```
  000000000    PPPPPPPPPPPP       CCCCCCCCCCC    000000000    MMM        MMM
  000000000    PPPPPPPPPPPP       CCCCCCCCCCC    000000000    MMM        MMM
  000000000    PPPPPPPPPPPP       CCCCCCCCCCC    000000000    MMM        MMM
000       000  PPP       PPP  CCC            000       000  MMMMMM   MMMMMM
000       000  PPP       PPP  CCC            000       000  MMMMMM   MMMMMM
000       000  PPP       PPP  CCC            000       000  MMMMMM   MMMMMM
000       000  PPP       PPP  CCC            000       000  MMM   MMM   MMM
000       000  PPP       PPP  CCC            000       000  MMM   MMM   MMM
000       000  PPP       PPP  CCC            000       000  MMM   MMM   MMM
000       000  PPPPPPPPPPPP   CCC            000       000  MMM        MMM
000       000  PPPPPPPPPPPP   CCC            000       000  MMM        MMM
000       000  PPPPPPPPPPPP   CCC            000       000  MMM        MMM
000       000  PPP            CCC            000       000  MMM        MMM
000       000  PPP            CCC            000       000  MMM        MMM
000       000  PPP            CCC            000       000  MMM        MMM
000       000  PPP            CCC            000       000  MMM        MMM
000       000  PPP            CCC            000       000  MMM        MMM
000       000  PPP            CCC            000       000  MMM        MMM
  000000000    PPP               CCCCCCCCCCC    000000000    MMM        MMM
  000000000    PPP               CCCCCCCCCCC    000000000    MMM        MMM
  000000000    PPP               CCCCCCCCCCC    000000000    MMM        MMM
```

```
_$2



Sym
---
ALL


ASC


BOD
BOD
BOD
BOD
BOD
BOD
BOD
BUG
BYP
CAN
CAN
CAN
CHE
CHE


CLU
CLU
CLU
CLU
CLU
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CLU

CLU
CLU
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CLU
CLU


CLU
CLU
```

```
**FILE**ID**SHUTDOWN                          G 8                                              OP

  SSSSSSSS  HH      HH  UU      UU  TTTTTTTTTT  DDDDDDDD      OOOOOO    WW      WW  NN      NN
  SSSSSSSS  HH      HH  UU      UU  TTTTTTTTTT  DDDDDDDD      OOOOOO    WW      WW  NN      NN
SS          HH      HH  UU      UU      TT      DD      DD  OO      OO  WW      WW  NN      NN
SS          HH      HH  UU      UU      TT      DD      DD  OO      OO  WW      WW  NN      NN
SS          HH      HH  UU      UU      TT      DD      DD  OO      OO  WW      WW  NNNN    NN
SS          HH      HH  UU      UU      TT      DD      DD  OO      OO  WW      WW  NNNN    NN
  SSSSSS    HHHHHHHHHH  UU      UU      TT      DD      DD  OO      OO  WW      WW  NN  NN  NN
  SSSSSS    HHHHHHHHHH  UU      UU      TT      DD      DD  OO      OO  WW      WW  NN  NN  NN
        SS  HH      HH  UU      UU      TT      DD      DD  OO      OO  WW  WW  WW  NN    NNNN
        SS  HH      HH  UU      UU      TT      DD      DD  OO      OO  WW  WW  WW  NN    NNNN
        SS  HH      HH  UU      UU      TT      DD      DD  OO      OO  WWWW  WWWW  NN      NN       ....
        SS  HH      HH  UU      UU      TT      DD      DD  OO      OO  WWWW  WWWW  NN      NN       ....
SSSSSSSS    HH      HH  UUUUUUUUUU      TT      DDDDDDDD      OOOOOO    WW      WW  NN      NN       ....
SSSSSSSS    HH      HH  UUUUUUUUUU      TT      DDDDDDDD      OOOOOO    WW      WW  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
```

```
0 MODULE  OPC$SHUTDOWN    (
0                          LANGUAGE (BLISS32),
0                          IDENT = 'V04-000'
0                         ) =
0
0 !***************************************************************************
0 !*                                                                         *
0 !*  COPYRIGHT (c) 1978, 1980, 1982, 1984 BY                                *
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0 !*  SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.                *
0 !*                                                                         *
0 !*                                                                         *
0 !***************************************************************************
0
0 !++
0 ! FACILITY:
0 !
0 !       OPCOM
0 !
0 ! ABSTRACT:
0 !
0 !       This module contains the specialized logic to service
0 !       a particular type of request sent by a user to OPCOM.
0 !
0 ! Environment:
0 !
0 !       VAX/VMS operating system.
0 !
0 ! Author:
0 !
0 !       Steven T. Jeffreys
0 !
0 ! Creation date:
0 !
0 !       March 10, 1981
0 !
0 ! Revision history:
0 !
0 !       V03-003 CWH3003         CW Hobbs                        25-Jul-1984
0 !               Improve shutdown by bumping the cluster I/O parameters so that
0 !               all the messages can be sent immediately.
0 !
0 !       V03-002 CWH3169         CW Hobbs                        5-May-1984
```

```
:    58          0058  0 !                   Second pass for cluster-wide OPCOM:
:    59          0059  0 !                    - Add code to SHUTDOWN jacket routines to crash the
:    60          0060  0 !                      cluster on command.
:    61          0061  0 !
:    62          0062  0 !          V03-001 CWH3001         CW Hobbs                     30-Jul-1983
:    63          0063  0 !                   Various and sundry things to make OPCOM distributed
:    64          0064  0 !                   across the cluster.
:    65          0065  0 !
:    66          0066  0 ! V02-002           STJ0167         Steven T. Jeffreys,     08-Feb-1982
:    67          0067  0 !                   Removed reference to LIB$PUT_OUTPUT.
:    68          0068  0 !
:    69          0069  0 !--
:  71     0070  1 BEGIN                                                 : Start of SHUTDOWN
:  72     0071  1
:         0072  1 LIBRARY 'SYS$LIBRARY:LIB.L32';
:  74     0073  1 LIBRARY 'LIB$:OPCOMLIB';
:  75     0074  1
:  76     0075  1 FORWARD ROUTINE
:  77     0076  1         SHUTDOWN_HANDLER        : NOVALUE,
:  78     0077  1         SHUTDOWN_CLM_HANDLER    : NOVALUE;
:  79     0078  1
:  80     0079  1 EXTERNAL ROUTINE
:  81     0080  1         CLUSCOMM_SEND           : NOVALUE,
:  82     0081  1         DUMP_LOG_FILE           : NOVALUE,
:  83     0082  1         SHUTDOWN_LOOP           : NOVALUE;
:  84     0083  1
:  85     0084  1 EXTERNAL
:  86     0085  1         COD_BUSY_MAX,                                 ! Maximum concurrent messages
:  87     0086  1         COD_BUSY_NODE,                                ! Maximum concurrent messages to single node
:  88     0087  1         LCL_CSID;
:  89     0088  1
:  90     0089  1 BUILTIN
:  91     0090  1         INSQUE,                                       ! Insert entry onto a queue
:  92     0091  1         REMQUE;                                       ! Remove entry from a queue
```

```
1 GLOBAL ROUTINE SHUTDOWN_HANDLER (BUFFER_DESC) : NOVALUE =
1
1 !++
1 ! Functional description:
1 !
1 !       This routine is the handler for all SHUTDOWN messages received by OPCOM.
1 !
1 !
1 ! Input:
1 !
1 !       BUFFER_DESC : The address of a quadword buffer descriptor that
1 !                     describes the buffer containing the message.
1 !
1 ! Implicit Input:
1 !
1 !       None.
1 !
1 ! Output:
1 !
1 !       None.
1 !
1 ! Implict output:
1 !
1 !       Some accounting data will be updated
1 !       to reflect the receipt of the message.
1 !
1 ! Side effects:
1 !
1 !       None.
1 !
1 ! Routine value:
1 !
1 !       None.
1 !--
1
2 BEGIN                                         ! Start of SHUTDOWN_HANDLER
2
2 MAP
2       BUFFER_DESC     : $ref_bblock;
2
2 BIND
2       PRIV = (.BUFFER_DESC [DSC$A_POINTER])+4 : $bblock;
2
2 LOCAL
2       REQ             : $ref_bblock,
2       STATUS          : LONG;
2
2 !
2 ! Require cmkrnl privs to shut it down
2 !
2 IF NOT .priv [prv$v_cmkrnl]
2 THEN
2    RETURN DUMP_LOG_FILE (.buffer_desc, %ASCID 'Shutdown message received without sufficient privs');
2 !
2 ! If the request does not contain enough data,
2 ! then it cannot be processed.  Ignore it.
2 !
```

```
;  151          0149  3 IF .buffer_desc [dsc$w_length] LSS (opc$k_shutdown_min_size + opc$k_comhdrsiz)
;  152          0150  2 THEN
;  153          0151  2     RETURN;
;  154          0152  2 !
;  155          0153  2 ! Get a pointer to the message from the user
;  156          0154  2 !
;  157          0155  2 req = .buffer_desc [dsc$a_pointer] + opc$k_comhdrsiz;
;  158          0156  2 !
;  159          0157  2 ! If a cluster shutdown, then shut everything down
;  160          0158  2 !
;  161          0159  2 IF .$bblock [req [opc$l_rq_op:ions], opc$v_cluster]
;  162          0160  2 THEN
;  163          0161  3     BEGIN
;  164          0162  3     LOCAL
;  165          0163  3         message : $bblock [shut_k_min_size];
;  166          0164  3     CH$FILL (0, shut_k_min_size, message);
;  167          0165  3     message [clm_b_rqstcode]    = opc$_x_clusmsg;
;  168          0166  3     message [clm_b_clm_code]    = clm__shutdown;
;  169          0167  3     message [clm_b_ds_version]  = shut_k_ds_version;
;  170          0168  3     message [clm_b_sw_version]  = opc$k_sw_version;
;  171          0169  3     message [clm_w_length]      = shut_k_min_size;
;  172          0170  3     message [clm_l_csid]        = .lcl_csid;
;  173          0171  3     cod_busy_max = 64;
;  174          0172  3     cod_busy_node = 4;
;  175          0173  3     cluscomm_send (-1, shut_k_min_size, message);
;  176          0174  2     END;
;  177          0175  2 !
;  178          0176  2 ! Now do the evil deed
;  179          0177  2 !
;  180          0178  2 $CMKRNL (ROUTIN=shutdown_loop);
;  181          0179  2
;  182          0180  2 RETURN;
;  183          0181  1 END;                                                    ! End of SHUTDOWN_HANDLER

                                                                    .TITLE  OPC$SHUTDOWN
                                                                    .IDENT  \V04-000\

                                                                    .PSECT  $PLIT$,NOWRT,NOEXE,2

67 61 73 73 65 6D 20 6E 77 6F 64 74 75 68 53  00000 P.AAB:   .ASCII  \Shutdown message received without suffic\  ;
68 74 69 77 20 64 65 76 69 65 63 65 72 20 65  0000F                                                            ;
               63 69 66 66 75 73 20 74 75 6F  0001E                                                            ;
         00 00 73 76 69 72 70 20 74 6E 65 69  00028          .ASCII  \ient privs\<0><0>                        ;
                                   010E0032  00034 P.AAA:   .LONG   17694770                                   ;
                                   00000000' 00038          .ADDRESS P.AAB                                     ;

                                                            .EXTRN  CLUSCOMM_SEND, DUMP_LOG_FILE
                                                            .EXTRN  SHUTDOWN_LOOP, COD_BUSY_MAX
                                                            .EXTRN  COD_BUSY_NODE, LCL_CSID
                                                            .EXTRN  SYS$CMKRNL

                                                            .PSECT  $CODE$,NOWRT,2

                                       003C 00000           .ENTRY  SHUTDOWN_HANDLER, Save R2,R3,R4,R5       ; 0092
                    5E              0C   C2 00002           SUBL2   #12, SP
                    52        04    AC   D0 00005           MOVL    BUFFER_DESC, R2                          ; 0133
```

```
                     50        04  A2             04 C1 00009        ADDL3   #4, 4(R2), R0                          ;
                                   0C             60 E8 0000E        BLBS    (R0), 1$                               ; 0142
                                         0000'    CF 9F 00011        PUSHAB  P.AAA                                  ; 0144
                                                  52 DD 00015        PUSHL   R2                                     ;
                            0000G  CF             02 FB 00017        CALLS   #2, DUMP_LOG_FILE                      ;
                                                     04 0001C        RET                                            ;
                                   3F             62 B1 0001D 1$:    CMPW    (R2), #63                              ; 0149
                                                  46 1B 00020        BLEQU   3$                                     ;
                     50        04  A2             26 C1 00022        ADDL3   #38, 4(R2), REQ                        ; 0155
                                   30       06    A0 E9 00027        BLBC    6(REQ), 2$                             ; 0159
        0C           00            6E             00 2C 0002B        MOVC5   #0, (SP), #0, #12, MESSAGE             ; 0164
                                                  6E    00030                                                       ;
                                   6E     1313    8F B0 00031        MOVW    #4883, MESSAGE                         ; 0165
                               02  AE 000C0903    8F D0 00036        MOVL    #788739, MESSAGE+2                     ; 0167
                               08  AE    0000G    CF D0 0003E        MOVL    LCL_CSID, MESSAGE+8                    ; 0170
                            0000G  CF       40    8F 9A 00044        MOVZBL  #64, COD_BUSY_MAX                      ; 0171
                            0000G  CF             04 D0 0004A        MOVL    #4, COD_BUSY_NODE                      ; 0172
                                                  5E DD 0004F        PUSHL   SP                                     ; 0173
                                                  0C DD 00051        PUSHL   #12                                    ;
                                   7E             01 CE 00053        MNEGL   #1, -(SP)                              ;
                            0000G  CF             03 FB 00056        CALLS   #3, CLUSCOMM_SEND                      ;
                                                  7E D4 0005B 2$:    CLRL    -(SP)                                  ; 0178
                                         0000G    CF 9F 0005D        PUSHAB  SHUTDOWN_LOOP                          ;
                        00000000G  00             02 FB 00061        CALLS   #2, SYS$CMKRNL                         ;
                                                     04 00068 3$:    RET                                            ; 0181

; Routine Size:  105 bytes,    Routine Base:  $CODE$ + 0000
;  185          0182  1 GLOBAL ROUTINE SHUTDOWN_CLM_HANDLER (BUFFER_DESC : $ref_bblock, CLM : $ref_bblock, LEN) : NOVALUE =
;  186          0183  1
;  187          0184  1 !++
;  188          0185  1 ! Functional description:
;  189          0186  1 !
;  190          0187  1 !       This routine is the handler for all SHUTDOWN messages received by OPCOM from other nodes.
;  191          0188  1 !
;  192          0189  1 !
;  193          0190  1 ! Input:
;  194          0191  1 !
;  195          0192  1 !       BUFFER_DESC -   pointer to message from remote node, including $SNDOPR header
;  196          0193  1 !       CLM -           pointer to CLM structure
;  197          0194  1 !       LEN -           length of LEN
;  198          0195  1 !
;  199          0196  1 ! Implicit Input:
;  200          0197  1 !       None.
;  201          0198  1 !
;  202          0199  1 ! Output:
;  203          0200  1 !       None.
;  204          0201  1 !
;  205          0202  1 ! Routine value:
;  206          0203  1 !       None.
;  207          0204  1 !--
;  208          0205  1
;  209          0206  2 BEGIN                                           ! Start of SHUTDOWN_CLM_HANDLER
;  210          0207  2
;  211          0208  2 !
;  212          0209  2 ! Check the version number of the message.  If the message is from any other version,
;  213          0210  2 ! simply ignore it.
;  214          0211  2 !
;  215          0212  2 IF .CLM [CLM_B_DS_VERSION] NEQ SHUT_K_DS_VERSION
;  216          0213  2 THEN
;  217          0214  2     RETURN DUMP_LOG_FILE (.BUFFER_DESC, %ASCID 'CLM__SHUTDOWN mismatch');
;  218          0215  2
;  219          0216  2 !
;  220          0217  2 ! Bring things to a halt
;  221          0218  2 !
;  222          0219  2 $CMKRNL (ROUTIN=shutdown_loop);
;  223          0220  2
;  224          0221  2 RETURN;
;  225          0222  1 END;                                            ! End of SHUTDOWN_CLM_HANDLER


                                                                .PSECT  $PLIT$,NOWRT,NOEXE,2

6D  20  4E  57  4F  44  54  55  48  53  5F  5F  4D  4C  43  0003C P.AAD:  .ASCII  \CLM__SHUTDOWN mismatch\<0><0>          ;
                        00  00  68  63  74  61  6D  73  69  0004B                                                         ;
                                               010E0016  00054 P.AAC:  .LONG   17694742                                 ;
                                               00000000' 00058         .ADDRESS P.AAD                                   ;


                                                                .PSECT  $CODE$,NOWRT,2

                                                   0000 00000          .ENTRY  SHUTDOWN_CLM_HANDLER, Save nothing       ; 0182
                                50          08   AC  D0 00002          MOVL    CLM, R0                                  ; 0212
                        03        02   A0  91 00006          CMPB    2(R0), #3                                   ;
                                       0D  13 0000A          BEQL    1$                                          ;
                               0000'   CF  9F 0000C          PUSHAB  P.AAC                                       ; 0214
                                  04   AC  DD 00010          PUSHL   BUFFER_DESC                                 ;
                    0000G  CF          02  FB 00013          CALLS   #2, DUMP_LOG_FILE                           ;
                                           04 00018          RET                                                 ;
                                       7E  D4 00019 1$:      CLRL    -(SP)                                       ; 0219
                               0000G   CF  9F 0001B          PUSHAB  SHUTDOWN_LOOP                               ;
                000000000G  00         02  FB 0001F          CALLS   #2, SYS$CMKRNL                              ;
                                           04 00026          RET                                                 ; 0222

; Routine Size:  39 bytes,    Routine Base:  $CODE$ + 0069


;  226          0223  1
;  227          0224  1 END                                                    ! End of SHUTDOWN
;  228          0225  0 ELUDOM




;                                   PSECT SUMMARY
;
;      Name                        Bytes                        Attributes
;
;   $PLIT$                             92  NOVEC,NOWRT,  RD ,NOEXE,NOSHR,  LCL,  REL,  CON,NOPIC,ALIGN(2)
;   $CODE$                            144  NOVEC,NOWRT,  RD ,  EXE,NOSHR,  LCL,  REL,  CON,NOPIC,ALIGN(2)




;                             Library Statistics
;
;                                                -------- Symbols --------        Pages        Processing
;      File                                      Total     Loaded    Percent       Mapped       Time
;
;   _$255$DUA28:[SYSLIB]LIB.L32;1                18619          7          0        1000          00:01.9
;   _$255$DUA28:[OPCOM.OBJ]OPCOMLIB.L32;1          633         16          2          43          00:00.9




;                                    COMMAND QUALIFIERS

;      BLISS/CHECK=(FIELD,INITIAL,OPTIMIZE)/LIS=LIS$:SHUTDOWN/OBJ=OBJ$:SHUTDOWN MSRC$:SHUTDOWN/UPDATE=(ENH$:SHUTDOWN)
```

```
0 MODULE  OPC$SHUTDOWNL  (LANGUAGE (BLISS32),
0                          IDENT = 'V03-001',
0                          ADDRESSING_MODE (EXTERNAL=LONG_RELATIVE, NONEXTERNAL=LONG_RELATIVE)) =
1 BEGIN
1
1 LIBRARY 'SYS$LIBRARY:LIB.L32';
1 LIBRARY 'LIB$:OPCOMLIB';
1
1 PSECT                                          ! Need new module to change code psect
1     CODE    = _SHUTDOWN                        !  want it page-aligned so that page
1             (NOWRITE,EXECUTE,ALIGN(9));        !  faults won't occur at high IPL
1
1 BUILTIN
1         MTPR;
1
1 GLOBAL ROUTINE SHUTDOWN_LOOP : NOVALUE =
1
1 !++
1 ! Functional description:
1 !
1 !       This routine does the actual shutdown
1 '
1 . Input:
1 !       None.
1 !
1 ! Implicit Input:
1 !       None.
1 !
1 ! Output:
1 !       None.
1 !
1 !--
1
2 BEGIN
2
2 GLOBAL
2     LOOPS : VOLATILE;
2
2 BUILTIN
2     BUGW;
2
2 EXTERNAL LITERAL
2     BUG$_OPERCRASH;
2
2 !
2 ! Use the MTPR to fault in both our global page and the rest of the code
2 !
2 loops = ipl$_synch;
2 MTPR (loops, PR$_IPL);
2 !
2 ! Loop for a second or so to make sure that our messages made it out through the port
2 !
2 INCR K FROM 0 TO 500000
2 DO
2     loops = .loops + 1;                        ! Pause for a second
2 !
2 ! Now bring it to a halt with our specific bugcheck
```

```
;   287          0283  2 .
;   288          0284  2 BUGW (BUG$_OPERCRASH OR 4);
;   289          0285  2
;   290          0286  2 RETURN;
;   291          0287  1 END;


                                                        .TITLE  OPC$SHUTDOWNL
                                                        .IDENT  \V03-001\

                                                        .PSECT  $GLOBAL$,NOEXE,2

                                          00000 LOOPS:: .BLKB   4

                                                        .EXTRN  BUG$_OPERCRASH

                                                        .PSECT  _SHUTDOWN_,NOWRT,9

                                    0004 00000          .ENTRY  SHUTDOWN_LOOP, Save R2                              ; 0241
                   52 00000000'  EF   9E 00002          MOVAB   LOOPS, R2                                           ;
                   62            08   D0 00009          MOVL    #8, LOOPS                                           ; 0273
                   12            62   DA 0000C          MTPR    LOOPS, #18                                          ; 0274
                                 50   D4 0000F          CLRL    K                                                   ; 0278
                                 62   D6 00011 1$:      INCL    LOOPS                                               ; 0280
          F6       50 0007A120   8F   F3 00013          AOBLEQ  #500000, K, 1$                                      ;
                                    FEFF 0001B          BUGW                                                        ; 0284
                                   0000* 0001D          .WORD   <BUG$_OPERCRASH!4>                                  ;
                                      04 0001F          RET                                                         ; 0287

; Rout'ne Size:  32 bytes,    Routine Base:  _SHUTDOWN_ + 0000
;  293          0288  1 END                                           ! End of SHUTDOWN
;  294          0289  0 ELUDOM



;                                    PSECT SUMMARY
;
;       Name                    Bytes                         Attributes
;
;   $GLOBAL$                        4  NOVEC,  WRT,  RD ,NOEXE,NOSHR,  LCL,  REL,  CON,NOPIC,ALIGN(2)
;   _SHUTDOWN_                     32  NOVEC,NOWRT,  RD ,  EXE,NOSHR,  LCL,  REL,  CON,NOPIC,ALIGN(9)




;                               Library Statistics
;
;                                            -------- Symbols --------       Pages       Processing
;       File                                 Total    Loaded    Percent      Mapped      Time
;
;   _$255$DUA28:[SYSLIB]LIB.L32;1            18619         2          0       1000         00:01.8
;   _$255$DUA28:[OPCOM.OBJ]OPCOMLIB.L32;1      633         0          0         43         00:00.7




;                                      COMMAND QUALIFIERS
;
;       BLISS/CHECK=(FIELD,INITIAL,OPTIMIZE)/LIS=LIS$:SHUTDOWN/OBJ=OBJ$:SHUTDOWN MSRC$:SHUTDOWN/UPDATE=(ENH$:SHUTDOWN)

; Size:          176 code + 96 data bytes
; Run Time:         00:10.4
; Elapsed Time:     00:42.9
; Lines/CPU Min:     1668
; Lexemes/CPU-Min:  6687
; Memory Used:  74 pages
; Compilation Complete
```

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VAX/VMS V4.0

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