L 12

```
   SSSSSSSSSSSS  YYY         YYY     SSSSSSSSSSSS
   SSSSSSSSSSSS  YYY         YYY     SSSSSSSSSSSS
   SSSSSSSSSSSS  YYY         YYY     SSSSSSSSSSSS
SSS              YYY         YYY  SSS
SSS              YYY         YYY  SSS
SSS              YYY         YYY  SSS
SSS                 YYY   YYY     SSS
SSS                 YYY   YYY     SSS
SSS                 YYY   YYY     SSS
   SSSSSSSSS           YYY           SSSSSSSSS
   SSSSSSSSS           YYY           SSSSSSSSS
   SSSSSSSSS           YYY           SSSSSSSSS
            SSS        YYY                    SSS
            SSS        YYY                    SSS
            SSS        YYY                    SSS
            SSS        YYY                    SSS
            SSS        YYY                    SSS
            SSS        YYY                    SSS
SSSSSSSSSSSS           YYY        SSSSSSSSSSSS
SSSSSSSSSSSS           YYY        SSSSSSSSSSSS
SSSSSSSSSSSS           YYY        SSSSSSSSSSSS
```

```
_$

Ps
--

YZ

Z$

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Z$

Z$
```

```
                                                                 K  2
**FILE**ID**IOSUBNPAG











            IIIIII      OOOOOO      SSSSSSSS  UU      UU  BBBBBBBB    NN      NN  PPPPPPPP      AAAAAA      GGGGGGGG
            IIIIII      OOOOOO      SSSSSSSS  UU      UU  BBBBBBBB    NN      NN  PPPPPPPP      AAAAAA      GGGGGGGG
              II      OO      OO  SS          UU      UU  BB      BB  NN      NN  PP      PP  AA      AA  GG
              II      OO      OO  SS          UU      UU  BB      BB  NN      NN  PP      PP  AA      AA  GG
              II      OO      OO  SS          UU      UU  BB      BB  NNNN    NN  PP      PP  AA      AA  GG
              II      OO      OO  SS          UU      UU  BB      BB  NNNN    NN  PP      PP  AA      AA  GG
              II      OO      OO    SSSSSS    UU      UU  BBBBBBBB    NN  NN  NN  PPPPPPPP    AA      AA  GG
              II      OO      OO    SSSSSS    UU      UU  BBBBBBBB    NN  NN  NN  PPPPPPPP    AA      AA  GG
              II      OO      OO          SS  UU      UU  BB      BB  NN    NNNN  PP          AAAAAAAAAA  GG  GGGGGG
              II      OO      OO          SS  UU      UU  BB      BB  NN    NNNN  PP          AAAAAAAAAA  GG  GGGGGG
              II      OO      OO          SS  UU      UU  BB      BB  NN      NN  PP          AA      AA  GG      GG      ....
              II      OO      OO          SS  UU      UU  BB      BB  NN      NN  PP          AA      AA  GG      GG      ....
            IIIIII      OOOOOO    SSSSSSSS    UUUUUUUUUU  BBBBBBBB    NN      NN  PP          AA      AA    GGGGGG        ....
            IIIIII      OOOOOO    SSSSSSSS    UUUUUUUUUU  BBBBBBBB    NN      NN  PP          AA      AA    GGGGGG        ....


          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
```

```
0000          .TITLE  IOSUBNPAG - NONPAGED I/O RELATED SUBROUTINES
0000          .IDENT  'V04-000'
0000    ;****************************************************************************
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0000    ;*                                                                          *
0000    ;*                                                                          *
0000    ;****************************************************************************
0000    ;
0000    ; D. N. CUTLER 13-JUN-76
0000    ;
0000    ;
0000    ; NONPAGED I/O RELATED SUBROUTINES
0000    ;
0000    ; MODIFIED BY:
0000    ;
0000    ;       V03-038 WMC0004         Wayne Cardoza           23-Aug-1984
0000    ;               Add routine for emergency message to console.
0000    ;
0000    ;       V03-037 WMC0003         Wayne Cardoza           14-Aug-1984
0000    ;               Fix ROW0409 to restore the correct register.
0000    ;
0000    ;       V03-036 ACG0442         Andrew C. Goldstein,    7-Aug-1984  17:52
0000    ;               Save R8 in IOC$LAST_CHAN; fix order of tests in IOC$TESTUNIT
0000    ;               for correct allocation and mount checks. Fix handling of
0000    ;               lock value block on device lock in IOC$TESTUNIT.
0000    ;
0000    ;       V03-035 ROW0409         Ralph O. Weber           6-AUG-1984
0000    ;               Fix release map registers processing of requests waiting for
0000    ;               map registers.  Restore saved fork registers -- including the
0000    ;               PDT address -- before the calling IOC$ALOMAPUDA at
0000    ;               REALLOC_CD_MAPREGS.
0000    ;
0000    ;       V03-034 TCM0006         Trudy C. Matthews       20-Jul-1984
0000    ;               Add routine IOC$THREADCRB.
0000    ;
0000    ;       V03-033 WMC0002         Wayne Cardoza           03-May-1984
0000    ;               Add support for MNTVERPND bit.
0000    ;
0000    ;       V03-032 RAS0300         Ron Schaefer             2-May-1984
0000    ;               Change IOC$CVT_DEVNAM to only prefix cluster node names if
```

```
0000    ;               the DEV$V_NNM device characteristic is set in UCB$L_DEVCHAR2.
0000    ;               Add additional itemcode (4) to IOC$CVT_DEVNAM to provide
0000    ;               the device name string sans unit number.
0000    ;
0000    ;       V03-031 TMK0001         Todd M. Katz            23-Apr-1984
0000    ;               Remove the $LOGDEF data definitions.
0000    ;
0000    ;       V03-030 RLRPDTADP       Robert L. Rappaport     9-Apr-1984
0000    ;               Modify entrypoints used for allocating and deallocating
0000    ;               Buffered Data Paths and UNIBUS Map Registers for UQPORTS (UDA),
0000    ;               to pickup pointer for ADP from PDT$L_ADP(R4).
0000    ;
0000    ;       V03-029 ACG0414         Andrew C. Goldstein,    30-Mar-1984  15:49
0000    ;               Minor parse and searching fixes in IOC$SEARCH...
0000    ;               add IOC$V_ALLOC to force allocation
0000    ;
0000    ;       V03-028 ACG0406         Andrew C. Goldstein,    16-Mar-1984  15:42
0000    ;               Fix bugs in searching for allocation class
0000    ;
0000    ;       V03-027 ACG0399         Andrew C. Goldstein,    24-Feb-1984  22:28
0000    ;               Add IOC$LAST_CHAN subroutine, and move in internal I/O
0000    ;               database parse and search routines, so they can be called
0000    ;               by IPC.
0000    ;
0000    ;       V03-026 RLRMAPSP        Robert L. Rappaport     15-Feb-1984
0000    ;               Correct bug in BEQL destination in IOC$ALOUBAMAPSP that is
0000    ;               only triggered if the range specified, coincides with the
0000    ;               exact end of an extent of map registers.
0000    ;
0000    ;       V03-025 ROW0292         Ralph O. Weber          4-FEB-1984
0000    ;               Fix branch displacements broken by movement of EXE$MOUNTVER to
0000    ;               SYSLOAxxx.
0000    ;
0000    ;       V03-024 KPL0001         Peter Lieberwirth       7-Nov-1983
0000    ;               Add paths for new processors to CPUDISP invocation.
0000    ;
0000    ;       V03-023 ROW0244         Ralph O. Weber          17-OCT-1983
0000    ;               Change the IOC$CVT_DEVNAM name string formation rules to
0000    ;               eliminate _$1$TTA0: and other allocation class based names
0000    ;               for devices which can never be dual pathed.  See routine
0000    ;               comments for details of current operation mode.
0000    ;
0000    ;       V03-022 ROW0239         Ralph O. Weber          11-OCT-1983
0000    ;               Fix IOC$CVT_DEVNAM to not insert node name or trailing dollar
0000    ;               sign when node name is null.  Also correct comments describing
0000    ;               the R4 argument to IOC$CVT_DEVNAM.
0000    ;
0000    ;       V03-021 ROW0234         Ralph O. Weber          5-OCT-1983
0000    ;               Change IOC$CVT_DEVNAM to produce $allocation-class$device
0000    ;               strings completely in ASCII, when allocation class output is
0000    ;               requested.  In the process rip up the whole thing because that
0000    ;               was the only way to get something that worked and didn't
0000    ;               occupy all non-page memory
0000    ;
0000    ;       V03-020 TCM0005         Trudy C. Matthews       5-OCT-1983
0000    ;               Add IOC$SCAN_IODB_2P which is functionally the same as
0000    ;               IOC$SCAN_IOCB except that both primary and secondary paths to
```

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0000   ;               a device are scanned.
0000   ;
0000   ;       V03-019 KDM0084         Kathleen D. Morse       26-Sep-1983
0000   ;               Added MicroVAX I support to CPUDISP macros.
0000   ;
0000   ;       V03-018 ROW0221         Ralph O. Weber          8-SEP-1983
0000   ;               Change IOC$UNITINIT to look for a unit initialization routine
0000   ;               in the DDT before looking in the CRB.  See the note in the
0000   ;               routine's header for details.
0000   ;
0000   ;       V03-017 ROW0203         Ralph O. Weber          5-AUG-1983
0000   ;               Add two new routines IOC$CTRLINIT and IOC$UNITINIT.  These are
0000   ;               the proscribed mechanism for calling device driver controller
0000   ;               and unit initialization routines.  These routines correctly
0000   ;               setup for, locate, and call the appropriate driver routines.
0000   ;
0000   ;       V03-016 TCM0004         Trudy C. Matthews       26-Jul-1983
0000   ;               Change IOC$CVT_DEVNAM to return the <allocation_class>+
0000   ;               <devnam> form of device name if R4 > 0.
0000   ;
0000   ;       V03-015 RLRBYTEOFF      Robert L. Rappaport     27-Jun-1983
0000   ;               Correct error in IOC$REQDATAPUDA.  Error is that this
0000   ;               routine has operated in a NOWAIT mode, that is, if no
0000   ;               Buffered Datapath was available, we just used the
0000   ;               Direct Datapath.  Unfortunately, this doesn't work on
0000   ;               780's and 790's if the user buffer is located at an
0000   ;               odd byte address since Byte Offset doesn't work on the
0000   ;               Direct Datapath for the UNIBUS Adapters on these
0000   ;               processors.
0000   ;
0000   ;       V03-014 LMPBUILD        L. Mark Pilant,         26-Jun-1983  23:11
0000   ;               Change references from TTY$K_WB_HDRLEN to TTY$K_WB_LENGTH.
0000   ;
0000   ;       V03-013 TCM0003         Trudy C. Matthews       17-Jun-1983
0000   ;               Change the way cluster-style device names are conditionally
0000   ;               returned, such that cluster-style names are returned for
0000   ;               local disk devices if the system is participating in a
0000   ;               cluster (routine IOC$CVT_DEVNAM).
0000   ;
0000   ;       V03-012 TCM0002         Trudy C. Matthews       09-Jun-1983
0000   ;               Fix bug in TCM0001.
0000   ;
0000   ;       V03-011 TCM0001         Trudy C. Matthews       21-Apr-1983
0000   ;               Add new parameter to IOC$CVT_DEVNAM that allows caller
0000   ;               to specify whether he wants the node name returned for
0000   ;               local devices or not.
0000   ;
0000   ;       V03-010 ROW0188         Ralph O. Weber          30-APR-1983
0000   ;               Fix broken branches to PMS$ routines.
0000   ;
0000   ;       V03-009 KTA3022         Kerbey T. Altmann       29-Dec-1982
0000   ;               Enhance KTA3018. Add new routine to scan the IO
0000   ;               data base and return the blocks.
0000   ;
0000   ;       V03-008 ROW0140         Ralph O. Weber          18-NOV-1982
0000   ;               Cause IOC$DALOCUBAMAP to give non-fatal INCONSTATE,
0000   ;               "Inconsistant UBA data base" bugcheck if number of map
```

```
0000   ;               registers to deallocate is zero.
0000   ;
0000   ;       V03-007 MLJ0'01         Martin L. Jack          11-Nov-1982
0000   ;               Add $SBDEF.
0000   ;
0000   ;       V03-006 KTA3018         Kerbey T. Altmann       01-Nov-1982
0000   ;               Modify CVT_DEVNAME for new IO database.
0000   ;
0000   ;       V03-005 ROW0130         Ralph O. Weber           5-OCT-1982
0000   ;               Remove IOC$DELMBX whose functionality is replaced by new
0000   ;               routines in module UCBCREDEL.
0000   ;
0000   ;       V03-004 KDM0002         Kathleen D. Morse       28-Jun-1982
0000   ;               Added $DCDEF.
0000   ;
0000   ;       V03-003 RLR0003         Robert L. Rappaport     1-June-1982
0000   ;               Correct errors in UNIBUS map register allocation and
0000   ;               deallocation that occur when the number of active
0000   ;               descriptors is zero.  Errors were in IOC$ALOUBAMAPSP
0000   ;               (allocation error), IOC$ALOUBAPRM (allocation error),
0000   ;               and IOC$DALOCUBAMAP (deallocation error).  The error
0000   ;               in IOC$DALOCUBAMAP is corrected in a patch to V3.1.
0000   ;
0000   ;       V03-002 RLR0002         Robert L. Rappaport     22-May-1982
0000   ;               Remove IOC$REQMAPREGN and all comments that reference it.
0000   ;
0000   ;       V03-001 RLR0001 Robert L. Rappaport     22-May-1982
0000   ;               Correct error in UNIBUS map register allocation that
C000   ;               doubly allocated registers when the number of active
0000   ;               descriptors was zero.
0000   ;               This bug corrected in patch to V3.1.
0000   ;
```

```
0000       ;
0000       ;
0000       ; MACRO LIBRARY CALLS
0000       ;
0000
0000               $ADPDEF                             ;DEFINE ADP OFFSETS
0000               $CADEF                              ;DEFINE CONDITIONAL ASSEMBLY PARAMETERS
0000               $CANDEF                             ;DEFINE CANCEL I/O REASON CODES
0000               $CDRPDEF                            ;DEFINE CLASS DRIVER I/O REQUEST PACKET
0000               $CRBDEF                             ;DEFINE CRB OFFSETS
0000               $DCDEF                              ;DEFINE DEVICE CLASSES
0000               $DDBDEF                             ;DEFINE DDB OFFSETS
0000               $DDTDEF                             ;DEFINE DDT OFFSETS
0000               $DEVDEF                             ;DEFINE DEVICE CHARACTERISTICS FLAGS
0000               $DYNDEF                             ;DEFINE DYNAMIC POOL BLOCK TYPES
0000               $EMBDEF                             ;DEFINE EMB OFFSETS
0000               $IDBDEF                             ;DEFINE IDB OFFSETS
0000               $IOCDEF                             ;DEFINE IOC$SEARCHxxx FLAGS
0000               $IPLDEF                             ;DEFINE INTERRUPT PRIORITY LEVELS
0000               $IRPDEF                             ;DEFINE IRP OFFSETS
0000               $JIBDEF                             ;DEFINE JIB OFFSETS
0000               $LCKDEF                             ;DEFINE LOCK MANAGER SYMBOLS
0000               $MSCPDEF                            ;DEFINE MSCP STRUCTURES
0000               $PCBDEF                             ;DEFINE PCB OFFSETS
0000               $PDTDEF                             ;Define PDT offsets
0000               $PRDEF                              ;DEFINE PROCESSOR REGISTERS
0000               $PRVDEF                             ;DEFINE PRIVILEGE BITS
0000               $SBDEF                              ; Define system block offsets
0000               $SSDEF                              ;DEFINE SYSTEM STATUS CODES
0000               $TTYDEF                             ;DEFINE TERMINAL WRITE PACKET OFFSETS
0000               $UBMDDEF                            ;Define UNIBUS Map Descriptor structure
0000               $UCBDEF                             ;DEFINE UCB OFFSETS
0000               $VECDEF                             ;DEFINE CRB VECTOR OFFSETS
```

```
                           0000        .SBTTL  CANCEL I/O ON CHANNEL
                           0000  ;+
                           0000  ; IOC$CANCELIO - CANCEL I/O ON CHANNEL
                           0000  ;
                           0000  ; THIS ROUTINE IS A DEVICE INDEPENDENT CANCEL I/O ROUTINE THAT CONDITIONALLY
                           0000  ; MARKS THE UCB SUCH THAT THE CURRENT I/O REQUEST WILL BE CANCELED IF CONDITIONS
                           0000  ; WARRANT SUCH A ACTION.
                           0000  ;
                           0000  ; INPUTS:
                           0000  ;
                           0000  ;       R2 = NEGATIVE OF THE CHANNEL NUMBER.
                           0000  ;       R3 = CURRENT IO PACKET.
                           0000  ;       R4 = PCB ADDRESS.
                           0000  ;       R5 = UCB ADDRESS.
                           0000  ;
                           0000  ; OUTPUTS:
                           0000  ;
                           0000  ;       IF THE DEVICE IS BUSY, THE REQUEST IS FOR THE CURRENT PROCESS, AND
                           0000  ;       THE I/O WAS ISSUED FROM THE DESIGNATED CHANNEL, THEN THE CANCEL I/O
                           0000  ;       BIT IS SET IN THE CORRESPONDING UCB.
                           0000  ;
                           0000  ;       R2, R3, R4, AND R5 ARE PRESERVED ACROSS CALL.
                           0000  ;-
                           0000
                       00000000        .PSECT  WIONONPAGED
                           0000  IOC$CANCELIO::                          ;CANCEL I/O ON CHANNEL
11 64 A5      08      E1   0000        BBC     #UCB$V_BSY,UCB$W_STS(R5),10$ ;IF CLR, DEVICE NOT BUSY
60 A4    0C   A3      D1   0005        CMPL    IRP$L_PID(R3),PCB$L_PID(R4) ;PROCESS ID MATCH?
              0A      12   000A        BNEQ    10$                     ;IF NEQ NO
   28 A3      52      B1   000C        CMPW    R2,IRP$W_CHAN(R3)       ;CHANNEL NUMBER MATCH
              04      12   0010        BNEQ    10$                     ;IF NEQ NO
   64 A5      08      A8   0012        BISW    #UCB$M_CANCEL,UCB$W_STS(R5) ;SET CANCEL PENDING
                      05   0016  10$:  RSB                             ;
```

```
                         0017                 .SBTTL  Handle Last Channel Deassign
                         0017
                         0017       ;+
                         0017       ; IOC$LAST_CHAN - Last Channel Deassign Specific
                         0017       ; IOC$LAST_CHAN_AMBX - Last Assoc. MBX Channel Deassign Specific
                         0017       ;
                         0017       ; Functional Description:
                         0017       ;
                         0017       ;         Common functions done on last channel deassignment are handled.  The
                         0017       ;         driver's cancel I/O routine is called with an appropriate reason code
                         0017       ;         (CAN$C_DASSGN for regular deassign, or CAN$C_AMBXDGN for associated
                         0017       ;         mailboxes).  If after the cancel routine finished UCB$V_DELETEUCB is
                         0017       ;         set, the UCB is credited and deleted.
                         0017       ;
                         0017       ; Inputs:
                         0017       ;
                         0017       ;         R5      UCB address
                         0017       ;         R2      Channel index (LAST_CHAN only)
                         0017       ;
                         0017       ; Outputs:
                         0017       ;
                         0017       ;         R0 thru R3 destroyed.
                         0017       ;         If appropriate, UCB is deallocated.
                         0017       ;
                         0017       ;-
                         0017
                         0017                 .ENABLE LSB
                         0017
                         0017       IOC$LAST_CHAN_AMBX::
               58   DD   0017                 PUSHL   R8                          ; Save R8
               52   7C   0019                 CLRQ    R2                          ; Clear unused cancel inputs.
          58   02   9A   001B                 MOVZBL  #CAN$C_AMBXDGN, R8          ; Set cancel reason code.
               09   11   001E                 BRB     10$
                         0020
                         0020       IOC$LAST_CHAN::
               58   DD   0020                 PUSHL   R8                          ; Save R8
       53   58 A5   D0   0022                 MOVL    UCB$L_IRP(R5), R3           ; Get active packet address.
          58   01   9A   0026                 MOVZBL  #CAN$C_DASSGN, R8           ; Set cancel reason code.
                         0029
      50    0088 C5   D0   0029       10$:      MOVL    UCB$L_DDT(R5), R0           ; Get DDT address.
                         002E                 SETIPL  UCB$B_FIPL(R5)              ; Raise to fork IPL.
            0C B0   16   0032                 JSB     @DDT$L_CANCEL(R0)           ; Call driver's cancel I/O routine.
                         0035                 SETIPL  #IPL$_ASTDEL                ; Lower IPL.
     1A 38 A5   17   E0   0038                 BBS     #DEV$V_ALL, -               ; Branch if still allocated
                         003D                         UCB$L_DEVCHAR(R5),30$
38 A5    00100004 8F   D3   003D                 BITL    #DEV$M_TRM!DEV$M_MBX, -     ; Is this a terminal, remote terminal
                         0045                         UCB$L_DEVCHAR(R5)           ; or mailbox?
               05   13   0045                 BEQL    20$                         ; Branch if not.
     00 38 A5   07   E4   0047                 BBSC    #DEV$V_OPR, -               ; Else, clear OPR bit.
                         004C                         UCB$L_DEVCHAR(R5), 20$      ; This is an implicit operator disable.
               10   E1   004C       20$:      BBC     #UCB$V_DELETEUCB,-          ; Branch if UCB not to be deleted.
         06 64 A5        004E                         UCB$L_STS(R5), 30$
            FFAC'   30   0051                 BSBW    IOC$CREDIT_UCB              ; Else credit UCB quotas,
            FFA9'   30   0054                 BSBW    IOC$DELETE_UCB              ; and delete the UCB.
               58 8ED0   0057       30$:      POPL    R8                          ; Restore R8
                  05   005A                 RSB
                         005B
      005B   330         .DISABLE LSB
```

```
                                   005B          .SBTTL  FILL DIAGNOSTIC BUFFER
                                   005B     ;+
                                   005B     ; IOC$DIAGBUFILL - FILL DIAGNOSTIC BUFFER
                                   005B     ;
                                   005B     ; THIS ROUTINE IS CALLED AT THE END OF AN I/O OPERATION, BUT BEFORE RELEASING
                                   005B     ; THE I/O CHANNEL, TO FILL THE FINAL DEVICE PARAMETERS INTO AN INTERNAL DIAG-
                                   005B     ; NOSTIC BUFFER IF ONE IS SPECIFIED.
                                   005B     ;
                                   005B     ; INPUTS:
                                   005B     ;
                                   005B     ;       R4 = ADDRESS OF DEVICE CSR REGISTER.
                                   005B     ;       R5 = DEVICE UNIT UCB ADDRESS.
                                   005B     ;
                                   005B     ; OUTPUTS:
                                   005B     ;
                                   005B     ;       IF A DIAGNOSTIC BUFFER WAS SPECIFIED IN THE ORIGINAL REQUEST, THEN
                                   005B     ;       THE COMPLETION TIME, FINAL ERROR COUNTERS, AND DEVICE REGISTERS ARE
                                   005B     ;       FILLED INTO THE DIAGNOSTIC BUFFER.
                                   005B     ;-
                                   005B
                                   005B     IOC$DIAGBUFILL::                          ;FILL DIAGNOSTIC BUFFER
          53    58 A5     D0       005B             MOVL    UCB$L_IRP(R5),R3          ;GET ADDRESS OF I/O PACKET
       1B 2A A3     07    E1       005F             BBC     #IRP$V_DIAGBUF,IRP$W_STS(R3),10$ ;IF CLR, NO DIAGNOSTIC BUFFER
          50    4C B3     D0       0064             MOVL    @IRP$L_DIAGBUF(R3),R0     ;GET ADDRESS OF INTERNAL BUFFER DATA AREA
             50    08     C0       0068             ADDL    #8,R0                     ;POINT PAST START TIME
    80   00000000'EF      7D       006B             MOVQ    EXE$GQ_SYSTIME,(R0)+      ;INSERT COMPLETION TIME
       80    0080 C5      3C       0072             MOVZWL  UCB$B_ERTCNT(R5),(R0)+    ;INSERT FINAL ERROR COUNTERS
       52    0088 C5      D0       0077             MOVL    UCB$L_DDT(R5),R2          ;GET ADDRESS OF DDT
                10 B2     16       007C             JSB     @DDT$C_REGDUMP(R2)        ;CALL DEVICE SPECIFIC REGISTER DUMP ROUTINE
                          05       007F     10$:    RSB                               ;
```

```
                         0080          .SBTTL  RELEASE I/O CHANNEL
                         0080  ;+
                         0080  ; IOC$RELCHAN - RELEASE ALL I/O CHANNELS
                         0080  ; IOC$RELSCHAN - RELEASE SECONDARY I/O CHANNEL
                         0080  ;
                         0080  ; THIS ROUTINE IS CALLED AT THE END OF AN I/O OPERATION TO RELEASE ALL
                         0080  ; CHANNELS THE I/O WAS BEING PERFORMED ON.
                         0080  ;
                         0080  ; INPUTS:
                         0080  ;
                         0080  ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                         0080  ;
                         0080  ; OUTPUTS:
                         0080  ;
                         0080  ;       THE CHANNELS ARE RELEASED AND AN ATTEMPT IS MADE TO REMOVE THE NEXT
                         0080  ;       WAITING DRIVER PROCESS FROM EACH CHANNEL QUEUE. IF A DRIVER PROCESS
                         0080  ;       IS WAITING, THEN THE CHANNEL IS ASSIGNED TO THAT DRIVER PROCESS AND
                         0080  ;       IT IS CALLED VIA A JSB TO ITS CHANNEL WAIT RETURN ADDRESS. WHEN THE
                         0080  ;       CALLED DRIVER PROCESS RETURNS, A RETURN IS MADE TO THE DRIVER PROCESS
                         0080  ;       THAT RELEASED THE CHANNEL. IF THERE IS NO DRIVER PROCESS WAITING FOR
                         0080  ;       THE CHANNEL, THEN THE CHANNEL STATUS IS SET TO IDLE.
                         0080  ;
                         0080  ;       R3 AND R4 ARE PRESERVED ACROSS CALL.
                         0080  ;-
                         0080
                         0080          .ENABL  LSB
                         0080  IOC$RELSCHAN::                                   ;RELEASE SECONDARY I/O CHANNEL
   50    24 A5     D0    0080          MOVL    UCB$L_CRB(R5),R0                 ;GET ADDRESS OF PRIMARY CRB
   50    20 A0     D0    0084          MOVL    CRB$L_LINK(R0),R0                ;GET ADDRESS OF SECONARY CRB
            10     11    0088          BRB     20$                              ;
                         008A  IOC$RELCHAN::                                    ;RELEASE I/O CHANNEL
   50    24 A5     D0    008A          MOVL    UCB$L_CRB(R5),R0                 ;GET ADDRESS OF PRIMARY CRB
   50    20 A0     D0    008E          MOVL    CRB$L_LINK(R0),R0                ;GET ADDRESS OF SECONDARY CRB
            02     13    0092          BEQL    10$                              ;IF EQL NONE
            04     10    0094          BSBB    20$                              ;RELEASE SECONDARY CHANNEL
   50    24 A5     D0    0096  10$:    MOVL    UCB$L_CRB(R5),R0                 ;GET ADDRESS OF PRIMARY CRB
25 0E A0     00    E1    009A  20$:    BBC     #CRB$V_BSY,CRB$B_MASK(R0),30$ ;IF CLR, THEN CHANNEL NOT BUSY
   51    2C A0     D0    009F          MOVL    CRB$L_INTD+VEC$L_IDB(R0),R1 ;GET ADDRESS OF IDB
   04 A1     55    D1    00A3          CMPL    R5,IDB$L_OWNER(R1)               ;DRIVER PROCESS OWN CHANNEL?
            1B     12    00A7          BNEQ    30$                              ;IF NEQ NO
   52    00 B0     0F    00A9          REMQUE  @CRB$L_WQFL(R0),R2               ;GET ADDRESS OF NEXT DRIVER FORK BLOCK
            16     1D    00AD          BVS     40$                              ;IF VS NO DRIVER PROCESS WAITING
            38     BB    00AF          PUSHR   #^M<R3,R4,R5>                    ;SAVE CONTEXT OF CURRENT DRIVER PROCESS
      55    52     D0    00B1          MOVL    R2,R5                            ;COPY ADDRESS OF DRIVER PROCESS FORK BLOCK
   53    10 A5     D0    00B4          MOVL    UCB$L_FR3(R5),R3                 ;LOAD WAITING DRIVER PROCESS CONTEXT
      54    61     D0    00B8          MOVL    IDB$L_CSR(R1),R4                 ;SET ASSIGNED CHANNEL CSR ADDRESS
   04 A1     55    D0    00BB          MOVL    R5,IDB$L_OWNER(R1)               ;SET ADDRESS OF OWNER PROCESS UCB
         0C B5     16    00BF          JSB     @UCB$L_FPC(R5)                   ;CALL DRIVER AT CHANNEL WAIT RETURN ADDRESS
            38     BA    00C2          POPR    #^M<R3,R4,R5>                    ;RESTORE PREVIOUS DRIVER PROCESS CONTEXT
                   05    00C4  30$:    RSB                                      ;
         04 A1     D4    00C5  40$:    CLRL    IDB$L_OWNER(R1)                  ;CLEAR OWNER UNIT UCB ADDRESS
   0E A0     01    8A    00C8          BICB    #CRB$M_BSY,CRB$B_MASK(R0) ;CLEAR CHANNEL BUSY
                   05    00CC          RSB                                      ;
                         00CD          .DSABL  LSB
```

```
                        00CD              .SBTTL  REQUEST I/O CHANNEL
                        00CD      ;+
                        00CD      ; IOC$REQPCHANH - REQUEST PRIMARY I/O CHANNEL HIGH PRIORITY
                        00CD      ; IOC$REQSCHANH - REQUEST SECONDARY I/O CHANNEL HIGH PRIORITY
                        00CD      ; IOC$REQPCHANL - REQUEST PRIMARY I/O CHANNEL LOW PRIORITY
                        00CD      ; IOC$REQSCHANL - REQUEST SECONDARY I/O CHANNEL LOW PRIORITY
                        00CD      ;
                        00CD      ; THESE ROUTINES ARE CALLED TO REQUEST AN I/O CHANNEL TO PERFORM AN I/O
                        00CD      ; OPERATION ON.
                        00CD      ;
                        00CD      ; INPUTS:
                        00CD      ;
                        00CD      ;       R5 = UCB ADDPESS OF DEVICE UNIT.
                        00CD      ;       04(SP) = RETURN ADDRESS OF CALLER'S CALLER.
                        00CD      ;
                        00CD      ; OUTPUTS:
                        00CD      ;
                        00CD      ;       IF THE SPECIFIED I/O CHANNEL IS IDLE, THEN IT IS IMMEDIATELY
                        00CD      ;       ASSIGNED TO THE CURRENT DRIVER PROCESS. ELSE THE DRIVER PROCESS
                        00CD      ;       CONTEXT IS SAVED IN ITS FORK BLOCK, THE FORK BLOCK IS INSERTED
                        00CD      ;       IN THE CHANNEL WAIT QUEUE, AND A RETURN TO THE DRIVER PROCESS'
                        00CD      ;       CALLER IS EXECUTED.
                        00CD      ;
                        00CD      ;       WHEN THE CHANNEL IS ASSIGNED, THE CSR ADDRESS OF THE ASSIGNED
                        00CD      ;       CONTROLLER IS RETURNED TO THE CALLER IN REGISTER R4.
                        00CD      ;
                        00CD      ;       R3 IS PRESERVED ACROSS CALL.
                        00CD      ;-
                        00CD
                        00CD              .ENABL  LSB
                        00CD      IOC$REQSCHANH::                         ;REQUEST SECONDARY I/O CHANNEL HIGH PRIORITY
       50   24 A5   D0  00CD              MOVL    UCB$L_CRB(R5),R0        ;GET ADDRESS OF PRIMARY CRB
       50   20 A0   D0  00D1              MOVL    CRB$L_LINK(R0),R0       ;GET ADDRESS OF SECONDARY CRB
               0E   11  00D5              BRB     10$                     ;
                        00D7      IOC$REQSCHANL::                         ;REQUEST SECONDARY I/O CHANNEL LOW PRIORITY
       50   24 A5   D0  00D7              MOVL    UCB$L_CRB(R5),R0        ;GET ADDRESS OF PRIMARY CRB
       50   20 A0   D0  00DB              MOVL    CRB$L_LINK(R0),R0       ;GET ADDRESS OF SECONDARY CRB
               0D   11  00DF              BRB     20$                     ;
                        00E1      IOC$REQPCHANH::                         ;REQUEST PRIMARY I/O CHANNEL HIGH PRIORITY
       50   24 A5   D0  00E1              MOVL    UCB$L_CRB(R5),R0        ;GET ADDRESS OF PRIMARY CRB
          52   50   D0  00E5      10$:    MOVL    R0,R2                   ;SET ADDDRESS OF WAIT QUEUE LISTHEAD
               08   11  00E8              BRB     30$                     ;
                        00EA      IOC$REQPCHANL::                         ;REQUEST PRIMARY I/O CHANNEL LOW PRIORITY
       50   24 A5   D0  00EA              MOVL    UCB$L_CRB(R5),R0        ;GET ADDRESS OF PRIMARY CRB
       52   04 A0   D0  00EE      20$:    MOVL    CRB$L_WQBL(R0),R2       ;GET ADDRESS OF LAST ENTRY IN QUEUE
       51   2C A0   D0  00F2      30$:    MOVL    CRB$L_INTD+VEC$L_IDB(R0),R1 ;GET ADDRESS OF IDB
 08 0E A0   00      E2  00F6              BBSS    #CRB$V_BSY,CRB$B_MASK(R0),40$ ;IF SET, THEN CHANNEL BUSY
          54   61   D0  00FB              MOVL    IDB$L_CSR(R1),R4        ;SET ASSIGNED CHANNEL CSR ADDRESS
    04 A1      55   D0  00FE              MOVL    R5,IDB$L_OWNER(R1)      ;SET OWNER UCB ADDRESS
               05       0102              RSB                             ;
    10 A5      53   D0  0103      40$:    MOVL    R3,UCB$L_FR3(R5)        ;SAVE R3 IN FORK BLOCK
         0C A5    8ED0  0107              POPL    UCB$L_FPC(R5)           ;SAVE CHANNEL WAIT RETURN ADDRESS
          62   65   0E  010B              INSQUE  UCB$L_FQFL(R5),CRB$L_WQFL(R2) ;INSERT DRIVER PROCESS IN CHANNEL WAI
    04 A1      55   D1  010E              CMPL    R5,IDB$L_OWNER(R1)      ;CURRENT DRIVER PROCESS OWNER?
               03   12  0112              BNEQ    50$                     ;IF NEQ, BRANCH TO RETURN
             FF73   31  0114              BRW     IOC$RELCHAN             ;IF EQL BRW TO RELEASE CHANNELS
                        0117      50$:
```

```
   05  0117    475          RSB                              ;
       0118    476          .DSABL  LSB
```

```
                            0118          .SBTTL  I/O Request Completion Processing for Class Drivers
                            0118
                            0118    ;+
                            0118    ; IOC$ALTREQCOM - I/O Request Complete Alternate Entry.
                            0118    ;
                            0118    ; This routine is entered when an I/O operation is completed on one
                            0118    ;       one of the devices using the disk or tape class drivers.
                            0118    ;       The packet is inserted in the I/O finish queue for I/O post
                            0118    ;       processing.
                            0118    ;
                            0118    ; INPUTS:
                            0118    ;
                            0118    ;       R0 = First  longword of I/O status
                            0118    ;       R1 = Second longword of I/O status
                            0118    ;       R5 = CDRP address
                            0118    ;
                            0118    ; OUTPUTS:
                            0118    ;
                            0118    ;       The I/O packet is inserted in the I/O Post Processing Queue,
                            0118    ;       a Software interrupt is requested to initiate I/O Post
                            0118    ;       Processing.
                            0118    ;-
                            0118
                            0118    IOC$ALTREQCOM::
         53    A0 A5    9E  0118            MOVAB   CDRP$L_IOQFL(R5),R3     ; R3 => IRP section of CDRP. This is
                            011C                                            ;  for compatibility with rest of QIO
                            011C                                            ;  logic.
         55    1C A3    D0  011C            MOVL    IRP$L_UCB(R3),R5        ; R5 => UCB.
               70 A5    D6  0120            INCL    UCB$L_OPCNT(R5)         ; Increment operations completed
                            0123
               15 50    E9  0123            BLBC    R0,20$                  ; LBC implies I/O error, so goto call
                            0126                                            ;  MOUNT VERIFICATION just in case.
                            0126    10$:
         38 A3    50    7D  0126            MOVQ    R0,IRP$L_MEDIA(R3)      ; Save final I/O status in IRP.
                            012A
                            012A            .IF DF  CA$_MEASURE_IOT
                            012A
       00000000'GF      16  012A            JSB     G^PMS$END_IO            ; Insert end of I/O transaction message
                            0130
                            0130            .ENDC
                            0130
   00000000'FF    63    0E  0130            INSQUE  (R3),@L^IOC$GL_PSBL     ; Insert packet in POST process queue
                            0137            SOFTINT #IPL$_IOPOST            ; Initiate SOFTWARE INTERRUPT
                        05  013A            RSB
                            013B    20$:
       00000000'GF      16  013B            JSB     G^EXE$MOUNTVER          ; If LBC, call MOUNT VERIFICATION.
                  E3    11  0141            BRB     10$                     ; Go back to normal flow.
```

```
                             0143            .SBTTL  I/O REQUEST COMPLETION PROCESSING
                             0143    ;+
                             0143    ; IOC$REQCOM - I/O REQUEST COMPLETE
                             0143    ;
                             0143    ; THIS ROUTINE IS ENTERED WHEN AN I/O OPERATION IS COMPLETED ON A
                             0143    ; DEVICE UNIT. THE FINAL I/O STATUS IS STORED IN THE ASSOCIATED I/O
                             0143    ; PACKET AND THE PACKET IS INSERTED IN THE I/O FINISH QUEUE FOR
                             0143    ; I/O POST PROCESSING. DEVICE UNIT BUSY IS CLEARED AND AN ATTEMPT
                             0143    ; IS MADE TO START ANOTHER I/O REQUEST ON THE DEVICE UNIT.
                             0143    ;
                             0143    ; IF THE I/O REQUEST COMPLETED WITH AN ERROR, AND THE DEVICE IS
                             0143    ; A DISK, THEN BRANCH TO THE MOUNT VERIFICATION CODE, WHICH WILL
                             0143    ; DETERMINE IF THE SITUATION REQUIRES MOUNT VERIFICATION.
                             0143    ;
                             0143    ; IF MOUNT VERIFICATION IS IN PROGRESS, NO FURTHER I/O REQUESTS WILL
                             0143    ; BE INITIATED.  THIS HAS A SIDE EFFECT OF KEEPING THE 'BSY' BIT IN
                             0143    ; WHATEVER STATE IT IS CURRENTLY IN.  FOR CONVENTIONAL DISK DRIVERS,
                             0143    ; THE BSY BIT WILL BE LEFT ON, WHICH WILL BLOCK $QIO FROM INITIATING
                             0143    ; ANY NEW I/O ON THE DEVICE.  FOR THE DISK CLASS DRIVER, THE BUSY
                             0143    ; BIT WILL BE OFF, WHICH WILL ALLOW $QIO TO INITIATE NEW I/O.
                             0143    ;
                             0143    ; INPUTS:
                             0143    ;
                             0143    ;       R0 = FIRST LONGWORD OF I/O STATUS.
                             0143    ;       R1 = SECOND LONGWORD OF I/O STATUS.
                             0143    ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                             0143    ;
                             0143    ; OUTPUTS:
                             0143    ;
                             0143    ;       THE I/O PACKET IS INSERTED IN THE I/O POST PROCESSING QUEUE
                             0143    ;       AND DEVICE UNIT BUSY IS CLEARED. A SOFTWARE INTERRUPT IS
                             0143    ;       REQUESTED TO INITIATE I/O POST PROCESSING.
                             0143    ;-
                             0143
                             0143            .ENABL  LSB
                             0143    IOC$REQCOM::                            ;I/O DONE PROCESSING
    1C 64 A5    02      E5   0143            BBCC    #UCB$V_ERLOGIP,UCB$W_STS(R5),10$ ;IF CLR, ERROR LOG NOT IN PROGRESS
     52   0094 C5       D0   0148            MOVL    UCB$L_EMB(R5),R2        ;GET ADDRESS OF ERROR MESSAGE BUFFER
    1A A2   64 A5       B0   014D            MOVW    UCB$W_STS(R5),EMB$W_DV_STS(R2) ;INSERT FINAL DEVICE STATUS
 10 A2    0080 C5       B0   0152            MOVW    UCB$B_ERTCNT(R5),EMB$B_DV_ERTCNT(R2) ;INSERT FINAL ERROR COUNTERS
       12 A2    50      7D   0158            MOVQ    R0,EMB$Q_DV_IOSB(R2)    ;INSERT FINAL I/O STATUS
                50      DD   015C            PUSHL   R0                      ;SAVE R0
             FE9F'      30   015E            BSBW    ERL$RELEASEMB           ;RELEASE ERROR MESSAGE BUFFER
                50 8ED0      0161            POPL    R0                      ;RESTORE R0
       53    58 A5      D0   0164    10$:    MOVL    UCB$L_IRP(R5),R3        ;GET ADDRESS OF I/O PACKET
             70 A5      D6   0168            INCL    UCB$L_OPCNT(R5)         ;INCREMENT OPERATIONS COMPLETED
             2A 50      E9   016B            BLBC    R0,DISKCHK              ;IF I/O ERROR, CHECK FOR DISK DEVICE
                             016E    ;
                             016E    ; DO NOT SAVE THE I/O STATUS IN THE IRP UNTIL IT HAS BEEN DECIDED THAT
                             016E    ; MOUNT VERIFICATION IS NOT NECESSARY.  THIS IS TO AVOID OVERWRITING THE
                             016E    ; PHYSICAL DISK ADDRESS STORED IN THE IRP AT OFFSET IRP$L_MEDIA.
                             016E    ;
       38 A3    50      7D   016E    20$:    MOVQ    R0,IRP$L_MEDIA(R3)      ;STORE FINAL I/O STATUS
                             0172
                             0172            .IF DF  CA$_MEASURE_IOT
                             0172
       00000000'EF      D5   0172            TSTL    L^PMS$GL_IOPFMPDB       ;DATA COLLECTION ENABLED?
```

```
             36     12  0178    583              BNEQ    DO_PMS                       ;BRANCH IF YES
                        017A    584
                        017A    585              .ENDC
                        017A    586
 00000000'FF    63  0E  017A    587 PMSEND: INSQUE  (R3),@L^IOC$GL_PSBL         ;INSERT PACKET IN POST PROCESS QUEUE
                        0181    588              SOFTINT #IPL$_IOPOST                ;INITIATE SOFTWARE INTERRUPT
             0E     E0  0184    589              BBS     #UCB$V_MNTVERIP,-           ;BRANCH IF MOUNT VERIFICATION IN PROGRESS
       2F 64 A5         0186    590                      UCB$W_STS(R5),MNTVERPNDCHK ;(NOTE THIS LEAVES 'BSY' AS IS)
      53    4C B5   0F  0189    591 NXTIRP: REMQUE  @UCB$L_IOQFL(R5),R3         ;REMOVE I/O PACKET FROM DEVICE UNIT QUEUE
             4C     1C  018D    592              BVC     IOC$INITIATE                ;IF VC INITIATE NEXT FUNCTION
  64 A5  0100 8F    AA  018F    593              BICW    #UCB$M_BSY,UCB$W_STS(R5)   ;CLEAR UNIT BUSY
                        0195    594 RELEASE:                                         ;RELEASE ALL CHANNELS
           FEF2     31  0195    595              BRW     IOC$RELCHAN                 ;
                        0198    596 ;
                        0198    597 ; IF THIS IS A DISK DEVICE, CALL THE MOUNT VERIFICATION ROUTINE
                        0198    598 ; TO DETERMINE IF MOUNT VERIFICATION IS NECESSARY.  IF NOT, CONTROL
                        0198    599 ; WILL RETURN, AND THE REQUEST WILL BE COMPLETED IN THE NORMAL MANNER.
                        0198    600 ;
                        0198    601 DISKCHK:
             01     91  0198    602              CMPB    #DC$_DISK,-                 ;IS THIS DEVICE A DISK?
          40 A5         019A    603                      UCB$B_DEVCLASS(R5)          ;
             D0     12  019C    604              BNEQ    20$                         ;BRANCH IF NOT
             13     E5  019E    605              BBCC    #UCB$V_MNTVERPND,-          ;CHECK FOR MOUNT VERIFICATION PENDING
       05 64 A5         01A0    606                      UCB$L_STS(R5),30$           ;IF NOT, JUST ENTER MOUNT VERIFICATION
             0E     E5  01A3    607              BBCC    #UCB$V_MNTVERIP,-           ;CLEAR IN-PROGRESS BIT BEFORE CALL
       00 64 A5         01A5    608                      UCB$L_STS(R5),30$           ; SO IT WILL REALLY START
    00000000'GF     16  01A8    609 30$:         JSB     G^EXE$MOUNTVER              ;START MOUNT VERIFICATION
             BE     11  01AE    610              BRB     20$                         ;COMPLETE I/O REQUEST
                        01B0    611
                        01B0    612              .IF DF  CA$_MEASURE_IOT
                        01B0    613
    00000000'GF     16  01B0    614 DO_PMS: JSB     G^PMS$END_IO                ;INSERT END OF I/O TRANSACTION MESSAGE
             C2     11  01B6    615              BRB     PMSEND                      ;REJOIN COMMON CODE
                        01B8    616
                        01B8    617              .ENDC
                        01B8    618 ;
                        01B8    619 ; THE MOUNT-VERIFICATION-PENDING BIT IS USED TO INDICATE THAT A DISK SHOULD GO
                        01B8    620 ; INTO MOUNT VERIFICATION AS SOON AS THE CURRENT I/O IS DONE.  THIS IS INTENDED
                        01B8    621 ; FOR USE IN A CLUSTER TO STALL I/O WHEN QUORUM IS LOST.
                        01B8    622 ;
                        01B8    623 MNTVERPNDCHK:
             13     E5  01B8    624              BBCC    #UCB$V_MNTVERPND,-          ;CHECK FOR MOUNT VERIFICATION PENDING
       D8 64 A5         01BA    625                      UCB$L_STS(R5),RELEASE       ;IF NOT, JUST CLEAN UP
             01     91  01BD    626              CMPB    #DC$_DISK,-                 ;IS THIS DEVICE A DISK?
          40 A5         01BF    627                      UCB$B_DEVCLASS(R5)          ;
             D2     12  01C1    628              BNEQ    RELEASE                     ;BRANCH IF NOT
             0E     E5  01C3    629              BBCC    #UCB$V_MNTVERIP,-           ;CLEAR IN-PROGRESS BIT BEFORE CALL
       00 64 A5         01C5    630                      UCB$L_STS(R5),40$
             53     D4  01C8    631 40$:         CLRL    R3                          ;NO IRP PASSED TO MOUNT VERIFICATION
    00000000'GF     16  01CA    632              JSB     G^EXE$MOUNTVER              ;TRY TO START MOUNT VERIFICATION
             B7     11  01D0    633              BRB     NXTIRP                      ;WASN'T NECESSARY
                        01D2    634
                        01D2    635              .DSABL  LSB
```

```
                      01D2             .SBTTL  MOUNT VERIFICATION HELPER
                      01D2        ;++
                      01D2        ; IOC$MNTVER    - Assist driver with mount verification.
                      01D2        ;
                      01D2        ; This routine is called by EXE$MOUNTVER to perform some driver-specific
                      01D2        ; actions necessary for mount verification.  This routine is used by non-
                      01D2        ; CLASS drivers, and is called by default if EXE$MOUNTVER finds the address
                      01D2        ; of IOC$RETURN in DDT$L_MNTVER.
                      01D2        ;
                      01D2        ; Inputs:
                      01D2        ;
                      01D2        ;        R3      = IRP address or 0
                      01D2        ;        R5      = UCB address
                      01D2        ;
                      01D2        ; Outputs:
                      01D2        ;
                      01D2        ;        None.
                      01D2        ;
                      01D2        ; Side effects:
                      01D2        ;
                      01D2        ;        If R3 contains an IRP address, the IRP will be queued to the
                      01D2        ;        head of the UCB's IRP work queue.  If R3 contains is zero, then
                      01D2        ;        remove the IRP from the head of the UCB's work queue and attempt
                      01D2        ;        to initiate the I/O.
                      01D2        ;--
                      01D2
                      01D2        IOC$MNTVER::                                    ;Driver-specific mount verification code
          53    D5    01D2                 TSTL     R3                            ;Check IRP address
          B3    13    01D4                 BEQL     NXTIRP                        ;Branch if none
          63    0E    01D6                 INSQUE   IRP$L_IOQFL(R3),-             ;Requeue the IRP
       4C A5          01D8                          UCB$L_IOQFL(R5)               ;
                05    01DA                 RSB                                    ;Return
```

```
                             01DB          .SBTTL  INITIATE I/O FUNCTION ON DEVICE
                             01DB     ;+
                             01DB     ; IOC$INITIATE - INITIATE NEXT FUNCTION ON DEVICE
                             01DB     ;
                             01DB     ; THIS ROUTINE IS CALLED TO INITIATE THE NEXT FUNCTION ON A DEVICE BY CLEARING
                             01DB     ; STATUS BITS, SETTING THE OPERATION START TIME IF A DIAGNOSTIC BUFFER IS
                             01DB     ; SPECIFIED, AND CALLING THE DRIVER AT ITS START I/O ENTRY POINT.
                             01DB     ;
                             01DB     ; INPUTS:
                             01DB     ;
                             01DB     ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                             01DB     ;       R5 = DEVICE UNIT UCB ADDRESS.
                             01DB     ;
                             01DB     ; OUTPUTS:
                             01DB     ;
                             01DB     ;       CANCEL I/O, POWERFAIL, AND TIME OUT STATUS BITS ARE CLEARED, THE
                             01DB     ;       CURRENT SYSTEM TIME IS FILLED INTO THE INTERNAL DIAGNOSTIC BUFFER
                             01DB     ;       IF ONE IS SPECIFIED, AND THE DRIVER IS CALLED AT ITS START I/O ENTRY
                             01DB     ;       POINT.
                             01DB     ;-
                             01DB
                             01DB     IOC$INITIATE::                                  ;INITIATE I/O FUNCTION
        58 A5    53    D0    01DB             MOVL    R3,UCB$L_IRP(R5)        ;SAVE I/O PACKET ADDRESS
                             01DF
                             01DF             .IF DF  CA$_MEASURE_IOT
                             01DF
      00000000'GF      16    01DF             JSB     G^PMS$START_IO          ;INSERT START OF I/O TRANSACTION MESSAGE
                             01E5
                             01E5             .ENDC
                             01E5
     78 A5    2C A3    7D    01E5             MOVQ    IRP$L_SVAPTE(R3),UCB$L_SVAPTE(R5) ;COPY TRANSFER PARAMETERS
   64 A5    0048 8F    AA    01EA             BICW    #UCB$M_CANCEL!UCB$M_TIMOUT,UCB$W_STS(R5) ;CLEAR CANCEL AND TIME OUT
    0B 2A A3    07     E1    01F0             BBC     #IRP$V_DIAGBUF,IRP$W_STS(R3),10$ ;IF CLR, NO DIAGNOSTIC BUFFER
         50    4C B3   D0    01F5             MOVL    @IRP$L_DIAGBUF(R3),R0   ;GET ADDRESS OF DIAGNOSTIC BUFFER DATA AREA
  60   00000000'EF     7D    01F9             MOVQ    EXE$GQ_SYSTIME,(R0)     ;INSERT I/O OPERATION START TIME
      50    0088 C5    D0    0200     10$:    MOVL    UCB$L_DDT(R5),R0        ;GET ADDRESS OF DRIVER DISPATCH TABLE
              00 B0    17    0205             JMP     @DDT$L_START(R0)        ;START I/O OPERATION
```

```
                        0208         .SBTTL  Allocate Buffered Data Path
                        0208  ;+
                        0208  ; ALLOCATE BUFFERED DATA PATH CODE -
                        0208  ;
                        0208  ; IOC$REQDATAP - Entrypoint (called from traditional drivers) where caller
                        0208  ;         wishes to be queued (using UCB fork block) if no buffered data path
                        0208  ;         is available at the time of the call.
                        0208  ; INPUT:
                        0208  ;                         R5 => UCB.
                        0208  ;
                        0208  ; IOC$REQDATAPNW - Entrypoint to call when caller does not want to wait for
                        0208  ;         unavailable data path.
                        0208  ; INPUT:
                        0208  ;                         R5 => UCB
                        0208  ;
                        0208  ; IOC$REQDATAPUDA - Entrypoint (called from UDA port driver) where CDRP
                        0208  ;         is used as the source of information about the request and where
                        0208  ;         the caller does not want to wait for unavailable datapath.
                        0208  ;
                        0208  ; INPUT:
                        0208  ;                         R4 => PDT
                        0208  ;                         R5 => CDRP
                        0208  ;-
                        0208
                        0208  IOC$REQDATAP::
            10     10   0208         BSBB    IOC$REQDATAPNW          ; Try to alloc. and get control after.
         0C 50     E8   020A         BLBS    R0,10$                  ; LBS implies allocation success.
                        020D
   10 A5    53     7D   020D         MOVQ    R3,UCB$L_FR3(R5)        ; Save driver context in UCB fork block.
         0C A5   8ED0   0211         POPL    UCB$L_FPC(R5)           ; Save caller's return point.
            65     0E   0215         INSQUE  UCB$L_FQFL(R5),-        ; Queue fork block to resource wait queue.
         18 B1          0217                 @ADP$L_DPQBL(R1)        ;  Assumes IOC$ALODATAP saves R1=>ADP.
                   05   0219  10$:   RSB                             ; Return to caller or caller's caller.
                        021A
                        021A  IOC$REQDATAPNW::
   50    24 A5     D0   021A         MOVL    UCB$L_CRB(R5),R0                ; R0=>CRB.
   51    38 A0     D0   021E         MOVL    CRB$L_INTD+VEC$L_ADP(R0),R1     ; R1=>ADP (pass to IOC$ALODATAP)
   52    34 A0     9E   0222         MOVAB   CRB$L_INTD+VEC$W_MAPREG(R0),R2  ; R2=>UBMD     "     "     "
                        0226
            40     11   0226         BRB     IOC$ALODATAP            ; NOWAIT, RSB from IOC$ALODATAP
                        0228                                         ;  returns to our caller.
                        0228  IOC$REQDATAPUDA::
   51  00E0 C4     D0   0228         MOVL    PDT$L_ADP(R4),R1        ; R1=>ADP (pass to IOC$ALODATAP)
   52    3C A5     9E   022D         MOVAB   CDRP$L_UBARSRCE(R5),R2  ; R2=>UBMD     "     "     "
                        0231
            35     10   0231         BSBB    IOC$ALODATAP            ; Call to allocate a data path.
         2D 50     E8   0233         BLBS    R0,20$                  ; LBS means we got one.
      29 D0 A5     E9   0236         BLBC    CDRP$W_BOFF(R5),20$     ; LBC means, user buffer is on an
                        023A                                         ;  even byte address so we can use
                        023A                                         ;  the Direct Data Path.
                        023A
                        023A  ; Here we have a transfer to a user buffer located at an odd byte address.
                        023A  ; On those processors which support Byte Offset on the Direct Datapath, we
                        023A  ; can continue processing.  On other processors, we must wait for a buffered
                        023A  ; datapath.
                        023A
                        023A         CPUDISP <<780,10$>,-            ; On 11-780 we wait.
```

```
                       023A                         <750,20$>,-                ; On 11-750 we continue.
                       023A                         <730,20$>,-                ; On 11-730 we continue.
                       023A                         <790,10$>,-                ; On 11-790 we wait.
                       023A                         <8SS,10$>,-                ; On SCORPIO we wait.
                       023A                         <8NN,10$>,-                ; On NAUTILUS we wait.
                       023A                         <UV1,30$>>                 ; On MicroVAX we bugcheck.
                       0254
 10 A5     53    7D    0254  10$:    MOVQ     R3,CDRP$L_FR3(R5)         ; Save driver context in CDRP fork block.
        0C A5  8ED0    0258          POPL     CDRP$L_FPC(R5)            ; Save caller's return point.
        28 B5    B6    025C          INCW     @CDRP$L_RWCPTR(R5)        ; Increment RWAITCNT.
           65    0E    025F          INSQUE   CDRP$L_FQFL(R5),-         ; Queue fork block to resource wait queue.
        18 B1          0261                   @ADP$L_DPQBL(R1)          ;  Assumes IOC$ALODATAP saves R1=>ADP.
                       0263  20$:
                 05    0263          RSB                                ; Return to caller or caller's caller.
                       0264
                       0264  30$:    BUG_CHECK        IVBYTEALGN,FATAL
```

F 4

```
                         0268  ; IOC$ALODATAP - Common subroutine called by above routines to allocate
                         0268  ;        a UNIBUS buffered datapath.
                         0268  ;
                         0268  ; INPUTS:
                         0268  ;        R1 => ADP wherein the datapath allocation bit map is stored.
                         0268  ;        R2 => UBA mapping descriptor in user's data structure.
                         0268  ;
                         0268  ; OUTPUTS:
                         0268  ;        R0 LBS - implies allocation success
                         0268  ;                datapath field in R2 => UBA mapping descriptor is set to the
                         0268  ;                        number of the datapath allocated.
                         0268  ;                appropriate bit in datapath allocation bit map is cleared.
                         0268  ;        R0 LBC - implies allocation failure.
                         0268  ;
                         0268
                         0268  IOC$ALODATAP:
              07   E0    0268          BBS     #VEC$V_PATHLOCK,-       ; If this user has a permanently allocated
        17 03 A2         026A                  UBMD$B_DATAPATH(R2),10$ ;  datapath, branch around to success.
                         026D
                         026D          ASSUME  ADP$C_NUMDATAP  EQ  16
              00   EA    026D          FFS     #0,-                    ; Find first available datapath,
              10         026F                  #ADP$C_NUMDATAP,-       ;  according to bit map.  Note failure
           60 A1         0270                  ADP$W_DPBITMAP(R1),-    ;  leaves R0 with the value "16", an
              50         0272                  R0                      ;  even number with the low bit clear.
              12   13    0273          BEQL    20$                     ; EQL implies failure.
                         0275
              50   F0    0275          INSV    R0,-                    ; Upon success, R0 has number of the
                         0277                  #VEC$V_DATAPATH,-       ;  available datapath to allocate.
        05    00         0277                  #VEC$S_DATAPATH,-       ;  So we update the user's datapath
           03 A2         0279                  UBMD$B_DATAPATH(R2)     ;  descriptor pointed at by R2.
                         027B
  04 60 A1    50   E4    027B          BBSC    R0,ADP$W_DPBITMAP(R1),10$; And we update the bit map.
                         0280          BUG_CHECK INCONSTATE            ; We shouldn't be here obviously.
                         0284
        50    01   D0    0284  10$:    MOVL    S^#SS$_NORMAL,R0        ; Indicate allocation success.
                   05    0287  20$:    RSB                             ; And we return to our caller.
```

```
                         0288          .SBTTL  Release Buffered Data Path
                         0288  ;+
                         0288  ; RELEASE BUFFERED DATA PATH CODE -
                         0288  ;
                         0288  ; IOC$RELDATAPUDA - Entry point called from UDA port driver in response
                         0288  ;       to an UNMAP call.  Here the data as to the buffered data path
                         0288  ;       is in the CDRP.
                         0288  ;
                         0288  ; INPUTS:
                         0288  ;       R4 => PDT
                         0288  ;       R5 => CDRP
                         0288  ;
                         0288  ; IOC$RELDATAP - Entry point called from traditional drivers to release
                         0288  ;       the buffered datapath described in CRB$L_INTD+VEC$B_DATAPATH.
                         0288  ;
                         0288  ; INPUTS:
                         0288  ;       R5 => UCB
                         0288  ;
                         0288  ; OUTPUTS:
                         0288  ;       Datapath re-allocated (if any waiters). R0, R1, and R2 modified.
                         0288  ; NOTE: Since calls to IOC$REQDATAPUDA are NOWAIT, fork blocks dequeued
                         0288  ;       here from ADP$L_DPQFL are guaranteed to be UCB's.
                         0288  ;
                         0288
                         0288 IOC$RELDATAPUDA::
  51   00E0 C4     D0    0288          MOVL    PDT$L_ADP(R4),R1        ; R1 => ADP.
   52    3C A5     9E    028D          MOVAB   CDRP$L_UBARSRCE(R5),R2  ; R2 => UBMD.
            0C     11    0291          BRB     RELDATAP_COMMON
                         0293 IOC$RELDATAP::
   50    24 A5     D0    0293          MOVL    UCB$L_CRB(R5),R0                 ; R0 => CRB.
   52    34 A0     9E    0297          MOVAB   CRB$L_INTD+VEC$W_MAPREG(R0),R2   ; R2 => UBMD.
   51    38 A0     D0    029B          MOVL    CRB$L_INTD+VEC$L_ADP(R0),R1      ; R1 => ADP.
                         029F RELDATAP_COMMON:
   50    03 A2     98    029F          CVTBL   UBMD$B_DATAPATH(R2),R0           ; Get datapath designator.
            36     15    02A3          BLEQ    10$                              ; If LSS permanent assignment.
                         02A5                                                   ; If EQL we had NO datapath to
                         02A5                                                   ;  release.
            00     F0    02A5          INSV    #0,-                             ; Zero datapath number.
       05   00           02A7                  #VEC$V_DATAPATH,#VEC$S_DATAPATH,-
         03 A2           02A9                  UBMD$B_DATAPATH(R2)
            00     EF    02AB          EXTZV   #VEC$V_DATAPATH,-       ; Extract datapath number.
  52   50   05           02AD                  #VEC$S_DATAPATH,R0,R2   ;
   50    14 B1     0F    02B0          REMQUE  @ADP$L_DPQFL(R1),R0     ; R0 => next driver fork block
            26     1D    02B4          BVS     20$                     ; If VS no driver process waiting
                         02B6
       7E   53     7D    02B6          MOVQ    R3,-(SP)                ; Save R3, R4, R5
            55     DD    02B9          PUSHL   R5
       55   50     D0    02BB          MOVL    R0,R5                   ; R5 => driver fork block.
            10     91    02BE          CMPB    #DYN$C_UCB,-            ; See if we dequeued a UCB or a CDRP.
         0A A5           02C0                  UCB$B_TYPE(R5)
            22     12    02C2          BNEQ    30$                     ; NEQ implies a CDRP.
                         02C4
                         02C4 ; Here we have R5 => UCB.
                         02C4
   51    24 A5     D0    02C4          MOVL    UCB$L_CRB(R5),R1        ; R1 => CRB.
                         02C8
            52     F0    02C8          INSV    R2,-                    ; Store assigned datapath #
```

```
                         02CA   876                 #VEC$V_DATAPATH,-          ;  in CRB.
         05   00         02CA   877                 #VEC$S_DATAPATH,-
           37 A1         02CC   878                 CRB$L_INTD+VEC$B_DATAPATH(R1)
                         02CE   879
    53   10 A5    7D     02CE   880         MOVQ    UCB$L_FR3(R5),R3           ; Restore driver context.
         0C B5    16     02D2   881         JSB     @UCB$L_FPC(R5)             ; Call back waiting driver.
                         02D5   882 5$:
             55 8ED0     02D5   883         POPL    R5                         ; Restore deallocator's R5,R4,R3
    53      8E    7D     02D8   884         MOVQ    (SP)+,R3                   ;
                  05     02DB   885 10$:    RSB                                ; Return to deallocator.
FA 60 A1      52  E3     02DC   886 20$:    BBCS    R2,-
                         02E1   887                 ADP$W_DPBITMAP(R1),10$     ; Set datapath bit and exit
                         02E1   888         BUG_CHECK INCONSTATE               ; Inconsistent state.
                  05     02E5   889         RSB                                ;
                         02E6   890
                         02E6   891 ; Here we have R5 => CDRP.
                         02E6   892
                         02E6   893 30$:
              52  F0     02E6   894         INSV    R2,-                       ; Store assigned datapath #
                         02E8   895                 #VEC$V_DATAPATH,-          ;  in CDRP field.
         05   00         02E8   896                 #VEC$S_DATAPATH,-
           3F A5         02EA   897                 CDRP$L_UBARSRCE+UBMD$B_DATAPATH(R5)
                         02EC   898
   00000000'EF    16     02EC   899         JSB     SCS$RESUMEWAITR            ; Resume waiting thread and any backed
                         02F2   900                                            ;  up IRP's.
              E1  11     02F2   901         BRB     5$                         ; Branch back to resume deallocator's
                         02F4   902                                            ;  thread.
```

```
                    02F4           .SBTTL  REQUEST AND ALLOCATE UNIBUS MAP REGISTERS FOR CLASS DRIVER
                    02F4    ;+
                    02F4    ; IOC$REQMAPUDA - REQUEST AND ALLOCATE UNIBUS MAP REGISTERS FOR CLASS DRIVER
                    02F4    ;
                    02F4    ; THIS ROUTINE IS CALLED TO ALLOCATE UBA MAP REGISTERS AND TO MARK THE ALLOCATION
                    02F4    ; IN THE UBA MAP REGISTER ALLOCATION DATA STRUCTURES.
                    02F4    ;
                    02F4    ; INPUTS:
                    02F4    ;
                    02F4    ;       R4 = ADDRESS OF PORT DESCRIPTOR TABLE.
                    02F4    ;       R5 = ADDRESS OF CLASS DRIVER REQUEST PACKET (CDRP).
                    02F4    ;
                    02F4    ; OUTPUTS:
                    02F4    ;
                    02F4    ;       IF MAP REGISTERS ARE ALLOCATED FOR THE CDRP, THE APPROPRIATE FIELDS
                    02F4    ;       IN THE CDRP ARE MODIFIED TO INDICATE WHICH REGISTERS, AND THE NUMBER
                    02F4    ;       OF REGISTERS THAT HAVE BEEN ALLOCATED.  ALSO THE ALLOCATION DATA
                    02F4    ;       STRUCTURE IN THE ADP IS MODIFIED.
                    02F4    ;
                    02F4    ;       IF MAP REGISTERS CANNOT BE ALLOCATED AT THIS TIME, THE CDRP IS
                    02F4    ;       QUEUED ONTO THE RESOURCE WAIT LIST AND THE UCB$W_RWAITCNT IS
                    02F4    ;       INCREMENTED.
                    02F4    ;
                    02F4    ;-
                    02F4
                    02F4   IOC$REQMAPUDA::                               ; Allocate UBA map registers for class drive
          25   10   02F4           BSBB    IOC$ALOMAPUDA                 ; Call to allocate map registers if availabl
                    02F6                                                 ;  Returns R2 => ADP.
                    02F6
                    02F6    ; If here, low bit of R0 tells us whether we were successful in the allocation
                    02F6    ;       attempt.
                    02F6
       0F 50   E8   02F6           BLBS    R0,10$                        ; Branch around if successful.
    10 A5  53  7D   02F9           MOVQ    R3,CDRP$L_FR3(R5)             ; Save driver process context
       28 B5   B6   02FD           INCW    @CDRP$L_RQCPTR(R5)            ; One more CDRP, on this UCB, awaiting
                    0300                                                 ;  resources.
     0C A5 8ED0     0300           POPL    CDRP$L_FPC(R5)                ; Save map register wait return address
          65   0E   0304           INSQUE  CDRP$L_FQFL(R5),-
       34 B2        0306                   @ADP$L_MRQBL(R2)              ; Insert process in map register wait queue
               05   0308   10$:    RSB                                   ;
```

```
                        0309              .SBTTL  REQUEST UNIBUS MAP REGISTERS
                        0309       ;+
                        0309       ; IOC$REQMAPREG - REQUEST UNIBUS MAP REGISTERS
                        0309       ;
                        0309       ; THIS ROUTINE IS CALLED TO REQUEST UNIBUS MAP REGISTERS TO PERFORM AN
                        0309       ; I/O TRANSFER.
                        0309       ;
                        0309       ; INPUTS:
                        0309       ;
                        0309       ;      R5 = UCB ADDRESS OF DEVICE UNIT.
                        0309       ;      04(SP) = RETURN ADDRESS OF CALLER'S CALLER.
                        0309       ;
                        0309       ;      IT IS ASSUMED THAT THE CALLER OWNS THE I/O CHANNEL ON WHICH THE
                        0309       ;      TRANSFER IS TO OCCUR ON.
                        0309       ;
                        0309       ; OUTPUTS:
                        0309       ;
                        0309       ;      IF MAP REGISTERS HAVE BEEN PERMANENTLY ASSIGNED TO THE ASSOCIATED
                        0309       ;      I/O CHANNEL, THEN CONTROL IS IMMEDIATELY RETURNED TO THE CALLER.
                        0309       ;      ELSE AN ATTEMPT IS MADE TO ALLOCATE THE REQUESTED NUMBER OF MAP REG-
                        0309       ;      ISTERS. IF SUFFICIENT CONTIGUOUS MAP REGISTERS ARE FOUND, THEN THEY
                        0309       ;      ARE ASSIGNED TO THE ASSOCIATED I/O CHANNEL AND CONTROL IS RETURNED
                        0309       ;      TO THE CALLER. ELSE THE DRIVER PROCESS CONTEXT IS SAVED IN ITS FORK
                        0309       ;      BLOCK, THE FORK BLOCK IS INSERTED IN THE MAP REGISTER WAIT QUEUE,
                        0309       ;      AND A RETURN TO THE DRIVER PROCESS' CALLER IS EXECUTED.
                        0309       ;-
                        0309
                        0309       IOC$REQMAPREG::                             ;REQUEST UNIBUS MAP REGISTERS
             3A    10   0309              BSBB    IOC$ALOUBAMAP                ; ALLOCATE UBA MAP REGISTER
          0C 50    E8   030B              BLBS    R0,10$                       ;IF LBS SUCCESSFUL ALLOCATION
    10 A5    53    7D   030E              MOVQ    R3,UCB$L_FR3(R5)             ;SAVE DRIVER PROCESS CONTEXT
          0C A5  8ED0   0312              POPL    UCB$L_FPC(R5)                ;SAVE MAP REGISTER WAIT RETURN ADDRESS
    34 B2    65    0E   0316              INSQUE  UCB$L_FQFL(R5),@ADP$L_MRQBL(R2) ;INSERT PROCESS IN MAP REGISTER WAIT
                   05   031A       10$:   RSB                                  ;
```

```
                        031B          .SBTTL  ALLOCATE UNIBUS MAP REGISTERS
                        031B  ;+
                        031B  ; IOC$ALOUBAMAP - ALLOCATE UBA MAP REGISTERS (CRB DATABASE SPECIFIED)
                        031B  ; IOC$ALOUBAMAPN - ALLOCATE UBA MAP REGISTERS (ARGUMENT SPECIFIED)
                        031B  ; IOC$ALOMAPUDA - ALLOCATE UBA MAP REGISTERS (FOR CLASS DRIVER(S))
                        031B  ;
                        031B  ; This routine is called to allocate uba map registers and to mark the allocation
                        031B  ;       in the map register allocation structure located in the ADP.  The state
                        031B  ;       of the UNIBUS map registers is maintained in a set of descriptors
                        031B  ;       that describe contiguous extents of allocatable (i.e. free) map
                        031B  ;       registers.  A map register descriptor consists of the
                        031B  ;       corresponding elements of two distinct arrays (of one word items)
                        031B  ;       located in the ADP.  These arrays, ADP$W_MRNREGARY and ADP$W_MRFREGARY,
                        031B  ;       contain the number of map registers and the first map register in each
                        031B  ;       contiguous extent of free map registers.  These arrays are each
                        031B  ;       preceeded by a one word field containing all 1's (-1) so that compares
                        031B  ;       made against the "previous" descriptor fail when the current desciptor
                        031B  ;       is the one whose index is zero.
                        031B  ;
                        031B  ;       ADP$L_MRACTMDRS maintains the number of active descriptors, i.e. the
                        031B  ;       number of elements of each array which contain valid data.
                        031B  ;
                        031B  ; INPUTS: (FOR IOC$ALOUBAMAP AND ALOUBAMAPN)
                        031B  ;       R3 = NUMBER OF MAP REGISTERS TO ALLOCATE (IOC$ALOUBAMAPN only).
                        031B  ;       R5 = DEVICE UNIT UCB ADDRESS.
                        031B  ;
                        031B  ; INPUT:  (FOR IOC$ALOMAPUDA)
                        031B  ;       R4 => PDT
                        031B  ;       R5 => CDRP
                        031B  ;
                        031B  ; OUTPUTS:
                        031B  ;       R0 = SUCCESS INDICATION.
                        031B  ;       R2 => ADP
                        031B  ;-
                        031B          .enabl  lsb
                        031B  IOC$ALOMAPUDA:
         7E    53   7D  031B          MOVQ    R3,-(SP)                ; Save R3,R4,R5
               55   DD  031E          PUSHL   R5                      ;
                        0320
   52    00E0 C4    D0  0320          MOVL    PDT$L_ADP(R4),R2        ; R2 => ADP before we modify R4.
                        0325
      53    D2 A5   D0  0325          MOVL    CDRP$L_BCNT(R5),R3      ; Get transfer byte count
      54    D0 A5   3C  0329          MOVZWL  CDRP$W_BOFF(R5),R4      ; Get byte offset in page
  53   03FF C344    9E  032D          MOVAB   ^X3FF(R3)[R4],R3        ; Calculate highest relative byte and round
53    53    F7 8F   78  0333          ASHL    #-9,R3,R3               ; Calculate number of map registers required
                        0338
      51    3C A5   9E  0338          MOVAB   CDRP$L_UBARSRCE(R5),R1  ; R1 => UBMD.
               2F   11  033C          BRB     COMMON_ALOUBAMAP        ; Branch to common code.
                        033E
                        033E  IOC$ALOUBAMAPN::                        ;ALLOCATE UBA MAP REGISTERS ARGUMENT SPECIFI
         7E    53   7D  033E          MOVQ    R3,-(SP)                ; Save R3,R4,R5
               55   DD  0341          PUSHL   R5                      ;
               18   11  0343          BRB     5$                      ;
                        0345
                        0345  IOC$ALOUBAMAP::                         ;ALLOCATE UBA MAP REGISTERS CRB SPECIFIED
         7E    53   7D  0345          MOVQ    R3,-(SP)                ; Save R3,R4,R5
               55   DD  0348          PUSHL   R5                      ;
```

```
                          034A  1037
      53   7E A5     3C   034A  1038              MOVZWL  UCB$W_BCNT(R5),R3         ;GET TRANSFER BYTE COUNT
      54   7C A5     3C   034E  1039              MOVZWL  UCB$W_BOFF(R5),R4         ;GET BYTE OFFSET IN PAGE
   53   03FF C344    9E   0352  1040              MOVAB   ^X3FF(R3)[R4],R3          ;CALCULATE HIGHEST RELATIVE BYTE AND ROUND
   53   53   F7 8F   78   0358  1041              ASHL    #-9,R3,R3                 ;CALCULATE NUMBER OF MAP REGISTERS REQUIRED
                          035D  1042 5$:
      51   24 A5     D0   035D  1043              MOVL    UCB$L_CRB(R5),R1                  ; R1 => CRB.
      52   38 A1     D0   0361  1044              MOVL    CRB$L_INTD+VEC$L_ADP(R1),R2       ; R2 => ADP.
      51   34 A1     9E   0365  1045              MOVAB   CRB$L_INTD+VEC$W_MAPREG(R1),R1    ; R1 => UBMD.
              0F     E0   0369  1046              BBS     #VEC$V_MAPLOCK,-                  ; If SET, already permanently
           38 61          036B  1047                      UBMD$W_MAPREG(R1),40$             ;  allocated, so branch around.
                          036D  1048
                          036D  1049 ; Here:
                          036D  1050 ;            R1 => UBMD - caller's structure where we record registers allocated
                          036D  1051 ;            R2 => ADP
                          036D  1052 ;            R3 =  number of map registers to allocate
                          036D  1053 ;
                          036D  1054
                          036D  1055 COMMON_ALOUBAMAP:
           5C A2     D5   036D  1056              TSTL    ADP$L_MRACTMDRS(R2)       ; Test for zero active descriptors.
              13     13   0370  1057              BEQL    15$                       ; EQL implies no registers available.
              53     D6   0372  1058              INCL    R3                        ; Round up request to next multiple
         53   01     8A   0374  1059              BICB    #1,R3                     ;  of 2.
              55     D4   0377  1060              CLRL    R5                        ; Establish loop variable.
                          0379  1061 10$:
    64 A245   53     B1   0379  1062              CMPW    R3,ADP$W_MRNREGARY(R2)[R5]        ; See if enough regs described here.
              09     15   037E  1063              BLEQ    20$                               ; LEQ implies YES.
                          0380  1064
   F4 55   5C A2     F2   0380  1065              AOBLSS  ADP$L_MRACTMDRS(R2),R5,10$        ; Else branch back and continue
                          0385  1066 15$:
              50     D4   0385  1067              CLRL    R0                                ; If here, allocation failure.
              1F     11   0387  1068              BRB     50$                               ; Branch around to return.
                          0389  1069 20$:
  61   015E C245     B0   0389  1070              MOVW    ADP$W_MRFREGARY(R2)[R5],-         ; Allocate from low end of extent
                          038F  1071                      UBMD$W_MAPREG(R1)                 ;  by copying 1st map reg. #.
     02 A1    53     90   038F  1072              MOVB    R3,UBMD$B_NUMREG(R1)              ; Set # of map regs allocated.
    64 A245   53     A2   0393  1073              SUBW    R3,ADP$W_MRNREGARY(R2)[R5]        ; Subtract out # regs allocated.
              05     12   0398  1074              BNEQ    30$                               ; NEQ implies extent not empty,
                          039A  1075                                                        ;   branch around deallocate.
            0129     30   039A  1076              BSBW    DEALLOC_DESCRIP                   ; Call to deallocate descriptor.
              06     11   039D  1077              BRB     40$                               ;  And branch back to return.
                          039F  1078 30$:
  015E C245   53     A0   039F  1079              ADDW    R3,ADP$W_MRFREGARY(R2)[R5]        ; Bump descriptor past
                          03A5  1080                                                        ;  allocated registers.
         50   01     D0   03A5  1081 40$:         MOVL    S^#SS$_NORMAL,R0          ; Indicate success.
              55   8ED0   03A8  1082 50$:         POPL    R5                        ; Restore R5,R4,R3
         53   8E     7D   03AB  1083              MOVQ    (SP)+,R3                  ;
                     05   03AE  1084              RSB
                          03AF  1085              .dsabl  lsb
```

```
                              03AF          .SBTTL  Allocate a specific set of UNIBUS Map Registers
                              03AF   ;+
                              03AF   ; IOC$ALOUBAMAPSP
                              03AF   ;
                              03AF   ; This routine is called to allocate a specific set of UNIBUS Map Registers.
                              03AF   ;
                              03AF   ; INPUTS:
                              03AF   ;          R3 =  # of map registers to allocate
                              03AF   ;          R4 =  # of first map register to allocate
                              03AF   ;          R5 => UCB
                              03AF   ;
                              03AF   ; OUTPUTS:
                              03AF   ;          R0 =  Success or failure indication
                              03AF   ;                  Note R0, R1 and R2 modified.
                              03AF   ;-
                              03AF
                              03AF   IOC$ALOUBAMAPSP::
              7E    53    7D  03AF          MOVQ    R3,-(SP)                    ; Save R3,R4,R5
                    55    DD  03B2          PUSHL   R5                          ;
                              03B4
         50    24 A5      D0  03B4          MOVL    UCB$L_CRB(R5),R0                  ; R0 => CRB.
         52    38 A0      D0  03B8          MOVL    CRB$L_INTD+VEC$L_ADP(R0),R2       ; R2 => ADP.
         51    34 A0      9E  03BC          MOVAB   CRB$L_INTD+VEC$W_MAPREG(R0),R1    ; R1 => UBA mapping descriptor.
                              03C0
               5C A2      D5  03C0          TSTL    ADP$L_MRACTMDRS(R2)         ; Test for zero active descriptors.
                    2C    13  03C3          BEQL    30$                         ; EQL implies no registers available.
               05   54    E9  03C5          BLBC    R4,10$                      ; Prepare to round DOWN to even boundary.
              54    01    8A  03C8          BICB    #1,R4                       ; Clear low bit if set and
                    53    D6  03CB          INCL    R3                          ;  then increment # of registers to allocate
                              03CD   10$:
                    53    D6  03CD          INCL    R3                          ; Prepare to round UP to even # of registers
              53    01    8A  03CF          BICB    #1,R3                       ;
                              03D2
                    55    D4  03D2          CLRL    R5                          ; R5 will be index register.
                              03D4   20$:
      015E C245     54    B1  03D4          CMPW    R4,ADP$W_MRFREGARY(R2)[R5]        ; Are registers we want in
                              03DA                                                ;  current extent?
                    15    19  03DA          BLSS    30$                         ; LSS means current extent is beyond the
                              03DC                                              ;  desired registers. Therefore they are
                              03DC                                              ;  not availiable and we have failed.
                    46    13  03DC          BEQL    50$                         ; EQL means they are at the beginning
                              03DE                                              ;  of the current extent.
                              03DE
                              03DE   ; Here the registers we want are either within the middle of the current
                              03DE   ;          extent or else beyond the current extent.
                              03DE
  50   64 A245   015E C245    A1  03DE          ADDW3   ADP$W_MRFREGARY(R2)[R5],-         ; R0 = 1st register beyond
                              03E7                  ADP$W_MRNREGARY(R2)[R5],R0        ;  current extent.
              50    54    B1  03E7          CMPW    R4,R0                       ; Are we in current extent?
                    09    19  03EA          BLSS    40$                         ; LSS means YES, in current.
      E3 55    5C A2      F2  03EC          AOBLSS  ADP$L_MRACTMDRS(R2),R5,20$  ; Loop thru all extents.
                              03F1   30$:                                       ; Failure if we fall thru.
                    50    D4  03F1          CLRL    R0                          ; Set failure code.
                    52    11  03F3          BRB     80$                         ; And branch to return.
                              03F5   40$:
                              03F5
                              03F5   ; Here the first register we want is greater than the first register of
```

```
                          03F5  :        current extent (defined by R5 = index) and is less than or equal to
                          03F5  :        the last register of the extent. R0 contains the # of the register just
                          03F5  :        beyond the current extent.  In other words,
                          03F5  :
                          03F5  :        ADP$W_MRFREGARY(R2)[R5] < R4 < R0
                          03F5
          50    54    A2  03F5           SUBW     R4,R0                      ; R0 = length of subextent based at R4.
          53    50    B1  03F8           CMPW     R0,R3                      ; Compare to # of registers needed.
                F4    19  03FB           BLSS     30$                        ; LSS means failure.
                          03FD
          61    54    B0  03FD           MOVW     R4,UBMD$W_MAPREG(R1)       ; Success. Fill in user's descriptor
       02 A1    53    90  0400           MOVB     R3,UBMD$B_NUMREG(R1)       ;  with base register and # of registers.
                          0404
                          0404  :        SUBW3    ADP$W_MRFREGARY(R2)[R5],R4,-    ; Distance from beginning of
                          0404  :                 ADP$W_MRNREGARY(R2)[R5]         ;  extent to R4 is new length.
     64 A245    50    A2  0404           SUBW     R0,ADP$W_MRNREGARY(R2)[R5]      ; Equivalent result.
                          0409
          50    53    A2  0409           SUBW     R3,R0                      ; R0 = # regs. left in sub-extent.
                36    13  040C           BEQL     70$                        ; EQL means we do not have to allocate
                          040E                                               ;  and fill a new extent descriptor.
                55    D6  040E           INCL     R5                         ; R5 = index of new extent descriptor.
          7E    50    B0  0410           MOVW     R0,-(SP)                   ; Save length of new extent.
              00C9    30  0413           BSBW     ALLOC_DESCRIP              ; Call to allocate a new descriptor.
                          0416
015E C245       53    54    A1  0416     ADDW3    R4,R3,ADP$W_MRFREGARY(R2)[R5]   ; Fill in new descriptor with
     64 A245    8E    B0  041D           MOVW     (SP)+,ADP$W_MRNREGARY(R2)[R5]   ;  1st register and # registers.
                20    11  0422           BRB      70$                             ; Branch around to success.
                          0424  50$:
                          0424
                          0424  ; Here the first register we want is equal to the first register of the current
                          0424  :        extent (defined by index register R5).  In other words,
                          0424  :
                          0424  :        R4 = ADP$W_MRFREGARY(R2)[R5]
                          0424
     64 A245    53    B1  0424           CMPW     R3,ADP$W_MRNREGARY(R2)[R5]      ; See if we have enough registers.
                C6    14  0429           BGTR     30$                             ; GTR implies failure.
                          042B
          61    54    B0  042B           MOVW     R4,UBMD$W_MAPREG(R1)       ; Success.  Fill in user's descriptor
       02 A1    53    B0  042E           MOVW     R3,UBMD$B_NUMREG(R1)       ;  with 1st register and # allocated.
                          0432
     64 A245    53    A2  0432           SUBW     R3,ADP$W_MRNREGARY(R2)[R5]      ; Update current descriptor.
                08    13  0437           BEQL     60$                             ; EQL means current extent now
                          0439                                                    ;  empty. Go to deallocate.
  015E C245     53    A0  0439           ADDW     R3,ADP$W_MRFREGARY(R2)[R5]      ; If not empty, update 1st register.
                03    11  043F           BRB      70$                             ; Branch around deallocate.
                          0441  60$:
              0082    30  0441           BSBW     DEALLOC_DESCRIP                 ; Deallocate system descriptor.
          50    01    D0  0444  70$:     MOVL     S^#SS$_NORMAL,R0           ; Set success indicator.
             55 8ED0      0447  80$:     POPL     R5                         ; Restore R5,R4,R3
          53    8E    7D  044A           MOVQ     (SP)+,R3                   ;
                      05  044D           RSB                                 ; And return to caller.
```

```
                        044E            .SBTTL  Permanently Allocate UNIBUS Map Registers
                        044E    ;+
                        044E    ; IOC$ALOUBAMAPRM  - Permanently Allocate UBA Map Registers (CRB Database Specified)
                        044E    ; IOC$ALOUBAMAPRMN - Permanently Allocate UBA Map Registers (Argument Specified)
                        044E    ;
                        044E    ; This routine is called to permanently allocate UNIBUS map registers.
                        044E    ;       Here we allocate the map registers from the highest numbered
                        044E    ;       available registers.
                        044E    ;
                        044E    ; INPUTS:
                        044E    ;       R3 =  # Registers to allocate (IOC$A_OUBAMAPRMN only)
                        044E    ;       R5 => UCB
                        044E    ;
                        044E    ; OUTPUTS:
                        044E    ;       R0 = Success indication
                        044E    ;
                        044E    ;-
                        044E
                        044E            .enabl  LSB
                        044E    IOC$ALOUBMAPRMN::                               ;ALLOCATE UBA MAP REGISTERS ARGUMENT SPECIFI
        7E    53    7D  044E            MOVQ    R3,-(SP)                        ; Save R3,R4,R5
              55    DD  0451            PUSHL   R5                              ;
                        0453
              18    11  0453            BRB     5$                              ;
                        0455    IOC$ALOUBMAPRM::                                ;ALLOCATE UBA MAP REGISTERS CRB SPECIFIED
        7E    53    7D  0455            MOVQ    R3,-(SP)                        ; Save R3,R4,R5
              55    DD  0458            PUSHL   R5                              ;
                        045A
     53    7E A5    3C  045A            MOVZWL  UCB$W_BCNT(R5),R3               ;GET TRANSFER BYTE COUNT
     54    7C A5    3C  045E            MOVZWL  UCB$W_BOFF(R5),R4               ;GET BYTE OFFSET IN PAGE
  53   03FF C344    9E  0462            MOVAB   ^X3FF(R3)[R4],R3                ;CALCULATE HIGHEST RELATIVE BYTE AND ROUND
 53    53    F7 8F  78  0468            ASHL    #-9,R3,R3                       ;CALCULATE NUMBER OF MAP REGISTERS REQUIRED
                        046D    5$:
     51    24 A5    D0  046D            MOVL    UCB$L_CRB(R5),R1                        ; R1 => CRB
     52    38 A1    D0  0471            MOVL    CRB$L_INTD+VEC$L_ADP(R1),R2             ; R2 => ADP
     51    34 A1    9E  0475            MOVAB   CRB$L_INTD+VEC$W_MAPREG(R1),R1          ; R1 => UBMD.
              0F    E0  0479            BBS     #VEC$V_MAPLOCK,-                        ; If SET, already permanently
           38 61        047B                    UBMD$W_MAPREG(R1),30$                   ;  allocated, so branch around.
                        047D
              53    D6  047D            INCL    R3                                      ; Round up request to next multiple
        53    01    8A  047F            BICB    #1,R3                                   ;  of 2.
     55    5C A2    D0  0482            MOVL    ADP$L_MRACTMDRS(R2),R5                  ; R5 = index beyond last MRD.
              0A    13  0486            BEQL    15$                                     ; EQL implies no registers available.
                        0488    10$:
   62 A245    53    B1  0488            CMPW    R3,ADP$W_MRNREGARY-2(R2)[R5]            ; See if enough regs described here.
              07    15  048D            BLEQ    20$                                     ; LEQ implies YES.
                        048F
           F6 55    F5  048F            SOBGTR  R5,10$                                  ; Else branch back and continue
                        0492    15$:
              50    D4  0492            CLRL    R0                                      ; If here, allocation failure.
              22    11  0494            BRB     40$                                     ; Branch around to return.
                        0496    20$:
50   62 A245   015C C245   A1  0496     ADDW3   ADP$W_MRFREGARY-2(R2)[R5],-             ; Calculate register # beyond
                        049F                    ADP$W_MRNREGARY-2(R2)[R5],R0            ;  last extent.
        50    53    A2  049F            SUBW    R3,R0                                   ; We allocate from high end. R0
                        04A2                                                            ;  contains 1st reg. to alloc.
        61    50    B0  04A2            MOVW    R0,UBMD$W_MAPREG(R1)                    ; Record 1st register allocated.
```

```
61   8000 8F    A8  04A5   1253          BISW     #VEC$M_MAPLOCK,UBMD$W_MAPREG(R1);  and mark it permanent.
  02 A1   53    90  04AA   1254          MOVB     R3,UBMD$B_NUMREG(R1)              ; Set # of map regs allocated.
62 A245   53    A2  04AE   1255          SUBW     R3,ADP$W_MRNREGARY-2(R2)[R5]      ; Subtract out # regs allocated.
          0A    13  04B3   1256          BEQL     50$                               ; EQL implies descriptor not
                    04B5   1257                                                     ;  valid; branch to deallocate.
                    04B5   1258 30$:
     50   01    D0  04B5   1259          MOVL     S^#SS$_NORMAL,R0          ; Indicate success.
                    04B8   1260 40$:
          55  8ED0  04B8   1261          POPL     R5                        ; Restore R5,R4,R3
     53   8E    7D  04BB   1262          MOVQ     (SP)+,R3                  ;
                05  04BE   1263          RSB
                    04BF   1264 50$:
          55    D7  04BF   1265          DECL     R5                        ; R5 = index of descriptor to dealloc.
        0002    30  04C1   1266          BSBW     DEALLOC_DESCRIP           ; Call to deallocate descriptor.
          EF    11  04C4   1267          BRB      30$                       ;  And branch back to return.
                    04C6   1268          .dsabl   lsb
```

```
                              04C6  ;+
                              04C6  ; DEALLOC_DESCRIP - Common internal subroutine called to deallocate
                              04C6  ;         a UBA Map Register descriptor.
                              04C6  ;
                              04C6  ; INPUTS:
                              04C6  ;         R2 => ADP
                              04C6  ;         R5 =  index of descriptor to deallocate.
                              04C6  ; OUTPUTS:
                              04C6  ;         The UBA Map Allocation structures are updated by contracting
                              04C6  ;                 descriptors over the deallocated one.
                              04C6  ;         Register R5 is modified.
                              04C6  ;-
                              04C6
                              04C6  DEALLOC_DESCRIP:
               5C A2    D7    04C6          DECL    ADP$L_MRACTMDRS(R2)       ; Decrement # active descriptors.
                              04C9  10$:
    64 A245   66 A245   B0    04C9          MOVW    ADP$W_MRNREGARY+2(R2)[R5],-      ; Move data towards lower index
                              04D0                  ADP$W_MRNREGARY(R2)[R5]          ;  to fill up hole.
  015E C245 0160 C245   B0    04D0          MOVW    ADP$W_MRFREGARY+2(R2)[R5],-      ;
                              04D9                  ADP$W_MRFREGARY(R2)[R5]          ;
        EB 55   5C A2   F2    04D9          AOBLSS  ADP$L_MRACTMDRS(R2),R5,10$       ; Loop thru rest of active MDRS.
                        05    04DE          RSB
                              04DF
                              04DF  ;+
                              04DF  ; ALLOC_DESCRIP - Common internal subroutine to allocate a UBA map register
                              04DF  ;         descriptor in the middle of the range of descriptors.
                              04DF  ;
                              04DF  ; INPUTS:
                              04DF  ;         R2 => ADP
                              04DF  ;         R5 =  index of where we must allocate descriptor
                              04DF  ; OUTPUTS:
                              04DF  ;         Allocation is accomplished by creating a hole in each of the arrays
                              04DF  ;                 by moving descriptor items to the next higher element.
                              04DF  ;         Note R0 is modified.
                              04DF  ;-
                              04DF
                              04DF  ALLOC_DESCRIP:
           50   5C A2   D0    04DF          MOVL    ADP$L_MRACTMDRS(R2),R0           ; R0 = # active descriptors.
                              04E3  10$:
              55    50  D1    04E3          CMPL    R0,R5                            ; Have we finished?
                    13  15    04E6          BLEQ    20$                              ; LEQ implies YES.
    64 A240   62 A240   B0    04E8          MOVW    ADP$W_MRNREGARY-2(R2)[R0],-      ; Starting from ends of arrays,
                              04EF                  ADP$W_MRNREGARY(R2)[R0]          ;  copy # register items.
                              04EF
  015E C240 015C C240   B0    04EF          MOVW    ADP$W_MRFREGARY-2(R2)[R0],-      ;
                              04F8                  ADP$W_MRFREGARY(R2)[R0]          ;
              E8    50  F5    04F8          SOBGTR  R0,10$                           ; And loop back until we reach
                              04FB                                                   ;  the hole we have created.
               5C A2    D6    04FB  20$:    INCL    ADP$L_MRACTMDRS(R2)              ; Increment # active descriptors.
                        05    04FE          RSB                                      ; Return to caller
                        04FF          .SBTTL  Release UNIBUS Map Registers
                        04FF  ;+
                        04FF  ; IOC$RELMAPUDA - RELEASE UNIBUS MAP REGISTERS (CALLED FROM UDA PORT DRIVER)
                        04FF  ; IOC$RELMAPREG - RELEASE UNIBUS MAP REGISTERS
                        04FF  ;
                        04FF  ; This routine is called to release UNIBUS map registers that were previously
                        04FF  ; assigned for an I/O transfer.
                        04FF  ;
                        04FF  ; INPUTS:
                        04FF  ;   (For IOC$RELMAPUDA only)
                        04FF  ;
                        04FF  ;        R4 => PDT
                        04FF  ;        R5 => CDRP
                        04FF  ;
                        04FF  ;   (For IOC$RELMAPREG call only)
                        04FF  ;
                        04FF  ;        R5 = UCB ADDRESS OF DEVICE UNIT.
                        04FF  ;
                        04FF  ;        It is assumed that the caller still owns the I/O channel on which
                        04FF  ;        the transfer took place.
                        04FF  ;
                        04FF  ; OUTPUTS:
                        04FF  ;
                        04FF  ;        If the mapping registers have been permanently assigned to the asso-
                        04FF  ;        ciated I/O channel (only possible for IOC$RELMAPREG), then control
                        04FF  ;        is immediately returned to the caller.  Else the mapping registers are
                        04FF  ;        released (via a call to IOC$DALOCUBAMAP) and we then go into a loop
                        04FF  ;        removing waiting driver processes from the Map Register Wait Queue
                        04FF  ;        until either the Queue is completely drained or we run out of map
                        04FF  ;        registers to satisfy the needs of a given waiting driver process.
                        04FF  ;        Driver processes waiting here have their context stored in either
                        04FF  ;        a UCB fork block or a CDRP fork block and the processing required to
                        04FF  ;        resume each of these types of driver process is slightly different.
                        04FF  ;        What is done for each is to allocate the required map registers
                        04FF  ;        (via a call to IOC$ALOUBAMPA for UCB threads and via a call to
                        04FF  ;        IOC$ALOUBAMAP for CDRP threads) and to resume the waiting driver
                        04FF  ;        process.  Resuming a UCB thread is done by restoring register
                        04FF  ;        context and JSB'ing to the saved PC.  Resuming a CDRP thread is
                        04FF  ;        accomplished by calling SCS$RESUMEWAITR.
                        04FF  ;-
                        04FF          .enabl  lsb
                        04FF  IOC$RELMAPUDA::
       7E    53   7D    04FF          MOVQ    R3,-(SP)                ; Save R3-R6
       7E    55   7D    0502          MOVQ    R5,-(SP)                ;
                        0505
52   00E0 C4      D0    0505          MOVL    PDT$L_ADP(R4),R2        ; R2 => ADP.
       56    52   D0    050A          MOVL    R2,R6                   ; R6 => ADP also.
                        050D
  53    3C A5     9E    050D          MOVAB   CDRP$L_UBARSRCE(R5),R3  ; R3 => UBMD.
     54    63     3C    0511          MOVZWL  UBMD$W_MAPREG(R3),R4    ; R4 has 1st mapreg #.
  53    02 A3     9A    0514          MOVZBL  UBMD$B_NUMREG(R3),R3    ; R3 has # of mapregs.
           1E     11    0518          BRB     10$                     ; Branch to common code.
                        051A
                        051A  IOC$RELMAPREG::                         ; Release unibus map registers
  51    24 A5     D0    051A          MOVL    UCB$L_CRB(R5),R1        ; R1 => CRB.
           0F     E0    051E          BBS     #VEC$V_MAPLOCK,-        ; If SET, permanent allocation so branch.
  3D 34 A1              0520                  CRB$L_INTD+VEC$W_MAPREG(R1),50$
```

```
     7E    53   7D  0523  1378            MOVQ    R3,-(SP)                       ; Save R3-R6
     7E    55   7D  0526  1379            MOVQ    R5,-(SP)                       ;
                    0529  1380
  52   38 A1    D0  0529  1381            MOVL    CRB$L_INTD+VEC$L_ADP(R1),R2 ;GET ADDRESS OF ADP
     56    52   D0  052D  1382            MOVL    R2,R6                          ;SAVE ADDRESS OF ADP
  54   34 A1    3C  0530  1383            MOVZWL  CRB$L_INTD+VEC$W_MAPREG(R1),R4 ;GET STARTING MAP REGISTER NUMBER
  53   36 A1    9A  0534  1384            MOVZBL  CRB$L_INTD+VEC$B_NUMREG(R1),R3 ;GET NUMBER OF REGISTERS TO DEALLOC
                    0538  1385 10$:
        0038    30  0538  1386            BSBW    IOC$DALOCUBAMAP                ; Free up UBA map resources.
                    053B  1387 20$:
  55   30 B6    0F  053B  1388            REMQUE  @ADP$L_MRQFL(R6),R5            ;GET ADDRESS OF NEXT DRIVER FORK BLOCK
          19    1D  053F  1389            BVS     40$                            ;IF VS NO DRIVER PROCESS WAITING
                    0541  1390
          10    91  0541  1391            CMPB    #DYN$C_UCB,-                   ; See i* we dequeued a UCB or a CDRP.
       0A A5        0543  1392                    UCB$B_TYPE(R5)
          1A    12  0545  1393            BNEQ    REALLOC_CD_MAPREGS             ; NEQ implies a CDRP.
                    0547  1394
        FDFB    30  0547  1395            BSBW    IOC$ALOUBAMAP                  ;SEARCH MAP REGISTER BITMAP AND ALLOCATE
       09 50    E9  054A  1396            BLBC    R0,30$                         ;IF LBC ALLOCATION FAILURE
  53   10 A5    7D  054D  1397            MOVQ    UCB$L_FR3(R5),R3               ;RESTORE DRIVE PROCESS CONTEXT
       0C B5    16  0551  1398            JSB     @UCB$L_FPC(R5)                 ;CALL DRIVER AT MAP REGISTER WAIT RETURN ADD
          E5    11  0554  1399            BRB     20$                            ;
  30 A6    65   0E  0556  1400 30$:       INSQUE  UCB$L_FQFL(R5),ADP$L_MRQFL(R6) ;REINSERT DRIVER PROCESS AT FRONT OF
     55    8E   7D  055A  1401 40$:       MOVQ    (SP)+,R5                       ; Restore R3-R6
     53    8E   7D  055D  1402            MOVQ    (SP)+,R3                       ;
                05  0560  1403 50$:       RSB                                    ;
                    0561  1404
                    0561  1405 REALLOC_CD_MAPREGS:                               ; Reallocate mapregs to a class driver
                    0561  1406                                                   ;  process.
  54   14 A5    D0  0561  1407            MOVL    CDRP$L_FR4(R5),R4              ; Restore saved fork register.
        FDB3    30  0565  1408            BSBW    IOC$ALOMAPUDA                  ; Allocate map regi :ers if we can.
       EB 50    E9  0568  1409            BLBC    RO,30$                         ; LBC implies allocatior failure, branch
                    056B  1410
 00000000'EF    16  056B  1411            JSB     SCS$RESUMEWAITR                ; Resume waiting thread and any backed
                    0571  1412                                                   ;  up IRP's.
          C8    11  0571  1413            BRB     20$                            ; Branch back to try and allocate more
                    0573  1414                                                   ;  UNIBUS map registers.
                    0573  1415            .dsabl  lsb
```

```
                              0573 ;+
                              0573 ; IOC$DALOCUBAMAP - Common internal subroutine to update the UBA Map allocation
                              0573 ;         structures to include the map registers specified here among the
                              0573 ;         available map registers.
                              0573 ;
                              0573 ; INPUTS:
                              0573 ;         R2 => ADP
                              0573 ;         R3 =  # map registers to free.
                              0573 ;         R4 =  first map register to free.
                              0573 ;
                              0573 ; OUTPUTS:
                              0573 ;         The UBA Map Allocation structures are updated.
                              0573 ;
                              0573 ;         Registers R0, R1 and R5 are modified.
                              0573 ;
                              0573 ;-
                              0573
                              0573 IOC$DALOCUBAMAP:
                     55   D4  0573         CLRL    R5                        ; Initialize loop variable.
           51   53   54   C1  0575         ADDL3   R4,R3,R1                  ; R1 = map register beyond extent.
                     53   D5  0579         TSTL    R3                        ; Is the # of regs. to deallocate zero?
                     62   13  057B         BEQL    90$                       ; Branch to bugcheck if zero.
                  5C A2   D5  057D         TSTL    ADP$L_MRACTMDRS(R2)       ; Test for zero active descriptors.
                     4E   13  0580         BEQL    50$                       ; EQL implies no registers available.
                              0582 10$:
     015E C245       51   B1  0582         CMPW    R1,ADP$W_MRFREGARY(R2)[R5]      ; See if map registers to free
                              0588                                                 ;  are before those described
                              0588                                                 ;  by current descriptor.
                     07   15  0588         BLEQ    20$                             ; LEQ implies yes.
                              058A
       F3 55      5C A2   F2  058A         AOBLSS  ADP$L_MRACTMDRS(R2),R5,10$      ; Else branch back and try next.
                     28   11  058F         BRB     40$                             ; If here, registers to free
                              0591                                                 ;  beyond those described by
                              0591                                                 ;  last descriptor. So branch
                              0591                                                 ;  to try and absorb at end of
                              0591                                                 ;  last descriptor.
                              0591 20$:
                     29   12  0591         BNEQ    40$                       ; NEQ implies that although we alloca-
                              0593                                           ;  registers before the current des-
                              0593                                           ;  criptor, we are not contiguous with
                              0593                                           ;  it.  So we branch to try and absorb
                              0593                                           ;  these registers in the previous one.
                              0593
                              0593 ; Here we can absorb the registers in the current descriptor.
                              0593
50   015C C245    62 A245   A1  0593         ADDW3   ADP$W_MRNREGARY-2(R2)[R5],-     ; Calculate end of previous
                              059C                 ADP$W_MRFREGARY-2(R2)[R5],R0    ;  extent and move to R0.
              54       50   B1  059C         CMPW    R0,R4                           ; Does it coincide with start
                              059F                                                 ;  of this extent?
                     0C   13  059F         BEQL    30$                             ; EQL implies yes.
                              05A1
                              05A1 ; Here we have the most likely case. The map registers that we are freeing can
                              05A1 ;         be absorbed into the top of the current descriptor but not also in the
                              05A1 ;         previous descriptor.
                              05A1
     015E C245       54   B0  05A1         MOVW    R4,ADP$W_MRFREGARY(R2)[R5]      ; First register freed becomes
                              05A7                                                 ;  first register of current
```

```
                               05A7                                                          ;  descriptor.
          64 A245     53   A0  05A7              ADDW     R3,ADP$W_MRNREGARY(R2)[R5]         ; Number of registers is sum of
                               05AC                                                          ;  registers freed and registers
                               05AC                                                          ;  previously described here.
                           05  05AC              RSB
                               05AD
                               05AD      ; Here we have the case where the map registers being freed fall between two
                               05AD      ;       discontiguous blocks and exactly span the difference.  We then can
                               05AD      ;       describe the entire group with one descriptor, and so we also
                               05AD      ;       deallocate the current descriptor.  Note new combined descriptor
                               05AD      ;       will still begin at same map register number so we do NOT alter
                               05AD      ;       this item.
                               05AD
                               05AD      30$:
          62 A245     53   A0  05AD              ADDW     R3,ADP$W_MRNREGARY-2(R2)[R5]       ; Partial sum of registers
                               05B2                                                          ;  being freed and previous ones.
     62 A245     64 A245   A0  05B2              ADDW     ADP$W_MRNREGARY(R2)[R5],-          ; Now add in registers described
                               05B9                       ADP$W_MRNREGARY-2(R2)[R5]          ;  in current descriptor.
                               05B9
                    FF0A   31  05B9              BRW      DEALLOC_DESCRIP                    ; BRW to subroutine and let it
                               05BC                                                          ;  return to our caller.
                               05BC
                               05BC      ; Here we cannot absorb the freed map registers in the current descriptor.
                               05BC      ;       We test to see if we can absorb them in the previous descriptor.
                               05BC
                               05BC      40$:
50   015C C245   62 A245   A1  05BC              ADDW3    ADP$W_MRNREGARY-2(R2)[R5],-        ; Calculate end of previous
                               05C5                       ADP$W_MRFREGARY-2(R2)[R5],R0       ;  extent and move to R0.
               54     50   B1  05C5              CMPW     R0,R4                              ; See if contigous with previous.
                      06   12  05C8              BNEQ     50$                                ; NEQ implies NO.
                               05CA
          62 A245     53   A0  05CA              ADDW     R3,ADP$W_MRNREGARY-2(R2)[R5]       ; Sum # of registers in extent.
                           05  05CF              RSB
                               05D0
                               05D0      ; Here we must allocate a new descriptor to describe the map registers we
                               05D0      ;       are freeing.  Conditions at this time are as follows:
                               05D0      ;
                               05D0      ;               R2 => ADP
                               05D0      ;               R3 =  # registers to free
                               05D0      ;               R4 =  first register to free
                               05D0      ;               R5 =  index of where we must allocate descriptor
                               05D0      ;
                               05D0      ;       Allocation is accomplished by calling subroutine ALLOC_DESCRIP
                               05D0      ;
                               05D0
                               05D0      50$:
                    FF0C   30  05D0              BSBW     ALLOC_DESCRIP                      ; Alloc R5 = index of descriptor.
          64 A245     53   B0  05D3              MOVW     R3,ADP$W_MRNREGARY(R2)[R5]         ; Fill in allocated descriptor.
        015E C245     54   B0  05D8              MOVW     R4,ADP$W_MRFREGARY(R2)[R5]         ;
                           05  05DE              RSB
                               05DF
                               05DF      90$:    BUG_CHECK INCONSTATE                ; Non-fatal bugcheck on zero map
                               05E3                                                  ; registers deallocation attempts.
                           05  05E3              RSB                                 ; Then ignore deallocate request.
        05E4           .SBTTL  RETURN TO CALLER
        05E4      ;+
        05E4      ; IOC$RETURN - RETURN TO CALLER
        05E4      ;
        05E4      ; THIS ROUTINE IS CALLED AS A RESULT OF A DDT DISPATCH TO A NULL ENTRY. ITS
        05E4      ; FUNCTION IS MERELY TO RETURN TO ITS CALLER.
        05E4      ;
        05E4      ; INPUTS:
        05E4      ;
        05E4      ;       NONE.
        05E4      ;
        05E4      ; OUTPUTS:
        05E4      ;
        05E4      ;       NONE.
        05E4      ;-
        05E4
        05E4      IOC$RETURN::                         ;RETURN TO CALLER
    05  05E4              RSB                          ;
```

```
                                05E5          .SBTTL  WAITFOR INTERRUPT OR TIMEOUT AND KEEP CHANNEL
                                05E5    ;+
                                05E5    ; IOC$WFIKPCH - WAITFOR INTERRUPT OR TIMEOUT AND KEEP CHANNEL
                                05E5    ;
                                05E5    ; THIS ROUTINE IS CALLED TO SOFTWARE ENABLE INTERRUPTS AND TIMEOUT ON
                                05E5    ; A DEVICE UNIT AND TO KEEP THE CHANNEL. THIS ROUTINE CAN BE CALLED AT
                                05E5    ; EITHER FORK OR DEVICE INTERRUPT LEVEL.
                                05E5    ;
                                05E5    ; INPUTS:
                                05E5    ;
                                05E5    ;       00(SP) = RETURN ADDRESS OF CALLER.
                                05E5    ;       04(SP) = TIMEOUT VALUE IN SECONDS.
                                05E5    ;       08(SP) = IPL TO LOWER TO AFTER SETTING WAIT.
                                05E5    ;       12(SP) = RETURN ADDRESS OF CALLER'S CALLER.
                                05E5    ;
                                05E5    ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                                05E5    ;
                                05E5    ; OUTPUTS:
                                05E5    ;
                                05E5    ;       THE TIMEOUT VALUE IS COMPUTED AND STORED IN DUE TIME, REGISTERS R3 AND
                                05E5    ;       R4 ALONG WITH THE RETURN PC ARE SAVED IN THE FORK BLOCK, INTERRUPTS AND
                                05E5    ;       TIMEOUT ARE ENABLED, AND A RETURN TO THE CALLER'S CALLER IS EXECUTED.
                                05E5    ;-
                                05E5
                                05E5    IOC$WFIKPCH::                                   ;WAITFOR INTERRUPT/TIMEOUT AND KEEP CHANNEL
               6E    02    C0   05E5          ADDL    #2,(SP)                         ;CALCULATE OFFSET TO NORMAL RETURN
            10 A5    53    7D   05E8          MOVQ    R3,UCB$L_FR3(R5)                ;SAVE REGISTERS R3 AND R4
               0C A5 8ED0       05EC          POPL    UCB$L_FPC(R5)                   ;SAVE INTERRUPT RETURN ADDRESS
            64 A5    03    A8   05F0          BISW    #UCB$M_INT!UCB$M_TIM,UCB$W_STS(R5) ;ENABLE INTERRUPT AND TIMEOUT
 6C A5   00000000'EF   8E  C1   05F4          ADDL3   (SP)+,@#EXE$GL_ABSTIM,UCB$L_DUETIM(R5) ;SET TIMEOUT TIME
      64 A5   0040 8F      AA   05FD          BICW    #UCB$M_TIMOUT,UCB$W_STS(R5) ;CLEAR UNIT TIMED OUT
                                0603          ENBINT                                  ;ENABLE INTERRUPTS
                           05   0606          RSB                                     ;
```

```
                                0607            .SBTTL  WAITFOR INTERRUPT OR TIMEOUT AND RELEASE CHANNEL
                                0607  ;+
                                0607  ; IOC$WFIRLCH - WAITFOR INTERRUPT OR TIMEOUT AND RELEASE CHANNEL
                                0607  ;
                                0607  ; THIS ROUTINE IS CALLED TO SOFTWARE ENABLE INTERRUPTS AND TIMEOUT ON A DEVICE
                                0607  ; UNIT AND TO RELEASE THE CHANNEL. THIS ROUTINE CAN ONLY BE CALLED AT FORK LEVEL.
                                0607  ;
                                0607  ; INPUTS:
                                0607  ;
                                0607  ;       00(SP) = RETURN ADDRESS OF CALLER.
                                0607  ;       04(SP) = TIMEOUT VALUE IN SECONDS.
                                0607  ;       08(SP) = IPL TO LOWER TO AFTER SETTING WAIT.
                                0607  ;       12(SP) = RETURN ADDRESS OF CALLER'S CALLER.
                                0607  ;
                                0607  ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                                0607  ;
                                0607  ; OUTPUTS:
                                0607  ;
                                0607  ;       THE TIMEOUT VALUE IS COMPUTED AND STORED IN DUE TIME, REGISTERS R3 AND
                                0607  ;       R4 ALONG WITH THE RETURN PC ARE SAVED IN THE FORK BLOCK, INTERRUPTS AND
                                0607  ;       TIMEOUT ARE ENABLED, THE CHANNEL IS RELEASED, AND A RETURN TO THE CALLER'S
                                0607  ;       CALLER IS EXECUTED.
                                0607  ;-
                                0607
                                0607  IOC$WFIRLCH::                                   ;WAITFOR INTERRUPT/TIMEOUT AND RELEASE CHANN
                 6E    02    C0 0607          ADDL    #2,(SP)                       ;CALCULATE OFFSET TO NORMAL RETURN
              10 A5    53    7D 060A          MOVQ    R3,UCB$L_FR3(R5)              ;SAVE REGISTERS R3 AND R4
                   0C A5   8ED0 060E          POPL    UCB$L_FPC(R5)                 ;SAVE INTERRUPT RETURN ADDRESS
              64 A5    03    A8 0612          BISW    #UCB$M_INT!UCB$M_TIM,UCB$W_STS(R5) ;ENABLE INTERRUPT AND TIMEOUT
  6C A5   00000000'EF  8E    C1 0616          ADDL3   (SP)+,[^EXE$GL_ABSTIM,UCB$L_DUETIM(R5) ;SET TIMEOUT TIME
      64 A5   0040 8F        AA 061F          BICW    #UCB$M_TIMOUT,UCB$W_STS(R5)   ;CLEAR UNIT TIMED OUT
                                0625          ENBINT                                ;ENABLE INTERRUPTS
                   FA5F      31 0628          BRW     IOC$RELCHAN                   ;RELEASE ALL CHANNELS AND RETURN TO CALLER
                                062B
                                062B
```

```
                                   062B         .SBTTL  ALLOCATE SYSTEM PAGE TABLE
                                   062B  ;+
                                   062B  ; IOC$ALLOSPT - ALLOCATE SYSTEM PAGE TABLE
                                   062B  ;
                                   062B  ; THIS ROUTINE ALLOCATES SYSTEM PAGE TABLE (SPT) ENTRIES.
                                   062B  ;
                                   062B  ; INPUTS:
                                   062B  ;
                                   062B  ;        R1 = NUMBER OF SPT ENTRIES TO BE ALLOCATED
                                   062B  ;
                                   062B  ;        BOO$GL_SPTFREL = LOWEST FREE VPN
                                   062B  ;        BOO$GL_SPTFREH = HIGHEST FREE VPN
                                   062B  ;
                                   062B  ;        IT IS ASSUMED THAT THE CALLER IS RUNNING AT IPL$_SYNCH.
                                   062B  ;
                                   062B  ; OUTPUTS:
                                   062B  ;
                                   062B  ;        R0 = SUCCESS INDICATION.
                                   062B  ;        R2 = STARTING PAGE NUMBER ALLOCATED (SVPN).
                                   062B  ;        R3 = ADDRESS OF BASE OF SYSTEM PAGE TABLE (MMG$GL_SPTBASE).
                                   062B  ;
                                   062B  ;        R1 IS PRESERVED ACROSS CALL.
                                   062B  ;-
                                   062B  IOC$ALLOSPT::                                  ;ALLOCATE SYSTEM PAGE TABLE
                       50     D4   062B          CLRL    R0                             ;ASSUME FAILURE
          52   00000000'EF     D0   062D          MOVL    L^BOO$GL_SPTFREL,R2            ;GET NEXT AVAILABLE SYSTEM VPN
               53    52   51     C1   0634          ADDL3   R1,R2,R3                       ;COMPUTE NEXT WITH THIS ALLOCATION
          00000000'EF     53     D1   0638          CMPL    R3,L^BOO$GL_SPTFREH            ;ARE THERE ENOUGH AVAILABLE?
                       10     1E   063F          BGEQU   10$                            ;BR IF NO
          00000000'EF     53     D0   0641          MOVL    R3,L^BOO$GL_SPTFREL            ;MARK THE ENTRIES ALLOCATED
          53   00000000'EF     D0   0648          MOVL    L^MMG$GL_SPTBASE,R3            ;GET ADDR OF BASE OF SPT
                       50     D6   064F          INCL    R0                             ;SET SUCCESS
                                   0651  10$:
                              05   0651          RSB                                    ;
```

```
0652           .SBTTL  CONVERT DEVICE NAME AND UNIT
0652   ;+
0652   ; IOC$CVT_DEVNAM - Convert device name and unit
0652   ;
0652   ; This routine is called to convert a device name and unit number to a physical
0652   ; device name string.
0652   ;
0652   ; Inputs:
0652   ;
0652   ;       The caller is assumed to have PROBEd the output buffer for write access.
0652   ;       The I/O data base is locked for read access.  This means that the caller
0652   ;       owns the I/O data base mutex and/or is at IPL SYNCH or higher.
0652   ;
0652   ;       R0 = length of output buffer.
0652   ;       R1 = address of output buffer.
0652   ;       R4 = name string formation mode, one of:
0652   ;           -1 (DVI$_DEVNAM) -- a name suitable for displays
0652   ;               for non-local devices, return node$ddcn
0652   ;               for local devices:
0652   ;                   if in cluster and file oriented device, return node$ddcn
0652   ;                   otherwise, return ddcn
0652   ;            0 (DVI$_FULLDEVNAM) -- a name with appropriate node information
0652   ;               if allocation class not zero and file oriented device, return
0652   ;                       $alloclass$ddcn
0652   ;               otherwise, return node$ddcn
0652   ;            1 (DVI$_ALLDEVNAM) -- a name with allocation class information
0652   ;               if allocation class not zero, return $alloclass$ddcn
0652   ;               otherwise, return node$ddcn
0652   ;            2 (no GETDVI item code) -- an old fashioned name
0652   ;               return ddcn
0652   ;            3 (no GETDVI item code) -- a secondary path name for displays
0652   ;               same as -1 except secondary path name returned
0652   ;            4 (no GETDVI item code) -- path controller name for displays
0652   ;               same as -1 except no unit number is appended
0652   ;            Note: if the node name string is null, node$ is not returned.
0652   ;       R5 = address of device UCB.
0652   ;
0652   ; Outputs:
0652   ;
0652   ;       The device name and unit number are converted and stored in the specified
0652   ;       output buffer. The following register values are returned:
0652   ;
0652   ;               R0 = Final conversion status.
0652   ;                       SS$_NORMAL or
0652   ;                       SS$_BUFFEROVF (an alternate success status which
0652   ;                               indicates that the supplied buffer could not
0652   ;                               hold the device name string)
0652   ;               R1 = Length of conversion string.  R1 = 0 if the alternate
0652   ;                    path name was requested but none exists.
0652   ;-
0652
0652   ;
0652   ; Working storage (offsets from R7)
0652   ;
0652           $OFFSET 0,POSITIVE,< -
0652                   <BINNUM,8>, -           ;Binary value to convert to ASCII
0652                   -       ; add new working storage cells before this line
```

```
                  0652                          <RESR0>, -              ;Result R0
                  0652                          <RESR1>, -              ;Result R1
                  0652                          <SCRLEN,0> -            ;amount of working storage
                  0652                          <RESR2>, -              ;saved R2
                  0652                          <RESR3>, -              ;saved R3
                  0652                          <RESR4>, -              ;saved R4
                  0652                          >
                  0000      BINNUM:
                  0008      RESR0:
                  000C      RESR1:
                  0010      SCRLEN:
                  0010      RESR2:
                  0014      RESR3:
                  0018      RESR4:
                  0652
                  0652      IOC$CVT_DEVNAM::                            ;Convert device name and unit
                  0652
     00FC 8F  BB  0652              PUSHR   #^M<R2,R3,R4,R5,R6,R7>  ;Save registers
                  0656      ;
                  0656      ; Push a quadword onto the stack.  The quadword will land
                  0656      ; on the stack so that when the POPR at the end of the routine
                  0656      ; is executed, R0 will contain the routine value, and R1 will
                  0656      ; contain the length of the formatted device name.
                  0656      ;
     7E    01  7D 0656              MOVQ    #SS$_NORMAL,-(SP)       ;Put a 1 and a 0 on the stack
           7E  7C 0659              CLRQ    -(SP)                   ;Init binary number working area.
                  065B              ASSUME  SCRLEN EQ 16
     57    5E  D0 065B              MOVL    SP, R7                  ;Setup result R0 and R1 pointer in R7.
                  065E      ;
                  065E      ; Precede the device name with a "_" (underscore character) to
                  065E      ; indicate that this is a physical device name.
                  065E      ;
  53    5F 8F  9A 065E              MOVZBL  #^A/_/,R3               ;Put underscore character in R3
        00B4   30 0662              BSBW    PUTCHAR                 ;Put it in the output buffer
                  0665      ;
                  0665      ; Check for a possible nodename. If it exists, determine which format
                  0665      ; of name was requested by the caller.
                  0665      ;
  56    28 A5  D0 0665              MOVL    UCB$L_DDB(R5),R6        ;Get DDB address
  52    34 A6  D0 0669              MOVL    DDB$L_SB(R6),R2         ;Get System Block address
           5D  13 066D              BEQL    LOCAL_NAME              ;None, leave
           09  E1 066F              BBC     #DEV$V_NNM,-            ;Branch if nodename not wanted
   58 3C A5       0671                      UCB$L_DEVCHAR2(R5),LOCAL_NAME
                  0674              CASE    R4, -                   ;Dispatch on type of output requested:
                  0674                      limit=#-1, displist=< -
                  0674                      DISPLAY_NAME, -         ; -1 ==> node$dev: for disks, else dev:
                  0674                      FULL_NAME, -            ;  0 ==> $allocls$dev: or node$dev:
                  0674                      ALLOC_NAME, -           ;  1 ==> $allocls$dev: or node$dev:
                  0674                      LOCAL_NAME, -           ;  2 ==> just dev:
                  0674                      SECONDARY_NAME, -       ;  3 ==> secondary path
                  0674                      DISPLAY_NAME -          ;  4 ==> same as -1 sans unit number
                  0674                      >
           5B  11 0686              BRB     EXDVNM                  ; All others are NOPs.
                  0688
                  0688      FULL_NAME:
33 38 A5   0E  E1 0688              BBC     #DEV$V_FOD, -           ;A file oriented device?
                  068D                      UCB$L_DEVCHAR(R5), -
```

```
                            068D  1760                    ADD_NODE                ;Branch if not file oriented device.
                            068D  1761
                            068D  1762 ALLOC_NAME:
                            068D  1763
        67    3C A6    9A   068D  1764            MOVZBL  DDB$L_ALLOCLS(R6), -    ;Setup allocation class value
                            0691  1765                    BINNUM(R7)              ; for conversion.
                 2D    13   0691  1766            BEQL    ADD_NODE                ;If none return node+device name.
               0080    30   0693  1767            BSBW    PUTDOLLAR               ;Prepend allocation class with a '$'
                 58    10   0696  1768            BSBB    PUTNUM                  ;Convert allocation class number to
                            0698  1769                                            ;ASCII and put it in the buffer
                 30    11   0698  1770            BRB     ADD_DOLLAR              ;Append dollar sign to alloc. class
                            069A  1771                                            ; and add device name to buffer.
                            069A  1772
                            069A  1773 SECONDARY_NAME:
                 04    E1   069A  1774            BBC     #DEV$V_2P,-             ;Branch if device not dual-pathed.
              3C A5         069C  1775                    UCB$L_DEVCHAR2(R5),-    ; (I.E. there is n^ secondary path to
                 4C         069E  1776                    NO_SECONDARY            ; return.)
     56    00A0 C5     D0   069F  1777            MOVL    UCB$L_DP_DDB(R5),R6     ;Get secondary DDB.
                 45    13   06A4  1778            BEQL    NO_SECONDARY            ;Branch to no sec. path if none.
        52    34 A6    D0   06A6  1779            MOVL    DDB$L_SB(R6),R2         ;Get alternate SB.
                            06AA  1780
                            06AA  1781 DISPLAY_NAME:
  00000000'8F    52    D1   06AA  1782            CMPL    R2,#SCS$GA_LOCALSB      ;Is it the perm local system block?
                 0D    12   06B1  1783            BNEQ    ADD_NODE                ;Return node+devnam for non-local devs.
                            06B3  1784            IFNOCLSTR LOCAL_NAME            ;Return devnam if not part of a cluster.
     0C 38 A5    0E    E1   06BB  1785            BBC     #DEV$V_FOD, -           ;A file oriented device?
                            06C0  1786                    UCB$L_DEVCHAR(R5), -
                            06C0  1787                    LOCAL_NAME              ;Branch if not a file oriented device.
                            06C0  '788                                            ;Its a local disk in a cluster: return
                            06C0  1789                                            ;node+device name format.
                            06C0  1790 ;
                            06C0  1791 ; Return node name plus device name.  Copy node name to buffer and
                            06C0  1792 ; suffix with a "$" before moving in rest of device name.
                            06C0  '793 ;
                            06C0  1794 ADD_NODE:
        52    44 A?    9E   06C0  1795            MOVAB   SB$T_NODENAME(R2),R2    ;Point to name field
                 62    95   06C4  1796            TSTB    (R2)                    ;Is the node name null?
                 04    13   06C6  1797            BEQL    LOCAL_NAME              ;Skip inserting node name, if its null.
                 3E    10   06C8  1798            BSBB    PUTASCIC                ;Copy counted ASCII str. to output buf.
                            06CA  1799 ADD_DOLLAR:
                 4A    10   06CA  1800            BSBB    PU;DOLLAR               ;Append dollar sign to node name
                            06CC  1801 ;
                            06CC  1802 ; Copy device name to buffer.
                            06CC  1803 ;
                            06CC  1804 LOCAL_NAME:
        52    14 A6    9E   06CC  1805            MOVAB   DDB$T_NAME(R6),R2       ;Get address of ASCIC device name.
                 36    10   06D0  1806            BSBB    PUTASCIC                ;Copy counted ASCII str. to output buf.
        04    18 A7    B1   06D2  1807            CMPW    RESR4(R7),#4            ;Do we want the unit number?
                 0B    13   06D6  1808            BEQL    EXDVNM                  ;Nope
        67    54 A5    3C   06D8  1809            MOVZWL  UCB$W_UNIT(R5), -       ;Setup device unit number for
                            06DC  1810                    BINNUM(R7)              ; converstion to ASCII.
                 12    10   06DC  1811            BSBB    PUTNUM                  ;Convert unit number to ASCII.
                            06DE  1812 ;
                            06DE  1813 ; Terminate the device name with a ":" (colon).
                            06DE  1814 ;
           53    3A    9A   06DE  1815            MOVZBL  #^A/:/,R3               ;Put a ":" in R3
                 36    10   06E1  1816            BSBB    PUTCHAR                 ;Put the ":" in output buffer
```

```
                        06E3  ;
                        06E3  ; Clean up the stack and exit.  The stack has been set up so that
                        06E3  ; the proper values will be stored in R0 and R1 by the POPR.
                        06E3  ;
         5E   08   C0   06E3  EXDVNM: ADDL    #RESR0,SP               ;Remove everything upto result R0
                        06E6                                          ;from the stack
         00FF 8F   BA   06E6          POPR    #^M<R0,R1,R2,R3,R4,R5,R6,R7> ;Restore registers
                   05   06EA          RSB                             ;Return
                        06EB
                        06EB  ;
                        06EB  ; Come here when the secondary device name was requested but none exists.
                        06EB  ;
                        06EB  NO_SECONDARY:
          0C A7    D4   06EB          CLRL    RESR1(R7)               ;Clear count of characters
             F3    11   06EE          BRB     EXDVNM                  ;and return.
                        06F0
                        06F0
                        06F0  ;++
                        06F0  ; The following code is a local subroutine to convert binary to ASCII and
                        06F0  ; put the ASCII equivalent in the output name buffer.
                        06F0  ;
                        06F0  ; Inputs:
                        06F0  ;
                        06F0  ;       BINNUM(R7)      binary number to be converted (a quadword with high
                        06F0  ;                       longword zeroed
                        06F0  ;
                        06F0  ; Outputs:
                        06F0  ;       The number at BINNUM(R7) is converted to ASCII and stored in the
                        06F0  ;       device name buffer.
                        06F0  ;--
                        06F0  PUTNUM:
         53   01   8E   06F0          MNEGB   #1, R3                  ;Get end-of-number marker.
         7E   53   90   06F3  10$:    MOVB    R3, -(SP)               ;Move digit/marker to scratch.
53   67  67   0A   7B   06F6          EDIV    #10, BINNUM(R7), -      ;Divide number by 10, overwrite number
                        06FB                  BINNUM(R7), R3          ;with quotient, put remainder in R3.
              F6   12   06FB          BNEQ    10$                     ;If quotient not zero, go save this
                        06FD                                          ; digit and get the next one.
                        06FD  ;
                        06FD  ; Get digits -- most significant first (then saved ones), convert them to
                        06FD  ; ASCII, and put them in the output buffer
                        06FD  ;
         53   30   80   06FD  50$:    ADDB    #^A/0/, R3              ;Convert binary digit to ASCII
              17   10   0700          BSBB    PUTCHAR                 ;Copy digit to output buffer
         53   8E   90   0702          MOVB    (SP)+, R3               ;Get another digit
              F6   18   0705          BGEQ    50$                     ;Branch if the end
                   05   0707          RSB
                        0708
                        0708  ;++
                        0708  ; The following code is a local subroutine to copy a counted ASCII string
                        0708  ; to the output name buffer.
                        0708  ;
                        0708  ; Inputs:
                        0708  ;
                        0708  ;       R2      Beginning address of a counted ASCII string
                        0708  ;
                        0708  ; Outputs:
                        0708  ;       The counted ASCII string pointed to by R2 is copied to the device
```

```
                       0708  ;       name buffer.
                       0708  ;--
                       0708  PUTASCIC:
        54    82   9A  0708          MOVZBL  (R2)+, R4               ;Get counted string length.
              08   13  070B          BEQL    90$                     ;If no characters, leave.
        53    82   90  070D  5$:     MOVB    (R2)+, R3               ;Move one byte to output buffer.
              07   10  0710          BSBB    PUTCHAR                 ;Put the character in the output buffer.
         F8   54   F5  0712          SOBGTR  R4, 5$                  ;Branch if more to copy.
                   05  0715  90$:    RSB                             ;All done, return.
                       0716
                       0716  ;++
                       0716  ;
                       0716  ; The following code is a local subroutine to place a given
                       0716  ; byte in the output buffer.  A count is kept of all characters
                       0716  ; placed in the output buffer.  If the output buffer is full,
                       0716  ; the byte is not copied, the count is not increased, and the
                       0716  ; return status for IOC$CVT_DEVNAM is changed to SS$_BUFFEROVF
                       0716  ; (an alternate success status).
                       0716  ;
                       0716  ; Inputs:
                       0716  ;       R0      Count of unstored character slots remaining in output buffer
                       0716  ;       R1      Address of next unused character slot in output buffer
                       0716  ;       R3      Character to be placed in the buffer
                       0716  ;
                       0716  ; Implicit inputs:
                       0716  ;       RESR0(R7)       longword holding final IOC$CVT_DEVNAM status
                       0716  ;       RESR1(R7)       longword holding final IOC$CVT_DEVNAM count of
                       0716  ;                               characters stored in the buffer (to be
                       0716  ;                               returned in R1
                       0716  ;
                       0716  ; Outputs:
                       0716  ;       None.
                       0716  ;
                       0716  ; Implicit outputs:
                       0716  ;       If R0 >= zero:
                       0716  ;               R0              <== R0 - 1
                       0716  ;               (R1)            <== R3
                       0716  ;               R1              <== R1 + 1
                       0716  ;               RESR1(R7)       <== RESR1(R7) + 1
                       0716  ;       otherwise:
                       0716  ;               RESR0(R7)       <== SS$_BUFFEROVF
                       0716  ;++
                       0716  ; PUTDOLLAR is an internal routine which is the equivalent of:
                       0716  ;
                       0716  ;       MOVB    #^A/$/, R3
                       0716  ;       BSBB    PUTCHAR
                       0716  ;--
                       0716  PUTDOLLAR:
        53    24   90  0716          MOVB    #^A/$/, R3              ;Setup to put "$" in output buffer.
                       0719  PUTCHAR:
              50   D7  0719          DECL    R0                      ;Decrease characters remaining count.
              07   19  071B          BLSS    90$                     ;Branch if no more characters remaining.
        81    53   90  071D          MOVB    R3, (R1)+               ;Copy character to output buffer
         0C   A7   D6  0720          INCL    RESR1(R7)               ;Count characters stored
                   05  0723          RSB                             ;Return
                       0724
08 A7   0601  8F   3C  0724  90$:    MOVZWL  #SS$_BUFFEROVF, -       ;Set buffer overflow status
```

```
    072A  1931                  RESRO(R7)
05  072A  1932          RSB
```

```
                        072B          .SBTTL  BROADCAST TO A TERMINAL
                        072B   ;++
                        072B   ; IOC$BROADCAST
                        072B   ;
                        072B   ;       This routine will allow driver fork processes to broadcast a
                        072B   ;       given message to given terminal.  The broadcast request is
                        072B   ;       dispatched to the proper terminal and control returns immediately
                        072B   ;       to the caller.  Some time later the broadcast will complete, and
                        072B   ;       at that time all the necessary post-processing will be done.
                        072B   ;
                        072B   ;       This routine does not implement all the features of the $BRDCST system
                        072B   ;       service, but only the bare minimum necessary to send a message to a
                        072B   ;       single terminal.  For more information about the terminal broadcast
                        072B   ;       mechanism, see the module SYSBRDCST.
                        072B   ;
                        072B   ; Input:
                        072B   ;
                        072B   ;       R1 = Message length
                        072B   ;       R2 = Message address
                        072B   ;       R5 = Address of target terminal's UCB
                        072B   ;
                        072B   ; Implicit input:
                        072B   ;
                        072B   ;       IPL$_ASTDEL  <=  CURRENT_IPL  <=  UCB$B_FIPL(R5)
                        072B   ;
                        072B   ; Output:
                        072B   ;
                        072B   ;       None.  The contents of R1 .. R5 are preserved across the call.
                        072B   ;
                        072B   ; Routine value:
                        072B   ;
                        072B   ;       SS$_NORMAL      - The broadcast completed successfully.
                        072B   ;       SS$_INSFMEM     - Insufficient dynamic nonpaged pool for the request.
                        072B   ;       SS$_DEVOFFLINE  - The target terminal has rejected the request.
                        072B   ;       SS$_ILLIOFUNC   - The specified UCB does not belong to a terminal.
                        072B   ;                         (Therefore a BROADCAST is an illegal I/O function.)
                        072B   ;--
                        072B
              00000000  072B   SAVED_R0 = 0                             ;.
              00000004  072B   SAVED_R1 = 4                             ; .
              00000008  072B   SAVED_R2 = 8                             ; .
              0000000C  072B   SAVED_R3 = 12                            ; . Symbolic offsets to saved registers
              00000010  072B   SAVED_R4 = 16                            ; .
              00000014  072B   SAVED_R5 = 20                            ;.
                        072B
                        072B   IOC$BROADCAST::                          ; Broadcast to a terminal
50   00F4 8F     3C     072B           MOVZWL  #SS$_ILLIOFUNC,R0        ; Assume device not a terminal
            02   E1     0730           BBC     #DEV$V_TRM,-             ; Branch if not a terminal
      56 38 A5          0732                   UCB$L_DEVCHAR(R5),14$    ;
            3F   BB     0735           PUSHR   #^M<R0,R1,R2,R3,R4,R5>   ; Save R0 .. R5
       51   30   C0     0737           ADDL2   #TTY$K_WB_LENGTH,R1      ; Calculate the total pool required
6E   0124 8F     3C     073A           MOVZWL  #SS$_INSFMEM,SAVED_R0(SP); Assume allocation failure
         F8BE'   30     073F           BSBW    EXE$ALONONPAGED          ; Allocate the pool
         44 50   E9     0742           BLBC    R0,13$                   ; Exit if error
                        0745           ;
                        0745           ; Fill in the Terminal Write Packet (TWP).
                        0745           ; Note that EXE$ALONONPAGED the pool size
                        0745           ; in R1 and the pool address in R2.
                        0745           ;
      08 A2    51   B0  0745           MOVW    R1,TTY$W_WB_SIZE(R2)     ; Set TWP size
               30   90  0749           MOVB    #DYN$C_TWP,-             ; Set TWP structure type
            0A A2       074B                   TTY$B_WB_TYPE(R2)        ;
               06   90  074D           MOVB    #IPL$_QUEUEAST,-         ; Set the TWP fork IPL (for later use)
            0B A2       074F                   TTY$B_WB_FIPL(R2)        ;
      10 A2    01   D0  0751           MOVL    #1,TTY$L_WB_FR3(R2)      ; Request refresh of read prompt
            30 A2   9E  0755           MOVAB   TTY$L_WB_DATA(R2),-      ; Set address of message start
            1C A2       0758                   TTY$L_WB_NEXT(R2)        ;
            04 AE   C1  075A           ADDL3   SAVED_R1(SP),-           ; Set address of message end
            1C A2       075D                   TTY$L_WB_NEXT(R2),-      ;
            20 A2       075F                   TTY$L_WB_END(R2)         ;
            96'AF   9E  0761           MOVAB   B^END_BROADCAST,-        ; Set callback address
            2C A2       0764                   TTY$L_WB_RETADDR(R2)     ;
            24 A2   D4  0766           CLRL    TTY$L_WB_IRP(R2)         ; Clear pointer to associated IRP
               52   DD  0769           PUSHL   R2                       ; Save TWP address
            08 AE   28  076B           MOVC3   4+SAVED_R1(SP),-         ; Copy the message text to the TWP
            0C BE       076E                   @4+SAVED_R2(SP),-        ; (note the stack depth changed)
            30 A2       0770                   TTY$L_WB_DATA(R2)        ;
                        0772           ;
                        0772           ; Queue the broadcast request to the terminal.
                        0772           ; The disposition of the broadcast request will be determined
                        0772           ; by the contents of TTY$L_WB_END.  Note that if the request is
                        0772           ; accepted by a remote terminal, or is rejected outright, the
                        0772           ; TWP is no longer needed, and may be deallocated.  The TTY$L_WB_END
                        0772           ; field of the TWP will contain one of the following values:
                        0772           ;
                        0772           ;       System address: request accepted by TTDRIVER
                        0772           ;       1:              request accepted by RTTDRIVER
                        0772           ;       2:              request rejected
                        0772           ;
         53    6E   D0  0772           MOVL    (SP),R3                  ; Put TWP address in R3
      55    18 AE   D0  0775           MOVL    4+SAVED_R5(SP),R5        ; Restore UCB address
          F884'     30  0779           BSBW    EXE$ALTQUEPKT            ; Queue the request to the terminal
              50 8ED0   077C           POPL    R0                       ; Remove TWP address from the stack
         6E    01   3C  077F           MOVZWL  #SS$_NORMAL,SAVED_R0(SP) ; Assume success
            20 A0   D5  0782           TSTL    TTY$L_WB_END(R0)         ; Check for rejection
               05   13  0785           BEQL    69$                      ; Branch if request rejected
               08   14  0787           BGTR    80$                      ; Branch if remote terminal accepted
               3F   BA  0789      13$: POPR    #^M<R0,R1,R2,R3,R4,R5>   ; Restore the registers
                    05  078B      14$: RSB                              ; Return
          0084 8F   3C  078C      69$: MOVZWL  #SS$_DEVOFFLINE,-        ; Set broadcast rejection status
               6E       0790                   SAVED_R0(SP)             ;
          F86C'     30  0791      80$: BSBW    COM$DRVDEALMEM           ; Deallocate the TWP
               F3   11  0794           BRB     13$                      ; Take common exit path
                        0796
                        0796      ;
                        0796      ; The following code performs all of the necessary broadcast post-processing.
                        0796      ; This entry point is FORKed to at IPL IPL$_QUEUEAST from the terminal driver.
                        0796      ; The fork block is the TWP.
                        0796      ;
                        0796      END_BROADCAST:                        ; Post-processor for broadcast requests
         50    55   D0  0796           MOVL    R5,R0                    ; Copy TWP address
          F864'     31  0799           BRW     EXE$DEANONPAGED          ; Deallocate the TWP and return
```

```
                            079C          .SBTTL  BROADCAST EMERGENCY MESSAGE TO CONSOLE
                            079C   ;++
                            079C   ; IOC$CONBRDCST
                            079C   ;
                            079C   ;       This routine will allow emergency messages to be put on the console
                            079C   ;       terminal.  Some time later the broadcast will complete, and
                            079C   ;       at that time all the necessary post-processing will be done.
                            079C   ;
                            079C   ; Input:
                            079C   ;
                            079C   ;       R1 = Message length
                            079C   ;       R2 = Message address
                            079C   ;
                            079C   ; Implicit input:
                            079C   ;
                            079C   ;       IPL$_ASTDEL  <=  CURRENT_IPL  <=  UCB$B_FIPL(R5)
                            079C   ;
                            079C   ;       A dedicated TWP block must immediately preced the message.
                            079C   ;       The low bit of the first byte of the TWP is assumed to remain clear
                            079C   ;       while it is in use.
                            079C   ;
                            079C   ; Output:
                            079C   ;
                            079C   ;       None.  The contents of R1 .. R5 are preserved across the call.
                            079C   ;
                            079C   ; Routine value:
                            079C   ;
                            079C   ;       SS$_NORMAL       - The broadcast completed successfully.
                            079C   ;--
                            079C
             00000000       079C   SAVED_R0 = 0                                 ;.
             00000004       079C   SAVED_R1 = 4                                 ; .
             00000008       079C   SAVED_R2 = 8                                 ; .
             0000000C       079C   SAVED_R3 = 12                                ; . Symbolic offsets to saved registers
             00000010       079C   SAVED_R4 = 16                                ; .
             00000014       079C   SAVED_R5 = 20                                ;.
                            079C
                            079C   IOC$CONBRDCST::                              ; Broadcast to a terminal
                   3F   BB  079C          PUSHR   #^M<R0,R1,R2,R3,R4,R5>  ; Save R0 .. R5
  55     00000000'EF    9E  079E          MOVAB   OPA$UCB0,R5             ; Get the console terminal UCB
            52     30   C2  07A5          SUBL2   #TTY$K_WB_LENGTH,R2     ; Retreat to the start of the TWP
                            07A8          ;
                            07A8          ; Fill in the Terminal Write Packet (TWP).
                            07A8          ;
         08 A2     51   B0  07A8          MOVW    R1,TTY$W_WB_SIZE(R2)    ; Set TWP size
                   30   90  07AC          MOVB    #DYN$C_TWP,-            ; Set TWP structure type
            0A A2           07AE                  TTY$B_WB_TYPE(R2)       ;
                   06   90  07B0          MOVB    #IPL$_QUEUEAST,-        ; Set the TWP fork IPL (for later use)
            0B A2           07B2                  TTY$B_WB_FIPL(R2)       ;
         10 A2     01   D0  07B4          MOVL    #1,TTY$L_WB_FR3(R2)     ; Request refresh of read prompt
            30 A2       9E  07B8          MOVAB   TTY$L_WB_DATA(R2),-     ; Set address of message start
            1C A2           07BB                  TTY$L_WB_NEXT(R2)       ;
            04 AE       C1  07BD          ADDL3   SAVED_R1(SP),-          ; Set address of message end
            1C A2           07C0                  TTY$L_WB_NEXT(R2),-     ;
            20 A2           07C2                  TTY$L_WB_END(R2)        ;
            EC'AF       9E  07C4          MOVAB   B^END_CONBRDCST,-       ; Set callback address
            2C A2           07C7                  TTY$L_WB_RETADDR(R2)    ;
```

```
   24 A2    D4  07C9                CLRL    TTY$L_WB_IRP(R2)          ; Clear pointer to associated IRP
      52    DD  07CC                PUSHL   R2                        ; Save TWP address
                07CE                ;
                07CE                ; Queue the broadcast request to the terminal.
                07CE                ;
53    52    D0  07CE                MOVL    R2,R3                     ; Put TWP address in R3
   F82C'    30  07D1                BSBW    EXE$ALTQUEPKT             ; Queue the request to the terminal
      50 8ED0   07D4                POPL    R0                        ; Remove TWP address from the stack
6E    01    3C  07D7                MOVZWL  #SS$_NORMAL,SAVED_R0(SP); Assume success
   20 A0    D5  07DA                TSTL    TTY$L_WB_END(R0)          ; Check for rejection
      03    13  07DD                BEQL    69$                       ; Branch if request rejected
      3F    BA  07DF      13$:      POPR    #^M<R0,R1,R2,R3,R4,R5>    ; Restore the registers
            05  07E1      14$:      RSB                               ; Return
0084  8F    3C  07E2      69$:      MOVZWL  #SS$_DEVOFFLINE,-         ; Set broadcast rejection status
      6E        07E6                        SAVED_R0(SP)              ;
60    01    CE  07E7      80$:      MNEGL   #1,(R0)                   ; Mark the TWP free
      F3    11  07EA                BRB     13$                       ; Take common exit path
                07EC
                07EC      ;
                07EC      ; The following code performs all of the necessary broadcast post-processing.
                07EC      ; This entry point is FORKed to at IPL IPL$_QUEUEAST from the terminal driver.
                07EC      ; The fork block is the TWP.
                07EC      ;
                07EC      END_CONBRDCST:                              ; Post-processor for broadcast requests
65    01    CE  07EC                MNEGL   #1,(R5)                   ; Mark the TWP free
            05  07EF                RSB
```

```
                                   07F0          .SBTTL  SCAN THE I/O DATA BASE
                                   07F0   ;+
                                   07F0   ; IOC$SCAN_IODB - Scan the I/O data base and return next block.
                                   07F0   ;
                                   07F0   ; This routine is called to scan the device lists in the IO data base and
                                   07F0   ; return a pointer to the next block in the list.  Context is kept in R11
                                   07F0   ; and by using back pointers.
                                   07F0   ;
                                   07F0   ; Inputs:
                                   07F0   ;
                                   07F0   ;       The I/O data base is locked for read access.  This means that the caller
                                   07F0   ;       owns the I/O data base mutex and/or is at IPL SYNCH or higher.
                                   07F0   ;
                                   07F0   ;               R11 =  0 implies first call
                                   07F0   ;               R11 <> 0 indicates that R11 is pointer to current DDB
                                   07F0   ;               R10 =  0 implies end of UCB chain
                                   07F0   ;               R10 <> 0 indicates that R10 is pointer to current UCB
                                   07F0   ;
                                   07F0   ; Outputs:
                                   07F0   ;
                                   07F0   ;               R0  = Success status.
                                   07F0   ;               R10 = Pointer to UCB
                                   07F0   ;               R11 = Pointer to DDB
                                   07F0   ;
                                   07F0   ;       All other registers preserved.
                                   07F0   ;
                                   07F0   ;-
                                   07F0
                                   07F0   IOC$SCAN_IODB::
                                   07F0
              50    01      D0     07F0            MOVL    #1,R0                   ; Success
                    5B      D5     07F3            TSTL    R11                     ; Initial condition?
                    2C      13     07F5            BEQL    50$                     ; Yes
                    5A      D5     07F7            TSTL    R10                     ; End of chain?
                    07      13     07F9            BEQL    10$                     ; Yes
         5A    30   AA      D0     07FB            MOVL    UCB$L_LINK(R10),R10     ; Get next UCB
                    01      13     07FF            BEQL    10$                     ; None
                            05     0801            RSB
                                   0802
                    6B      D5     0802   10$:     TSTL    DDB$L_LINK(R11)         ; At end of DDB chain?
                    0A      13     0804            BEQL    30$                     ; Yes
              5B    6B      D0     0806            MOVL    DDB$L_LINK(R11),R11     ; No, get next one
         5A    04   AB      D0     0809   20$:     MOVL    DDB$L_UCB(R11),R10      ; Pick up first UCB
                    F3      13     080D            BEQL    10$                     ; None, get next DDB
                            05     080F            RSB
                                   0810
         5B    34   AB      D0     0810   30$:     MOVL    DDB$L_SB(R11),R11       ; Get back to parent system block
              5B    6B      D0     0814   40$:     MOVL    SB$L_FLINK(R11),R11     ; Get next system block
    00000000'8F     5B      D1     0817            CMPL    R11,#SCS$GQ_CONFIG      ; End of chain?
                    0A      12     081E            BNEQ    60$                     ; No
                    50      D7     0820            DECL    R0
                            05     0822            RSB
                                   0823
    5B    00000000'9F       D0     0823   50$:     MOVL    @#SCS$GQ_CONFIG,R11     ; Pick up first system block
               54   AB      D5     082A   60$:     TSTL    SB$L_DDB(R11)           ; Is there a DDB chain?
                    E5      13     082D            BEQL    40$                     ; No, go try next SB
         5B    54   AB      D0     082F            MOVL    SB$L_DDB(R11),R11       ; Yes, get the first DDB
```

```
D4   11  0833  2188           BRB      20$
         0835  2189
```

```
                         0835            .SBTTL  SCAN THE I/O DATA BASE BOTH PRIMARY & SECONDARY PATHS
                         0835      ;++
                         0835      ; IOC$SCAN_IODB_2P
                         0835      ;
                         0835      ; This routine is called to scan the device lists in the IO data base and
                         0835      ; return a pointer to the next block in the list.  Context is kept in R10
                         0835      ; and R11 and by using back pointers.
                         0835      ;
                         0835      ; SCAN_IODB_2P differs from SCAN_IODB in that it will scan both the primary
                         0835      ; and secondary UCB chain for each DDB.  This means that if a device is
                         0835      ; dual-pathed, SCAN_IODB_2P will return the address of its UCB twice, once in
                         0835      ; the context of the primary controller and once in the context of the
                         0835      ; secondary.
                         0835      ;
                         0835      ; Inputs and Outputs are identical to IOC$SCAN_IODB.
                         0835      ;--
                         0835
                         0835      IOC$SCAN_IODB_2P::
                         0835
      50   01   D0       0835              MOVL    #1,R0                       ; Success
           5B   D5       0838              TSTL    R11                         ; Initial condition?
           41   13       083A              BEQL    60$                         ; Yes
           5A   D5       083C              TSTL    R10                         ; Caller signalled end of chain?
           1C   13       083E              BEQL    30$                         ; Yes, done with this DDB
                         0840      ;
                         0840      ; At this point we must decide if we're following the primary or secondary
                         0840      ; chain of UCBs on this DDB.
                         0840      ;
   5B    28 AA  D1       0840              CMPL    UCB$L_DDB(R10),R11          ; Are we traversing the primary chain?
           07   12       0844              BNEQ    10$                         ; Branch if we're following secondary
   5A    30 AA  D0       0846              MOVL    UCB$L_LINK(R10),R10         ; Get next UCB on primary chain
           09   13       084A              BEQL    20$                         ; Branch if none to try secondary chain
           05            084C              RSB                                 ; Else return UCB address to caller
                         084D      ;
                         084D      ; Get next UCB on secondary chain.
                         084D      ;
 5A    00A4 CA  D0       084D      10$:    MOVL    UCB$L_DP_LINK(R10),R10      ; Get next UCB on secondary chain
           08   13       0852              BEQL    30$                         ; Branch if none left
           05            0854              RSB                                 ; Else return UCB address to caller
                         0855      ;
                         0855      ; No UCBs left on primary chain; traverse secondary chain if present.
                         0855      ;
   5A    40 AB  D0       0855      20$:    MOVL    DDB$L_DP_UCB(R11),R10       ; Get first UCB on secondary chain
           01   13       0859              BEQL    30$                         ; Branch if none to try next DDB
           05            085B              RSB                                 ; Else return UCB address to caller
                         085C      ;
                         085C      ; Step to next DDB.
                         085C      ;
           6B   D5       085C      30$:    TSTL    DDB$L_LINK(R11)             ; At end of DDB chain?
           0A   13       085E              BEQL    40$                         ; Yes, try next system block
        5B 6B   D0       0860              MOVL    DDB$L_LINK(R11),R11         ; No, get next one
   5A    04 AB  D0       0863      35$:    MOVL    DDB$L_UCB(R11),R10          ; Pick up first UCB on primary chain
           EC   13       0867              BEQL    20$                         ; None, try for UCB on secondary chain
           05            0869              RSB                                 ; Else return UCB address to caller
                         086A
                         086A      ;
                         086A      ; Step to next system block.
```

```
                            086A  2248 ;
        5B   34 AB     D0   086A  2249 40$:     MOVL    DDB$L_SB(R11),R11        ; Get back to parent system block
            5B   6B    D0   086E  2250 50$:     MOVL    SB$L_FLINK(R11),R11      ; Get next system block
    00000000'8F   5B   D1   0871  2251          CMPL    R11,#SCS$GQ_CONFIG       ; End of chain?
                  0A   12   0878  2252          BNEQ    70$                      ; No
                  50   D7   087A  2253          DECL    R0                       ; Signal end of IO scan
                       05   087C  2254          RSB
                            087D  2255
5B    00000000'9F      D0   087D  2256 60$:     MOVL    @#SCS$GQ_CONFIG,R11      ; Pick up first system block
             54 AB     D5   0884  2257 70$:     TSTL    SB$L_DDB(R11)            ; Is there a DDB chain?
                  E5   13   0887  2258          BEQL    50$                      ; No, go try next SB
        5B   54 AB     D0   0889  2259          MOVL    SB$L_DDB(R11),R11        ; Yes, get the first DDB
                  D4   11   088D  2260          BRB     35$                      ; Try for UCB on primary chain
```

```
                   088F        .SBTTL  IOC$CTRLINIT - Call driver controller init. routine
                   088F  ;++
                   088F  ; FUNCTIONAL DESCRIPTION:
                   088F  ;
                   088F  ;       For UNIBUS devices, the device CSR is tested for existance.  If this
                   088F  ;       test fails, a no routine call occurs and failure status is returned in
                   088F  ;       R0.  Input values for a device driver's controller initialization
                   088F  ;       routine are loaded into the proper registers, the routine starting
                   088F  ;       address is located, and if a routine exists, it is called.
                   088F  ;
                   088F  ; INPUTS:
                   088F  ;       R1      CSR address to use if IDB contains zero
                   088F  ;       R8      CRB address (primary)
                   088F  ;       R11     DDB address
                   088F  ;
                   088F  ; OUTPUTS:
                   088F  ;       R0      Status (success, or failure ==> UNIBUS CSR non-existant)
                   088F  ;       R1-R6   Destroyed
                   088F  ;--
                   088F
                   088F  ;++
                   088F  ; Controller initialization routine parameters:
                   088F  ;
                   088F  ; INPUTS:
                   088F  ;       R4      CSR address (for UNIBUS and MASSBUS devices)
                   088F  ;               SCSSYSTEMID address (for class drivers during SYSGEN driver
                   088F  ;                       loading)
                   088F  ;               zero for all others, including class drivers during power
                   088F  ;                       failure recovery
                   088F  ;       R5      IDB address (or zero if none exists)
                   088F  ;       R6      DDB address
                   088F  ;       R8      CRB address
                   088F  ;
                   088F  ; OUTPUTS:
                   088F  ;       Must preserve all registers except R0 through R4.
                   088F  ;
                   088F  ;--
                   088F
                   088F
                   088F  IOC$CTRLINIT::
                   088F
 55   2C A8   D0   088F          MOVL    CRB$L_INTD+VEC$L_IDB(R8), R5    ; Get IDB address.
         05   18   0893          BGEQ    10$                             ; Branch if none.
    54   65   D0   0895          MOVL    IDB$L_CSR(R5), R4               ; Get CSR address.
         05   19   0898          BLSS    20$                             ; Branch if really a CSR.
    54   51   D0   089A  10$:    MOVL    R1, R4                          ; Else, use supplied value,
         1B   11   089D          BRB     40$                             ; and skip CSR testing.
                   089F
 56   14 A5   D0   089F  20$:    MOVL    IDB$L_ADP(R5), R6               ; Get ADP address.
         15   18   08A3          BGEQ    40$                             ; If none, skip CSR test.
 0E A6   01   B1   08A5          CMPW    #AT$_UBA, ADP$W_ADPTYPE(R6)     ; Is this a UBA?
         0F   12   08A9          BNEQ    40$                             ; If not a UBA, skip CSR test.
    56   66   D0   08AB          MOVL    ADP$L_CSR(R6), R6               ; Get adapter config reg addr.
    50   54   D0   08AE          MOVL    R4, R0                          ; Setup CSR for test.
00000000'GF   16   08B1          JSB     G^EXE$TEST_CSR                  ; Test UNIBUS CSR.
    0E   50   E9   08B7          BLBC    R0, 90$                         ; Branch if no CSR present.
                   08BA
 50   30 A8   D0  08BA  2319 40$:    MOVL    CRB$L_INTD+VEC$L_INITIAL(R8), R0 ; Get ctrl init rout addr.
         05   18  08BE  2320         BGEQ    80$                              ; Branch if none.
    56   5B   D0  08C0  2321         MOVL    R11, R6                          ; Get DDB address.
         60   16  08C3  2322         JSB     (R0)                             ; Call ctrl init routine.
                  08C5  2323
    50   01   D0  08C5  2324 80$:    MOVL    #1, R0                           ; Set success status.
              05  08C8  2325 90$:    RSB                                      ; Return w/ status.
```

```
                  08C9        .SBTTL  IOC$UNITINIT - Call driver unit init. routine
                  08C9  ;++
                  08C9  ; FUNCTIONAL DESCRIPTION:
                  08C9  ;
                  08C9  ;       Input values for a device driver's unit initialization routine are
                  08C9  ;       loaded into the proper registers, the routine starting address is
                  08C9  ;       located, and if a routine exists, it is called.
                  08C9  ;
                  08C9  ; INPUTS:
                  08C9  ;       R5      UCB address
                  08C9  ;       R8      CRB address (primary)
                  08C9  ;
                  08C9  ; OUTPUTS:
                  08C9  ;       R0-R4   Destroyed
                  08C9  ;
                  08C9  ; NOTES:
                  08C9  ;
                  08C9  ;       There are two unit initialization routine addresses in the I/O data
                  08C9  ;       base; CRB$L_INTD_VEC$L_UNITINIT and DDT$L_UNITINIT.  Normally, only
                  08C9  ;       one of these two places should contain a unit initialization routine
                  08C9  ;       address.  However, for the console block storage device, the both
                  08C9  ;       locations contain an address, and the DDT contains the address which
                  08C9  ;       must be used.
                  08C9  ;
                  08C9  ;       In this case, the CRB is shared by the console terminal and console
                  08C9  ;       block storage devices.  The CRB contains the address of the unit
                  08C9  ;       initialization routine for the console terminal, and the console
                  08C9  ;       terminal DDT contains no unit initialization routine address.  Thus
                  08C9  ;       the console terminal device "fits" the "normal" case.  However, the
                  08C9  ;       console block storage device DDT contains a unit initialization
                  08C9  ;       routine which differs from the console terminal unit initialization
                  08C9  ;       routine and whose address is stored in the DDT.
                  08C9  ;
                  08C9  ;       Since the CRB is shared and contains the wrong unit initialization
                  08C9  ;       routine address for the console block storage device, the DDT must be
                  08C9  ;       inspected first.  Initialization for the console terminal will be
                  08C9  ;       accomplished correctly regardless of which address is checked first.
                  08C9  ;
                  08C9  ;--
                  08C9
                  08C9  ;++
                  08C9  ; Unit initialization routine parameters:
                  08C9  ;
                  08C9  ; INPUTS:
                  08C9  ;       R3      CSR address (primary)
                  08C9  ;       R4      CSR address (secondary, same as primary if no secondary exists)
                  08C9  ;       R5      UCB address
                  08C9  ;
                  08C9  ; OUTPUTS:
                  08C9  ;       Must preserve all registers except R0 through R4.
                  08C9  ;
                  08C9  ;--
                  08C9
                  08C9
                  08C9  IOC$UNITINIT::
                  08C9
 50   0088 C5  D0 08C9        MOVL    UCB$L_DDT(R5), R0               ; Get DDT address.
```

```
         50   18 A0   D0  08CE   2384            MOVL    DDT$L_UNITINIT(R0), R0          ; Get DDT unit init rout addr.
 000005E4'8F     50   D1  08D2   2385            CMPL    R0, #IOC$RETURN                 ; Null unit init routine?
                 06   12  08D9   2386            BNEQ    10$                             ; Branch if real unit init rout.
         50   3C A8   D0  08DB   2387            MOVL    CRB$L_INTD+VEC$L_UNITINIT(R8), R0 ; Get CRB unit init rout addr.
                 1A   18  08DF   2388            BGEQ    90$                             ; Branch if no unit init rout.
                          08E1   2389
                 54   D4  08E1   2390 10$:       CLRL    R4                              ; Assume no IDB exists.
         53   2C A8   D0  08E3   2391            MOVL    CRB$L_INTD+VEC$L_IDB(R8), R3    ; Get IDB address.
                 10   18  08E7   2392            BGEQ    50$                             ; Branch if none.
             53  63   D0  08E9   2393            MOVL    IDB$L_CSR(R3), R3               ; Get primary CSR.
             54  53   D0  08EC   2394            MOVL    R3, R4                          ; Assume no sec. CRB exists.
         51   20 A8   D0  08EF   2395            MOVL    CRB$L_LINK(R8), R1              ; Get secondary CRB addr.
                 04   18  08F3   2396            BGEQ    50$                             ; Branch if none.
                          08F5   2397            ASSUME  IDB$L_CSR EQ 0
         54   2C B1   D0  08F5   2398            MOVL    @CRB$L_INTD+VEC$L_IDB(R1), R4   ; Get secondary CSR addr.
                          08F9   2399
                 60   17  08F9   2400 50$:       JMP     (R0)                            ; Call unit init routine, and
                          08FB   2401                                                    ; return to caller.
                          08FB   2402
                      05  08FB   2403 90$:       RSB                                     ; No unit init routine to call:
                          08FC   2404                                                    ; return to caller.
```

```
                        08FC            .SBTTL  Parse Device Name String
                        08FC
                        08FC    ;+
                        08FC    ;
                        08FC    ; IOC$PARSDEVNAM - parse device name string
                        08FC    ;
                        08FC    ; This routine parses a device name string, checking syntax and
                        08FC    ; extracting node name, allocation class number, and unit number.
                        08FC    ; If device type format is specified, it is converted into the internal
                        08FC    ; compressed format.
                        08FC    ;
                        08FC    ; INPUTS:
                        08FC    ;
                        08FC    ;       R8 = size of name string
                        08FC    ;       R9 = address of name string
                        08FC    ;       R10 = flags
                        08FC    ;
                        08FC    ; OUTPUTS:
                        08FC    ;
                        08FC    ;       R0 = SS$_NORMAL - valid name string
                        08FC    ;          = SS$_IVDEVNAM - invalid device name string
                        08FC    ;       R2 = unit number
                        08FC    ;       R3 = length of SCS node name at head of name string
                        08FC    ;            or allocation class number
                        08FC    ;            or device type code
                        08FC    ;       R8 = size of name string
                        08FC    ;       R9 = address of name string
                        08FC    ;       R10 = flags
                        08FC    ;       R4 - R7, R11 preserved
                        08FC    ;
                        08FC    ;-
                        08FC
                        08FC            .ENABLE LSB
                        08FC
                        08FC    IOC$PARSDEVNAM::
      0070 8F     BB    08FC            PUSHR   #^M<R4,R5,R6>           ; save working registers
             58   D5    0900            TSTL    R8                      ; check name string length
             28   13    0902            BEQL    30$                     ; branch if null - error
        54   58   7D    0904            MOVQ    R8,R4                   ; copy name string descriptor
   56   59   01   C3    0907            SUBL3   #1,R9,R6                ; default is no node no allocation
                        090B                                            ; class, set pointer before beginning
                        090B                                            ; of the string
   69   58   24   3A    090B            LOCC    #^A'$',R8,(R9)          ; scan name for a "$"
             03   13    090F            BEQL    10$                     ; failed to find one - no nodename
        56   51   D0    0911            MOVL    R1,R6                   ; found it, save pointer
             52   7C    0914    10$:    CLRQ    R2                      ; init unit number and node name
        50   65   9A    0916    20$:    MOVZBL  (R5),R0                 ; get next character
   11   50   06   E1    0919            BBC     #6,R0,40$               ; br if code 0-^X3F - numeric or $
        50   20   8A    091D            BICB    #^X20,R0                ; collapse lower case to upper case
   5A 8F     50   91    0920            CMPB    R0,#^A'Z'               ; possible alphabetic?
             77   1A    0924            BGTRU   150$                    ; br if not
   41 8F     50   91    0926            CMPB    R0,#^A'A'               ; possible alphabetic?
             37   1E    092A            BGEQU   70$                     ; branch if OK - store it
             6F   11    092C    30$:    BRB     150$                    ; no - error
                        092E    ;
                        092E    ; Non alphabetic - may be numeric or "$"
                        092E    ;
```

```
           56    55  D1  092E  40$:    CMPL    R5,R6                   ; hit the "$" yet?
                 0E  13  0931          BEQL    50$                     ; yes, deal with it
                 34  1A  0933          BGTRU   80$                     ; past it, digits are unit number
           39    50  91  0935          CMPB    R0,#^A'9'               ; legal?
                 63  1A  0938          BGTRU   150$                    ; no, error
           30    50  91  093A          CMPB    R0,#^A'0'               ; legal?
                 24  1E  093D          BGEQU   70$                     ; yes, accept it as alpha
                 5C  11  093F          BRB     150$                    ; no, error
                         0941  ;
                         0941  ; $ in device name - either node name or allocation class.
                         0941  ;
       53  55    59  C3  0941  50$:    SUBL3   R9,R5,R3                ; compute length of node name
                 1C  12  0945          BNEQ    70$                     ; branch if non-null - process the $
                         0947  ;
                         0947  ; Process allocation class number.
                         0947  ;
                 55  D6  0947  60$:    INCL    R5                      ; move over "$" to allocation
                 54  D7  0949          DECL    R4                      ; class digits.
                 6A  10  094B          BSBB    GETNUMBER               ; convert allocation class.
           53    52  D0  094D          MOVL    R2,R3                   ; store requested allocation class.
                 4B  15  0950          BLEQ    150$                    ; leq zero is not legal.
           5A    04  88  0952          BISB    #IOC$M_CLASS,R10        ; set allocation class flag
           50    24  91  0955          CMPB    #^A'$',R0               ; was terminator a "$"?
                 43  12  0958          BNEQ    150$                    ; if not, invalid device name.
           58    54  7D  095A          MOVQ    R4,R8                   ; reset device name - unit size.
                 54  D5  095D          TSTL    R4                      ; check remaining string count
                 B5  14  095F          BGTR    20$                     ; if characters remain, process them.
                 3A  11  0961          BRB     150$                    ; else, invalid device name.
                         0963
           85    50  90  0963  70$:    MOVB    R0,(R5)+                ; store potentially upcased character
              AD 54  F5  0966          SOBGTR  R4,20$                  ; any more characters to scan?
                         0969  ;
                         0969  ; End of alpha scan. Make sure we actually got a non-null device name.
                         0969  ;
           58    54  C2  0969  80$:    SUBL    R4,R8                   ; subtract unit number from string
                 2F  13  096C          BEQL    150$                    ; if eql no device name specified
                 56  D6  096E          INCL    R6                      ; point past $ in node name
           55    56  D1  0970          CMPL    R6,R5                   ; see if we've processed any more chars
                 09  1F  0973          BLSSU   90$                     ; branch if yes
              25 5A  E8  0975          BLBS    R10,150$                ; branch if physical - not valid
        21 5A    06  E1  0978          BBC     #IOC$V_ANY,R10,150$     ; or if not generic search for any
                 0D  11  097C          BRB     100$                    ; node name only - verify end of string
                         097E  ;
                         097E  ; Process unit number and make sure there's no trailing junk.
                         097E  ;
                 52  D4  097E  90$:    CLRL    R2                      ; init unit number to 0
                 54  D5  0980          TSTL    R4                      ; see if there's anything left
                 0B  15  0982          BLEQ    110$                    ; branch if not
           5A    01  88  0984          BISB    #IOC$M_PHY,R10          ; set physical flag
                 2E  10  0987          BSBB    GETNUMBER               ; convert unit number
                 54  D6  0989          INCL    R4                      ; return terminator to string count
                 54  D5  098B  100$:   TSTL    R4                      ; reached end of string?
                 0E  14  098D          BGTR    150$                    ; branch if not - error
        37 5A    01  E0  098F  110$:   BBS     #IOC$V_TYPE,R10,190$    ; branch if name is a device type
           50    01  D0  0993  120$:   MOVL    #SS$_NORMAL,R0          ; successful parse
         0070    8F  BA  0996  130$:   POPR    #^M<R4,R5,R6>           ; restore registers
                     05  099A          RSB                             ; and return
```

```
                              099B      ;
                              099B      ; Invalid device name
                              099B      ;
                   8E  D5     099B 140$:     TSTL     (SP)+                    ; pop GETNUMBER return address from stack
      50      0144 8F  3C     099D 150$:     MOVZWL   #SS$_IVDEVNAM,R0         ; set invalid device name
                   F2  11     09A2           BRB      130$
                              09A4
                              09A4      ;+
                              09A4      ; Routine to convert ASCII to integer
                              09A4      ;
                              09A4      ; Inputs:
                              09A4      ;
                              09A4      ;        R2      assumed zero
                              09A4      ;        R4      size of string
                              09A4      ;        R5      starting address of string
                              09A4      ;
                              09A4      ; Outputs:
                              09A4      ;
                              09A4      ;        R0      terminator character
                              09A4      ;        R2      converted number
                              09A4      ;        R4      size of string with number and terminator character removed
                              09A4      ;        R5      address of first character after number terminator character
                              09A4      ;-
                              09A4
              50   85  9A     09A4 160$:     MOVZBL   (R5)+,R0                 ; get next character.
              50   30  82     09A7           SUBB     #^A'0',R0                ; base it at decimal digits.
              10   1F         09AA           BLSSU    170$                     ; branch if not a decimal digit.
              09   50  91     09AC           CMPB     R0,#9                    ; is it a digit?
              0B   1A         09AF           BGTRU    170$                     ; branch if not a decimal digit.
              52   0A  C4     09B1           MULL     #10,R2                   ; scale current unit number by 10
              52   50  C0     09B4           ADDL     R0,R2                    ; add new digit to accumulation.
                              09B7 GETNUMBER:
              EA   54  F4     09B7           SOBGEQ   R4,160$                  ; count off a character
                   04  11     09BA           BRB      180$                     ; branch if no more characters
                              09BC
         50   FF   A5  9A     09BC 170$:     MOVZBL   -1(R5),R0                ; restore terminator character.
  00008000 8F      52  D1     09C0 180$:     CMPL     R2,#32768                ; check number value
                   D2  1E     09C7           BGEQU    140$                     ; branch if not valid
                       05     09C9           RSB                               ; return to caller.
                              09CA
                              09CA      ;
                              09CA      ; Parse device type name. We do this last because all the regular device
                              09CA      ; name validation is necessary anyway. Now we just have to do the
                              09CA      ; additional checks and pack the characters.
                              09CA      ;
                   53  D5     09CA 190$:     TSTL     R3                       ; check if we saw node or alloc class
                   CF  12     09CC           BNEQ     150$                     ; branch if so - not valid
          50  55   59  C3     09CE           SUBL3    R9,R5,R0                 ; compute total length of string
              50   58  C2     09D2           SUBL     R8,R0                    ; compute length of unit number string
              02   50  D1     09D5           CMPL     R0,#2                    ; must be two digits
                   C3  12     09D8           BNEQ     150$                     ; branch if not - not valid
              55   59  D0     09DA           MOVL     R9,R5                    ; copy name address again
              02   58  D1     09DD           CMPL     R8,#2                    ; check minimum name length
                   BB  1F     09E0           BLSSU    150$                     ; too short - out
     50   85   40  8F  83     09E2           SUBB3    #^A'A'-1,(R5)+,R0        ; get char and convert to compressed
  53  05   11  50  F0         09E7           INSV     R0,#17,#5,R3             ; store compressed code
     50   85   40  8F  83     09EC           SUBB3    #^A'A'-1,(R5)+,R0        ; get char and convert to compressed
```

```
 53   05   0C   50   F0  09F1   2577          INSV    R0,#12,#5,R3           ; store compressed code
           03   58   D1  09F6   2578          CMPL    R8,#3                  ; check how many chars left
                A2   1A  09F9   2579          BGTRU   150$                   ; string was longer than 5 - error
                0A   1F  09FB   2580          BLSSU   200$                   ; short - don't take 3rd alpha
  50   85    40 8F   83  09FD   2581          SUBB3   #^A'A'-1,(R5)+,R0      ; get char and convert to compressed
 53   05   07   50   F0  0A02   2582          INSV    R0,#7,#5,R3            ; store compressed code
           53   52   C0  0A07   2583 200$:    ADDL    R2,R3                  ; add in unit number
           5A   01   8A  0A0A   2584          BICB    #IOC$M_PHY,R10         ; clear physical flag
              FF83   31  0A0D   2585          BRW     120$                   ; done
```

```
          0A10        .SBTTL  Search I/O Database for Device
          0A10
          0A10  ;+
          0A10  ;
          0A10  ; IOC$SEARCHINT - internal I/O database search
          0A10  ;
          0A10  ; This routine searches the I/O database for the specified device, using
          0A10  ; the specified search rules. Depending on the search, a lock may or may
          0A10  ; not be taken out on the device when it is found.
          0A10  ;
          0A10  ; Note! While this routine is non-paged and therefore may be called at
          0A10  ; elevated IPL, the device locking code it calls is not. Therefore, only
          0A10  ; searches with IOC$V_ANY may be called from elevated IPL.
          0A10  ;
          0A10  ; INPUTS:
          0A10  ;
          0A10  ;       R2 = unit number
          0A10  ;       R3 = length of SCS node name at head of name string
          0A10  ;            or allocation class number
          0A10  ;            or device type code
          0A10  ;       R8 = size of name string
          0A10  ;       R9 = address of name string
          0A10  ;       R10 = flags
          0A10  ;       R11 = address to store lock value block
          0A10  ;       I/O database mutex held, IPL 2
          0A10  ;
          0A10  ; OUTPUTS:
          0A10  ;
          0A10  ;       R0 = SS$_NORMAL - device found
          0A10  ;          = SS$_NOSUCHDEV - device not found
          0A10  ;          = SS$_NODEVAVL - device exists but not available according to rules
          0A10  ;          = SS$_DEVALLOC - device allocated to other user
          0A10  ;          = SS$_NOPRIV - failed device protection
          0A10  ;          = SS$_TEMPLATEDEV - can't allocate template device
          0A10  ;          = SS$_DEVMOUNT - device already mounted
          0A10  ;          = SS$_DEVOFFLINE - device marked offline
          0A10  ;       R5 = UCB
          0A10  ;       R6 = DDB
          0A10  ;       R7 = system block
          0A10  ;       R10 - R4, R8 - R11 preserved
          0A10  ;
          0A10  ;       Note: If failure, R5 - R7 point to the last structures looked at.
          0A10  ;
          0A10  ;-
          0A10
          0A10  ;
          0A10  ; Stack use:
          0A10  ;
00000000  0A10  SAVR2   = 0
00000004  0A10  SAVR3   = 4
00000008  0A10  SAVR4   = 8
0000000C  0A10  SAVR8   = 12
00000010  0A10  SAVR9   = 16
          0A10
          0A10
          0A10        .ENABLE LSB
          0A10
```

```
                               0A10   2644 IOC$SEARCHINT::
          031C 8F      BB      0A10   2645          PUSHR    #^M<R2,R3,R4,R8,R9>      ; save registers
                               0A14   2646 ;
                               0A14   2647 ; Search the system blocks for a suitable node. If we are doing a search
                               0A14   2648 ; by allocation class, generic device type, or no node name is given,
                               0A14   2649 ; all system blocks qualify.
                               0A14   2650 ;
 57    00000000'EF     DE      0A14   2651          MOVAL    SCS$GQ_CONFIG,R7           ; get head of SCS SB list
            50    67   D0      0A1B   2652 10$:     MOVL     SB$L_F[INK(R7),R0          ; get next system block
00000000'8F       50   D1      0A1E   2653          CMPL     R0,#SCS$GQ_CONFIG          ; are we back at list head?
                  78   13      0A25   2654          BEQL     50$                        ; branch if yes - all done
                               0A27   2655
            57    50   D0      0A27   2656          MOVL     R0,R7
       56     54  A7   DE      0A2A   2657          MOVAL    SB$L_DDB-DDB$L_LINK(R7),R6 ; pick up DDB listhead
            55    56   D0      0A2E   2658          MOVL     R6,R5                      ; make sure UCB is non-zero
                               0A31   2659                                              ; if allocation class or generic dev,
            5A    06   93      0A31   2660          BITB     #IOC$M_CLASS!IOC$M_TYPE,R10
                  27   12      0A34   2661          BNEQ     30$                        ; check every system block
       58     0C  AE   7D      0A36   2662          MOVQ     SAVR8(SP),R8               ; get orig dev name descriptor
       53     04  AE   D0      0A3A   2663          MOVL     SAVR3(SP),R3               ; get node name length
                  1D   13      0A3E   2664          BEQL     30$                        ; branch if none - go ahead
       44 A7      53   91      0A40   2665          CMPB     R3,SB$T_NODENAME(R7)       ; check node name length
                  D5   12      0A44   2666          BNEQ     10$                        ; branch if not
  69   45 A7      53   29      0A46   2667          CMPC3    R3,SB$T_NODENAME+1(R7),(R9) ; node names match?
                  CE   12      0A4B   2668          BNEQ     10$                        ; branch if not
                               0A4D   2669 ;
                               0A4D   2670 ; Found a suitable system block. Search its DDB list.
                               0A4D   2671 ;
            50    01   3C      0A4D   2672 20$:     MOVZWL   #SS$_NORMAL,R0
  53     04 AE    01   C1      0A50   2673          ADDL3    #1,SAVR3(SP),R3            ; include the "$"
            59    53   C0      0A55   2674          ADDL     R3,R9                      ; skip over the nodename
            58    53   C2      0A58   2675          SUBL     R3,R8                      ; adjust the length
                  52   15      0A5B   2676          BLEQ     60$                        ; if no device name, just return SB
                               0A5D   2677
            5ᴗ    66   D0      0A5D   2678 30$:     MOVL     DDB$L_LINK(R6),R0          ; get address of next DDB
                  5A   13      0A60   2679          BEQL     80$                        ; if eql end of list
            56    50   D0      0A62   2680          MOVL     R0,R6
       55     D4  A6   DE      0A65   2681          MOVAL    <DDB$L_UCB-UCB$L_LINK>(R6),R5 ; initialize primary UCB address
            5A    20   8A      0A69   2682          BICB     #IOC$M_2P,R10              ; new DDB - clear secondary flag
         5E 5A    01   E0      0A6C   2683          BBS      #IOC$V_TYPE,R10,100$       ; branch if generic type search
         07 5A    02   E1      0A70   2684          BBC      #IOC$V_CLASS,R10,40$       ; branch if no class to check
    3C A6     04  AE   D1      0A74   2685          CMPL     SAVR3(SP),DDB$L_ALLOCLS(R6) ; else, is allo. class right?
                  E2   12      0A79   2686          BNEQ     30$                        ; branch if not, try next DDB
  15 A6    69     58   29      0A7B   2687 40$:     CMPC3    R8,(R9),DDB$T_NAME+1(R6)   ; check device name
                  DB   12      0A80   2688          BNEQ     30$                        ; if no match, try next DDB
       50     14  A6   9A      0A82   2689          MOVZBL   DDB$T_NAME(R6),R0          ; get length of name in DDB
            50    58   D1      0A86   2690          CMPL     R8,R0                      ; check name lengths
                  43   13      0A89   2691          BEQL     100$                       ; if they match - OK
                  50   D7      0A8B   2692          DECL     R0                         ; try subtracting out controller letter
            50    58   D1      0A8D   2693          CMPL     R8,R0                      ; and see if this matches
                  CB   12      0A90   2694          BNEQ     30$                        ; if not, keep trying
              39  5A   E9      0A92   2695          BLBC     R10,100$                        ; branch if not physical search - OK
 41 8F     15 A640     91      0A95   2696          CMPB     DDB$T_NAME+1(R6)[R0],#^A'A' ; is this controller A?
                  31   13      0A9B   2697          BEQL     100$                       ; if so, search it
                  BE   11      0A9D   2698          BRB      30$                        ; if not, keep looking
                               0A9F   2699 ;
                               0A9F   2700 ; End of search - no suitable device has been found
```

```
                         0A9F    ;
  50    0908 8F     3C   0A9F    50$:    MOVZWL  #SS$_NOSUCHDEV,R0           ; no device found
     4D 5A   04     E1   0AA4            BBC     #IOC$V_EXISTS,R10,140$     ; branch if not seen
  50    09B0 8F     3C   0AA8            MOVZWL  #SS$_NODEVAVL,R0           ; otherwise status is not available
             46     11   0AAD            BRB     140$
                         0AAF    ;
                         0AAF    ; To here if we're just returning a system block, with no device specified.
                         0AAF    ;
        56   66     D0   0AAF    60$:    MOVL    (R6),R6                    ; get first DDB
   55    04 A6      D0   0AB2            MOVL    DDB$L_UCB(R6),R5           ; and first UCB
             3D     11   0AB6            BRB     140$                       ; and return
                         0AB8    ;
                         0AB8    ; To here when all UCB's on a DDB have been searched.
                         0AB8    ;
     A1 5A   01     E0   0AB8    70$:    BBS     #IOC$V_TYPE,R10,30$        ; if generic type search, try next DDB
                         0ABC    ;
                         0ABC    ; To here when all DDB's on a system block have been searched.
                         0ABC    ;
        5A   06     93   0ABC    80$:    BITB    #IOC$M_CLASS!IOC$M_TYPE,R10 ; if generic type or alloc class
             0A     12   0ABF            BNEQ    90$                        ; keep searching system blocks
        5A   09     93   0AC1            BITB    #IOC$M_PHY!IOC$M_LOCAL,R10 ; if physical or local only
             D9     12   0AC4            BNEQ    50$                        ; we're done
          04 AE     D5   0AC6            TSTL    SAVR3(SP)                  ; if there was an explicit node
             D4     12   0AC9            BNEQ    50$                        ; we're done
           FF4D     31   0ACB    90$:    BRW     10$                        ; else go try next system block
                         0ACE    ;
                         0ACE    ; Found a suitable DDB. Search both its UCB lists for the right UCB.
                         0ACE    ;
        52   6E     7D   0ACE    100$:   MOVQ    SAVR2(SP),R2               ; get unit number and device type
54   00000000'EF    D0   0AD1            MOVL    SCH$GL_CURPCB,R4           ; get PCB address
                         0AD8    NEXTUCB:                                   ; re-entry for next UCB
     07 5A   05     E1   0AD8    110$:   BBC     #IOC$V_2P,R10,120$         ; branch if on primary path
  55    00A4 C5     D0   0ADC            MOVL    UCB$L_2P_LINK(R5),R5       ; link to next secondary unit.
             04     11   0AE1            BRB     130$
   55    30 A5      D0   0AE3    120$:   MOVL    UCB$L_LINK(R5),R5          ; link to next primary unit.
             11     13   0AE7    130$:   BEQL    150$                       ; branch if no more units.
             28     10   0AE9            BSBB    IOC$TESTUNIT               ; is this unit ok?
          07 50     E8   0AEB            BLBS    R0,140$                    ; branch if successful
     E6 5A   04     E1   0AEE            BBC     #IOC$V_EXISTS,R10,110$     ; keep going if we haven't seen it yet
          E3 5A     E9   0AF2            BLBC    R10,110$                   ; or if not physical search
        031C 8F     BA   0AF5    140$:   POPR    #^M<R2,R3,R4,R8,R9>        ; restore registers
                    05   0AF9            RSB                                ; and return
                         0AFA
     BA 5A   05     E2   0AFA    150$:   BBSS    #IOC$V_2P,R10,70$          ; branch if secondary path already searched
   55    9C A6      DE   0AFE            MOVAL   <DDB$L_2P_UCB -            ; initialize secondary UCB address.
                         0B02                    -UCB$L_2P_LINK>(R6),R5
             D4     11   0B02            BRB     110$                       ; go search secondary path
                         0B04
                         0B04            .DISABLE LSB
```

```
                            0B04            .SBTTL  Continue I/O Database Search
                            0B04
                            0B04    ;+
                            0B04    ;
                            0B04    ; IOC$SEARCHCONT - internal I/O database search
                            0B04    ;
                            0B04    ; This routine continues a search started with a call to IOC$SEARCHINT.
                            0B04    ; It uses IOC$SEARCHINT's outputs as the starting point at which to
                            0B04    ; resume.
                            0B04    ;
                            0B04    ; INPUTS:
                            0B04    ;
                            0B04    ;       R2 = unit number
                            0B04    ;       R3 = length of SCS node name at head of name string
                            0B04    ;            or allocation class number
                            0B04    ;            or device type code
                            0B04    ;       R5 = last UCB
                            0B04    ;       R6 = last DDB
                            0B04    ;       R7 = last system block
                            0B04    ;       R8 = size of name string
                            0B04    ;       R9 = address of name string
                            0B04    ;       R10 = flags
                            0B04    ;       R11 = address to store lock value block
                            0B04    ;       I/O database mutex held, IPL 2
                            0B04    ;
                            0B04    ; OUTPUTS:
                            0B04    ;
                            0B04    ;       R0 = SS$_NORMAL - device found
                            0B04    ;          = SS$_NOSUCHDEV - device not found
                            0B04    ;          = SS$_NODEVAVL - device exists but not available according to rules
                            0B04    ;          = SS$_DEVALLOC - device allocated to other user
                            0B04    ;          = SS$_NOPRIV - failed device protection
                            0B04    ;          = SS$_TEMPLATEDEV - can't allocate template device
                            0B04    ;          = SS$_DEVMOUNT - device already mounted
                            0B04    ;          = SS$_DEVOFFLINE - device marked offline
                            0B04    ;       R5 = UCB
                            0B04    ;       R6 = DDB
                            0B04    ;       R7 = system block
                            0B04    ;       R10 - R4, R8 - R11 preserved
                            0B04    ;
                            0B04    ;       Note: If failure, R5 - R7 point to the last structures looked at.
                            0B04    ;
                            0B04    ;-
                            0B04
                            0B04    IOC$SEARCHCONT::
       031C 8F     BB       0B04            PUSHR   #^M<R2,R3,R4,R8,R9>     ; save registers
    05 5A   08     E5       0B08            BBCC    #IOC$V_ALT,R10,10$      ; check if alternate UCB in use
55     00A8 C5     D0       0B0C            MOVL    UCB$L_DP_ALTUCB(R5),R5  ; link back to other to continue
            C5     11       0B11    10$:    BRB     NEXTUCB                 ; continue search
```

```
                       0B13           .SBTTL  Check UCB Against Search Rules
                       0B13
                       0B13      ;+
                       0B13      ;
                       0B13      ; IOC$TESTUNIT - Check UCB Against Search Rules
                       0B13      ;
                       0B13      ; INPUTS:
                       0B13      ;
                       0B13      ;        R2 = unit number
                       0B13      ;        R3 = device type code
                       0B13      ;        R4 = PCB address
                       0B13      ;        R5 = UCB address
                       0B13      ;        R10 = flags
                       0B13      ;        R11= address of lock value block
                       0B13      ;
                       0B13      ; OUTPUTS:
                       0B13      ;
                       0B13      ;        R0 = SS$_NORMAL - eligible for use according to flags
                       0B13      ;           = SS$_NOSUCHDEV - wrong unit number
                       0B13      ;           = SS$_DEVALLOC - device allocated to other user
                       0B13      ;           = SS$_NOPRIV - failed device protection
                       0B13      ;           = SS$_TEMPLATEDEV - can't allocate template device
                       0B13      ;           = SS$_DEVMOUNT - device already mounted
                       0B13      ;           = SS$_DEVOFFLINE - device marked offline
                       0B13      ;
                       0B13      ;-
                       0B13
                       0B13      IOC$TESTUNIT::
  50   0908 8F    3C   0B13              MOVZWL  #SS$_NOSUCHDEV,R0        ; assume wrong device
          06 5A   E9   0B18              BLBC    R10,10$                  ; branch if not physical search
    54 A5   52    B1   0B1B              CMPW    R2,UCB$W_UNIT(R5)        ; is the unit number exactly right?
            56    12   0B1F              BNEQ    70$                      ; branch to error if not right.
                       0B21
    09 5A   01    E1   0B21      10$:    BBC     #IOC$V_TYPE,R10,20$      ; branch if not searching for dev type
            00    ED   0B25              CMPZV   #MSCP$V_MTYP_N,-
            16         0B27                      #MSCP$V_MTYP_D1,-
  53   008C C5         0B28                      UCB$L_MEDIA_ID(R5),R3    ; is this the requested type?
            49    12   0B2C              BNEQ    70$                      ; branch if not
       5A   10    88   0B2E      20$:    BISB    #IOC$M_EXISTS,R10        ; note eligible device seen
 0A 3C A5   03    E1   0B31              BBC     #DEV$V_CDP,UCB$L_DEVCHAR2(R5),30$ ; is this served path to a local d
  55   00A8 C5    D0   0B36              MOVL    UCB$L_DP_ALTUCB(R5),R5   ; yes, get local path UCB address.
  5A   0100 8F    A8   0B3B              BISW    #IOC$M_ACT,R10           ; note alternate UCB in use
    03 5A   06    E1   0B40      30$:    BBC     #IOC$V_ANY,R10,40$       ; if SEARCHALL, finish with success.
        0091      31   0B44              BRW     150$
                       0B47      ;
                       0B47      ; Check the device reference count and allocation status.
                       0B47      ;
  50   006C 8F    3C   0B47      40$:    MCVZWL  #SS$_DEVMOUNT,R0         ; check if device is already mounted
 55 38 A5   13    E0   0B4C              BBS     #DEV$V_MNT,UCB$L_DEVCHAR(R5),100$
  50   0840 8F    3C   0B51              MOVZWL  #SS$_DEVALLOC,R0
 4B 64 A5   09    E0   0B56              BBS     #UCB$V_MOUNTING,UCB$W_STS(R5),100$ ; branch if mount in progress
       5C A5    B5     0B5B              TSTW    UCB$W_REFC(R5)           ; is reference count zero?
            19    13   0B5E              BEQL    80$                      ; branch if reference count is zero.
    0B 5A   07    E1   0B60              BBC     #IOC$V_MOUNT,R10,50$     ; if mounting...
    0A 5A   0A    E0   0B64              BBS     #IOC$V_ALLOC,R10,60$     ; if shared mount
 0C 38 A5   17    E1   0B68              BBC     #DEV$V_ALL,UCB$L_DEVCHAR(R5),80$ ; OK if not allocated
            03    11   0B6D              BRB     60$                      ; otherwise check allocation
```

```
                          0B6F
          34 5A    E9     0B6F   50$:    BLBC    R10,100$                        ; allocate: error if not phy
 60 A4    2C A5    D1     0B72   60$:    CMPL    UCB$L_PID(R5),PCB$L_PID(R4) ; does this process own the device?
             2D    12     0B77   70$:    BNEQ    100$                            ; branch to error if not our device.
                          0B79           ;
                          0B79           ; Check all the other miscellaneous junk that can make a device not
                          0B79           ; available.
                          0B79           ;
       50    24    3C     0B79   80$:    MOVZWL  #SS$_NOPRIV,R0                  ; check if device is spooled
 06 38 A5    06    E1     0B7C           BBC     #DEV$V_SPL,UCB$L_DEVCHAR(R5),90$ ; branch if not
                          0B81           IFNPRIV ALLSPOOL,100$,R4                ; else, process must have ALLSPOOL priv.
    50     0084 8F 3C     0B87   90$:    MOVZWL  #SS$_DEVOFFLINE,R0              ; check if device is available
 15 38 A5    12    E1     0B8C           BBC     #DEV$V_AVL,UCB$L_DEVCHAR(R5),100$
 10 64 A5    04    E1     0B91           BBC     #UCB$V_ONLINE,UCB$W_STS(R5),100$
    50     21DC 8F 3C     0B96           MOVZWL  #SS$_TEMPLATEDEV,R0             ; check if device is a template
 06 64 A5    0D    E0     0B9B           BBS     #UCB$V_TEMPLATE,UCB$W_STS(R5),100$
          F45D'    30     0BA0           BSBW    EXE$CHKRDACCES                  ; check device protection
          0A 50    E8     0BA3           BLBS    R0,120$                         ; continue if accessible
                          0BA6           ;
                          0BA6           ; To here on any error.
                          0BA6           ;
    05 5A    08    E5     0BA6   100$:   BBCC    #IOC$V_ALT,R10,110$             ; check if alternate UCB in use
   55     00A8 C5  D0     0BAA           MOVL    UCB$L_DP_ALTUCB(R5),R5          ; link back to other to continue
                   05     0BAF   110$:   RSB                                     ; return
                          0BB0           ;
                          0BB0           ; We've passed all the local tests. Now try to take out the appropriate
                          0BB0           ; lock on the device.
                          0BB0           ;
          51 5B    D0     0BB0   120$:   MOVL    R11,R1                          ; value block address
             05    13     0BB3           BEQL    130$                            ; branch if none
             61    7C     0BB5           CLRQ    (R1)                            ; initialize value block
          08 A1    7C     0BB7           CLRQ    8(R1)
 19 3C A5    00    E1     0BBA   130$:   BBC     #DEV$V_CLU,UCB$L_DEVCHAR2(R5),150$ ; br. if not cluster visible
       50    05    D0     0BBF           MOVL    #LCK$K_EXMODE,R0                ; assume exclusive lock
    0C 5A    0A    E0     0BC2           BBS     #IOC$V_ALLOC,R10,140$           ; branch if allocation requested
    08 5A    07    E1     0BC6           BBC     #IOC$V_MOUNT,R10,140$           ; branch if not mount mode
 03 38 A5    17    E0     0BCA           BBS     #DEV$V_ALL,UCB$L_DEVCHAR(R5),140$ ; br. if allocated
       50    04    D0     0BCF           MOVL    #LCK$K_PWMODE,R0                ; mount, no allocation - use PW
          F42B'    30     0BD2   140$:   BSBW    IOC$LOCK_DEV                    ; and try to take device lock
          CE 50    E9     0BD5           BLBC    R0,100$
       50    01    D0     0BD8   150$:   MOVL    #SS$_NORMAL,R0                  ; indicate success
                   05     0BDB           RSB
```

```
                               0BDC          .SBTTL  IOC$THREADCRB
                               0BDC
                               0BDC   ;++
                               0BDC   ;
                               0BDC   ; FUNCTIONAL DESCRIPTION:
                               0BDC   ;
                               0BDC   ;       This routine will thread a CRB onto the duetime chain headed by
                               0BDC   ;       IOC$CRBTMOUT.
                               0BDC   ;
                               0BDC   ; CALLING SEQUENCE:
                               0BDC   ;
                               0BDC   ;       JSB     IOC$THREADCRB
                               0BDC   ;
                               0BDC   ; INPUTS:
                               0BDC   ;
                               0BDC   ;       R3 -->  CRB
                               0BDC   ;
                               0BDC   ; OUTPUTS:
                               0BDC   ;
                               0BDC   ;       NONE
                               0BDC   ;
                               0BDC   ;--
                               0BDC
                               0BDC   IOC$THREADCRB::
                     50   DD   0BDC           PUSHL   R0                          ; Save a register
 50       00000000'GF   DE   0BDE           MOVAL   G^IOC$GL_CRBTMOUT, R0       ; Pointer to list head
                     60   D5   0BE5   10$:    TSTL    (R0)                        ; End of the line?
                     05   13   0BE7           BEQL    20$                         ; Yes, go add new one
                50   60   D0   0BE9           MOVL    (R0), R0                    ; No, get next block
                     F7   11   0BEC           BRB     10$                         ; Try, try again
                               0BEE
       60       14 A3   DE   0BEE   20$:    MOVAL   CRB$L_TIMELINK(R3),(R0) ; Link the new block in
                     50 8ED0   0BF2           POPL    R0                          ; Restore register
                          05   0BF5           RSB                                 ; Leave
                               0BF6
                               0BF6
                               0BF6           .END
```

```
$$BASE                    = 00000001                DDB$L_SB                  = 00000034
$$DISPL                   = 00000008                DDB$L_UCB                 = 00000004
$$GENSW                   = 00000001                DDB$T_NAME                = 00000014
$$HIGH                    = 00000007                DDT$L_CANCEL              = 0000000C
$$LIMIT                   = 00000006                DDT$L_REGDUMP             = 00000010
$$LOW                     = 00000001                DDT$L_START               = 00000000
$$MNSW                    = 00000001                DDT$L_UNITINIT            = 00000018
$$MXSW                    = 00000001                DFALLOC_DESCRIP             000004C6 R       02
ADD_DOLLAR                  000006CA R       02     DEV$M_MBX                 = 00100000
ADD_NODE                    000006C0 R       02     DEV$M_TRM                 = 00000004
ADP$C_NUMDATAP            = 00000010                DEV$V_2P                  = 00000004
ADP$L_CSR                 = 00000000                DEV$V_ALL                 = 00000017
ADP$L_DPQBL               = 00000018                DEV$V_AVL                 = 00000012
ADP$L_DPQFL               = 00000014                DEV$V_CDP                 = 00000003
ADP$L_MRACTMDRS           = 0000005C                DEV$V_CLU                 = 00000000
ADP$L_MRQBL               = 00000034                DEV$V_FOD                 = 0000000E
ADP$L_MRQFL               = 00000030                DEV$V_MNT                 = 00000013
ADP$W_ADPTYPE             = 0000000E                DEV$V_NNM                 = 00000009
ADP$W_DPBITMAP            = 00000060                DEV$V_OPR                 = 00000007
ADP$W_MRFREGARY           = 0000015E                DEV$V_SPL                 = 00000006
ADP$W_MRNREGARY           = 00000064                DEV$V_TRM                 = 00000002
ALLOC_DESCRIP               000004DF R       02     DIR...                    = 00000001
ALLOC_NAME                  0000068D R       02     DISKCHK                     00000198 R       02
AT$_UBA                   = 00000001                DISPLAY_NAME                000006AA R       02
BINNUM                      00000000                DO_PMS                      000001B0 R       02
BOO$GL_SPTFREH              ********     X   02     DYN$C_TWP                 = 00000030
BOO$GL_SPTFREL              ********     X   02     DYN$C_UCB                 = 00000010
BUG$_INCONSTATE             ********     X   02     EMB$B_DV_ERTCNT           = 00000C10
BUG$_IVBYTEALGN             ********     X   02     EMB$Q_DV_IOSB             = 00000012
BUG$_UNSUPRTCPU             ********     X   02     EMB$W_DV_STS              = 0000001A
CAN$C_AMBXDGN             = 00000002                END_BROADCAST               00000796 R       02
CAN$C_DASSGN              = 00000001                END_CONBRDCST               000007EC R       02
CDRP$C_BCNT               = FFFFFFD2                ERL$RELEASEMB               ********     X   02
CDRP$L_FPC                = 0000000C                EXDVNM                      000006E3 R       02
CDRP$L_FQFL               = 00000000                EXE$ALONONPAGED             ********     X   02
CDRP$L_FR3                = 00000010                EXE$ALTQUEPKT               ********     X   02
CDRP$L_FR4                = 00000014                EXE$CHKRDACCES              ********     X   02
CDRP$L_IOQFL              = FFFFFFA0                EXE$DEANONPAGED             ********     X   02
CDRP$L_RWCPTR             = 00000028                EXE$GB_CPUTYPE              ********     X   02
CDRP$L_UBARSRCE           = 0000003C                EXE$GL_ABSTIM               ********     X   02
CDRP$W_BOFF               = FFFFFFD0                EXE$GQ_SYSTIME              ********     X   02
CLU$GL_CLUB                 ********     X   02     EXE$MOUNTVER                ********     X   02
COM$DRVDEALMEM              ********     X   02     EXE$TEST_CSR                ********     X   02
COMMON_ALOUBAMAP            0000036D R       02     FULL_NAME                   00000688 R       02
CRB$B_MASK                = 0000000E                GETNUMBER                   000009B7 R       02
CRB$L_INTD                = 00000024                IDB$L_ADP                 = 00000014
CRB$L_LINK                = 00000020                IDB$L_CSR                 = 00000000
CRB$L_TIMELINK            = 00000014                IDB$L_OWNER               = 00000004
CRB$L_WQBL                = 00000004                IOC$ALLOSPT                 0000062B RG      02
CRB$L_WQFL                = 00000000                IOC$ALODATAP                00000268 R       02
CRB$M_BSY                 = 00000001                IOC$ALOMAPUDA               0000031B R       02
CRB$V_BSY                 = 00000000                IOC$ALOUBAMAP               00000345 RG      02
DC$_DISK                  = 00000001                IOC$ALOUBAMAPN              0000033E RG      02
DDB$L_2P_UCB              = 00000040                IOC$ALOUBAMAPSP             000003AF RG      02
DDB$L_ALLOCLS             = 0000003C                IOC$ALOUBMAPRM              00000455 RG      02
DDB$L_DP_UCB              = 00000040                IOC$ALOUBMAPRMN             0000044E RG      02
DDB$L_LINK                = 00000000                IOC$ALTREQCOM               00000118 RG      02
```

```
IOC$BROADCAST                 0000072B RG    02       IOC$WFIRLCH                   00000607 RG    02
IOC$CANCELIO                  00000000 RG    02       IPL$_ASTDEL                 = 00000002
IOC$CONBRDCST                 0000079C RG    02       IPL$_IOPOST                 = 00000004
IOC$CREDIT_UCB                ********   X   02       IPL$_QUEUEAST               = 00000006
IOC$CTRLINIT                  0000088F RG    02       IRP$C_DIAGBUF               = 0000004C
IOC$CVT_DEVNAM                00000652 RG    02       IRP$L_IOQFL                 = 00000000
IOC$DALOCUBAMAP               00000573 R     02       IRP$L_MEDIA                 = 00000038
IOC$DELETE_UCB                ********   X   02       IRP$L_PID                   = 0000000C
IOC$DIAGBUFILL                0000005B RG    02       IRP$L_SVAPTE                = 0000002C
IOC$GL_CRBTMOUT               ********   X   02       IRP$L_UCB                   = 0000001C
IOC$GL_PSBL                   ********   X   02       IRP$V_DIAGBUF               = 00000007
IOC$INITIATE                  000001DB RG    02       IRP$W_CHAN                  = 00000028
IOC$LAST_CHAN                 00000020 RG    02       IRP$W_STS                   = 0000002A
IOC$LAST_CHAN_AMBX            00000017 RG    02       LCK$K_EXMODE                = 00000005
IOC$LOCK_DEV                  ********   X   02       LCK$K_PWMODE                = 00000004
IOC$MNTVER                    000001D2 RG    02       LOCAL_NAME                    000006CC R     02
IOC$M_2P                    = 00000020                MMG$GL_SPTBASE                ********   X   02
IOC$M_ALT                   = 00000100                MNTVERPNDCHK                  000001B8 R     02
IOC$M_CLASS                 = 00000004                MSCP$V_MTYP_D1              = 00000016
IOC$M_EXISTS                = 00000010                MSCP$V_MTYP_N               = 00000000
IOC$M_LOCAL                 = 00000008                NEXTUCB                       00000AD8 R     02
IOC$M_PHY                   = 00000001                NO_SECONDARY                  000006EB R     02
IOC$M_TYPE                  = 00000002                NXTIRP                        00000189 R     02
IOC$PARSDEVNAM                000008FC RG    02       OPA$UCB0                      ********   X   02
IOC$RELCHAN                   0000008A RG    02       PCB$L_PID                   = 00000060
IOC$RELDATAP                  00000293 RG    02       PCB$Q_PRIV                  = 00000084
IOC$RELDATAPUDA               00000288 RG    02       PDT$L_ADP                   = 000000E0
IOC$RELMAPREG                 0000051A RG    02       PMS$END_IO                    ********   X   02
IOC$RELMAPUDA                 000004FF RG    02       PMS$GL_IOPFMPDB               ********   X   02
IOC$RELSCHAN                  00000080 RG    02       PMS$START_IO                  ********   X   02
IOC$REQCOM                    00000143 RG    02       PMSEND                        0000017A R     02
IOC$REQDATAP                  00000208 RG    02       PR$_IPL                     = 00000012
IOC$REQDATAPNW                0000021A RG    02       PR$_SID_TYP730              = 00000003
IOC$REQDATAPUDA               00000228 RG    02       PR$_SID_TYP750              = 00000002
IOC$REQMAPREG                 00000309 RG    02       PR$_SID_TYP780              = 00000001
IOC$REQMAPUDA                 000002F4 RG    02       PR$_SID_TYP790              = 00000004
IOC$REQPCHANH                 000000E1 RG    02       PR$_SID_TYP8NN              = 00000006
IOC$REQPCHANL                 000000EA RG    02       PR$_SID_TYP8SS              = 00000005
IOC$REQSCHANH                 000000CD RG    02       PR$_SID_TYPUV1              = 00000007
IOC$REQSCHANL                 000000D7 RG    02       PR$_SIRR                    = 00000014
IOC$RETURN                    000005E4 RG    02       PRV$V_ALLSPOOL              = 00000004
IOC$SCAN_IODB                 000007F0 RG    02       PUTASCIC                      00000708 R     02
IOC$SCAN_IODB_2P              00000835 RG    02       PUTCHAR                       00000719 R     02
IOC$SEARCHCONT                00000B04 RG    02       PUTDOLLAR                     00000716 R     02
IOC$SEARCHINT                 00000A10 RG    02       PUTNUM                        000006F0 R     02
IOC$TESTUNIT                  00000B13 RG    02       REALLOC_CD_MAPREGS            00000561 R     02
IOC$THREADCRB                 00000BDC RG    02       RELDATAP_COMMON               0000029F R     02
IOC$UNITINIT                  000008C9 RG    02       RELEASE                       00000195 R     02
IOC$V_2P                    = 00000005                RESR0                         00000008
IOC$V_ALLOC                 = 0000000A                RESR1                         0000000C
IOC$V_ALT                   = 00000008                RESR2                         00000010
IOC$V_ANY                   = 00000006                RESR3                         00000014
IOC$V_CLASS                 = 00000002                RESR4                         00000018
IOC$V_EXISTS                = 00000004                SAVABS...                   = 0000001C
IOC$V_MOUNT                 = 00000007                SAVED_R0                    = 00000000
IOC$V_TYPE                  = 00000001                SAVED_R1                    = 00000004
IOC$WFIKPCH                   000005E5 RG    02       SAVED_R2                    = 00000008
```

```
SAVED_R3                 = 0000000C               UCB$L_FPC                = 0000000C
SAVED_R4                 = 00000010               UCB$L_FQFL               = 00000000
SAVED_R5                 = 00000014               UCB$L_FR3                = 00000010
SAVR2                    = 00000000               UCB$L_IOQFL              = 0000004C
SAVR3                    = 00000004               UCB$L_IRP                = 00000058
SAVR4                    = 00000008               UCB$L_LINK               = 00000030
SAVR8                    = 0000000C               UCB$L_MEDIA_ID           = 0000008C
SAVR9                    = 00000010               UCB$L_OPCNT              = 00000070
SB$L_DDB                 = 00000054               UCB$L_PID                = 0000002C
SB$L_FLINK               = 00000000               UCB$L_STS                = 00000064
SB$T_NODENAME            = 00000044               UCB$L_SVAPTE             = 00000078
SCH$GL_CURPCB              ********   X    02     UCB$M_BSY                = 00000100
SCRLEN                     00000010               UCB$M_CANCEL             = 00000008
SCS$GA_LOCALSB             ********   X    02     UCB$M_INT                = 00000002
SCS$GQ_CONFIG              ********   X    02     UCB$M_TIM                = 00000001
SCS$RESUMEWAITR            ********   X    02     UCB$M_TIMOUT             = 00000040
SECONDARY_NAME             0000069A R      02     UCB$V_BSY                = 00000008
SS$_BUFFEROVF            = 00000601               UCB$V_DELETEUCB          = 00000010
SS$_DEVALLOC             = 00000840               UCB$V_ERLOGIP            = 00000002
SS$_DEVMOUNT             = 0000006C               UCB$V_MNTVERIP           = 0000000E
SS$_DEVOFFLINE           = 00000084               UCB$V_MNTVERPND          = 00000013
SS$_ILLIOFUNC            = 000000F4               UCB$V_MOUNTING           = 00000009
SS$_INSFMEM              = 00000124               UCB$V_ONLINE             = 00000004
SS$_IVDEVNAM             = 00000144               UCB$V_TEMPLATE           = 0000000D
SS$_NODEVAVL             = 000009B0               UCB$W_BCNT               = 0000007E
SS$_NOPRIV               = 00000024               UCB$W_BOFF               = 0000007C
SS$_NORMAL               = 00000001               UCB$W_REFC               = 0000005C
SS$_NOSUCHDEV            = 00000908               UCB$W_STS                = 00000064
SS$_TEMPLATEDEV          = 000021DC               UCB$W_UNIT               = 00000054
TTY$B_WB_FIPL            = 0000000B               VEC$B_DATAPATH           = 00000013
TTY$B_WB_TYPE            = 0000000A               VEC$B_NUMREG             = 00000012
TTY$K_WB_LENGTH          = 00000030               VEC$L_ADP                = 00000014
TTY$L_WB_DATA            = 00000030               VEC$L_IDB                = 00000008
TTY$L_WB_END             = 00000020               VEC$L_INITIAL            = 0000000C
TTY$L_WB_FR3             = 00000010               VEC$L_UNITINIT           = 00000018
TTY$L_WB_IRP             = 00000024               VEC$M_MAPLOCK            = 00008000
TTY$L_WB_NEXT            = 0000001C               VEC$S_DATAPATH           = 00000005
TTY$L_WB_RETADDR         = 0000002C               VEC$V_DATAPATH           = 00000000
TTY$W_WB_SIZE            = 00000008               VEC$V_MAPLOCK            = 0000000F
UBMD$B_DATAPATH          = 00000003               VEC$V_PATHLOCK           = 00000007
UBMD$B_NUMREG            = 00000002               VEC$W_MAPREG             = 00000010
UBMD$W_MAPREG            = 00000000
UCB$B_DEVCLASS           = 00000040
UCB$B_ERTCNT             = 00000080
UCB$B_FIPL               = 0000000B
UCB$B_TYPE               = 0000000A
UCB$L_2P_LINK            = 000000A4
UCB$L_CRB                = 00000024
UCB$L_DDB                = 00000028
UCB$L_DDT                = 00000088
UCB$L_DEVCHAR            = 00000038
UCB$L_DEVCHAR2           = 0000003C
UCB$L_DP_ALTUCB          = 000000A8
UCB$L_DP_DDB             = 000000A0
UCB$L_DP_LINK            = 000000A4
UCB$L_DUETIM             = 0000006C
UCB$L_EMB                = 00000094
```

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

PSECT name                      Allocation          PSECT No.  Attributes
----------                      ----------          ---------  ----------
.  ABS  .                       00000000  (    0.)  00 (  0.)  NOPIC   USR   CON   ABS   LCL NOSHR NOEXE NORD  NOWRT NOVEC BYTE
$ABS$                           0000001C  (   28.)  01 (  1.)  NOPIC   USR   CON   ABS   LCL NOSHR   EXE   RD    WRT NOVEC BYTE
WIONONPAGED                     00000BF6  ( 3062.)  02 (  2.)  NOPIC   USR   CON   REL   LCL NOSHR   EXE   RD    WRT NOVEC BYTE

                                           +------------------------+
                                           ! Performance indicators !
                                           +------------------------+

Phase                     Page faults    CPU Time       Elapsed Time
-----                     -----------    --------       ------------
Initialization                     29    00:00:00.06    00:00:01.71
Command processing                106    00:00:00.55    00:00:04.30
Pass 1                            693    00:00:31.36    00:01:37.67
Symbol table sort                   0    00:00:04.39    00:00:11.34
Pass 2                            403    00:00:08.26    00:00:26.97
Symbol table output                 1    00:00:00.25    00:00:00.66
Psect synopsis output               0    00:00:00.01    00:00:00.02
Cross-reference output              0    00:00:00.00    00:00:00.00
Assembler run totals             1234    00:00:44.90    00:02:22.68

The working set limit was 2400 pages.
182054 bytes (356 pages) of virtual memory were used to buffer the intermediate code.
There were 150 pages of symbol table space allocated to hold 2771 non-local and 169 local symbols.
2937 source lines were read in Pass 1, producing 24 object records in Pass 2.
59 pages of virtual memory were used to define 55 macros.

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

Macro library name                         Macros defined
------------------                         --------------
_$255$DUA28:[SYS.OBJ]LIB.MLB;1                   35
_$255$DUA28:[SYSLIB]STARLET.MLB;2                12
TOTALS (all libraries)                           47

3009 GETS were required to define 47 macros.

There were no errors, warnings or information messages.

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

0376 AH-BT13A-SE
VAX/VMS V4.0

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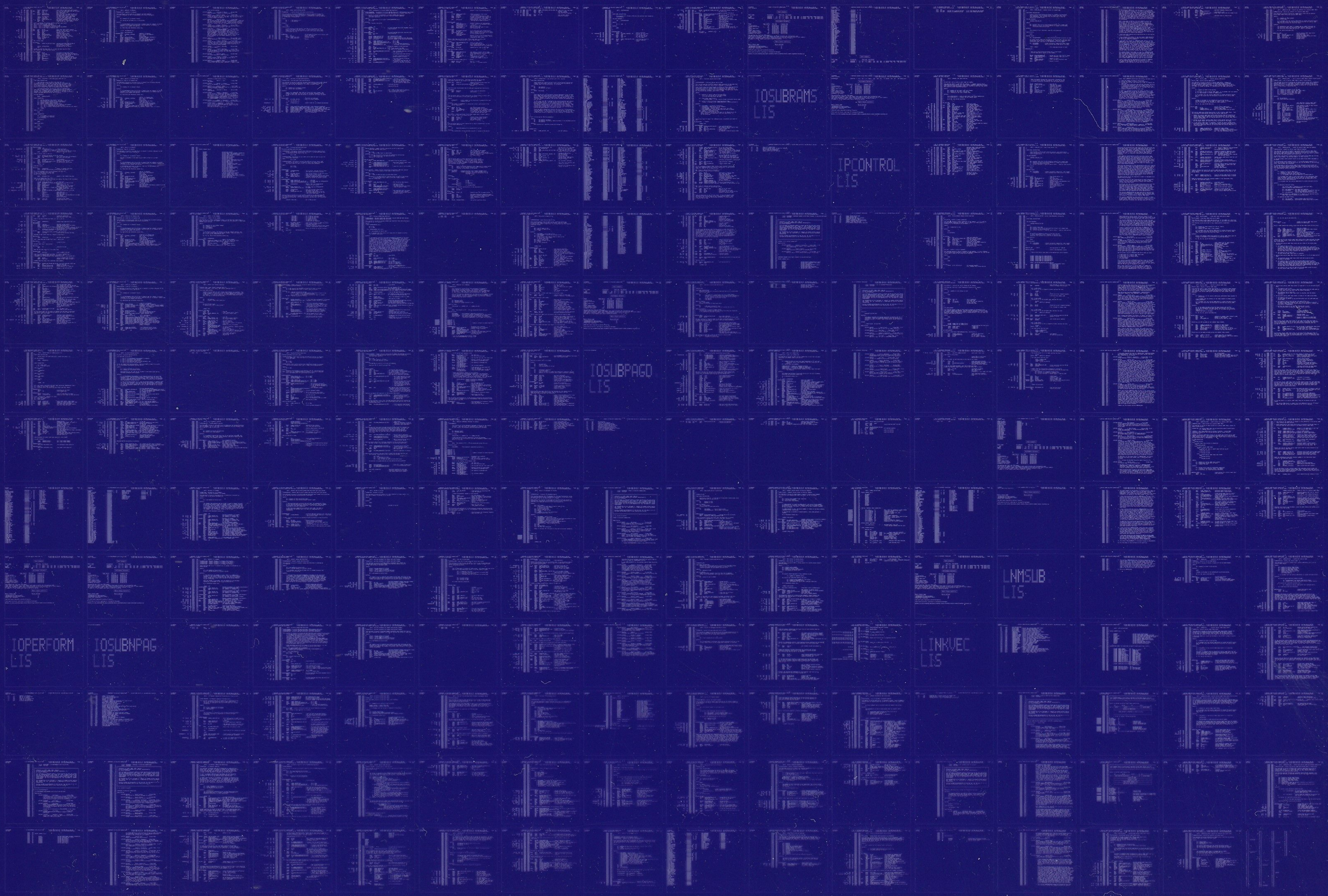

IOSUBRAMS
LIS

IPCONTROL
LIS

IOSUBPAGD
LIS

LNMSUB
LIS

IOPERFORM
LIS

IOSUBNPAG
LIS

LINKVEC
LIS