2,R3,R4>          ;SAVE REGISTERS R2, R3, AND R4
  53  24 AE    07   C1 00C3    681          ADDL3   #7,36(SP),R3           ;CALCULATE NUMBER OF LONGWORDS TO MOVE
          01EF'CF   9F 00C8    682          PUSHAB  W^NORMAL               ;ASSUME INFORMATION CAN BE COPIED
          7E    D4   00CC    683          CLRL    -(SP)                  ;SET TO USE CURRENT STACK POINTER VALUE
          6E    9F   00CE    684          PUSHAB  (SP)                   ;PUSH ADDRESS TO STORE UPDATED STACK VALUE
    7E    53    02   78 00D0    685          ASHL    #2,R3,-(SP)            ;CALCULATE STACK ADJUSTMENT VALUE
          6E    6E   CE 00D4    686          MNEGL   (SP),(SP)              ;SET NEGATIVE ADJUSTMENT VALUE
7E  50    02    16   EF 00D7    687          EXTZV   #PSL$V_PRVMOD,#PSL$S_PRVMOD,R0,-(SP) ;PUSH ACCESS MODE OF STACK
```

```
                                                H 8
                      03   DD  00DC   688          PUSHL   #3                              ;PUSH NUMBER OF ARGUMENTS
          00000000'9F    6E   FA  00DE   689          CALLG   (SP),@#SYS$ADJSTK              ;ADJUST PREVIOUS MODE STACK POINTER
                   33 50   E8  00E5   690          BLBS    R0,20$                          ;IF LBS SUCCESSFUL COMPLETION
           14 AE   0292'CF   9E  00E8   691 10$:     MOVAB   W^BADSTACK,20(SP)               ;SET BAD STACK RETURN
               52   04 AE   D0  00EE   692          MOVL    4(SP),R2                        ;RETRIEVE PREVIOUS ACCESS MODE
     10 AE   00000000'9F42   D0  00F2   693          MOVL    @#CTL$AL_STACK[R2],16(SP)       ;SET TO USE SPECIFED STACK POINTER VALUE
          00000000'EF    6E   FA  00FB   694          CALLG   (SP),SYS$ADJSTK                 ;RELOAD PREVIOUS MODE STACK POINTER
                   16 50   E8  0102   695          BLBS    R0,20$                          ;IF LBS SUCCESSFUL COMPLETION
   7E   00000000'9F42    04   C3  0105   696          SUBL3   #4,@#CTL$AL_STACK[R2],-(SP)     ;CALCULATE TOP ADDRESS OF STACK RANGE
        7E   6E    0C AE   C1  010E   697          ADDL3   12(SP),(SP),-(SP)               ;CALCULATE BOTTOM ADDRESS OF STACK RANGE
                  008C   30  0113   698          BSBW    CRESTACK                        ;RE-CREATE VIRTUAL SPACE UNDER STACK
                   5E    08   C0  0116   699          ADDL    #8,SP                           ;REMOVE VIRTUAL ADDRESS DESCRIPTOR
                         CD   11  0119   700          BRB     10$                             ;AND TRY AGAIN
                              011B   701
                   5E    10   C0  011B   702 20$:     ADDL    #16,SP                          ;REMOVE ARGUMENT LIST FROM STACK
                         02   BA  011E   703          POPR    #^M<R1>                         ;GET NEW PREVIOUS MODE STACK POINTER VALUE
                     01EB   31  0120   704          BRW     COPYARGS                        ;
                0000019A'EF   17  0123   705 30$:     JMP     REFLECT                         ;
                     00C3   31  0129   706 40$:     BRW     NORMAL                          ;
```

```
                                                                I 8
                     012C    708          .SBTTL  COMMON EXCEPTION EXIT
                     012C    709 ;
                     012C    710 ; ALL EXCEPTIONS CONVERGE TO THIS POINT WITH:
                     012C    711 ;
                     012C    712 ;       00(SP) = NUMBER OF SIGNAL ARGUMENTS.
                     012C    713 ;       04(SP) = EXCEPTION NAME (INTEGER VALUE).
                     012C    714 ;       08(SP) = FIRST EXCEPTION PARAMETER (IF ANY).
                     012C    715 ;       12(SP) = SECOND EXCEPTION PARAMETER (IF ANY).
                     012C    716 ;              .
                     012C    717 ;              .
                     012C    718 ;              .
                     012C    719 ;       04+N*4(SP) = N'TH EXCEPTION PARAMETER (IF ANY).
                     012C    720 ;       04+N*4+4(SP) = EXCEPTION PC.
                     012C    721 ;       04+N*4+8(SP) = EXCEPTION PSL.
                     012C    722 ;
                     012C    723 ; NOTE THAT THE PREVIOUS MODE FIELD OF THE PSL CONTAINS THE ACCESS MODE
                     012C    724 ; OF THE EXCEPTION.
                     012C    725 ;
                     012C    726
                0000018F     727          .PSECT  $AEXENONPAGED,LONG
                     018F    728          .ENABL  LSB
                     018F    729 EXE$EXCEPTION::                         ;THIS LABEL MUST BE GLOBAL FOR MP CODE
          01    DD   018F    730          PUSHL   #1                     ;SET CODE INDICATING SIGNAL
          03    BB   0191    731          PUSHR   #^M<R0,R1>             ;SAVE REGISTERS R0 AND R1
       7E 03    CE   0193    732          MNEGL   #3,-(SP)               ;SET INITIAL FRAME DEPTH
          5D    DD   0196    733          PUSHL   FP                     ;SET INITIAL HANDLER ESTABLISHER FRAME
          04    DD   0198    734          PUSHL   #4                     ;SET NUMBER OF MECHANISM ARGUMENTS
                     019A    735
                     019A    736 ;
                     019A    737 ; AT THIS POINT THE STACK HAS THE FOLLOWING FORMAT:
                     019A    738 ;
                     019A    739 ;       00(SP) = NUMBER OF MECHANISM ARGUMENTS (ALWAYS 4).
                     019A    740 ;       04(SP) = FP OF HANDLER ESTABLISHER FRAME (TENTATIVE).
                     019A    741 ;       08(SP) = FRAME DEPTH (ALWAYS -3).
                     019A    742 ;       12(SP) = SAVED R0.
                     019A    743 ;       16(SP) = SAVED R1.
                     019A    744 ;       20(SP) = FLAGS LONGWORD
                     019A    745 ;       24(SP) = NUMBER OF SIGNAL ARGUMENTS.
                     019A    746 ;       28(SP) = EXCEPTION NAME (INTEGER VALUE).
                     019A    747 ;       32(SP) = FIRST EXCEPTION PARAMETER (IF ANY).
                     019A    748 ;       36(SP) = SECOND EXCEPTION PARAMETER (IF ANY).
                     019A    749 ;              .
                     019A    750 ;              .
                     019A    751 ;              .
                     019A    752 ;       28+N*4(SP) = N'TH EXCEPTION PARAMETER (IF ANY).
                     019A    753 ;       28+N*4+4(SP) = EXCEPTION PC.
                     019A    754 ;       28+N*4+8(SP) = EXCEPTION PSL.
                     019A    755 ;
                     019A    756
                     019A    757 REFLECT:                                ;REFLECT EXCEPTION TO PROPER ACCESS MODE
 50   18 AE    06    C1   019A    758          ADDL3   #6,24(SP),R0       ;CALCULATE LONGWORD OFFSET TO SAVED PSL
                     019F    759          ASSUME  PSL$V_CM EQ 31
            6E40    D5   019F    760          TSTL    (SP)[R0]           ;PREVIOUSLY IN COMPATIBILITY MODE?
              20    18   01A2    761          BGEQ    10$                ;BRANCH IF NOT
51   00000000'9F    DE   01A4    762          MOVAL   @#CTL$AL_CMCNTX,R1 ;GET ADDRESS OF COMPATIBILITY CONTEXT AREA
     81    0C AE    7D   01AB    763          MOVQ    12(SP),(R1)+       ;SAVE R0 AND R1
        81    52    7D   01AF    764          MOVQ    R2,(R1)+           ;SAVE R2 AND R3
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                81    54    7D   01B2   765          MOVQ    R4,(R1)+                ;SAVE R4 AND R5
                81    56    D0   01B5   766          MOVL    R6,(R1)+                ;SAVE R6
                81    08    9A   01B8   767          MOVZBL  #8,(R1)+                ;SET CM EXCEPTION TYPE
             81    FC AE40    D0   01BB   768          MOVL    -4(SP)[R0],(R1)+        ;SAVE PC
                61    6E40    D0   01C0   769          MOVL    (SP)[R0],(R1)           ;SAVE PSL
                      51    DC   01C4   770 10$:     MOVPSL  R1                      ;READ CURRENT PSL
                50    12    DB   01C6   771          MFPR    #PR$_IPL,R0             ;READ CURRENT IPL
                50    02    D1   01C9   772          CMPL    #IPL$_ASTDEL,R0         ;INVALID PRIORITY LEVEL?
                      04    19   01CC   773          BLSS    20$                     ;IF LSS YES
             04 51    1A    E1   01CE   774          BBC     #PSL$V_IS,R1,30$        ;IF CLR, THEN NOT ON INTERRUPT STACK
                                01D2   775 20$:     BUG_CHECK INVEXCEPTN,FATAL      ;INVALID EXCEPTION
                                01D6   776 30$:     IFNORD  #4,@#CTL$AL_STACK,20$   ;IS THERE A CONTROL REGION?
                                01E0   777                                          ; (NOT SWAPPER,NULLPROC)
50   51    02    16   EF   01E0   778          EXTZV   #PSL$V_PRVMOD,#PSL$S_PRVMOD,R1,R0 ;EXTRACT PREVIOUS MODE FIELD
                      06    12   01E5   779          BNEQ    35$                     ;IF EQL PREVIOUS MODE WAS KERNEL
          000001EF'EF   17   01E7   780          JMP     NORMAL                  ;
          0000012C'EF   17   01ED   781 35$:     JMP     37$                     ;GOTO PAGED CODE
                                0000012C   782          .PSECT  YEXEPAGED1
                      1C    BB   012C   783 37$:     PUSHR   #^M<R2,R3,R4>           ;SAVE REGISTERS R2, R3, R4
                01EF'CF    9F   012E   784          PUSHAB  W^NORMAL                ;ASSUME INFORMATION CAN BE COPIED
                52    50    D0   0132   785          MOVL    R0,R2                   ;SAVE PREVIOUS MODE
          53    28 AE    07    C1   0135   786          ADDL3   #7,40(SP),R3            ;CALCULATE NUMBER OF LONGWORDS TO MOVE
                51    52    DB   013A   787          MFPR    R2,R1                   ;READ PREVIOUS MODE STACK POINTER
                   01E8    30   013D   788 38$:     BSBW    CHECK_STACK             ;CHECK STACK RANGE
                      14    12   0140   789          BNEQ    40$                     ;CONTINUE IF STACK OK
                52    03    D1   0142   790          CMPL    #PSL$C_USER,R2          ;IS IT USER MODE STACK FAULT?
                      28    12   0145   791          BNEQ    50$                     ;NO, THEN BAD STACK
                      0E    BB   0147   792          PUSHR   #^M<R1,R2,R3>           ;SAVE REGISTERS
                52    50    D0   0149   793          MOVL    R0,R2                   ;GET LOWEST STACK ADDRESS FROM CHECK_STACK
                   02CB    30   014C   794          BSBW    EXE$EXPANDSTK           ;AND CALL TO EXPAND STACK
                      0E    BA   014F   795          POPR    #^M<R1,R2,R3>           ;RESTORE REGISTERS
                1B 50    E9   0151   796          BLBC    R0,50$                  ;BR IF ANY ERROR TO DECLARE BAD STACK
                      E7    11   0154   797          BRB     38$                     ;CHECK THE STACK AGAIN
                                0156   798                                          ;NOTE- CHECK_STACK PREVENTS US FROM LOOPING
00000000'9F42    51    D1   0156   799 40$:     CMPL    R1,@#CTL$AL_STACK[R2]   ;TOP ADDRESS OF STACK IN RANGE?
                      0F    1A   015E   800          BGTRU   50$                     ;IF GTRU NO
             52    03    D1   0160   801          CMPL    #PSL$C_USER,R2          ;PREVIOUS MODE USER?
                      30    13   0163   802          BEQL    70$                     ;IF EQL YES
00000000'9F42    50    D1   0165   803          CMPL    R0,@#CTL$AL_STACKLIM[R2];BOTTOM ADDRESS OF STACK IN RANGE?
                      26    1E   016D   804          BGEQU   70$                     ;IF GEQU YES
      6E    0292'CF    9E   016F   805 50$:     MOVAB   W^BADSTACK,(SP)         ;SET BAD STACK RETURN
51    00000000'9F42    D0   0174   806          MOVL    @#CTL$AL_STACK[R2],R1   ;GET STARTING ADDRESS OF PREVIOUS MODE STACK
                   01A9    30   017C   807          BSBW    CHECK_STACK             ;CHECK STACK RANGE
                      14    12   017F   808          BNEQ    70$                     ;IF NEQ SUCCESSFUL RANGE CHECK
                      71    DF   0181   809          PUSHAL  -(R1)                   ;PUSH TOP ADDRESS OF STACK RANGE
      7E    FC04    C1   9E   0183   810          MOVAB   -1024+4(R1),-(SP)       ;PUSH BOTTOM ADDRESS OF STACK RANGE
                      18    10   0188   811          BSBB    CRESTACK                ;RE-CREATE STACK SPACE
                5E    08    C0   018A   812          ADDL    #8,SP                   ;REMOVE VIRTUAL ADDRESS LIMITS FROM STACK
51    00000000'9F42    D0   018D   813          MOVL    @#CTL$AL_STACK[R2],R1   ;GET STARTING ADDRESS OF PREVIOUS MODE STACK
      50    53    02    78   0195   814 70$:     ASHL    #2,R3,R0                ;CALCULATE NUMBER OF BYTES TO MOVE
                51    50    C2   0199   815          SUBL    R0,R1                   ;CALCULATE NEW TOP OF STACK ADDRESS
                52    51    DA   019C   816          MTPR    R1,R2                   ;SET NEW PREVIOUS MODE STACK POINTER
                   016C    31   019F   817          BRW     COPYARGS                ;
                                01A2   818
                                01A2   819          .DSABL  LSB
                                01A2   820
                                01A2   821 ;
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                                01A2    822 ; SUBROUTINE TO CREATE VIRTUAL SPACE WHERE THE STACK SHOULD BE. TOP
                                01A2    823 ; OF STACK (UNDER THE CALL PC) IS A VA DESCRIPTOR; R2 CONTAINS ACCESS
                                01A2    824 ; MODE.
                                01A2    825 ;
                                01A2    826
                                01A2    827 CRESTACK:
                                01A2    828         $SETSFM_S #0                    ;TURN OFF SYSTEM SERVICE EXCEPTIONS
                51    04 AE   9E  01AB    829         MOVAB   4(SP),R1                ;SET ADDRESS OF VIRTUAL ADDRESS LIMITS
                      50   DD   01AF    830         PUSHL   R0                      ;SAVE PREVIOUS STATE OF FAILURE MODE
                                01B1    831         $CRETVA_S (R1),(R1),R2          ;CREATE STACK PAGES FOR EXCEPTION
                   09   8E   D1  01BE    832         CMPL    (SP)+,#SS$_WASSET       ;WAS SYS. SERV. FAILURE EXCEP. SET?
                        0E   12  01C1    833         BNEQ    10$                     ;NO
                        50   DD  01C3    834         PUSHL   R0                      ;YES, SAVE STATUS FROM $CRETVA
                                01C5    835         $SETSFM_S #1                    ;AND SET IT AGAIN
                      50 8ED0   01CE    836         POPL    R0                      ;RESTORE STATUS FROM $CRETVA
                01 50    E9   01D1    837 10$:    BLBC    R0,VAFAIL               ;DEAL WITH FAILURE TO CREATE STACK
                         05   01D4    838         RSB
                                01D5    839 ;
                                01D5    840 ; TO HERE ON FAILURE TO CREATE VIRTUAL ADDRESS SPACE FOR THE BASE STACK.
                                01D5    841 ; THIS ONLY OCCURRS (1) IF THE USER HAS DELETED HIS ORIGINAL STACK AND
                                01D5    842 ; THEN RUN OUT HIS VIRTUAL ADDRESS SPACE, OR (2) IF THE STACK BASE AND
                                01D5    843 ; LIMIT REGISTERS ARE SCROZZLED. ACTION DEPENDS ON THE ACCESS MODE OF
                                01D5    844 ; THE ORIGINAL EXCEPTION: FOR USER AND SUPER MODE, WE QUIETLY DELETE
                                01D5    845 ; THE PROCESS; FOR EXEC AND KERNEL MODE WE BUGCHECK NON-FATALLY AND
                                01D5    846 ; FATALLY, RESPECTIVELY.
                                01D5    847 ;
                                01D5    848 ; NOTE: R2 CONTAINS PREVIOUS ACCESS MODE
                                01D5    849 ;
             01    52   D1  01D5    850 VAFAIL: CMPL    R2,#PSL$C_EXEC          ;CHECK ACCESS MODE OF EXCEPTION
                   11   1F  01D8    851         BLSSU   20$                     ;BRANCH IF KERNEL
                   04   1A  01DA    852         BGTRU   10$                     ;BRANCH IF USER OR SUPER
                                01DC    853         BUG_CHECK UNABLCREVA            ;NON-FATAL FOR EXEC MODE
                                01E0    854 10$:    $DELPRC_S                       ;BYE, BYE
                                01EB    855 20$:    BUG_CHECK UNABLCREVA,FATAL      ;FATAL FOR KERNEL MODE
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                                01EF    857          .SBTTL  SEARCH FOR AND CALL CONDITION HANDLER
                                01EF    858 ;
                                01EF    859 ; PUSH ARGUMENT LIST ON STACK
                                01EF    860 ;
                                01EF    861
                                01EF    862          .ENABL  LSB
                                01EF    863 NORMAL:                                     ;NORMAL EXIT FROM STACK COPY
                           6E   DF      01EF    864          PUSHAL  (SP)               ;PUSH ADDRESS OF MECHANISM ARGUMENTS
                         1C AE  DF      01F1    865          PUSHAL  28(SP)             ;PUSH ADDRESS OF SIGNAL ARGUMENTS
                           02   DD      01F4    866          PUSHL   #2                 ;PUSH NUMBER OF ARGUMENTS
                                01F6    867
                                01F6    868 ; CHECK IF THIS EXCEPTION SHOULD BE MODIFIED BY AN INSTRUCTION EMULATOR
                                01F6    869
                 51  00000000'EF  D0      01F6    870          MOVL    L^EXE$GL_VAXEXCVEC,R1  ;MODIFICATION ROUTINE SUPPLIED?
                           02   13      01FD    871          BEQL    EXE$SRCHANDLER     ;BRANCH IF NONE
                           61   16      01FF    872          JSB     (R1)               ;OTHERWISE, GO THERE
                                0201    873 ;
                                0201    874 ; CHECK THE PC OF THE EXCEPTION. IF IT IS IN THE CONDITION HANDLER CALL
                                0201    875 ; VECTOR, THEN AN EXCEPTION HAS OCCURRED ATTEMPTING TO CALL A CONDITION
                                0201    876 ; HANDLER (E.G., DUE TO BAD ADDRESS OR ENTRY MASK). IF THIS IS THE CASE,
                                0201    877 ; EXIT THE IMAGE TO AVOID AN EXCEPTION LOOP. WE DO THE SAME FOR CALLS
                                0201    878 ; TO AST ROUTINES. WHILE THIS IS NOT STRICTLY A BAD STACK, REPORTING THE
                                0201    879 ; EXCEPTION WITH THE AST CONTEXT RECORDED IN THE STACK IS SUCH A PAIN
                                0201    880 ; THAT IT IS NOT WORTH IT.  THE SPECIAL CASE OF A T-BIT PENDING EXCEPTION
                                0201    881 ; IS ALLOWED SINCE THIS CASE CANNOT RESULT IN A LOOP.
                                0201    882 ;
                                0201    883 EXE$SRCHANDLER::                            ;ENTRY POINT FOR EXTERNAL USE
              23 AE    24 AE    90      0201    884          MOVB    36(SP),35(SP)      ;SAVE SIGNAL VECTOR LENGTH
     00000464 8F    28 AE    D1      0206    885          CMPL    40(SP),#SS$_TBIT   ;CHECK FOR T-BIT PENDING EXCEPTION
                        19   13      020E    886          BEQL    10$                ;BRANCH IF YES - SKIP CHECKS
                51   24 AE    08    C1      0210    887          ADDL3   #8,36(SP),R1       ;COMPUTE LONGWORD OFFSET TO SAVED PC
          00000000'8F    6E41    D1      0215    888          CMPL    (SP)[R1],#SYS$CALL_HANDL ;COMPARE TO HANDLER CALL SITE
                        4E   13      021D    889          BEQL    BAD_HANDLER        ;BRANCH IF YES
          00000000'8F    6E41    D1      021F    890          CMPL    (SP)[R1],#EXE$ASTDEL    ;COMPARE TO AST CALL SITE
                        5E   13      0227    891          BEQL    BAD_AST            ;BRANCH IF YES
                                0229    892
                                0229    893 ;
                                0229    894 ; SEARCH FOR CONDITION HANDLER
                                0229    895 ;
               0345'CF    6E   FA      0229    896 10$:     CALLG   (SP),W^SEARCH      ;SEARCH FOR CONDITION HANDLER
                     6D 50    E9      022E    897          BLBC    R0,20$             ;IF LBC FATAL ERROR
                                0231    898
              06 20 AE    01   E1      0231    899          BBC     #1,32(SP),11$      ;BRANCH IF THIS IS NOT A STOP
28 AE    03    00    04   F0      0236    900          INSV    #STS$K_SEVERE,#STS$V_SEVERITY,#STS$S_SEVERITY,40(SP)
                                023C    901                                             ;FOR STOP, FORCE SEVERITY TO FATAL
                                023C    902 ;
                                023C    903 ; CALL CONDITION HANDLER
                                023C    904 ;
                                023C    905
                00000000'9F    16      023C    906 11$:     JSB     @#SYS$CALL_HANDL   ;CALL HANDLER VIA SYSTEM VECTOR
                     E4 50    E9      0242    907          BLBC    R0,10$             ;IF LBC RESIGNAL
              12 20 AE    01   E0      0245    908          BBS     #1,32(SP),CONT_FROM_STOP ;BRANCH IF ATTEMPTING TO CONTINUE FROM STOP
                                024A    909 ;
                                024A    910 ; CONTINUE FROM EXCEPTION. REMOVE THE SIGNAL ARGUMENT LISTS FROM THE
                                024A    911 ; STACK AND RESUME PROCESSING.
                                024A    912 ;
                                024A    913 EXE$CONTSIGNAL::
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                                                M 8
                6E    23 AE    9A  024A   914          MOVZBL  35(SP),(SP)              ;GET ORIGINAL SIGNAL ARG COUNT
                   6E    08    C0  024E   915          ADDL    #8,(SP)                 ;CALCULATE LONGWORD OFFSET TO SAVED PC
                   6E    04    C4  0251   916          MULL    #4,(SP)                 ;CALCULATE NUMBER OF BYTES TO REMOVE
                50    18 AE    7D  0254   917          MOVQ    24(SP),R0               ;RESTORE R0 AND R1
                   5E    6E    C0  0258   918          ADDL    (SP),SP                 ;REMOVE ARGUMENT LIST FROM STACK
                               02  025B   919          RFI                             ;
                                   025C   920
                                   025C   921 ;
                                   025C   922 ; TO HERE ON ATTEMPT TO CONTINUE FORM A CALL TO STOP
                                   025C   923 ;
                                   025C   924 CONT_FROM_STOP:                          ;SET FINAL STATUS AND MESSAGE
                50    00000001'8F  D0  025C   925          MOVL    #<LIB$_ATTCONSTO&^CSTS$M_SEVERITY>!ATTCONSTO_IDX,R0
            FFFFFFFD 8F    14 AE    D1  0263   926          CMPL    20(SP),#-3              ;SEE IF JUST CALLED LAST CHANCE HANDLER
                               12    11  026B   927          BRB     12$                     ;AND FLOW INTO EXIT CODE
                                   026D   928
                                   026D   929 ;
                                   026D   930 ; TO HERE IF AN EXCEPTION OCCURRED ATTEMPTING TO CALL A HANDLER
                                   026D   931 ;
                                   026D   932 BAD_HANDLER:
                50    28 AE    D0  026D   933          MOVL    40(SP),R0               ;SET CONDITION AS FINAL STATUS
                                   0271   934                                          ;SET MESSAGE STRING
             50    03    00    0C  F0  0271   935          INSV    #BADHANDLER_IDX,#STS$V_SEVERITY,#STS$S_SEVERITY,R0
            FFFFFFFD 8F    20 AE41  D1  0276   936          CMPL    32(SP)[R1],#-3          ;SEE IF TRYING TO CALL LAST CHANCE HANDLER
                               1D    12  027F   937 12$:     BNEQ    20$                     ;IF NOT, GO TO CALL IT
                20 AE    50    D0  0281   938          MOVL    R0,32(SP)               ;SAVE CONDITION AND MESSAGE
                               41    11  0285   939          BRB     30$                     ;IF YES, DON'T CALL IT AGAIN
                                   0287   940
                                   0287   941 ;
                                   0287   942 ; TO HERE IF AN EXCEPTION OCCURRED ATTEMPTING TO CALL AN AST
                                   0287   943 ;
                                   0287   944 BAD_AST:
                   50    28 AE    D0  0287   945          MOVL    40(SP),R0               ;SET CONDITION AS FINAL STATUS
                                   028B   946                                          ;SET MESSAGE STRING
             50    03    00    03  F0  028B   947          INSV    #BADAST_IDX,#STS$V_SEVERITY,#STS$S_SEVERITY,R0
                               0C    11  0290   948          BRB     20$
                                   0292   949 ;
                                   0292   950 ; BAD STACK WHEN TRYING TO COPY EXCEPTION ARGUMENTS
                                   0292   951 ;
                                   0292   952
                                   0292   953 BADSTACK:                               ;BAD STACK EXIT FROM STACK COPY
                      6E    DF   0292   954          PUSHAL  (SP)                    ;PUSH ADDRESS OF MECHANISM ARGUMENTS
                   1C AE    DF   0294   955          PUSHAL  28(SP)                  ;PUSH ADDRESS OF SIGNAL ARGUMENTS
                               02    DD  0297   956          PUSHL   #2                      ;PUSH NUMBER OF ARGUMENTS
                                   0299   957                                          ;SET BAD STACK STATUS
                50    02B0 8F    3C   0299   958          MOVZWL  #<SS$_BADSTACK&^CSTS$M_SEVERITY>!FINAL_IDX,R0
                                   029E   959
                   20 AE    50    D0  029E   960 20$:     MOVL    R0,32(SP)               ;SAVE FINAL STATUS AND MESSAGE
                                   02A2   961          $SETSFM_S       #0              ; CLEAR SYS. SERVICE FAILURE EXCEP. MODE
                      50    DC   02AB   962          MOVPSL  R0                      ;READ CURRENT PSL
             50    50    02    18  EF  02AD   963          EXTZV   #PSL$V_CURMOD,#PSL$S_CURMOD,R0,R0 ;EXTRACT CURRENT MODE
            51    00000000'9F40  D0  02B2   964          MOVL    @#CTL$AL_FINALEXC[R0],R1;GET ADDRESS OF LAST CHANCE HANDLER
                               0C    13  02BA   965          BEQL    30$                     ;IF EQL NONE
                   14 AE    03    CE  02BC   966          MNEGL   #3,20(SP)               ;SET FRAME DEPTH TO MINUS THREE
                00000000'9F      16   02C0   967          JSB     @#SYS$CALL_HANDL        ;CALL LAST CHANCE CONDITION HANDLER
                               0C    11  02C6   968          BRB     35$
                                   02C8   969
                      50    DC   02C8   970 30$:     MOVPSL  R0                      ;READ CURRENT PSL
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                50   50   02   18   EF  02CA   971          EXTZV   #PSL$V_CURMOD,#PSL$S_CURMOD,R0,R0 ;EXTRACT CURRENT MODE
                          50   01   D1  02CF   972          CMPL    #PSL$C_EXEC,R0          ;EXECUTIVE OR KERNEL MODE?
                               2E   1E  02D2   973          BGEQU   45$                     ;IF GEQU YES
             50   20 AE    03   00   EF  02D4   974 35$:     EXTZV   #STS$V_SEVERITY,#STS$S_SEVERITY,32(SP),R0 ;GET MESSAGE INDEX
                   00000000'9F   95   02DA   975          TSTB    @#CTL$GB_SSFILTER       ;ARE SYSTEM SERVICES INHIBITED?
                               0E   12  02E0   976          BNEQ    40$                     ;YES, DON'T TRY TO PRINT ANYTHING
                               6E   9F  02E2   977          PUSHAB  (SP)                    ;PUSH ADDRESS OF CONDITION ARGUMENT LIST
                      FD17 CF40   DD  02E4   978          PUSHL   MSG_VECTOR[R0]          ;PUSH ADDRESS OF FINAL EXCEPTION MESSAGE
                00000000'EF    02   FB  02E9   979          CALLS   #2,EXE$EXCMSG           ;PRINT FINAL EXCEPTION MESSAGE
                        50   20 AE   D0  02F0   980 40$:     MOVL    32(SP),R0               ;RETRIEVE FINAL STATUS
                50   03   00   04   F0  02F4   981          INSV    #STS$K_SEVERE,#STS$V_SEVERITY,#STS$S_SEVERITY,R0
                                    02F9   982          $EXIT_S R0                      ;EXIT PROCESS
                                    0302   983
                               06   1A  0302   984 45$:     BGTRU   50$                     ;BRANCH IF KERNEL MODE
                                    0304   985          BUG_CHECK FATALEXCPT            ;FATAL EXECUTIVE MODE EXCEPTION
                               E6   11  0308   986          BRB     40$                     ;GO DELETE THE PROCESS
                                    030A   987
                                    030A   988 50$:     BUG_CHECK FATALEXCPT,FATAL      ;FATAL KERNEL MODE EXCEPTION
                                    030E   989
                                    030E   990          .DSABL  LSB
                                    030E   991
                                    030E   992 ;
                                    030E   993 ; COPY ARGUMENTS TO PREVIOUS MODE STACK AND EXIT TO PREVIOUS MODE
                                    030E   994 ;
                                    030E   995
                                    030E   996 COPYARGS:                                ;COPY ARGUMENT LISTS TO PREVIOUS MODE STACK
                     50   10 AE   9E  030E   997          MOVAB   16(SP),R0               ;GET ADDRESS OF ARGUMENTS TO COPY
                          81   80   D0  0312   998 10$:     MOVL    (R0)+,(R1)+             ;COPY EXCEPTION ARGUMENTS TO PREVIOUS STACK
                               FA   53  F5  0315   999          SOBGTR  R3,10$                  ;ANY MORE LONGWORDS TO COPY?
                70   C8000010 8F   CA  0318  1000          BICL    #PSL$M_CM!PSL$M_TBIT!-  ;CLEAR COMPATIBILITY, T-BIT, T PENDING, AND
                                    031F  1001                  PSL$M_FPD!PSL$M_TP,-(R0) ;FIRST PART DONE
                               70 8ED0  031F  1002          POPL    -(R0)                   ;SET RETURN ADDRESS
                               1C   BA  0322  1003          POPR    #^M<R2,R3,R4>           ;RESTORE REGISTERS R2, R3, R4
                          5E   50   D0  0324  1004          MOVL    R0,SP                   ;REMOVE ARGUMENTS FROM KERNAL STACK
                                    02  0327  1005          REI                             ;
                                    0328  1006
                                    0328  1007 ;
                                    0328  1008 ; SUBROUTINE TO CHECK ACCESSIBILITY OF STACK ADDRESS RANGE
                                    0328  1009 ;
                                    0328  1010 ; INPUTS:
                                    0328  1011 ;       R1 - STACK POINTER
                                    0328  1012 ;       R3 - PARTIAL LONGWORD COUNT
                                    0328  1013 ;
                                    0328  1014 ; OUTPUTS:
                                    0328  1015 ;       R0 - BOTTOM ADDRESS OF RANGE
                                    0328  1016 ;       Z CONDITION CODE - 0 IF ACCESSIBLE, ELSE 1
                                    0328  1017 ;
                                    0328  1018 ;       R1,R2,R3 ARE PRESERVED.
                                    0328  1019 ;
                                    0328  1020 CHECK_STACK:                             ;CHECK STACK ADDRESS RANGE
                               0E   BB  0328  1021          PUSHR   #^M<R1,R2,R3>           ;SAVE REGISTERS
                51   53   15   C1  032A  1022          ADDL3   #3+1+17,R3,R1           ;CALCULATE TOTAL LONGWORDS IN RANGE
                     51   04   C4  032E  1023          MULL    #4,R1                   ;CALCULATE NUMBER OF BYTES IN RANGE
                50   6E   51   C3  0331  1024          SUBL3   R1,(SP),R0              ;CALCULATE BOTTOM ADDRESS OF RANGE
                          50   DD  0335  1025          PUSHL   R0                      ;SAVE THIS QUANTITY
                          53   D4  0337  1026          CLRL    R3                      ;ACCESS MODE TO MAXIMIZE WITH PSL<PRVMOD>
                 00000000'EF   16  0339  1027          JSB     EXE$PROBEW              ;CHECK WRITE ACCESS
```

```
                50  01  D3  033F  1028          BITL    #1,R0                   ;SET CONDITION CODE
                    0F  BA  0342  1029          POPR    #^M<R0,R1,R2,R3>        ;RESTORE REGISTERS (NOTE: COND. CODES
                        0344  1030                                              ; PRESERVED
                    05  0344  1031          RSB                                 ;RETURN
```

```
                     0345  1033          .SBTTL  SEARCH FOR CONDITION HANDLER
                     0345  1034 ;
                     0345  1035 ; SEARCH - SEARCH FOR CONDITION HANDLER
                     0345  1036 ;
                     0345  1037 ; THIS IS A SPECIAL INTERNAL ROUTINE THAT IS CALLED IN THE INITIAL SEARCH
                     0345  1038 ; FOR A CONDITION HANDLER AND ON RESIGNAL FROM A PREVIOUSLY SIGNALLED
                     0345  1039 ; CONDITION.
                     0345  1040 ;
                     0345  1041 ; INPUTS:
                     0345  1042 ;
                     0345  1043 ;       00(AP) = NUMBER OF CONDITION ARGUMENTS.
                     0345  1044 ;       04(AP) = ADDRESS OF SIGNAL ARGUMENT LIST.
                     0345  1045 ;       08(AP) = ADDRESS OF MECHANISM ARGUMENT LIST.
                     0345  1046 ;       12(AP) = NUMBER OF MECHANISM ARGUMENTS.
                     0345  1047 ;       16(AP) = FP OF HANDLER ESTABLISHER FRAME.
                     0345  1048 ;       20(AP) = FRAME DEPTH.
                     0345  1049 ;       24(AP) = SAVED R0.
                     0345  1050 ;       28(AP) = SAVED R1.
                     0345  1051 ;       32(AP) = FLAGS LONGWORD
                     0345  1052 ;       36(AP) = NUMBER OF SIGNAL ARGUMENTS.
                     0345  1053 ;       40(AP) = EXCEPTION NAME (INTEGER VALUE).
                     0345  1054 ;       44(AP) = FIRST EXCEPTION PARAMETER (IF ANY).
                     0345  1055 ;       48(AP) = SECOND EXCEPTION PARAMETER (IF ANY).
                     0345  1056 ;              .
                     0345  1057 ;              .
                     0345  1058 ;              .
                     0345  1059 ;       40+N*4(AP) = N'TH EXCEPTION PARAMETER (IF ANY).
                     0345  1060 ;       40+N*4+4(AP) = EXCEPTION PC.
                     0345  1061 ;       40+N*4+8(AP) = EXCEPTION PSL.
                     0345  1062 ;
                     0345  1063 ; OUTPUTS:
                     0345  1064 ;
                     0345  1065 ;       R0 LOW BIT CLEAR INDICATES FAILURE TO LOCATE CONDITION HANDLER.
                     0345  1066 ;
                     0345  1067 ;              R0 = SS$_ACCVIO - STACK CANNOT BE READ FROM CURRENT MODE.
                     0345  1068 ;
                     0345  1069 ;              R0 = SS$_NOHANDLER - NO CONDITION HANDLER COULD BE FOUND.
                     0345  1070 ;
                     0345  1071 ;       R0 LOW BIT SET INDICATES SUCCESSFUL COMPLETION.
                     0345  1072 ;
                     0345  1073 ;              R1 = ADDRESS OF CONDITION HANDLER.
                     0345  1074 ;
                     0345  1075
                     0345  1076          .ENABLE LSB
                     0345  1077
                     0345  1078 SEARCH:                                          ;SEARCH FOR CONDITION HANDLER
                0000 0345  1079          .WORD   0                              ;ENTRY MASK
      6D  03F3'CF   9E 0347  1080          MOVAB   W^EXE$SIGTORET,(FP)            ;SET ADDRESS OF CONDITION HANDLER
        50    10 AC   D0 034C  1081 10$:    MOVL    16(AP),R0                    ;GET PREVIOUS FRAME ADDRESS
              51   DC 0350  1082 20$:    MOVPSL  R1                             ;READ CURRENT PSL
 51   51   02   18   EF 0352  1083          EXTZV   #PSL$V_CURMOD,#PSL$S_CURMOD,R1,R1 ;EXTRACT CURRENT MODE
           14 AC   D6 0357  1084          INCL    20(AP)                         ;INCREMENT FRAME DEPTH
              37   13 035A  1085          BEQL    50$                            ;IF EQL FIRST STACK FRAME
              1B   14 035C  1086          BGTR    40$                            ;IF GTR OTHER STACK FRAME
 50   00000000'9F41   7E 035E  1087          MOVAQ   @#CTL$AQ_EXCVEC[R1],R0         ;GET ADDRESS OF EXCEPTION VECTOR QUADWORD
14 AC    FFFFFFFE 8F   D1 0366  1088          CMPL    #-2,20(AP)                     ;EXAMINE PRIMARY VECTOR?
              02   13 036E  1089          BEQL    30$                            ;IF EQL YES
```

```
                         80   D5  0370  1090          TSTL    (R0)+                           ;ADJUST TO SECONDARY VECTOR
                      51 60   D0  0372  1091 30$:      MOVL    (R0),R1                         ;GET ADDRESS OF CONDITION HANDLER
                         23   12  0375  1092          BNEQ    60$                             ;IF NEQ CONDITION HANDLER FOUND
                         D3   11  0377  1093          BRB     10$                             ;
                   70 16 AC   E8  0379  1094 40$:      BLBS    22(AP),100$                     ;IF LBS SEARCH COUNT OVERFLOW
                         4D   10  037D  1095 45$:      BSBB    CHECK_FP                        ;CHECK IF THIS FRAME IS VALID
                10 A0 00000004'8F D1  037F  1096          CMPL    #SYS$CALL_HANDL+4,SAVPC(R0) ;CALL FROM CONDITION DISPATCHER?
                         15   13  0387  1097          BEQL    70$                             ;BRANCH IF YES - MUST SKIP FRAMES
                   50 0C AO   D0  0389  1098          MOVL    SAVFP(R0),R0                    ;GET ADDRESS OF PREVIOUS FRAME
                         5E   13  038D  1099          BEQL    100$                            ;IF EQL NONE
                   10 AC 50   D0  038F  1100 48$:      MOVL    R0,16(AP)                       ;SAVE ADDRESS OF ESTABLISHER FRAME
                         37   10  0393  1101 50$:      BSBB    CHECK_FP                        ;CHECK IF THIS FRAME IS VALID
                      51 60   D0  0395  1102          MOVL    (R0),R1                         ;GET ADDRESS OF CONDITION HANDLER
                         B2   13  0398  1103          BEQL    10$                             ;IF EQL NONE
                      50 01   C8  039A  1104 60$:      BISL    #1,R0                           ;INDICATE SUCCESSFUL COMPLETION
                         04   039D  1105          RET                                     ;
                              039E  1106
          51 06 A0 0C    00   EF  039E  1107 70$:      EXTZV   #0,#12,SAVMSK(R0),R1            ;GET REGISTER SAVE MASK
          7E 06 A0 02    0E   EF  03A4  1108          EXTZV   #14,#2,SAVMSK(R0),-(SP)         ;GET STACK ALIGNMENT BIAS
                   50    14   C0  03AA  1109          ADDL    #SAVRG,R0                       ;ADD OFFSET TO REGISTER SAVE AREA
                   50    8E   C0  03AD  1110          ADDL    (SP)+,R0                        ;ADD STACK ALIGNMENT BIAS
                      03 51   E9  03B0  1111 80$:      BLBC    R1,90$                          ;IF LBC CORRESPONDING REGISTER NOT SAVED
                   50    04   C0  03B3  1112          ADDL    #4,R0                           ;ADJUST FOR SAVED REGISTER
                51 51    FF   8F  03B6  1113 90$:      ASHL    #-1,R1,R1                       ;ANY MORE REGISTERS SAVED?
                         F3   12  03BB  1114          BNEQ    80$                             ;IF NEQ YES
                   51    0C AO   D0  03BD  1115          MOVL    CHF$L_MCHARGLST+4(R0),R1        ;GET ADDRESS OF MECHANISM ARGUMENTS
                   50    04 A1   D0  03C1  1116          MOVL    CHF$L_MCH_FRAME(R1),R0          ;GET ADDRESS OF ESTABLISHER FRAME
                         08 A1   D5  03C5  1117          TSTL    CHF$L_MCH_DEPTH(R1)             ;CHECK IF THIS IS A VECTORED HANDLER
                         C5   19  03C8  1118          BLSS    48$                             ;IF SO, DON'T SKIP "ESTABLISHER"
                         B1   11  03CA  1119          BRB     45$                             ;
                              03CC  1120
                              03CC  1121 ;
                              03CC  1122 ; SUBROUTINE TO VALIDATE THE CURRENT FRAME ADDRESS. THIS IS DONE WITH
                              03CC  1123 ; A RANGE CHECK AGAINST THE STACK LIMIT REGISTERS IN THE P1 VECTOR PAGE.
                              03CC  1124 ; SINCE FP LINKAGES EXTEND ACROSS ACCESS MODES, THERE IS NO OTHER CHECK
                              03CC  1125 ; POSSIBLE TO PREVENT CHASING AN INNER MODE EXCEPTION OUT TO AN OUTER
                              03CC  1126 ; ACCESS MODE.
                              03CC  1127 ;
                              03CC  1128 CHECK_FP:
                      51 DC   03CC  1129          MOVPSL  R1                              ;READ CURRENT PSL
          51 51 02    18   EF  03CE  1130          EXTZV   #PSL$V_CURMOD,#PSL$S_CURMOD,R1,R1 ;EXTRACT CURRENT MODE
00000000'9F 41    50    D1   03D3  1131          CMPL    R0,@#CTL$AL_STACK[R1]           ;FRAME POINTER WITHIN STACK RANGE?
                         10   1A  03DB  1132          BGTRU   100$                            ;IF GTRU NO
                      51 03   D1  03DD  1133          CMPL    #PSL$C_USER,R1                  ;IF IN USER MODE
                         0A   13  03E0  1134          BEQL    95$                             ;SKIP TOP RANGE CHECK
00000000'9F 41    50    D1   03E2  1135          CMPL    R0,@#CTL$AL_STACKLIM[R1];FRAME POINTER WITHIN STACK RANGE?
                         01   1F  03EA  1136          BLSSU   100$                            ;IF LSSU NO
                         05   03EC  1137 95$:         RSB                                     ;STACK FRAME OK
                50 08F8 8F    3C   03ED  1138 100$:        MOVZWL  #SS$_NOHANDLER,R0               ;SET NO HANDLER FOUND
                         04   03F2  1139          RET                                     ;
                              03F3  1140
                              03F3  1141          .DISABLE LSB
```

```
                        03F3  1143          .SBTTL  EXE$SIGTORET - TURN EXCEPTION INTO RETURN STATUS
                        03F3  1144 ;++
                        03F3  1145 ; FUNCTIONAL DESCRIPTION:
                        03F3  1146 ;
                        03F3  1147 ;       THIS IS A CONDITION HANDLER THAT TURNS AN EXCEPTION IN THE ESTABLISHER
                        03F3  1148 ;       FRAME INTO A RETURN FROM THE ESTABLISHER FRAME WITH THE EXCEPTION NAME
                        03F3  1149 ;       AS THE STATUS.  EXCEPTIONS FROM ANY FRAME OTHER THAN THE ESTABLISHER
                        03F3  1150 ;       ARE RESIGNALLED.  UNWINDS ARE IGNORED.
                        03F3  1151 ;
                        03F3  1152 ; INPUT PARAMETERS:
                        03F3  1153 ;       00(AP) = NUMBER OF CONDITION ARGUMENTS.
                        03F3  1154 ;       04(AP) = ADDRESS OF SIGNAL ARGUMENT LIST.
                        03F3  1155 ;       08(AP) = ADDRESS OF MECHANISM ARGUMENT LIST.
                        03F3  1156 ;
                        03F3  1157 ; OUTPUT PARAMETERS:
                        03F3  1158 ;       R0 - COMPLETION STATUS CODE
                        03F3  1159 ;               SS$_RESIGNAL - ALWAYS
                        03F3  1160 ;
                        03F3  1161
                        03F3  1162 EXE$SIGTORET::
                0000    03F3  1163          .WORD   0
                        03F5  1164
                        03F5  1165          ASSUME  CHF$L_MCHARGLST,EQ,CHF$L_SIGARGLST+4
          50    04 AC   7D    03F5  1166          MOVQ    CHF$L_SIGARGLST(AP),R0  ; GET ADDRESS OF SIGNAL ARGUMENT LIST
04 A0   00000920 8F   D1    03F9  1167          CMPL    #SS$_UNWIND,CHF$L_SIG_NAME(R0) ; UNWINDING?
                11    13    0401  1168          BEQL    10$                     ; BRANCH TO EXIT IF YES
             08 A1    D5    0403  1169          TSTL    CHF$L_MCH_DEPTH(R1)     ; EXCEPTION WITHIN ESTABLISHER FRAME?
                0C    12    0406  1170          BNEQ    10$                     ; BRANCH AND RETURN RESIGNAL IF NO
       0C A1    04 A0   D0    0408  1171          MOVL    CHF$L_SIG_NAME(R0),CHF$L_MCH_SAVR0(R1) ; SET RETURN STATUS
                7E    7C    040D  1172          CLRQ    -(SP)                   ; CLEAR DEPTH AND NEW PC ARGUMENTS
        0000'CF    02    FB    040F  1173          CALLS   #2,W^EXE$UNWIND         ; UNWIND TO ESTABLISHER'S CALLER
        50    0918 8F   3C    0414  1174 10$:     MOVZWL  #SS$_RESIGNAL,R0        ; RETURN RESIGNAL STATUS
                04    0419  1175          RET                             ;
```

```
                                041A  1177          .SBTTL  EXE$EXPANDSTK - EXPAND USER STACK
                                041A  1178 ;++
                                041A  1179 ; FUNCTIONAL DESCRIPTION:
                                041A  1180 ;       EXPAND STACK IS CALLED BY EXE$ACVIOLAT,  REFLECT, AND SYS$ADJSTK
                                041A  1181 ;       TO ALLOCATE MORE SPACE TO THE USER STACK.
                                041A  1182 ;
                                041A  1183 ; INPUT PARAMTERS:
                                041A  1184 ;       R2 - VIRTUAL ADDRESS LOWER BOUND FOR STACK.
                                041A  1185 ;
                                041A  1186 ; OUTPUT PARAMETERS:
                                041A  1187 ;       R0 - COMPLETION STATUS CODE
                                041A  1188 ;               SS$_NORMAL - SUCCESSFUL COMPLETION
                                041A  1189 ;               SS$_VASFULL -VIRTUAL ADDRESS SPACE FULL
                                041A  1190 ;               SS$_PAGOWNVIO - PAGE OWNER VIOLATION
                                041A  1191 ;               SS$_EXQUOTA - PAGING FILE QUOTA EXCEEDED
                                041A  1192 ;               SS$_INSFWSL - INSUFFICIENT WORKING SET SIZE
                                041A  1193 ;--
                                041A  1194 EXE$EXPANDSTK::                              ;
                     3E   BB    041A  1195          PUSHR   #^M<R1,R2,R3,R4,R5>        ; SAVE WORKING REGISTERS
54   00000000'9F     D0    041C  1196          MOVL    @#CTL$GL_PCB,R4                 ; GET PCB ADDRESS
0000000C'9F  52      D1    0423  1197          CMPL    R2,@#CTL$AL_STACK+12            ; IS ADDRESS IN USER STACK?
                     5E    1A    042A  1198          BGTRU   50$                     ; NO, DEFINITE ACCESS VIOLATION
     5A 52           1E    E1    042C  1199          BBC     #VA$V_P1,R2,50$         ; BR IF NOT P1 SPACE ADDRESS
55   00000000'9F     D0    0430  1200          MOVL    @#CTL$GL_PHD,R5                 ; GET PHD ADDRESS
     00000000'EF     16    0437  1201          JSB     MMG$PTEINDX                     ; GET LW INDEX TO PTE IN PHD
           15 50     E9    043D  1202          BLBC    R0,20$                          ; BR IF JUST EXPAND REGION
        6C B443      D5    0440  1203          TSTL    @PCB$L_PHD(R4)[R3]              ; CHECK PTE OF ACCVIO VA
              44     12    0444  1204          BNEQ    50$                             ; BR IF NOT EMPTY
              53     D6    0446  1205 10$:     INCL    R3                              ; NEXT PTE INDEX
        6C B443      D5    0448  1206          TSTL    @PCB$L_PHD(R4)[R3]              ; CHECK PTE FOR EMPTY
              0B     12    044C  1207          BNEQ    30$                             ; NO, STOPPER FOR CREATE
     52   0200 C2    9E    044E  1208          MOVAB   512(R2),R2                      ; AUGMENT VA BY ANOTHER PAGE
              F1     11    0453  1209          BRB     10$                             ; AND TRY ANOTHER PAGE
   52    30 A5      D0    0455  1210 20$:     MOVL    PHD$L_FREP1VA(R5),R2            ; SET ENDING ADDRESS TO FREP1VA
         04 AE      DD    0459  1211 30$:     PUSHL   4(SP)                           ; BUILD INADR DESCRIPTOR
                    52    DD    045C  1212          PUSHL   R2                      ;
      53    7E      7E    045E  1213          MOVAQ   -(SP),R3                        ; CREATE SPACE FOR RETADR
                          0461  1214          $CRETVA_S 8(R3),(R3),#PSL$C_USER        ; CREATE SPACE
        13 50       E8    046F  1215          BLBS    R0,40$                          ; BR IF SUCCESS
           50       DD    0472  1216          PUSHL   R0                              ; SAVE ERROR STATUS
                          0474  1217          $DELTVA_S (R3),8(R3),#PSL$C_USER        ; DELETE PARTIAL AREA
           50 8EDO        0482  1218          POPL    R0                              ; RESTORE COMPLETION CODE
      5E   10       C0    0485  1219 40$:     ADDL    #16,SP                          ; CLEAN STACK
           03       11    0488  1220          BRB     60$
      50   0C       3C    048A  1221 50$:     MOVZWL  #SS$_ACCVIO,R0                  ; SET ERROR STATUS
           3E       BA    048D  1222 60$:     POPR    #^M<R1,R2,R3,R4,R5>             ; RESTORE REGISTERS
                    05    048F  1223          RSB                                     ; AND RETURN
                          0490  1224
                          0490  1225
```

```
                     0490  1227          .SBTTL  EXE$MCHK_PRTCT - MACHINE CHECK RECOVERY BLOCK
                     0490  1228
                     0490  1229 ;++
                     0490  1230 ; EXE$MCHK_PRTCT -ENABLE RECOVERY BLOCK FOR MACHINE CHECK EXCEPTIONS
                     0490  1231 ;
                     0490  1232 ; FUNCTIONAL DESCRIPTION:
                     0490  1233 ;
                     0490  1234 ;       ALLOW A SPECIFIED BLOCK OF KERNEL CODE TO PROTECT ITS SELF
                     0490  1235 ;       FROM FATAL MACHINE CHECKS, THEN FIND OUT IF ONE OCCURED WITHING
                     0490  1236 ;       THE EXECUTION OF THE BLOCK.
                     0490  1237 ;
                     0490  1238 ; INPUTS.
                     0490  1239 ;
                     0490  1240 ;       R0 = FUNCTION MASK TO FILTER SPECIFIC TYPES OF MACHINE CHECKS
                     0490  1241 ;       (SP) = RETURN ADDRESS (START OF RECOVERY BLOCK)
                     0490  1242 ;       4(SP) = END OF RECOVERY BLOCK ADDRESS
                     0490  1243 ;       MUST BE IN KERNEL MODE
                     0490  1244 ;       CODE IN RECOVERY BLOCK EXECUTES AT IPL 31
                     0490  1245 ;
                     0490  1246 ; OUTPUTS:
                     0490  1247 ;
                     0490  1248 ;       WHEN INSTRUCTION AFTER END OF RECOVERY BLOCK IS REACHED,
                     0490  1249 ;               R0 = 0 IF MACHINE CHECK OCCURRED
                     0490  1250 ;               R1 = 1 IF MACHINE CHECK DID NOT OCCUR
                     0490  1251 ;       ALL OTHER REGISTERS PRESERVED
                     0490  1252 ;
                     0490  1253 ; CALLING SEQUENCE:
                     0490  1254 ;
                     0490  1255 ;       PUSHAL  END_LABEL               ; LABEL, END OF RECOVERY BLOCK ON STACK
                     0490  1256 ;       MOVL    #MASK,R0                ; FUNCTION FILTER MASK
                     0490  1257 ;       JSB     EXE$MCHK_PRTCT          ; INITIATE RECOVERY BLOCK
                     0490  1258 ;               .                       ; PROTECTED CODE, EXECUTED AT IPL 31
                     0490  1259 ;               .
                     0490  1260 ;               .
                     0490  1261 ;       RSB                             ; END OF RECOVERY BLOCK RETURN
                     0490  1262 ; END_LABEL:                             ; END OF RECOVERY BLOCK LABEL
                     0490  1263 ;       BLBS    R0,MCHK_OK              ; IF LBS, NO MACHINE CHECK OCCURED
                     0490  1264 ;       BRW     MCHK_ERROR              ; ELSE, CODE FAULTED
                     0490  1265 ;--
                     0490  1266
                 000001F3  1267          .PSECT  $AEXENONPAGED,LONG
                     01F3  1268
                     01F3  1269 EXE$MCHK_PRTCT::
                     01F3  1270
7E    0000'CF    7D  01F3  1271          MOVQ    W^MCHK$GL_MASK,-(SP)    ; SAVE PREVIOUS MASK AND SP - RECURSIVE
                     01F8  1272                                          ; SO MACHINE CHECK HANDLER CAN USE PRTCT
                     01F8  1273          DSBINT                          ; GO TO IPL 31 FOR REMAINDER OF BLOCK
0000'CF    50    D0  01FE  1274          MOVL    R0,W^MCHK$GL_MASK       ; CURRENT FUNCTION MASK
0000'CF    5E    D0  0203  1275          MOVL    SP,W^MCHK$GL_SP         ; SAVE CURRENT SP FOR POTENTIAL RECOVERY
      0C BE    16  0208  1276          JSB     @<3*4>(SP)              ; CALL PROTECTED CODE BACK
                     020B  1277
                     020B  1278 ; IF PROTECTED CODE EXECUTED WITHOUT A MACHINE CHECK, IT RETURNS HERE
                     020B  1279
     50    01    3C  020B  1280          MOVZWL  #SS$_NORMAL,R0          ; NORMAL COMPLETION, NO MACHINE CHECK
                     020E  1281
                     020E  1282 ; RESTORE MASK AND SP OF OLD, FINAL RETURN TO CALLER
                     020E  1283
```

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                     020E  1284 PROTECT_RETURN:                          ; COMMON RETURN TO END OF RECOVERY BLOCK
                     020E  1285
0000'CF   04 AE   7D 020E  1286          MOVQ    <1*4>(SP),W^MCHK$GL_MASK ; RESTORE PREVIOUS MASK AND SP
                     0214  1287          ENBINT                           ; BACK TO ORIGONAL IPL
        5E   0C   C0 0217  1288          ADDL    #<3*4>,SP                ; CLEAN UP STACK
                  05 021A  1289          RSB                              ; FINAL RETURN TO CALLER AT END OF
                     021B  1290                                           ; RECOVERY BLOCK LABEL
```

```
                     021B  1292 ;++
                     021B  1293 ;
                     021B  1294 ; EXE$MCHK_BUGCHK - HANDLE ALL BUGCHECKS FOR WHICH PROTECTION IS DESIRED
                     021B  1295 ;
                     021B  1296 ; FUNCTIONAL DESCRIPTION:
                     021B  1297 ;
                     021B  1298 ;       THIS REOUTINE IS CALLED FROM WITHIN MACHINE CHECK HANDLER JUST
                     021B  1299 ;       BEFORE ISSUING A FATAL BUG-CHECK.  IF A CURRENT PROTECTION BLOCK
                     021B  1300 ;       IS IN EFFECT, A RETURN IS MADE AT THE END OF RECOVERY BLOCK LABEL
                     021B  1301 ;       AFTER PROTECTED CODE.  ELSE, IF NO PROTECTION BLOCK IN EFFECT, RETURN
                     021B  1302 ;       TO MAHCINE CHECK WHICH ISSUES THE FATAL BUG-CHECK.
                     021B  1303 ;
                     021B  1304 ; INPUTS:
                     021B  1305 ;
                     021B  1306 ;       (SP) = RETURN ADDRESS TO MACHINE CHECK
                     021B  1307 ;       4(SP) = ADDRESS OF MACHINE CHECK PC,PSL FROM EXCEPTION
                     021B  1308 ;       8(SP) = FUNCTION FILTER MASK BUILT BY MACHINE CHECK, DESCRIBES THE
                     021B  1309 ;               TYPE OF MACHINE CHECK FOR TESTING AGIANST MASK SPECIFIED BY
                     021B  1310 ;               PROTECTED CODE.
                     021B  1311 ;
                     021B  1312 ; OUTPUTS:
                     021B  1313 ;
                     021B  1314 ;       IF NO RECOVERY BLOCK IN EFFECT:
                     021B  1315 ;
                     021B  1316 ;               PC,PSL POINTER AND MASK REMOVED FROM STACK
                     021B  1317 ;               RSB BACK TO MACHINE CHECK
                     021B  1318 ;               ALL REGISTERS PRESERVED
                     021B  1319 ;
                     021B  1320 ;       IF RECOVERY BLOCK IN EFFECT:
                     021B  1321 ;
                     021B  1322 ;               MODE, IPL, STACK SET TO THAT IN EFFECT WHEN RECOVERY BLOCK
                     021B  1323 ;                       DECLARED.
                     021B  1324 ;               R0 - CODE INDICATING MACHINE CHECK OCCURED
                     021B  1325 ;               RETURN TO END OF RECOVERY BLOCK LABEL
                     021B  1326 ;               ALL OTHER REGISTERS PRESERVED
                     021B  1327 ;
                     021B  1328 ;--
                     021B  1329
                     021B  1330 EXE$MCHK_BUGCHK::
                     021B  1331
          07   BB    021B  1332          PUSHR   #^M<R0,R1,R2>            ; SAVE SOME REGISTERS
    51    10 AE   7D  021D  1333          MOVQ    <4*4>(SP),R1             ; GET PC,PSL POINTER AND MASK
          2F   10     0221  1334          BSBB    MCHK_TEST                ; CURRENTLY A RECOVERY BLOCK?
          0A   50     0223  1335          BLBS    R0,15$                   ; BRANCH IF YES
          07   BA     0226  1336 10$:     POPR    #^M<R0,R1,R2>            ; NO RECOVERY BLOCK, RESTORE REGS
    04 AE     8E    D0  0228  1337          MOVL    (SP)+,4(SP)              ; MOVE RETURN ADDRESS UP ON STACK
       5E     04    C0  022C  1338          ADDL    #<4*1>,SP                ; CLEAR STACK OF MASK
              05         022F  1339          RSB                              ; RETURN TO MACHINE CHECK HANDLER
                         0230  1340
       52     01    8A  0230  1341 15$:     BICB    #MCHK$M_LOG,R2           ; IGNORE LOG INHIBIT BIT
0000'CF       52    D3  0233  1342          BITL    R2,W^MCHK$GL_MASK        ; PROTECTION DESIRED HERE?
              EC   13     0238  1343          BEQL    10$                      ; NO, RETURN TO MACHINE CHECK
              07   BA     023A  1344          POPR    #^M<R0,R1,R2>            ; RESTORE REGISTERS
    5E    04 AE     D0  023C  1345          MOVL    4(SP),SP                 ; RESET STACK TO INTERRUPT PC,PSL
6E    0246'CF       DE  0240  1346          MOVAL   W^20$,(SP)               ; REI BACK HERE INSTEAD
              02         0245  1347          REI                              ; BACK TO PROTECTED CODES' MODE, ETC.
50    02BC 8F   3C  0246  1348 20$:     MOVZWL  #SS$_MCHECK,R0           ; ERROR CODE IN R0
```

```
                5E  0000'CF   D0  024B  1349          MOVL    W^MCHK$GL_SP,SP         ; RESET STACK FOR RETURN
                    BC   11   0250  1350              BRB     PROTECT_RETURN          ; RETURN TO END OF PROTECTED CODE
```

```
                     0252  1352 ;++
                     0252  1353 ; MCHK_TEST - TEST TO SEE IF RECOVERY BLCOK ENABLED AT TIME OF MACHINE CHECK
                     0252  1354 ;
                     0252  1355 ; INPUTS:
                     0252  1356 ;
                     0252  1357 ;       R1 - POINTER TO PC,PSL OF MACHINE CHECK EXCEPTION
                     0252  1358 ;
                     0252  1359 ; OUTPUTS:
                     0252  1360 ;
                     0252  1361 ;       R0 - .TRUE. IF RECOVERY BLOCK CURRENTLY IN EFFECT
                     0252  1362 ;            .FALSE. IF NO RECOVERY BLOCK
                     0252  1363 ;       ALL OTHER REGISTERS PRESERVED
                     0252  1364 ;
                     0252  1365 ;--
                     0252  1366
                     0252  1367 MCHK_TEST:
                     0252  1368
          50   D4    0252  1369          CLRL    R0                      ; ASSUME NO RECOVERY BLOCK
0000'     CF   D5    0254  1370          TSTL    W^MCHK$GL_SP            ; IF SP NOT ZERO, THEN RECOVERY BLCOK
          02   13    0258  1371          BEQL    40$
          50   D6    025A  1372          INCL    R0                      ; SET LOW BIT, INDICATING RECOVERY BLOCK
                     025C  1373 40$:
                05   025C  1374          RSB                             ; RETURN
```

```
                     025D  1376 ;++
                     025D  1377 ;
                     025D  1378 ; EXE$MCHK$_TEST - TEST RECOVERY BLOCK FOR MASK MATCH
                     025D  1379 ;
                     025D  1380 ; FUNCTIONAL DESCRIPTION:
                     025D  1381 ;
                     025D  1382 ;       TEST TO SEE IF MACHINE CHECK RECOVERY BLOCK EXEISTS WHEN MACHINE
                     025D  1383 ;       CHECK EXCEPTION OCCURRED.  IF SO, CHECK TO SEE IF FUNCTION MASK
                     025D  1384 ;       BITS MATCH.
                     025D  1385 ;
                     025D  1386 ; INPUTS:
                     025D  1387 ;
                     025D  1388 ;       R1 - POINTS TO PC,PSL PAIR ON STACK FROM MACHINE CHECK
                     025D  1389 ;       R2 - CONTAINS BITS TO TEST AGAINST MASK SPECIFIED BY PROTECTED CODE
                     025D  1390 ;
                     025D  1391 ; OUTPUTS:
                     025D  1392 ;
                     025D  1393 ;       R0 - .TRUE. IF RECOVERY BLOCK IN EFFECT AND MASKS MATCH
                     025D  1394 ;            .FALSE. IF NEITHER RECOVERY BLOCK OR MASK MATCH
                     025D  1395 ;       R2 - DESTROYED
                     025D  1396 ;       ALL OTHER REGISTERS PRESERVED
                     025D  1397 ;
                     025D  1398 ;--
                     025D  1399
                     025D  1400 EXE$MCHK_TEST::
                     025D  1401
      F3   10        02 D  1402          BSBB    MCHK_TEST                   ; RECOVERY BLOCK IN EFFECT HERE?
   0C 50   E9        025F  1403          BLBC    R0,50$                      ; NO, RETURN WITH R0 CLEAR
                     0262  1404
                     0262  1405          ASSUME  MCHK$M_LOG EQ 1
                     0262  1406
        0A 52   E8   0262  1407          BLBS    R2,60$                      ; HANDLE LOG BIT SEPARATELY
0000'CF    52   D3   0265  1408 45$:     BITL    R2,W^MCHK$GL_MASK           ; MASKS MATCH?
           02   12   026A  1409          BNEQ    50$                         ; YES
           50   D4   026C  1410 47$:     CLRL    R0                          ; NO, R0 = .FALSE.
                05   026E  1411 50$:     RSB                                 ; RETURN
                     026F  1412
  F8 0000'CF   E9   026F  1413 60$:     BLBC    W^MCHK$GL_MASK,47$          ; ERROR LOG NOT DISABLED
           52   D7   0274  1414          DECL    R2                          ; WANT TO DISABLE LOGGING, CHECK REST
                     0276  1415                                              ; OF MASK FOR ERROR TYPE
           ED   11   0276  1416          BRB     45$
                     0278  1417
                     0278  1418          .END
```

```
ACVIOLAT                        00000063 R      03
ATTCONSTO_IDX                 = 00000001
ATTCONSTO_MSG                   00000033 R      02
BADAST_IDX                    = 00000003
BADAST_MSG                      00000083 R      02
BADHANDLER_IDX                = 00000002
BADHANDLER_MSG                  00000052 R      02
BADSTACK                        00000292 R      02
BAD_AST                         00000287 R      02
BAD_HANDLER                     0000026D R      02
BUG$_FATALEXCPT                 ********   X    02
BUG$_INVEXCEPTN                 ********   X    03
BUG$_KRNLSTAKNV                 ********   X    03
BUG$_UNABLCREVA                 ********   X    02
CHECK_FP                        000003CC R      02
CHECK_STACK                     00000328 R      02
CHF$L_MCHARGLST               = 00000008
CHF$L_MCH_DEPTH               = 00000008
CHF$L_MCH_FRAME               = 00000004
CHF$L_MCH_SAVR0               = 0000000C
CHF$L_SIGARGLST               = 00000004
CHF$L_SIG_NAME                = 00000004
CONT_FROM_STOP                  0000025C R      02
COPYARGS                        0000030E R      02
CRESTACK                        000001A2 R      02
CTL$AL_CMCNTX                   ********   X    03
CTL$AL_FINALEXC                 ********   X    02
CTL$AL_STACK                    ********   X    02
CTL$AL_STACKLIM                 ********   X    02
CTL$AQ_EXCVEC                   ********   X    02
CTL$GB_SSFILTER                 ********   X    02
CTL$GL_CMHANDLR                 ********   X    03
CTL$GL_CMSUPR                   ********   X    03
CTL$GL_CMUSER                   ********   X    03
CTL$GL_PCB                      ********   X    02
CTL$GL_PHD                      ********   X    02
EX3ARG                          0000017B R      03
EX4ARG                          00000106 R      03
EX5ARG                          00000157 R      03
EXCCMD                          000000BF R      03
EXE$ACVIOLAT                    00000000 RG     03
EXE$ARITH                       0000006C RG     03
EXE$ASTDEL                      ********   X    02
EXE$ASTFLT                      00000077 RG     03
EXE$BREAK                       0000008C RG     03
EXE$BUG_CHECK                   ********   X    03
EXE$CMODSUPR                    00000094 RG     03
EXE$CMODUSER                    000000AC RG     03
EXE$COMPAT                      000000CC RG     03
EXE$CONTSIGNAL                  0000024A RG     02
EXE$EXCEPTION                   0000018F RG     03
EXE$EXCMSG                      ********   X    02
EXE$EXPANDSTK                   0000041A RG     02
EXE$GL_ABSTIM                   ********   X    03
EXE$GL_BADACV_C                 ********   X    03
EXE$GL_BADACV_T                 ********   X    03
EXE$GL_VAXEXCVEC                ********   X    02
EXE$KERSTKNV                    0000010C RG     03
EXE$MCHECK                      00000110 RG     03
EXE$MCHK_BUGCHK                 0000021B RG     03
EXE$MCHK_PRTCT                  000001F3 RG     03
EXE$MCHK_TEST                   0000025D RG     03
EXE$OPCCOS                      00000118 RG     03
EXE$OPCDEC                      00000120 RG     03
EXE$PAGRDERR                    00000152 RG     03
EXE$PROBEW                      ********   X    02
EXE$RADRMOD                     0000015C RG     03
EXE$REFLECT                     000000A6 RG     02
EXE$ROPRAND                     00000164 RG     03
EXE$SIGTORET                    000003F3 RG     02
EXE$SRCHANDLER                  00000201 RG     02
EXE$SSFAIL                      00000180 RG     03
EXE$TBIT                        0000016C RG     03
EXE$UNWIND                      ********   X    02
EXSSXT                          00000187 R      03
FINALMSG                        00000010 R      02
FINAL_IDX                     = 00000000
HANDLER                       = 00000000
IPL$_ASTDEL                   = 00000002
LIB$_ATTCONSTO                  ********   X    02
MCHK$GL_MASK                    ********   X    03
MCHK$GL_SP                      ********   X    03
MCHK$M_LOG                    = 00000001
MCHK_TEST                       00000252 R      03
MMG$PTEINDX                     ********   X    02
MSG_VECTOR                      00000000 R      02
NORMAL                          000001EF R      02
PCB$L_PHD                     = 0000006C
PHD$L_FREP1VA                 = 00000030
PR$_IPL                       = 00000012
PROTECT_RETURN                  0000020E R      03
PSL$C_EXEC                    = 00000001
PSL$C_SUPER                   = 00000002
PSL$C_USER                    = 00000003
PSL$M_CM                      = 80000000
PSL$M_FPD                     = 08000000
PSL$M_PRVMOD                  = 00C00000
PSL$M_TBIT                    = 00000010
PSL$M_TP                      = 40000000
PSL$S_CURMOD                  = 00000002
PSL$S_PRVMOD                  = 00000002
PSL$V_CM                      = 0000001F
PSL$V_CURMOD                  = 00000018
PSL$V_IS                      = 0000001A
PSL$V_PRVMOD                  = 00000016
REFLECT                         0000019A R      03
SAVAP                         = 00000008
SAVFP                         = 0000000C
SAVMSK                        = 00000006
SAVPC                         = 00000010
SAVPSW                        = 00000004
SAVRG                         = 00000014
SEARCH                          00000345 R      02
SS$_ACCVIO                    = 0000000C
```

```
SS$_ARTRES                      = 00000474
SS$_ASTFLT                      = 0000040C
SS$_BADSTACK                    = 000002B4
SS$_BREAK                       = 00000414
SS$_CMODSUPR                    = 0000041C
SS$_CMODUSER                    = 00000424
SS$_COMPAT                      = 0000042C
SS$_MCHECK                      = 000002BC
SS$_NOHANDLER                   = 000008F8
SS$_NORMAL                      = 00000001
SS$_OPCCUS                      = 00000434
SS$_OPCDEC                      = 0000043C
SS$_PAGRDERR                    = 00000444
SS$_RADRMOD                     = 0000044C
SS$_RESIGNAL                    = 00000918
SS$_ROPRAND                     = 00000454
SS$_SSFAIL                      = 0000045C
SS$_TBIT                        = 00000464
SS$_UNWIND                      = 00000920
SS$_WASSET                      = 00000009
STS$K_SEVERE                    = 00000004
STS$M_SEVERITY                  = 00000007
STS$S_SEVERITY                  = 00000003
STS$V_SEVERITY                  = 00000000
SYS$ADJSTK                        ********    X   02
SYS$CALL_HANDL                    ********    X   02
SYS$CRETVA                        ********   GX   02
SYS$DELPRC                        ********   GX   02
SYS$DELTVA                        ********   GX   02
SYS$EXIT                          ********   GX   02
SYS$SETSFM                        ********   GX   02
VA$V_P1                         = 0000001E
VAFAIL                            000001D5 R     02
```

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	00000000 (0.)	01 (1.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE
YEXEPAGED1	00000490 (1168.)	02 (2.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC LONG
$AEXENONPAGED	00000278 (632.)	03 (3.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC LONG

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	29	00:00:00.10	00:00:00.75
Command processing	107	00:00:00.53	00:00:04.35
Pass 1	336	00:00:11.05	00:00:28.15
Symbol table sort	0	00:00:01.54	00:00:04.80
Pass 2	266	00:00:03.59	00:00:10.22
Symbol table output	18	00:00:00.13	00:00:00.13

```
Psect synopsis output                1     00:00:00.02    00:00:00.02
Cross-reference output               0     00:00:00.00    00:00:00.00
Assembler run totals               759     00:00:16.97    00:00:48.74

The working set limit was 1800 pages.
66462 bytes (130 pages) of virtual memory were used to buffer the intermediate code.
There were 60 pages of symbol table space allocated to hold 953 non-local and 66 local symbols.
1418 source lines were read in Pass 1, producing 22 object records in Pass 2.
28 pages of virtual memory were used to define 27 macros.

                                        +----------------------------+
                                        ! Macro library statistics !
                                        +----------------------------+

Macro library name                       Macros defined
------------------                       --------------
_$255$DUA28:[SYS.OBJ]LIB.MLB;1                         9
_$255$DUA28:[SYSLIB]STARLET.MLB;2                     15
TOTALS (all libraries)                                24

1026 GETS were required to define 24 macros.

There were no errors, warnings or information messages.

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

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EXCEPTMSG
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FILERWIO
LIS

EXSUBRÔUT
LIS