EDUCATIONAL SERVICES

VAX/VMS
Training

VAX/VMS
Device Driver
Listings Book

digital

RELOCDRV in

EY-2278E-MM-0001

Module SYS

LISTINGS BOOK

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of
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APPENDIX

Supplemental Listings

The following listings are provided for your reference. Some are executive source modules. Others are solutions to Module Test problems.

Executive Source Modules

1. CRDRIVER - Card Reader Driver
2. SYSQIOREQ - $QIO System Service Procedure
3. SYSQIOFDT - System $QIO FDT Routines
4. IOSUBNPAG - Nonpaged I/O Subroutines
5. FORKCNTRL - Fork Process Dispatcher
6. INITADP - UNIBUS Adapter Initialization Routines only (entry INI$UBADP)
7. LIOSUB78Ø - Purge Data Path Routine
8. LOADMREG - Load Mapping Registers Routines
9. IOCIOPOST - I/O Post-Processing Routines
10. COMDRVSUB - Communication Routines

Solutions to Module Test Problems

1.	PCDRIVER.LIS	PC11 Reader/Punch Driver
	PCDRIVER.COM	Assembles and Links Driver
	PCDRIVER.OPT	Used for Linking Driver
	LOADER.COM	Loads Driver and Connects Units
	READV.FOR	Test Program
	RANDWV.FOR	Test Program
	MODE.FOR	Test Program
2.	ACPMNT.LIS	Mount Image for ACP
	ACPMNT.COM	Assembles and Links Mount Image
	PCACP.LIS	PC11 ACP
	PCACP.COM	Assembles and Links ACP
	PCDMT.LIS	Dismount Image for ACP
	PCDMT.COM	Assembles and Links Dismount Image
	TESTPROG.FOR	Test Program
3.	PCDRIVER.LIS	Set Attention PC11 Driver
	PCDRIVER.COM	Assembles and Links Driver
	PCDRIVER.OPT	Used for Linking Driver
	PCLOAD.COM	Loads Driver and Connects Units
	ATTN.FOR	Test Program -- Controls PC11
4.	PRINTER.LIS	Connect to Interrupt Example
	PRINTER.COM	Assembles and Links Program
	CINLOAD.COM	Connects Printer with Connect to Interrupt Driver

CRDRIVER

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(1)	686	CR11 FUNCTION DECISION TABLE
(1)	724	CANCEL I/O ON CHANNEL
(1)	752	READ FUNCTION PROCESSING
(1)	824	START I/O OPERATION ON CR11 CARD READER
(1)	1007	CR11 CARD READER INTDERRUPTS
(1)	1063	CARD READER INITIALIZATION
(1)	1085	CARD READER UNIT INITIALIZATION

```
                        0000     1          .TITLE  CRDRIVER - CR11 CARD READER DRIVER
;EMD0087                0000    .1          .IDENT  'V03-002'
-1                      0000     3
                        0000     4 ;
                        0000     5 ;*****************************************************************************
                        0000     6 ;*                                                                           *
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                        0000    24 ;*                                                                           *
                        0000    25 ;*                                                                           *
                        0000    26 ;*****************************************************************************
                        0000    27 ;
                        0000    28 ; D. N. CUTLER 1-SEP-77
                        0000    29 ;
;EMD0087                0000    .1 ; MODIFICATION HISTORY:
;EMD0087                0000    .2 ;
;EMD0087                0000    .3 ;       V03-002 EMD0087         Ellen M. Dusseault      30-Apr-1984
;EMD0087                0000    .4 ;               Add DEV$M_NNM characteristic to DEVCHAR2 so that these
;EMD0087                0000    .5 ;               devices will have the "node$" prefix.
;EMD0087                0000    .6 ;
;EMD0087                0000    .7 ;       V03-001 KDM0002         Kathleen D. Morse       28-Jun-1982
;EMD0087                0000    .8 ;               Added $DYNDEF, $SSDEF, $DCDEF, and $PRDEF.
;EMD0087                0000    .9 ;
-6                      0000    36 ;
                        0000    37 ; MACRO LIBRARY CALLS
                        0000    38 ;
                        0000    39
                        0000    40          $CRBDEF                     ;DEFINE CRB OFFSETS
                        0000    41          $CRDEF                      ;DEFINE CARD READER STATUS BITS
;KDM0002                0000    .1          $DCDEF                      ;DEFINE ADAPTER TYPES
;EMD0087                0000    .2          $DDBDEF                     ;DEFINE DDB OFFSETS
;EMD0087                0000    .3          $DPTDEF                     ;DEFINE DPT OFFSETS
;KDM0002                0000    .4          $DYNDEF                     ;DEFINE DYNAMIC DATA STRUCTURE TYPES
-2                      0000    44          $IDBDEF                     ;DEFINE IDB OFFSETS
                        0000    45          $IODEF                      ;DEFINE I/O FUNCTION CODES
                        0000    46          $IRPDEF                     ;DEFINE IRP OFFSETS
                        0000    47          $JIBDEF                     ;DEFINE JIB OFFSETS
                        0000    48          $MSGDEF                     ;DEFINE SYSTEM MESSAGE TYPES
                        0000    49          $PCBDEF                     ;DEFINE PCB OFFSETS
;KDM0002                0000    .1          $PRDEF                      ;DEFINE PROCESSOR REGISTERS
;KDM0002                0000    .2          $UCBDEF                     ;DEFINE UCB OFFSETS
;KDM0002                0000    .3          $SSDEF                      ;DEFINE STATUS CODES
```

```
-1                                      $VECDEF                         ;DEFINE VEC OFFSETS

                                        ;
                                        ; LOCAL SYMBOLS
                                        ;
                                        ; ARGUMENT LIST OFFSET DEFINITIONS
                                        ;

00000000                                P1=0                            ;FIRST FUNCTION DEPENDENT PARAMETER
00000004                                P2=4                            ;SECOND FUNCTION DEPENDENT PARAMETER
00000008                                P3=8                            ;THIRD FUNCTION DEPENDENT PARAMETER
0000000C                                P4=12                           ;FOURTH FUNCTION DEPENDENT PARAMETER
00000010                                P5=16                           ;FIFTH FUNCTION DEPENDENT PARAMETER
00000014                                P6=20                           ;SIZTH FUNCTION DEPENDENT PARAMETER

                                        ;
                                        ; SPECIAL CARD COLUMN PATTERNS
                                        ;

00000F0F                                CR_EOF=^B111100001111           ;END OF FILE (12-11-0-1-6-7-8-9)
000008A2                                CR_026=^B100010100010           ;TRANSLATE 026 CARD CODE (12-2-4-8)
00000AAA                                CR_029=^B101010101010           ;TRANSLATE 029 CARD CODE (12-0-2-4-6-8)

                                        ;
                                        ; CR11 CONTROLLER REGISTER OFFSET DEFINITIONS
                                        ;

                                        $DEFINI CR

                                $DEF    CR_CSR          .BLKW   1       ;CONTROL STATUS REGISTER
                                        _VIELD  CR_CSR,0,<-             ; CONTROL STATUS REGISTER FIELD DEFINITIONS
                                                <READ,,M>,-             ; READ CARD
                                                <EJECT,,M>,-            ; EJECT CARD
                                                <,4>,-                  ; RESERVED BITS
                                                <IE,,M>,-               ; INTERRUPT ENABLE
                                                <CLDONE,,M>,-           ; COLUMN DONE
                                                <OFFLIN,,M>,-           ; READER OFFLINE
                                                <BUSY,,M>,-             ; CARD BEING READ
                                                <ONLINE,,M>,-           ; READER ONLINE
                                                <TIMERR,,M>,-           ; TIMING ERROR
                                                <MCHECK,,M>,-           ; MOTION CHECK
                                                <HCHECK,,M>,-           ; HOPPER CHECK
                                                <CRDONE,,M>,-           ; CARD DONE
                                                <ERROR,,M>,-            ; ERROR CONDITION
                                                >                       ;
                                $DEF    CR_CRB1         .BLKW   1       ;CARD READ DATA BUFFER 1 (BINARY)
                                $DEF    CR_CRB2         .BLKW   1       ;CARD READ DATA BUFFER 2 (PACKED)

                                        $DEFEND CR

                                        ;
                                        ; DEFINE DEVICE DEPENDENT UNIT CONTROL BLOCK OFFSETS
                                        ;

                                        $DEFINI UCB

00000090                                .=UCB$K_LENGTH
```

```
                     0090   108
                     0090   109 $DEF    UCB$B_CR_COLCNT .BLKB   1       ;CURRENT COLUMN COUNT
                     0091   110 $DEF    UCB$B_CR_EOFCNT .BLKB   1       ;END OF FILE PUNCH COUNT
                     0092   111 $DEF    UCB$B_CR_EOFCOL .BLKB   1       ;NUMBER OF END OF FILE PUNCHES REQUIRED
                     0093   112 $DEF    UCB$B_CR_OFLCNT .BLKB   1       ;OFFLINE TIME COUNTER
                     0094   113 $DEF    UCB$W_CR_FSTCOL .BLKW   1       ;FIRST COLUMN BINARY DATA
                     0096   114 $DEF    UCB$W_CR_CSR    .BLKW   1       ;SAVED FINAL CONTROL STATUS REGISTER
                     0098   115
           00000098  0098   116 UCB$K_CR_LENGTH=.
                     0098   117
                     0098   118         $DEFEND UCB
                     0000   119
                     0000   120 ;
                     0000   121 ; LOCAL DATA
                     0000   122 ;
                     0000   123 ; DRIVER PROLOGUE TABLE
                     0000   124 ;
                     0000   125
                     0000   126         DPTAB   -                       ;DEFINE DRIVER PROLOGUE TABLE
                     0000   127                 END=CR_END,-            ;END OF DRIVER
                     0000   128                 ADAPTER=UBA,-           ;ADAPTER TYPE
                     0000   129                 UCBSIZE=UCB$K_CR_LENGTH,-       ;UCB SIZE
                     0000   130                 NAME=CRDRIVER           ;DRIVER NAME
                     0038   131         DPT_STORE INIT                  ;CONTROL BLOCK INIT VALUES
                     0038   132         DPT_STORE UCB,UCB$B_FIPL,B,8    ;FORK IPL
                     003C   133         DPT_STORE UCB,UCB$L_DEVCHAR,L,- ;DEVICE CHARACTERISTICS
                     003C   134                 <DEV$M_REC-             ; RECORD ORIENTED
                     003C   135                 !DEV$M_AVL-             ; AVAILABLE
                     003C   136                 !DEV$M_IDV>             ; INPUT DEVICE
;EMD0087              0043    .1         DPT_STORE UCB,UCB$L_DEVCHAR2,L,- ; DEVICE CHARACTERISTIC
;EMD0087              0043    .2                 <DEV$M_NNM>             ; PREFIX WITH "NODE$"
                     004A   137         DPT_STORE UCB,UCB$B_DEVCLASS,B,DC$_CARD ;DEVICE CLASS
                     004E   138         DPT_STORE UCB,UCB$B_DEVTYPE,B,DT$_CR11 ;DEVICE TYPE
                     0052   139         DPT_STORE UCB,UCB$W_DEVBUFSIZ,W,80 ;DEFAULT BUFFER SIZE
                     0057   140         DPT_STORE UCB,UCB$L_DEVDEPEND,L,CR$K_TO29 ;DEFAULT TRANSLATION MODE
                     005E   141         DPT_STORE UCB,UCB$B_DIPL,B,22   ;DEVICE IPL
                     0062   142         DPT_STORE REINIT                ;CONTROL BLOCK RE-INIT VALUES
                     0062   143         DPT_STORE CRB,CRB$L_INTD+4,D,CR$INT ;INTERRUPT SERVICE ROUTINE ADDRESS
                     0067   144         DPT_STORE CRB,CRB$L_INTD+VEC$L_INITIAL,D,CR_INITIAL ;CONTROLLER INIT
                     006C   145         DPT_STORE CRB,CRB$L_INTD+VEC$L_UNITINIT,D,CR_CR11_INIT ;UNIT INIT
                     0071   146         DPT_STORE DDB,DDB$L_DDT,D,CR$DDT ;DDT ADDRESS
                     0076   147         DPT_STORE END                   ;
                     0000   148
                     0000   149 ;
                     0000   150 ; DRIVER DISPATCH TABLE
                     0000   151 ;
                     0000   152
                     0000   153         DDTAB   CR,-                    ;DRIVER DISPATCH TABLE
                     0000   154                 CR_STARTIO,-            ;START I/O OPERATION
                     0000   155                 0,-                     ;UNSOLICITED INTERRUPT
                     0000   156                 CR_FUNCTABLE,-          ;FUNCTION DECISION TABLE
                     0000   157                 CR_CANCELIO,-           ;CANCEL I/O OPERATION
                     0000   158                 0,-                     ;REGISTER DUMP ROUTINE
                     0000   159                 0,-                     ;SIZE OF DIAGNOSTIC BUFFER
                     0000   160                 0                       ;SIZE OF ERROR LOG BUFFER
                     0038   161
                     0038   162 ;
```

```
                0038    163 ; 029 CONVERSION TABLE
                0038    164 ;
                0038    165
                0038    166 CR_CVT029:                          ;029 TRANSLATE TABLE
20              0038    167         .BYTE   ^A/ /               ;   0   ^X00   ^0000
31              0039    168         .BYTE   ^A/1/               ;   1   ^X01   ^0001
32              003A    169         .BYTE   ^A/2/               ;   2   ^X02   ^0002
33              003B    170         .BYTE   ^A/3/               ;   3   ^X03   ^0003
34              003C    171         .BYTE   ^A/4/               ;   4   ^X04   ^0004
35              003D    172         .BYTE   ^A/5/               ;   5   ^X05   ^0005
36              003E    173         .BYTE   ^A/6/               ;   6   ^X06   ^0006
37              003F    174         .BYTE   ^A/7/               ;   7   ^X07   ^0007
38              0040    175         .BYTE   ^A/8/               ;   8   ^X08   ^0010
60              0041    176         .BYTE   ^A/`/               ;   9   ^X09   ^0011
3A              0042    177         .BYTE   ^A/:/               ;  10   ^X0A   ^0012
23              0043    178         .BYTE   ^A/#/               ;  11   ^X0B   ^0013
40              0044    179         .BYTE   ^A/@/               ;  12   ^X0C   ^0014
27              0045    180         .BYTE   ^A/'/               ;  13   ^X0D   ^0015
3D              0046    181         .BYTE   ^A/=/               ;  14   ^X0E   ^0016
22              0047    182         .BYTE   ^A/"/               ;  15   ^X0F   ^0017
39              0048    183         .BYTE   ^A/9/               ;  16   ^X10   ^0020
5C              0049    184         .BYTE   ^A/\/               ;  17   ^X11   ^0021
16              004A    185         .BYTE   ^X16                ;  18   ^X12   ^0022
5C              004B    186         .BYTE   ^A/\/               ;  19   ^X13   ^0023
5C              004C    187         .BYTE   ^A/\/               ;  20   ^X14   ^0024
5C              004D    188         .BYTE   ^A/\/               ;  21   ^X15   ^0025
5C              004E    189         .BYTE   ^A/\/               ;  22   ^X16   ^0026
04              004F    190         .BYTE   ^X04                ;  23   ^X17   ^0027
5C              0050    191         .BYTE   ^A/\/               ;  24   ^X18   ^0030
5C              0051    192         .BYTE   ^A/\/               ;  25   ^X19   ^0031
5C              0052    193         .BYTE   ^A/\/               ;  26   ^X1A   ^0032
5C              0053    194         .BYTE   ^A/\/               ;  27   ^X1B   ^0033
14              0054    195         .BYTE   ^X14                ;  28   ^X1C   ^0034
15              0055    196         .BYTE   ^X15                ;  29   ^X1D   ^0035
5C              0056    197         .BYTE   ^A/\/               ;  30   ^X1E   ^0036
1A              0057    198         .BYTE   ^X1A                ;  31   ^X1F   ^0037
30              0058    199         .BYTE   ^A/0/               ;  32   ^X20   ^0040
2F              0059    200         .BYTE   ^A\/\               ;  33   ^X21   ^0041
53              005A    201         .BYTE   ^A/S/               ;  34   ^X22   ^0042
54              005B    202         .BYTE   ^A/T/               ;  35   ^X23   ^0043
55              005C    203         .BYTE   ^A/U/               ;  36   ^X24   ^0044
56              005D    204         .BYTE   ^A/V/               ;  37   ^X25   ^0045
57              005E    205         .BYTE   ^A/W/               ;  38   ^X26   ^0046
58              005F    206         .BYTE   ^A/X/               ;  39   ^X27   ^0047
59              0060    207         .BYTE   ^A/Y/               ;  40   ^X28   ^0050
5C              0061    208         .BYTE   ^A/\/               ;  41   ^X29   ^0051
5C              0062    209         .BYTE   ^A/\/               ;  42   ^X2A   ^0052
2C              0063    210         .BYTE   ^A/,/               ;  43   ^X2B   ^0053
25              0064    211         .BYTE   ^A/%/               ;  44   ^X2C   ^0054
5F              0065    212         .BYTE   ^A/_/               ;  45   ^X2D   ^0055
3E              0066    213         .BYTE   ^A/>/               ;  46   ^X2E   ^0056
3F              0067    214         .BYTE   ^A/?/               ;  47   ^X2F   ^0057
5A              0068    215         .BYTE   ^A/Z/               ;  48   ^X30   ^0060
5C              0069    216         .BYTE   ^A/\/               ;  49   ^X31   ^0061
5C              006A    217         .BYTE   ^A/\/               ;  50   ^X32   ^0062
5C              006B    218         .BYTE   ^A/\/               ;  51   ^X33   ^0063
5C              006C    219         .BYTE   ^A/\/               ;  52   ^X34   ^0064
```

```
0A  006D  220          .BYTE   ^X0A                    ;  53   ^X35   ^0065
17  006E  221          .BYTE   ^X17                    ;  54   ^X36   ^0066
1B  006F  222          .BYTE   ^X1B                    ;  55   ^X37   ^0067
5C  0070  223          .BYTE   ^A/\/                   ;  56   ^X38   ^0070
5C  0071  224          .BYTE   ^A/\/                   ;  57   ^X39   ^0071
5C  0072  225          .BYTE   ^A/\/                   ;  58   ^X3A   ^0072
5C  0073  226          .BYTE   ^A/\/                   ;  59   ^X3B   ^0073
5C  0074  227          .BYTE   ^A/\/                   ;  60   ^X3C   ^0074
05  0075  228          .BYTE   ^X05                    ;  61   ^X3D   ^0075
06  0076  229          .BYTE   ^X06                    ;  62   ^X3E   ^0076
07  0077  230          .BYTE   ^X07                    ;  63   ^X3F   ^0077
2D  0078  231          .BYTE   ^A/-/                   ;  64   ^X40   ^0100
4A  0079  232          .BYTE   ^A/J/                   ;  65   ^X41   ^0101
4B  007A  233          .BYTE   ^A/K/                   ;  66   ^X42   ^0102
4C  007B  234          .BYTE   ^A/L/                   ;  67   ^X43   ^0103
4D  007C  235          .BYTE   ^A/M/                   ;  68   ^X44   ^0104
4E  007D  236          .BYTE   ^A/N/                   ;  69   ^X45   ^0105
4F  007E  237          .BYTE   ^A/O/                   ;  70   ^X46   ^0106
50  007F  238          .BYTE   ^A/P/                   ;  71   ^X47   ^0107
51  0080  239          .BYTE   ^A/Q/                   ;  72   ^X48   ^0110
5C  0081  240          .BYTE   ^A/\/                   ;  73   ^X49   ^0111
5D  0082  241          .BYTE   ^A/]/                   ;  74   ^X4A   ^0112
24  0083  242          .BYTE   ^A/$/                   ;  75   ^X4B   ^0113
2A  0084  243          .BYTE   ^A/*/                   ;  76   ^X4C   ^0114
29  0085  244          .BYTE   ^A/)/                   ;  77   ^X4D   ^0115
3B  0086  245          .BYTE   ^A/;/                   ;  78   ^X4E   ^0116
5E  0087  246          .BYTE   ^A/^/                   ;  79   ^X4F   ^0117
52  0088  247          .BYTE   ^A/R/                   ;  80   ^X50   ^0120
11  0089  248          .BYTE   ^X11                    ;  81   ^X51   ^0121
12  008A  249          .BYTE   ^X12                    ;  82   ^X52   ^0122
13  008B  250          .BYTE   ^X13                    ;  83   ^X53   ^0123
5C  008C  251          .BYTE   ^A/\/                   ;  84   ^X54   ^0124
5C  008D  252          .BYTE   ^A/\/                   ;  85   ^X55   ^0125
08  008E  253          .BYTE   ^X08                    ;  86   ^X56   ^0126
5C  008F  254          .BYTE   ^A/\/                   ;  87   ^X57   ^0127
18  0090  255          .BYTE   ^X18                    ;  88   ^X58   ^0130
19  0091  256          .BYTE   ^X19                    ;  89   ^X59   ^0131
5C  0092  257          .BYTE   ^A/\/                   ;  90   ^X5A   ^0132
5C  0093  258          .BYTE   ^A/\/                   ;  91   ^X5B   ^0133
1C  0094  259          .BYTE   ^X1C                    ;  92   ^X5C   ^0134
1D  0095  260          .BYTE   ^X1D                    ;  93   ^X5D   ^0135
1E  0096  261          .BYTE   ^X1E                    ;  94   ^X5E   ^0136
1F  0097  262          .BYTE   ^X1F                    ;  95   ^X5F   ^0137
7D  0098  263          .BYTE   ^A/}/                   ;  96   ^X60   ^0140
7E  0099  264          .BYTE   ^A/~/                   ;  97   ^X61   ^0141
73  009A  265          .BYTE   ^A/s/                   ;  98   ^X62   ^0142
74  009B  266          .BYTE   ^A/t/                   ;  99   ^X63   ^0143
75  009C  267          .BYTE   ^A/u/                   ; 100   ^X64   ^0144
76  009D  268          .BYTE   ^A/v/                   ; 101   ^X65   ^0145
77  009E  269          .BYTE   ^A/w/                   ; 102   ^X66   ^0146
78  009F  270          .BYTE   ^A/x/                   ; 103   ^X67   ^0147
79  00A0  271          .BYTE   ^A/y/                   ; 104   ^X68   ^0150
5C  00A1  272          .BYTE   ^A/\/                   ; 105   ^X69   ^0151
5C  00A2  273          .BYTE   ^A/\/                   ; 106   ^X6A   ^0152
5C  00A3  274          .BYTE   ^A/\/                   ; 107   ^X6B   ^0153
5C  00A4  275          .BYTE   ^A/\/                   ; 108   ^X6C   ^0154
5C  00A5  276          .BYTE   ^A/\/                   ; 109   ^X6D   ^0155
```

```
5C  00A6   277          .BYTE   ^A/\/                   ; 110   ^X6E   ^O156
5C  00A7   278          .BYTE   ^A/\/                   ; 111   ^X6F   ^O157
7A  00A8   279          .BYTE   ^A/z/                   ; 112   ^X70   ^O160
5C  00A9   280          .BYTE   ^A/\/                   ; 113   ^X71   ^O161
5C  00AA   281          .BYTE   ^A/\/                   ; 114   ^X72   ^O162
5C  00AB   282          .BYTE   ^A/\/                   ; 115   ^X73   ^O163
5C  00AC   283          .BYTE   ^A/\/                   ; 116   ^X74   ^O164
5C  00AD   284          .BYTE   ^A/\/                   ; 117   ^X75   ^O165
5C  00AE   285          .BYTE   ^A/\/                   ; 118   ^X76   ^O166
5C  00AF   286          .BYTE   ^A/\/                   ; 119   ^X77   ^O167
5C  00B0   287          .BYTE   ^A/\/                   ; 120   ^X78   ^O170
5C  00B1   288          .BYTE   ^A/\/                   ; 121   ^X79   ^O171
5C  00B2   289          .BYTE   ^A/\/                   ; 122   ^X7A   ^O172
5C  00B3   290          .BYTE   ^A/\/                   ; 123   ^X7B   ^O173
5C  00B4   291          .BYTE   ^A/\/                   ; 124   ^X7C   ^O174
5C  00B5   292          .BYTE   ^A/\/                   ; 125   ^X7D   ^O175
5C  00B6   293          .BYTE   ^A/\/                   ; 126   ^X7E   ^O176
5C  00B7   294          .BYTE   ^A/\/                   ; 127   ^X7F   ^O177
26  00B8   295          .BYTE   ^A/&/                   ; 128   ^X80   ^O200
41  00B9   296          .BYTE   ^A/A/                   ; 129   ^X81   ^O201
42  00BA   297          .BYTE   ^A/B/                   ; 130   ^X82   ^O202
43  00BB   298          .BYTE   ^A/C/                   ; 131   ^X83   ^O203
44  00BC   299          .BYTE   ^A/D/                   ; 132   ^X84   ^O204
45  00BD   300          .BYTE   ^A/E/                   ; 133   ^X85   ^O205
46  00BE   301          .BYTE   ^A/F/                   ; 134   ^X86   ^O206
47  00BF   302          .BYTE   ^A/G/                   ; 135   ^X87   ^O207
48  00C0   303          .BYTE   ^A/H/                   ; 136   ^X88   ^O210
5C  00C1   304          .BYTE   ^A/\/                   ; 137   ^X89   ^O211
5B  00C2   305          .BYTE   ^A/[/                   ; 138   ^X8A   ^O212
2E  00C3   306          .BYTE   ^A/./                   ; 139   ^X8B   ^O213
3C  00C4   307          .BYTE   ^A/</                   ; 140   ^X8C   ^O214
28  00C5   308          .BYTE   ^A/(/                   ; 141   ^X8D   ^O215
2B  00C6   309          .BYTE   ^A/+/                   ; 142   ^X8E   ^O216
21  00C7   310          .BYTE   ^A/!/                   ; 143   ^X8F   ^O217
49  00C8   311          .BYTE   ^A/I/                   ; 144   ^X90   ^O220
01  00C9   312          .BYTE   ^X01                    ; 145   ^X91   ^O221
02  00CA   313          .BYTE   ^X02                    ; 146   ^X92   ^O222
03  00CB   314          .BYTE   ^X03                    ; 147   ^X93   ^O223
5C  00CC   315          .BYTE   ^A/\/                   ; 148   ^X94   ^O224
09  00CD   316          .BYTE   ^X09                    ; 149   ^X95   ^O225
5C  00CE   317          .BYTE   ^A/\/                   ; 150   ^X96   ^O226
FF  00CF   318          .BYTE   ^XFF                    ; 151   ^X97   ^O227
5C  00D0   319          .BYTE   ^A/\/                   ; 152   ^X98   ^O230
5C  00D1   320          .BYTE   ^A/\/                   ; 153   ^X99   ^O231
5C  00D2   321          .BYTE   ^A/\/                   ; 154   ^X9A   ^O232
0B  00D3   322          .BYTE   ^X0B                    ; 155   ^X9B   ^O233
0C  00D4   323          .BYTE   ^X0C                    ; 156   ^X9C   ^O234
0D  00D5   324          .BYTE   ^X0D                    ; 157   ^X9D   ^O235
0E  00D6   325          .BYTE   ^X0E                    ; 158   ^X9E   ^O236
0F  00D7   326          .BYTE   ^X0F                    ; 159   ^X9F   ^O237
7B  00D8   327          .BYTE   ^A/{/                   ; 160   ^XA0   ^O240
61  00D9   328          .BYTE   ^A/a/                   ; 161   ^XA1   ^O241
62  00DA   329          .BYTE   ^A/b/                   ; 162   ^XA2   ^O242
63  00DB   330          .BYTE   ^A/c/                   ; 163   ^XA3   ^O243
64  00DC   331          .BYTE   ^A/d/                   ; 164   ^XA4   ^O244
65  00DD   332          .BYTE   ^A/e/                   ; 165   ^XA5   ^O245
66  00DE   333          .BYTE   ^A/f/                   ; 166   ^XA6   ^O246
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67  00DF   334          .BYTE   ^A/g/
68  00E0   335          .BYTE   ^A/h/
5C  00E1   336          .BYTE   ^A/\/
5C  00E2   337          .BYTE   ^A/\/
5C  00E3   338          .BYTE   ^A/\/
5C  00E4   339          .BYTE   ^A/\/
5C  00E5   340          .BYTE   ^A/\/
5C  00E6   341          .BYTE   ^A/\/
5C  00E7   342          .BYTE   ^A/\/
69  00E8   343          .BYTE   ^A/i/
5C  00E9   344          .BYTE   ^A/\/
5C  00EA   345          .BYTE   ^A/\/
5C  00EB   346          .BYTE   ^A/\/
5C  00EC   347          .BYTE   ^A/\/
5C  00ED   348          .BYTE   ^A/\/
5C  00EE   349          .BYTE   ^A/\/
5C  00EF   350          .BYTE   ^A/\/
5C  00F0   351          .BYTE   ^A/\/
5C  00F1   352          .BYTE   ^A/\/
5C  00F2   353          .BYTE   ^A/\/
5C  00F3   354          .BYTE   ^A/\/
5C  00F4   355          .BYTE   ^A/\/
5C  00F5   356          .BYTE   ^A/\/
5C  00F6   357          .BYTE   ^A/\/
5C  00F7   358          .BYTE   ^A/\/
7C  00F8   359          .BYTE   ^A/|/
6A  00F9   360          .BYTE   ^A/j/
6B  00FA   361          .BYTE   ^A/k/
6C  00FB   362          .BYTE   ^A/l/
6D  00FC   363          .BYTE   ^A/m/
6E  00FD   364          .BYTE   ^A/n/
6F  00FE   365          .BYTE   ^A/o/
70  00FF   366          .BYTE   ^A/p/
71  0100   367          .BYTE   ^A/q/
5C  0101   368          .BYTE   ^A/\/
5C  0102   369          .BYTE   ^A/\/
5C  0103   370          .BYTE   ^A/\/
5C  0104   371          .BYTE   ^A/\/
5C  0105   372          .BYTE   ^A/\/
5C  0106   373          .BYTE   ^A/\/
5C  0107   374          .BYTE   ^A/\/
72  0108   375          .BYTE   ^A/r/
5C  0109   376          .BYTE   ^A/\/
5C  010A   377          .BYTE   ^A/\/
5C  010B   378          .BYTE   ^A/\/
5C  010C   379          .BYTE   ^A/\/
5C  010D   380          .BYTE   ^A/\/
5C  010E   381          .BYTE   ^A/\/
5C  010F   382          .BYTE   ^A/\/
5C  0110   383          .BYTE   ^A/\/
10  0111   384          .BYTE   ^X10
5C  0112   385          .BYTE   ^A/\/
5C  0113   386          .BYTE   ^A/\/
5C  0114   387          .BYTE   ^A/\/
5C  0115   388          .BYTE   ^A/\/
5C  0116   389          .BYTE   ^A/\/
5C  0117   390          .BYTE   ^A/\/
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                    ; 167   ^XA7    ^O247
                    ; 168   ^XA8    ^O250
                    ; 169   ^XA9    ^O251
                    ; 170   ^XAA    ^O252
                    ; 171   ^XAB    ^O253
                    ; 172   ^XAC    ^O254
                    ; 173   ^XAD    ^O255
                    ; 174   ^XAE    ^O256
                    ; 175   ^XAF    ^O257
                    ; 176   ^XB0    ^O260
                    ; 177   ^XB1    ^O261
                    ; 178   ^XB2    ^O262
                    ; 179   ^XB3    ^O263
                    ; 180   ^XB4    ^O264
                    ; 181   ^XB5    ^O265
                    ; 182   ^XB6    ^O266
                    ; 183   ^XB7    ^O267
                    ; 184   ^XB8    ^O270
                    ; 185   ^XB9    ^O271
                    ; 186   ^XBA    ^O272
                    ; 187   ^XBB    ^O273
                    ; 188   ^XBC    ^O274
                    ; 189   ^XBD    ^O275
                    ; 190   ^XBE    ^O276
                    ; 191   ^XBF    ^O277
                    ; 192   ^XC0    ^O300
                    ; 193   ^XC1    ^O301
                    ; 194   ^XC2    ^O302
                    ; 195   ^XC3    ^O303
                    ; 196   ^XC4    ^O304
                    ; 197   ^XC5    ^O305
                    ; 198   ^XC6    ^O306
                    ; 199   ^XC7    ^O307
                    ; 200   ^XC8    ^O310
                    ; 201   ^XC9    ^O311
                    ; 202   ^XCA    ^O312
                    ; 203   ^XCB    ^O313
                    ; 204   ^XCC    ^O314
                    ; 205   ^XCD    ^O315
                    ; 206   ^XCE    ^O316
                    ; 207   ^XCF    ^O317
                    ; 208   ^XD0    ^O320
                    ; 209   ^XD1    ^O321
                    ; 210   ^XD2    ^O322
                    ; 211   ^XD3    ^O323
                    ; 212   ^XD4    ^O324
                    ; 213   ^XD5    ^O325
                    ; 214   ^XD6    ^O326
                    ; 215   ^XD7    ^O327
                    ; 216   ^XD8    ^O330
                    ; 217   ^XD9    ^O331
                    ; 218   ^XDA    ^O332
                    ; 219   ^XDB    ^O333
                    ; 220   ^XDC    ^O334
                    ; 221   ^XDD    ^O335
                    ; 222   ^XDE    ^O336
                    ; 223   ^XDF    ^O337
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5C  0118   391          .BYTE   ^A/\/                   ; 224   ^XE0   ^0340
5C  0119   392          .BYTE   ^A/\/                   ; 225   ^XE1   ^0341
5C  011A   393          .BYTE   ^A/\/                   ; 226   ^XE2   ^0342
5C  011B   394          .BYTE   ^A/\/                   ; 227   ^XE3   ^0343
5C  011C   395          .BYTE   ^A/\/                   ; 228   ^XE4   ^0344
5C  011D   396          .BYTE   ^A/\/                   ; 229   ^XE5   ^0345
5C  011E   397          .BYTE   ^A/\/                   ; 230   ^XE6   ^0346
5C  011F   398          .BYTE   ^A/\/                   ; 231   ^XE7   ^0347
5C  0120   399          .BYTE   ^A/\/                   ; 232   ^XE8   ^0350
5C  0121   400          .BYTE   ^A/\/                   ; 233   ^XE9   ^0351
5C  0122   401          .BYTE   ^A/\/                   ; 234   ^XEA   ^0352
5C  0123   402          .BYTE   ^A/\/                   ; 235   ^XEB   ^0353
5C  0124   403          .BYTE   ^A/\/                   ; 236   ^XEC   ^0354
5C  0125   404          .BYTE   ^A/\/                   ; 237   ^XED   ^0355
5C  0126   405          .BYTE   ^A/\/                   ; 238   ^XEE   ^0356
5C  0127   406          .BYTE   ^A/\/                   ; 239   ^XEF   ^0357
5C  0128   407          .BYTE   ^A/\/                   ; 240   ^XF0   ^0360
5C  0129   408          .BYTE   ^A/\/                   ; 241   ^XF1   ^0361
5C  012A   409          .BYTE   ^A/\/                   ; 242   ^XF2   ^0362
5C  012B   410          .BYTE   ^A/\/                   ; 243   ^XF3   ^0363
5C  012C   411          .BYTE   ^A/\/                   ; 244   ^XF4   ^0364
5C  012D   412          .BYTE   ^A/\/                   ; 245   ^XF5   ^0365
5C  012E   413          .BYTE   ^A/\/                   ; 246   ^XF6   ^0366
5C  012F   414          .BYTE   ^A/\/                   ; 247   ^XF7   ^0367
5C  0130   415          .BYTE   ^A/\/                   ; 248   ^XF8   ^0370
5C  0131   416          .BYTE   ^A/\/                   ; 249   ^XF9   ^0371
5C  0132   417          .BYTE   ^A/\/                   ; 250   ^XFA   ^0372
5C  0133   418          .BYTE   ^A/\/                   ; 251   ^XFB   ^0373
5C  0134   419          .BYTE   ^A/\/                   ; 252   ^XFC   ^0374
5C  0135   420          .BYTE   ^A/\/                   ; 253   ^XFD   ^0375
5C  0136   421          .BYTE   ^A/\/                   ; 254   ^XFE   ^0376
5C  0137   422          .BYTE   ^A/\/                   ; 255   ^XFF   ^0377
    0138   423
    0138   424 ;
    0138   425 ; 026 CONVERSION TABLE
    0138   426 ;
    0138   427
    0138   428 CR_CVT026:                              ;026 TRANSLATE TABLE
20  0138   429          .BYTE   ^A/ /                   ;   0   ^X00   ^0000
31  0139   430          .BYTE   ^A/1/                   ;   1   ^X01   ^0001
32  013A   431          .BYTE   ^A/2/                   ;   2   ^X02   ^0002
33  013B   432          .BYTE   ^A/3/                   ;   3   ^X03   ^0003
34  013C   433          .BYTE   ^A/4/                   ;   4   ^X04   ^0004
35  013D   434          .BYTE   ^A/5/                   ;   5   ^X05   ^0005
36  013E   435          .BYTE   ^A/6/                   ;   6   ^X06   ^0006
37  013F   436          .BYTE   ^A/7/                   ;   7   ^X07   ^0007
38  0140   437          .BYTE   ^A/8/                   ;   8   ^X08   ^0010
60  0141   438          .BYTE   ^A/`/                   ;   9   ^X09   ^0011
5F  0142   439          .BYTE   ^A/_/                   ;  10   ^X0A   ^0012
3D  0143   440          .BYTE   ^A/=/                   ;  11   ^X0B   ^0013
40  0144   441          .BYTE   ^A/@/                   ;  12   ^X0C   ^0014
5E  0145   442          .BYTE   ^A/^/                   ;  13   ^X0D   ^0015
27  0146   443          .BYTE   ^A/'/                   ;  14   ^X0E   ^0016
5C  0147   444          .BYTE   ^A/\/                   ;  15   ^X0F   ^0017
39  0148   445          .BYTE   ^A/9/                   ;  16   ^X10   ^0020
5C  0149   446          .BYTE   ^A/\/                   ;  17   ^X11   ^0021
16  014A   447          .BYTE   ^X16                    ;  18   ^X12   ^0022
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5C  014B  448          .BYTE   ^A/\/                    ;  19   ^X13   ^0023
5C  014C  449          .BYTE   ^A/\/                    ;  20   ^X14   ^0024
5C  014D  450          .BYTE   ^A/\/                    ;  21   ^X15   ^0025
5C  014E  451          .BYTE   ^A/\/                    ;  22   ^X16   ^0026
04  014F  452          .BYTE   ^X04                     ;  23   ^X17   ^0027
5C  0150  453          .BYTE   ^A/\/                    ;  24   ^X18   ^0030
5C  0151  454          .BYTE   ^A/\/                    ;  25   ^X19   ^0031
5C  0152  455          .BYTE   ^A/\/                    ;  26   ^X1A   ^0032
5C  0153  456          .BYTE   ^A/\/                    ;  27   ^X1B   ^0033
14  0154  457          .BYTE   ^X14                     ;  28   ^X1C   ^0034
15  0155  458          .BYTE   ^X15                     ;  29   ^X1D   ^0035
5C  0156  459          .BYTE   ^A/\/                    ;  30   ^X1E   ^0036
1A  0157  460          .BYTE   ^X1A                     ;  31   ^X1F   ^0037
30  0158  461          .BYTE   ^A/0/                    ;  32   ^X20   ^0040
2F  0159  462          .BYTE   ^A\/\                    ;  33   ^X21   ^0041
53  015A  463          .BYTE   ^A/S/                    ;  34   ^X22   ^0042
54  015B  464          .BYTE   ^A/T/                    ;  35   ^X23   ^0043
55  015C  465          .BYTE   ^A/U/                    ;  36   ^X24   ^0044
56  015D  466          .BYTE   ^A/V/                    ;  37   ^X25   ^0045
57  015E  467          .BYTE   ^A/W/                    ;  38   ^X26   ^0046
58  015F  468          .BYTE   ^A/X/                    ;  39   ^X27   ^0047
59  0160  469          .BYTE   ^A/Y/                    ;  40   ^X28   ^0050
5C  0161  470          .BYTE   ^A/\/                    ;  41   ^X29   ^0051
3B  0162  471          .BYTE   ^A/;/                    ;  42   ^X2A   ^0052
2C  0163  472          .BYTE   ^A/,/                    ;  43   ^X2B   ^0053
28  0164  473          .BYTE   ^A/(/                    ;  44   ^X2C   ^0054
22  0165  474          .BYTE   ^A/"/                    ;  45   ^X2D   ^0055
23  0166  475          .BYTE   ^A/#/                    ;  46   ^X2E   ^0056
25  0167  476          .BYTE   ^A/%/                    ;  47   ^X2F   ^0057
5A  0168  477          .BYTE   ^A/Z/                    ;  48   ^X30   ^0060
5C  0169  478          .BYTE   ^A/\/                    ;  49   ^X31   ^0061
5C  016A  479          .BYTE   ^A/\/                    ;  50   ^X32   ^0062
5C  016B  480          .BYTE   ^A/\/                    ;  51   ^X33   ^0063
5C  016C  481          .BYTE   ^A/\/                    ;  52   ^X34   ^0064
0A  016D  482          .BYTE   ^X0A                     ;  53   ^X35   ^0065
17  016E  483          .BYTE   ^X17                     ;  54   ^X36   ^0066
1B  016F  484          .BYTE   ^X1B                     ;  55   ^X37   ^0067
5C  0170  485          .BYTE   ^A/\/                    ;  56   ^X38   ^0070
5C  0171  486          .BYTE   ^A/\/                    ;  57   ^X39   ^0071
5C  0172  487          .BYTE   ^A/\/                    ;  58   ^X3A   ^0072
5C  0173  488          .BYTE   ^A/\/                    ;  59   ^X3B   ^0073
5C  0174  489          .BYTE   ^A/\/                    ;  60   ^X3C   ^0074
05  0175  490          .BYTE   ^X05                     ;  61   ^X3D   ^0075
06  0176  491          .BYTE   ^X06                     ;  62   ^X3E   ^0076
07  0177  492          .BYTE   ^X07                     ;  63   ^X3F   ^0077
2D  0178  493          .BYTE   ^A/-/                    ;  64   ^X40   ^0100
4A  0179  494          .BYTE   ^A/J/                    ;  65   ^X41   ^0101
4B  017A  495          .BYTE   ^A/K/                    ;  66   ^X42   ^0102
4C  017B  496          .BYTE   ^A/L/                    ;  67   ^X43   ^0103
4D  017C  497          .BYTE   ^A/M/                    ;  68   ^X44   ^0104
4E  017D  498          .BYTE   ^A/N/                    ;  69   ^X45   ^0105
4F  017E  499          .BYTE   ^A/O/                    ;  70   ^X46   ^0106
50  017F  500          .BYTE   ^A/P/                    ;  71   ^X47   ^0107
51  0180  501          .BYTE   ^A/Q/                    ;  72   ^X48   ^0110
5C  0181  502          .BYTE   ^A/\/                    ;  73   ^X49   ^0111
3A  0182  503          .BYTE   ^A/:/                    ;  74   ^X4A   ^0112
24  0183  504          .BYTE   ^A/$/                    ;  75   ^X4B   ^0113
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2A  0184    505         .BYTE   ^A/*/                    ;  76   ^X4C   ^O114
5B  0185    506         .BYTE   ^A/[/                    ;  77   ^X4D   ^O115
3E  0186    507         .BYTE   ^A/>/                    ;  78   ^X4E   ^O116
26  0187    508         .BYTE   ^A/&/                    ;  79   ^X4F   ^O117
52  0188    509         .BYTE   ^A/R/                    ;  80   ^X50   ^O120
11  0189    510         .BYTE   ^X11                     ;  81   ^X51   ^O121
12  018A    511         .BYTE   ^X12                     ;  82   ^X52   ^O122
13  018B    512         .BYTE   ^X13                     ;  83   ^X53   ^O123
5C  018C    513         .BYTE   ^A/\/                    ;  84   ^X54   ^O124
5C  018D    514         .BYTE   ^A/\/                    ;  85   ^X55   ^O125
08  018E    515         .BYTE   ^X08                     ;  86   ^X56   ^O126
5C  018F    516         .BYTE   ^A/\/                    ;  87   ^X57   ^O127
18  0190    517         .BYTE   ^X18                     ;  88   ^X58   ^O130
19  0191    518         .BYTE   ^X19                     ;  89   ^X59   ^O131
5C  0192    519         .BYTE   ^A/\/                    ;  90   ^X5A   ^O132
5C  0193    520         .BYTE   ^A/\/                    ;  91   ^X5B   ^O133
1C  0194    521         .BYTE   ^X1C                     ;  92   ^X5C   ^O134
1D  0195    522         .BYTE   ^X1D                     ;  93   ^X5D   ^O135
1E  0196    523         .BYTE   ^X1E                     ;  94   ^X5E   ^O136
1F  0197    524         .BYTE   ^X1F                     ;  95   ^X5F   ^O137
7D  0198    525         .BYTE   ^A/}/                    ;  96   ^X60   ^O140
7E  0199    526         .BYTE   ^A/~/                    ;  97   ^X61   ^O141
73  019A    527         .BYTE   ^A/s/                    ;  98   ^X62   ^O142
74  019B    528         .BYTE   ^A/t/                    ;  99   ^X63   ^O143
75  019C    529         .BYTE   ^A/u/                    ; 100   ^X64   ^O144
76  019D    530         .BYTE   ^A/v/                    ; 101   ^X65   ^O145
77  019E    531         .BYTE   ^A/w/                    ; 102   ^X66   ^O146
78  019F    532         .BYTE   ^A/x/                    ; 103   ^X67   ^O147
79  01A0    533         .BYTE   ^A/y/                    ; 104   ^X68   ^O150
5C  01A1    534         .BYTE   ^A/\/                    ; 105   ^X69   ^O151
5C  01A2    535         .BYTE   ^A/\/                    ; 106   ^X6A   ^O152
5C  01A3    536         .BYTE   ^A/\/                    ; 107   ^X6B   ^O153
5C  01A4    537         .BYTE   ^A/\/                    ; 108   ^X6C   ^O154
5C  01A5    538         .BYTE   ^A/\/                    ; 109   ^X6D   ^O155
5C  01A6    539         .BYTE   ^A/\/                    ; 110   ^X6E   ^O156
5C  01A7    540         .BYTE   ^A/\/                    ; 111   ^X6F   ^O157
7A  01A8    541         .BYTE   ^A/z/                    ; 112   ^X70   ^O160
5C  01A9    542         .BYTE   ^A/\/                    ; 113   ^X71   ^O161
5C  01AA    543         .BYTE   ^A/\/                    ; 114   ^X72   ^O162
5C  01AB    544         .BYTE   ^A/\/                    ; 115   ^X73   ^O163
5C  01AC    545         .BYTE   ^A/\/                    ; 116   ^X74   ^O164
5C  01AD    546         .BYTE   ^A/\/                    ; 117   ^X75   ^O165
5C  01AE    547         .BYTE   ^A/\/                    ; 118   ^X76   ^O166
5C  01AF    548         .BYTE   ^A/\/                    ; 119   ^X77   ^O167
5C  01B0    549         .BYTE   ^A/\/                    ; 120   ^X78   ^O170
5C  01B1    550         .BYTE   ^A/\/                    ; 121   ^X79   ^O171
5C  01B2    551         .BYTE   ^A/\/                    ; 122   ^X7A   ^O172
5C  01B3    552         .BYTE   ^A/\/                    ; 123   ^X7B   ^O173
5C  01B4    553         .BYTE   ^A/\/                    ; 124   ^X7C   ^O174
5C  01B5    554         .BYTE   ^A/\/                    ; 125   ^X7D   ^O175
5C  01B6    555         .BYTE   ^A/\/                    ; 126   ^X7E   ^O176
5C  01B7    556         .BYTE   ^A/\/                    ; 127   ^X7F   ^O177
2B  01B8    557         .BYTE   ^A/+/                    ; 128   ^X80   ^O200
41  01B9    558         .BYTE   ^A/A/                    ; 129   ^X81   ^O201
42  01BA    559         .BYTE   ^A/B/                    ; 130   ^X82   ^O202
43  01BB    560         .BYTE   ^A/C/                    ; 131   ^X83   ^O203
44  01BC    561         .BYTE   ^A/D/                    ; 132   ^X84   ^O204
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45  01BD   562          .BYTE   ^A/E/                    ; 133   ^X85   ^O205
46  01BE   563          .BYTE   ^A/F/                    ; 134   ^X86   ^O206
47  01BF   564          .BYTE   ^A/G/                    ; 135   ^X87   ^O207
48  01C0   565          .BYTE   ^A/H/                    ; 136   ^X88   ^O210
5C  01C1   566          .BYTE   ^A/\/                    ; 137   ^X89   ^O211
3F  01C2   567          .BYTE   ^A/?/                    ; 138   ^X8A   ^O212
2E  01C3   568          .BYTE   ^A/./                    ; 139   ^X8B   ^O213
29  01C4   569          .BYTE   ^A/)/                    ; 140   ^X8C   ^O214
5D  01C5   570          .BYTE   ^A/]/                    ; 141   ^X8D   ^O215
3C  01C6   571          .BYTE   ^A/</                    ; 142   ^X8E   ^O216
21  01C7   572          .BYTE   ^A/!/                    ; 143   ^X8F   ^O217
49  01C8   573          .BYTE   ^A/I/                    ; 144   ^X90   ^O220
01  01C9   574          .BYTE   ^X01                     ; 145   ^X91   ^O221
02  01CA   575          .BYTE   ^X02                     ; 146   ^X92   ^O222
03  01CB   576          .BYTE   ^X03                     ; 147   ^X93   ^O223
5C  01CC   577          .BYTE   ^A/\/                    ; 148   ^X94   ^O224
09  01CD   578          .BYTE   ^X09                     ; 149   ^X95   ^O225
5C  01CE   579          .BYTE   ^A/\/                    ; 150   ^X96   ^O226
FF  01CF   580          .BYTE   ^XFF                     ; 151   ^X97   ^O227
5C  01D0   581          .BYTE   ^A/\/                    ; 152   ^X98   ^O230
5C  01D1   582          .BYTE   ^A/\/                    ; 153   ^X99   ^O231
5C  01D2   583          .BYTE   ^A/\/                    ; 154   ^X9A   ^O232
0B  01D3   584          .BYTE   ^X0B                     ; 155   ^X9B   ^O233
0C  01D4   585          .BYTE   ^X0C                     ; 156   ^X9C   ^O234
0D  01D5   586          .BYTE   ^X0D                     ; 157   ^X9D   ^O235
0E  01D6   587          .BYTE   ^X0E                     ; 158   ^X9E   ^O236
0F  01D7   588          .BYTE   ^X0F                     ; 159   ^X9F   ^O237
7B  01D8   589          .BYTE   ^A/{/                    ; 160   ^XA0   ^O240
61  01D9   590          .BYTE   ^A/a/                    ; 161   ^XA1   ^O241
62  01DA   591          .BYTE   ^A/b/                    ; 162   ^XA2   ^O242
63  01DB   592          .BYTE   ^A/c/                    ; 163   ^XA3   ^O243
64  01DC   593          .BYTE   ^A/d/                    ; 164   ^XA4   ^O244
65  01DD   594          .BYTE   ^A/e/                    ; 165   ^XA5   ^O245
66  01DE   595          .BYTE   ^A/f/                    ; 166   ^XA6   ^O246
67  01DF   596          .BYTE   ^A/g/                    ; 167   ^XA7   ^O247
68  01E0   597          .BYTE   ^A/h/                    ; 168   ^XA8   ^O250
5C  01E1   598          .BYTE   ^A/\/                    ; 169   ^XA9   ^O251
5C  01E2   599          .BYTE   ^A/\/                    ; 170   ^XAA   ^O252
5C  01E3   600          .BYTE   ^A/\/                    ; 171   ^XAB   ^O253
5C  01E4   601          .BYTE   ^A/\/                    ; 172   ^XAC   ^O254
5C  01E5   602          .BYTE   ^A/\/                    ; 173   ^XAD   ^O255
5C  01E6   603          .BYTE   ^A/\/                    ; 174   ^XAE   ^O256
5C  01E7   604          .BYTE   ^A/\/                    ; 175   ^XAF   ^O257
69  01E8   605          .BYTE   ^A/i/                    ; 176   ^XB0   ^O260
5C  01E9   606          .BYTE   ^A/\/                    ; 177   ^XB1   ^O261
5C  01EA   607          .BYTE   ^A/\/                    ; 178   ^XB2   ^O262
5C  01EB   608          .BYTE   ^A/\/                    ; 179   ^XB3   ^O263
5C  01EC   609          .BYTE   ^A/\/                    ; 180   ^XB4   ^O264
5C  01ED   610          .BYTE   ^A/\/                    ; 181   ^XB5   ^O265
5C  01EE   611          .BYTE   ^A/\/                    ; 182   ^XB6   ^O266
5C  01EF   612          .BYTE   ^A/\/                    ; 183   ^XB7   ^O267
5C  01F0   613          .BYTE   ^A/\/                    ; 184   ^XB8   ^O270
5C  01F1   614          .BYTE   ^A/\/                    ; 185   ^XB9   ^O271
5C  01F2   615          .BYTE   ^A/\/                    ; 186   ^XBA   ^O272
5C  01F3   616          .BYTE   ^A/\/                    ; 187   ^XBB   ^O273
5C  01F4   617          .BYTE   ^A/\/                    ; 188   ^XBC   ^O274
5C  01F5   618          .BYTE   ^A/\/                    ; 189   ^XBD   ^O275
```

```
5C  01F6  619          .BYTE   ^A/\/
5C  01F7  620          .BYTE   ^A/\/
7C  01F8  621          .BYTE   ^A/|/
6A  01F9  622          .BYTE   ^A/j/
6B  01FA  623          .BYTE   ^A/k/
6C  01FB  624          .BYTE   ^A/l/
6D  01FC  625          .BYTE   ^A/m/
6E  01FD  626          .BYTE   ^A/n/
6F  01FE  627          .BYTE   ^A/o/
70  01FF  628          .BYTE   ^A/p/
71  0200  629          .BYTE   ^A/q/
5C  0201  630          .BYTE   ^A/\/
5C  0202  631          .BYTE   ^A/\/
5C  0203  632          .BYTE   ^A/\/
5C  0204  633          .BYTE   ^A/\/
5C  0205  634          .BYTE   ^A/\/
5C  0206  635          .BYTE   ^A/\/
5C  0207  636          .BYTE   ^A/\/
72  0208  637          .BYTE   ^A/r/
5C  0209  638          .BYTE   ^A/\/
5C  020A  639          .BYTE   ^A/\/
5C  020B  640          .BYTE   ^A/\/
5C  020C  641          .BYTE   ^A/\/
5C  020D  642          .BYTE   ^A/\/
5C  020E  643          .BYTE   ^A/\/
5C  020F  644          .BYTE   ^A/\/
5C  0210  645          .BYTE   ^A/\/
10  0211  646          .BYTE   ^X10
5C  0212  647          .BYTE   ^A/\/
5C  0213  648          .BYTE   ^A/\/
5C  0214  649          .BYTE   ^A/\/
5C  0215  650          .BYTE   ^A/\/
5C  0216  651          .BYTE   ^A/\/
5C  0217  652          .BYTE   ^A/\/
5C  0218  653          .BYTE   ^A/\/
5C  0219  654          .BYTE   ^A/\/
5C  021A  655          .BYTE   ^A/\/
5C  021B  656          .BYTE   ^A/\/
5C  021C  657          .BYTE   ^A/\/
5C  021D  658          .BYTE   ^A/\/
5C  021E  659          .BYTE   ^A/\/
5C  021F  660          .BYTE   ^A/\/
5C  0220  661          .BYTE   ^A/\/
5C  0221  662          .BYTE   ^A/\/
5C  0222  663          .BYTE   ^A/\/
5C  0223  664          .BYTE   ^A/\/
5C  0224  665          .BYTE   ^A/\/
5C  0225  666          .BYTE   ^A/\/
5C  0226  667          .BYTE   ^A/\/
5C  0227  668          .BYTE   ^A/\/
5C  0228  669          .BYTE   ^A/\/
5C  0229  670          .BYTE   ^A/\/
5C  022A  671          .BYTE   ^A/\/
5C  022B  672          .BYTE   ^A/\/
5C  022C  673          .BYTE   ^A/\/
5C  022D  674          .BYTE   ^A/\/
5C  022E  675          .BYTE   ^A/\/

                ; 190   ^XBE    ^O276
                ; 191   ^XBF    ^O277
                ; 192   ^XC0    ^O300
                ; 193   ^XC1    ^O301
                ; 194   ^XC2    ^O302
                ; 195   ^XC3    ^O303
                ; 196   ^XC4    ^O304
                ; 197   ^XC5    ^O305
                ; 198   ^XC6    ^O306
                ; 199   ^XC7    ^O307
                ; 200   ^XC8    ^O310
                ; 201   ^XC9    ^O311
                ; 202   ^XCA    ^O312
                ; 203   ^XCB    ^O313
                ; 204   ^XCC    ^O314
                ; 205   ^XCD    ^O315
                ; 206   ^XCE    ^O316
                ; 207   ^XCF    ^O317
                ; 208   ^XD0    ^O320
                ; 209   ^XD1    ^O321
                ; 210   ^XD2    ^O322
                ; 211   ^XD3    ^O323
                ; 212   ^XD4    ^O324
                ; 213   ^XD5    ^O325
                ; 214   ^XD6    ^O326
                ; 215   ^XD7    ^O327
                ; 216   ^XD8    ^O330
                ; 217   ^XD9    ^O331
                ; 218   ^XDA    ^O332
                ; 219   ^XDB    ^O333
                ; 220   ^XDC    ^O334
                ; 221   ^XDD    ^O335
                ; 222   ^XDE    ^O336
                ; 223   ^XDF    ^O337
                ; 224   ^XE0    ^O340
                ; 225   ^XE1    ^O341
                ; 226   ^XE2    ^O342
                ; 227   ^XE3    ^O343
                ; 228   ^XE4    ^O344
                ; 229   ^XE5    ^O345
                ; 230   ^XE6    ^O346
                ; 231   ^XE7    ^O347
                ; 232   ^XE8    ^O350
                ; 233   ^XE9    ^O351
                ; 234   ^XEA    ^O352
                ; 235   ^XEB    ^O353
                ; 236   ^XEC    ^O354
                ; 237   ^XED    ^O355
                ; 238   ^XEE    ^O356
                ; 239   ^XEF    ^O357
                ; 240   ^XF0    ^O360
                ; 241   ^XF1    ^O361
                ; 242   ^XF2    ^O362
                ; 243   ^XF3    ^O363
                ; 244   ^XF4    ^O364
                ; 245   ^XF5    ^O365
                ; 246   ^XF6    ^O366
```

```
5C  022F    676         .BYTE   ^A/\/                    ; 247   ^XF7   ^O367
5C  0230    677         .BYTE   ^A/\/                    ; 248   ^XF8   ^O370
5C  0231    678         .BYTE   ^A/\/                    ; 249   ^XF9   ^O371
5C  0232    679         .BYTE   ^A/\/                    ; 250   ^XFA   ^O372
5C  0233    680         .BYTE   ^A/\/                    ; 251   ^XFB   ^O373
5C  0234    681         .BYTE   ^A/\/                    ; 252   ^XFC   ^O374
5C  0235    682         .BYTE   ^A/\/                    ; 253   ^XFD   ^O375
5C  0236    683         .BYTE   ^A/\/                    ; 254   ^XFE   ^O376
5C  0237    684         .BYTE   ^A/\/                    ; 255   ^XFF   ^O377
```

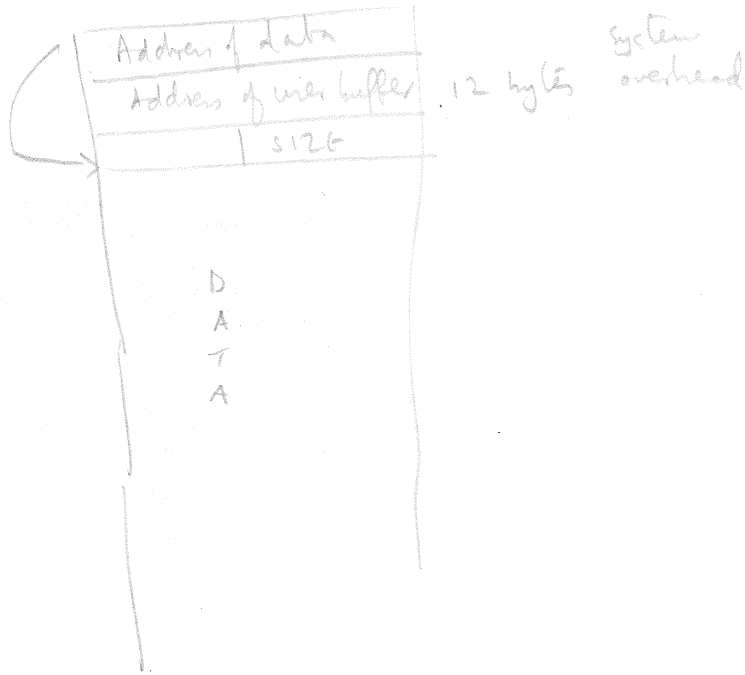
```
0238    686          .SBTTL  CR11 FUNCTION DECISION TABLE
0238    687 ;
0238    688 ; CR11 FUNCTION DECISION TABLE
0238    689 ;
0238    690
0238    691 CR_FUNCTABLE:                           ;FUNCTION DECISION TABLE
0238    692          FUNCTAB ,-                     ;LEGAL FUNCTION
0238    693                  <READLBLK,-            ;READ LOGICAL BLOCK
0238    694                   READPBLK,-            ;READ PHYSICAL BLOCK
0238    695                   READVBLK,-            ;READ VIRTUAL BLOCK
0238    696                   SENSEMODE,-           ;SENSE READ MODE
0238    697                   SENSECHAR,-           ;SENSE READER CHARACTERISTICS
0238    698                   SETMODE,-             ;SET READER MODE
0238    699                   SETCHAR,-             ;SET READER CHARACTERISTICS
0238    700                  >                      ;
0240    701          FUNCTAB ,-                     ;BUFFERED I/O FUNCTIONS
0240    702                  <READLBLK,-            ;READ LOGICAL BLOCK
0240    703                   READPBLK,-            ;READ PHYSICAL BLOCK
0240    704                   READVBLK,-            ;READ VIRTUAL BLOCK
0240    705                   SENSEMODE,-           ;SENSE READ MODE
0240    706                   SENSECHAR,-           ;SENSE READER CHARACTERISTICS
0240    707                   SETMODE,-             ;SET READER MODE
0240    708                   SETCHAR,-             ;SET READER CHARACTERISTICS
0240    709                  >                      ;
0248    710          FUNCTAB CR_READ,-              ;READ FUNCTIONS
0248    711                  <READLBLK,-            ;READ LOGICAL BLOCK
0248    712                   READPBLK,-            ;READ PHYSICAL BLOCK
0248    713                   READVBLK,-            ;READ VIRTUAL BLOCK
0248    714                  >                      ;
0254    715          FUNCTAB +EXE$SETMODE,-         ;SET MODE/CHARACTERISTICS FUNCTIONS
0254    716                  <SETCHAR,-             ;SET READER CHARACTERISTICS
0254    717                   SETMODE,-             ;SET READER MODE
0254    718                  >                      ;
0260    719          FUNCTAB +EXE$SENSEMODE,-       ;SENSE MODE/CHARACTERISTICS FUNCTIONS
0260    720                  <SENSECHAR,-           ;SENSE READER CHARACTERISTICS
0260    721                   SENSEMODE,-           ;SENSE READER MODE
0260    722                  >                      ;
```

External (system routines)

```
                     026C   724          .SBTTL  CANCEL I/O ON CHANNEL
                     026C   725 ;+
                     026C   726 ; CR_CANCELIO - CANCEL I/O ON CHANNEL
                     026C   727 ;
                     026C   728 ; THIS ROUTINE IS CALLED WHEN THE LAST CHANNEL ASSIGNED TO A DEVICE IS DEASSIGNED,
                     026C   729 ; THE DEVICE IS DEALLOCATED, AND WHEN THE CANCEL I/O ON CHANNEL SYSTEM SERVICE IS
                     026C   730 ; EXECUTED.
                     026C   731 ;
                     026C   732 ; INPUTS:
                     026C   733 ;
                     026C   734 ;       R2 = NEGATIVE CHANNEL NUMBER.
                     026C   735 ;       R3 = ADDRESS OF CURRENT I/O REQUEST PACKET.
                     026C   736 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                     026C   737 ;       R5 = DEVICE UCB ADDRESS.
                     026C   738 ;
                     026C   739 ; OUTPUTS:
                     026C   740 ;
                     026C   741 ;       THE DEVICE INDEPENDENT CANCEL I/O ROUTINE IS CALLED AND A CHECK IS MADE
                     026C   742 ;       TO SEE IF THE UCB REFERENCE COUNT IS ZERO. IF THE REFERENCE COUNT IS ZERO,
                     026C   743 ;       THEN THE MESSAGE SENT TO JOB CONTROLLER BIT IS CLEARED.
                     026C   744 ;-
                     026C   745
                     026C   746 CR_CANCELIO:                                ;CANCEL I/O ON CHANNEL
          5C A5   B5 026C   747          TSTW    UCB$W_REFC(R5)            ;REFERENCE COUNT ZERO?
              04   12 026F   748          BNEQ    10$                       ;IF NEQ NO
  68 A5   01   AA 0271   749          BICW    #UCB$M_JOB,UCB$W_DEVSTS(R5) ;CLEAR MESSAGE SENT BIT
00000000'GF   17 0275   750 10$:     JMP     G^IOC$CANCELIO            ;CANCEL I/O ON CHANNEL
```

```
                     027B   752          .SBTTL  READ FUNCTION PROCESSING
                     027B   753 ;+
                     027B   754 ; CR_READ - READ FUNCTION PROCESSING
                     027B   755 ;
                     027B   756 ; THIS ROUTINE IS CALLED FROM THE FUNCTION DECISION TABLE DISPATCHER TO PROCESS
                     027B   757 ; A READ LOGICAL, READ PHYSICAL, OR READ VIRTUAL FUNCTION TO A CARD READER.
                     027B   758 ;
                     027B   759 ; INPUTS:
                     027B   760 ;
                     027B   761 ;        R0 = SCRATCH.
                     027B   762 ;        R1 = SCRATCH.
                     027B   763 ;        R2 = SCRATCH.
                     027B   764 ;        R3 = ADDRESS OF I/O REQUEST PACKET.
                     027B   765 ;        R4 = CURRENT PROCESS PCB ADDRESS.
                     027B   766 ;        R5 = ASSIGNED DEVICE UCB ADDRESS.
                     027B   767 ;        R6 = ADDRESS OF CCB.
                     027B   768 ;        R7 = I/O FUNCTION CODE.
                     027B   769 ;        R8 = FUNCTION DECISION TABLE DISPATCH ADDRESS.
                     027B   770 ;        R9 = SCRATCH.
                     027B   771 ;        R10 = SCRATCH.
                     027B   772 ;        R11 = SCRATCH.
                     027B   773 ;        AP = ADDRESS OF FIRST FUNCTION DEPENDENT PARAMETER.
                     027B   774 ;
                     027B   775 ; OUTPUTS:
                     027B   776 ;
                     027B   777 ;        THE FUNCTION PARAMETERS ARE CHECKED AND A BUFFER IS ALLOCATED FOR THE
                     027B   778 ;        CARD READER DRIVER TO READ A CARD IMAGE INTO.
                     027B   779 ;-
                     027B   780
                     027B   781 CR_READ:                                             ;READ FUNCTION PROCESSING
          50    6C   D0  027B   782          MOVL    P1(AP),R0                      ;GET ADDRESS OF USER BUFFER
    51    04  AC   3C  027E   783          MOVZWL  P2(AP),R1                      ;GET LENGTH OF USER BUFFER
              5C   13  0282   784          BEQL    30$                            ;IF EQL ZERO LENGTH TRANSFER
  00000000'GF    16  0284   785          JSB     G^EXE$READCHK                  ;CHECK ACCESSIBILITY OF USER BUFFER
   32 A3    51   B0  028A   786          MOVW    R1,IRP$W_BCNT(R3)              ;INSERT LENGTH OF USER BUFFER
              09   BB  028E   787          PUSHR   #^M<R0,R3>                     ;SAVE BUFFER AND I/O PACKET ADDRESSES
    51    50 8F   9A  0290   788          MOVZBL  #80,R1                         ;SET LENGTH REQUIRED FOR ASCII READ
03 20 A3    06   E1  0294   789          BBC     #IO$V_BINARY,IRP$W_FUNC(R3),10$ ;IF CLR, ASCII READ
        51  02   C4  0299   790          MULL    #2,R1                          ;SET LENGTH REQUIRED FOR BINARY READ
   32 A3    51   B1  029C   791 10$:     CMPW    R1,IRP$W_BCNT(R3)              ;LENGTH OF READ LARGER THAN USER BUFFER?
              04   1E  02A0   792          BGEQU   20$                            ;IF GEQU YES
   32 A3    51   B0  02A2   793          MOVW    R1,IRP$W_BCNT(R3)              ;SET LENGTH OF USER BUFFER TO SIZE OF READ
        51  0C   C0  02A6   794 20$:     ADDL    #12,R1                         ;ACCOUNT FOR BUFFER OVERHEAD
  00000000'GF    16  02A9   795          JSB     G^EXE$BUFFRQUOTA               ;CHECK IF PROCESS HAS SUFFICIENT QUOTA
        37 50    E9  02AF   796          BLBC    R0,40$                         ;IF LBC QUOTA CHECK FAILURE
  00000000'GF    16  02B2   797          JSB     G^EXE$ALLOCBUF                 ;ALLOCATE BUFFER FOR CARD READ
        2E 50    E9  02B8   798          BLBC    R0,40$                         ;IF LBC ALLOCATION FAILURE
              09   BA  02BB   799          POPR    #^M<R0,R3>                     ;RETRIEVE BUFFER AND I/O PACKET ADDRESSES
   2C A3    52   D0  02BD   800          MOVL    R2,IRP$L_SVAPTE(R3)            ;INSERT ADDRESS OF READ BUFFER
   30 A3    51   B0  02C1   801          MOVW    R1,IRP$W_BOFF(R3)              ;INSERT NUMBER OF QUOTA BYTES CHARGED
              50   DD  02C5   802          PUSHL   R0                             ;SAVE BUFFER ADDRESS
 50    0080 C4   D0  02C7   803          MOVL    PCB$L_JIB(R4),R0               ;GET JIB ADDRESS
   20 A0    51   C2  02CC   804          SUBL    R1,JIB$L_BYTCNT(R0)            ;CHARGE PROCESS FOR BUFFER
              50 8ED0  02D0   805          POPL    R0                             ;RESTORE BUFFER ADDRESS
   82    0C A2   9E  02D3   806          MOVAB   12(R2),(R2)+                   ;INSERT ADDRESS OF DATA AREA
      62    50   D0  02D7   807          MOVL    R0,(R2)                        ;SAVE ADDRESS OF USER BUFFER
 00000000'GF    17  02DA   808          JMP     G^EXE$QIODRVPKT                ;QUEUE DRIVER PACKET
```

```
                        02E0    809
                        02E0    810 ;
                        02E0    811 ; ZERO LENGTH TRANSFER
                        02E0    812 ;
                        02E0    813
    50   01    3C   02E0    814 30$:    MOVZWL  #SS$_NORMAL,R0          ;SET NORMAL COMPLETION STATUS
00000000'GF    17   02E3    815         JMP     G^EXE$FINISHIOC         ;FINISH I/O
                        02E9    816
                        02E9    817 ;
                        02E9    818 ; QUOTA OR BUFFER ALLOCATION FAILURE
                        02E9    819 ;
                        02E9    820
     0C    BA   02E9    821 40$:    POPR    #^M<R2,R3>              ;RETRIEVE I/O PACKET ADDRESS
00000000'GF    17   02EB    822         JMP     G^EXE$ABORTIO           ;ABORT I/O OPERATION
```



```
                        02F1    824          .SBTTL  START I/O OPERATION ON CR11 CARD READER
                        02F1    825 ;+
                        02F1    826 ; CR_STARTIO - START I/O OPERATION ON CR11 CARD READER
                        02F1    827 ;
                        02F1    828 ; THIS ROUTINE IS ENTERED WHEN THE ASSOCIATED UNIT IS IDLE AND A PACKET IS
                        02F1    829 ; AVAILABLE FOR PROCESSING.
                        02F1    830 ;
                        02F1    831 ; INPUTS:
                        02F1    832 ;
                        02F1    833 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                        02F1    834 ;       R5 = ADDRESS OF DEVICE UNIT UCB.
                        02F1    835 ;
                        02F1    836 ; OUTPUTS:
                        02F1    837 ;
                        02F1    838 ;       CARD MOTION IS STARTED BY SETTING THE APPROPRIATE FUNCTION BITS IN THE
                        02F1    839 ;       CONTROL STATUS REGISTER. AS EACH COLUMN INTERRUPT OCCURS, THE DATA FROM
                        02F1    840 ;       THE DATA BUFFER REGISTER(S) IS STORED IN THE BUFFER ALLOCATED BY THE
                        02F1    841 ;       FDT ROUTINE. WHEN ALL 80 COLUMNS HAVE BEEN READ, A FORK PROCESS IS CREAT-
                        02F1    842 ;       ED, THE COLUMN DATA IS CONVERTED ACCORDING TO THE I/O FUNCTION CODE, AND
                        02F1    843 ;       REQUEST COMPLETE IS CALLED FOR POST PROCESSING.
                        02F1    844 ;-
                        02F1    845
                        02F1    846 CR_STARTIO:                                 ;START I/O OPERATION
    06   00    ED       02F1    847          CMPZV   #IRP$V_FCODE,#IRP$S_FCODE,- ;SET MODE FUNCTION?
23    20 A3             02F4    848                  IRP$W_FUNC(R3),#IO$_SETMODE ;
        0D    13        02F7    849          BEQL    10$                         ;IF EQL YES
    06   00    ED       02F9    850          CMPZV   #IRP$V_FCODE,#IRP$S_FCODE,- ;SET CHARACTERISTICS FUNCTION?
1A    20 A3             02FC    851                  IRP$W_FUNC(R3),#IO$_SETCHAR ;
        12    12        02FF    852          BNEQ    20$                         ;IF NEQ NO
                        0301    853
                        0301    854 ;
                        0301    855 ; SET READER CHARACTERISTICS
                        0301    856 ;
                        0301    857
40 A5    38 A3    B0    0301    858          MOVW    IRP$L_MEDIA(R3),UCB$B_DEVCLASS(R5)    ;SET DEVICE CLASS AND TYPE
                        0306    859
                        0306    860 ;
                        0306    861 ; SET READER MODE
                        0306    862 ;
                        0306    863
42 A5    3A A3    B0    0306    864 10$:     MOVW    IRP$L_MEDIA+2(R3),UCB$W_DEVBUFSIZ(R5) ;SET DEFAULT BUFFER SIZE
44 A5    3C A3    D0    030B    865          MOVL    IRP$L_MEDIA+4(R3),UCB$L_DEVDEPEND(R5) ;SET DEVICE DEPENDENT FLAGS
          016A    31    0310    866          BRW     140$                        ;
                        0313    867
                        0313    868 ;
                        0313    869 ; SET UP PARAMETERS AND READ CARD
                        0313    870 ;
                        0313    871
78 A5    2C B3    D0    0313    872 20$:     MOVL    @IRP$L_SVAPTE(R3),UCB$L_SVAPTE(R5) ;SET ADDRESS OF BUFFER
 0091 C5    01    90    0318    873          MOVB    #1,UCB$B_CR_EOFCNT(R5)  ;SET END OF FILE COUNT FOR ASCII
05 20 A3    06    E1    031D    874          BBC     #IO$V_BINARY,IRP$W_FUNC(R3),30$ ;IF CLR, ASCII READ
 0091 C5    08    90    0322    875          MOVB    #8,UCB$B_CR_EOFCNT(R5)  ;SET END OF FILE COUNT FOR BINARY
      0091 C5    90    0327    876 30$:     MOVB    UCB$B_CR_EOFCNT(R5),UCB$B_CR_EOFCOL(R5) ;SET REQUIRED NUMBER
      0092 C5          032B
 0090 C5    01    8E    032E    877          MNEGB   #1,UCB$B_CR_COLCNT(R5)  ;SET INITIAL COLUMN COUNT
      0093 C5    94    0333    878          CLRB    UCB$B_CR_OFLCNT(R5)     ;SET INITIAL OFFLINE COUNT
   54   24 A5    D0    0337    879          MOVL    UCB$L_CRB(R5),R4        ;GET ADDRESS OF CRB
```

```
                54    2C B4    D0   033B    880          MOVL    @CRB$L_INTD+VEC$L_IDB(R4),R4 ;GET DEVICE CSR ADDRESS
                                 033F    881 40$:     DSBINT                       ;DISABLE INTERRUPTS
                64    0100 8F    B3   0345    882          BITW    #CR_CSR_M_OFFLIN,CR_CSR(R4) ;READER OFFLINE?
                            5D    13   034A    883          BEQL    70$                  ;IF EQL NO
                                 034C    884          WFIKPCH 50$,#2               ;WAIT FOR TIMEOUT
                                 0356    885          IOFORK                       ;CREATE FORK PROCESS
                            E1    11   035C    886          BRB     40$                  ;
                                 035E    887
                                 035E    888 ;
                                 035E    889 ; READER TIME OUT OR DEVICE ERROR
                                 035E    890 ;
                                 035E    891
                64    40 8F    9B   035E    892 50$:     MOVZBW  #CR_CSR_M_IE,CR_CSR(R4) ;CLEAR READER ERRORS
                                 0362    893          SETIPL  UCB$B_FIPL(R5)       ;LOWER TO DEVICE FORK LEVEL
             22 64 A5    03    E0   0366    894          BBS     #UCB$V_CANCEL,UCB$W_STS(R5),60$ ;IF SET, CANCEL I/O REQUESTED
                   01    0F    9D   036B    895          ACBB    #15,#1,UCB$B_CR_OFLCNT(R5),40$ ;IF SET, NOT TIME FOR MESSAGE
              FFCC 0093 C5       036E
                   0093 C5    94   0373    896          CLRB    UCB$B_CR_OFLCNT(R5)  ;CLEAR OFFLINE COUNT
                            18    BB   0377    897          PUSHR   #^M<R3,R4>           ;SAVE REGISTERS
                      54    05    9A   0379    898          MOVZBL  #MSG$_DEVOFFLIN,R4   ;SET DEVICE MESSAGE NUMBER
              00000000'GF       9E   037C    899          MOVAB   G^SYS$GL_OPRMBX,R3   ;GET ADDRESS OF OPERATOR MAILBOX
                            53         0382
              00000000'GF       16   0383    900          JSB     G^EXE$SNDEVMSG       ;SEND MESSAGE TO OPERATOR
                            18    BA   0389    901          POPR    #^M<R3,R4>           ;RESTORE REGISTERS
                            B2    11   038B    902          BRB     40$                  ;
                                 038D    903
                                 038D    904 ;
                                 038D    905 ; CANCEL CURRENT READ REQUEST
                                 038D    906 ;
                                 038D    907
                      50    2C    3C   038D    908 60$:     MOVZWL  #SS$_ABORT,R0        ;SET ABORT STATUS
                         00F3    31   0390    909          BRW     150$                 ;
                                 0393    910 ;
                                 0393    911 ; DATA OVERFLOW (MORE THAN 80 COL) DETECTED
                                 0393    912 ;
                                 0393    913
                64    40 8F    9B   0393    914 65$:     MOVZBW  #CR_CSR_M_IE,CR_CSR(R4) ;INHIBIT READS
                                 0397    915          IOFORK                       ;
                      0082 C5    B6   039D    916          INCW    UCB$W_ERRCNT(R5)     ;INCREMENT HARDWARE ERROR COUNT
             50       0054 8F    3C   03A1    917          MOVZWL  #SS$_CTRLERR,R0      ;RETURN HARDWARE ERROR STATUS
                         00DD    31   03A6    918          BRW     150$                 ;
                                 03A9    919
                                 03A9    920 ;
                                 03A9    921 ; INITIATE READ
                                 03A9    922 ;
                                 03A9    923
                         02 A4    B5   03A9    924 70$:     TSTW    CR_CRB1(R4)          ;CLEAR COLUMN BUFFER
                         41 8F    9B   03AC    925          MOVZBW  #CR_CSR_M_IE!CR_CSR_M_READ,- ;ENABLE INTERRUPTS AND START READ
                            64         03AF    926                  CR_CSR(R4)           ;
                                 03B0    927 80$:     WFIKPCH 50$,#3               ;WAITFOR INTERRUPT OR TIMEOUT
             64       C000 8F    B3   03BA    928          BITW    #CR_CSR_M_CRDONE!CR_CSR_M_ERROR,CR_CSR(R4) ;CARD DONE OR ERROR?
                            4A    12   03BF    929          BNEQ    120$                 ;IF NEQ YES
                51    02 A4    B0   03C1    930          MOVW    CR_CRB1(R4),R1       ;READ BINARY COLUMN
                52    04 A4    B0   03C5    931          MOVW    CR_CRB2(R4),R2       ;READ PACKED COLUMN
                      0090 C5    96   03C9    932          INCB    UCB$B_CR_COLCNT(R5)  ;INCREMENT COLUMN COUNT
                            05    12   03CD    933          BNEQ    90$                  ;IF NEQ NOT FIRST COLUMN
             0094 C5       51    B0   03CF    934          MOVW    R1,UCB$W_CR_FSTCOL(R5) ;SAVE FIRST COLUMN BINARY DATA
```

```
                0092 C5   91   03D4   935 90$:    CMPB    UCB$B_CR_EOFCOL(R5),UCB$B_CR_COLCNT(R5) ;PAST END OF FILE DATA?
                0090 C5        03D8
                     0B   15   03DB   936         BLEQ    100$                    ;IF LEQ YES
          51    0F0F 8F   B1   03DD   937         CMPW    #CR_EOF,R1              ;END OF FILE PUNCH?
                     04   12   03E2   938         BNEQ    100$                    ;IF NEQ NO
                0091 C5   97   03E4   939         DECB    UCB$B_CR_EOFCNT(R5)     ;DECREMENT END OF FILE COUNT
                  50 8F   91   03E8   940 100$:    CMPB    #80,UCB$B_CR_COLCNT(R5) ;DATA OVERFLOW (MORE THAN 80 COL) ?
                0090 C5        03EB
                     A3   1B   03EE   941         BLEQU   65$                     ;IF LEQU, YES
             78 B5   52   90   03F0   942         MOVB    R2,@UCB$L_SVAPTE(R5)    ;STORE PACKED COLUMN
       07 20 A3   06   E1   03F4   943         BBC     #IO$V_BINARY,IRP$W_FUNC(R3),110$ ;IF CLR, ASCII READ
             78 B5   51   B0   03F9   944         MOVW    R1,@UCB$L_SVAPTE(R5)    ;STORE BINARY COLUMN
                78 A5   D6   03FD   945         INCL    UCB$L_SVAPTE(R5)        ;UPDATE BUFFER ADDRESS
                78 A5   D6   0400   946 110$:    INCL    UCB$L_SVAPTE(R5)        ;UPDATE BUFFER ADDRESS
                        0403   947         DSBINT                          ;DISABLE INTERRUPTS
                     A5   11   0409   948         BRB     80$                     ;
                        040B   949
                        040B   950 ;
                        040B   951 ; SPECIAL CONDITION
                        040B   952 ;
                        040B   953
          0096 C5   64   B0   040B   954 120$:    MOVW    CR_CSR(R4),UCB$W_CR_CSR(R5) ;SAVE READER STATUS
            64    40 8F   9B   0410   955         MOVZBW  #CR_CSR_M_IE,CR_CSR(R4) ;CLEAR READER ERRORS
                        0414   956         IOFORK                          ;CREATE FORK PROCESS
          50    0870 8F   3C   041A   957         MOVZWL  #SS$_ENDOFFILE,R0       ;ASSUME END OF FILE ENCOUNTERED
                0091 C5   95   041F   958         TSTB    UCB$B_CR_EOFCNT(R5)     ;END OF FILE?
                     61   13   0423   959         BEQL    150$                    ;IF EQL YES
          50    0838 8F   3C   0425   960         MOVZWL  #SS$_DATAOVERUN,R0      ;ASSUME TIMING ERROR
          51    0096 C5   3C   042A   961         MOVZWL  UCB$W_CR_CSR(R5),R1     ;GET READER STATUS
             53 51   0B   E0   042F   962         BBS     #CR_CSR_V_TIMERR,R1,150$ ;IF SET, TIMING ERROR - EXIT
             65 51   0C   E0   0433   963         BBS     #CR_CSR_V_MCHECK,R1,180$ ;IF SET, MOTION CHECK - RETRY
                        0437   964 ;
                        0437   965 ;*** NOTE: SINCE HOPPER CHECK SETS ERROR, A READ CHECK IS NOT DETECTABLE
                        0437   966 ;*** IF HOPPER CHECK IS ALSO SET, IE. NO READ CHECK RETRIES ON LAST CARD
                        0437   967 ;
             04 51   0D   E0   0437   968         BBS     #CR_CSR_V_HCHECK,R1,125$ ;IF SET, HOPPER CHECK - OK
             5D 51   0F   E0   043B   969         BBS     #CR_CSR_V_ERROR,R1,180$  ;IF SET, READ CHECK - RETRY
                        043F   970 125$:
                0C0 8F   B3   043F   971         BITW    #IO$M_BINARY!IO$M_PACKED,IRP$W_FUNC(R3) ;BINARY OR PACKED READ?
                  20 A3        0443
                     36   12   0445   972         BNEQ    140$                    ;IF NEQ YES
                0AAA 8F   B1   0447   973         CMPW    #CR_029,UCB$W_CR_FSTCOL(R5) ;CHANGE MODE TO 029 TRANSLATION?
                0094 C5        044B
                     3E   13   044E   974         BEQL    160$                    ;IF EQL YES
                08A2 8F   B1   0450   975         CMPW    #CR_026,UCB$W_CR_FSTCOL(R5) ;CHANGE MODE TO 026 TRANSLATION?
                0094 C5        0454
                     3D   13   0457   976         BEQL    170$                    ;IF EQL YES
          50    FBDB CF   9E   0459   977         MOVAB   CR_CVT029,R0            ;GET ADDRESS OF 029 TRANSLATION TABLE
                04   00   ED   045E   978         CMPZV   #CR$V_TMODE,#CR$S_TMODE,- ;029 TRANSLATION MODE?
             01   44 A5        0461   979                 UCB$L_DEVDEPEND(R5),#CR$K_T029 ;
                     05   13   0464   980         BEQL    130$                    ;IF EQL YES
          50    FCCE CF   9E   0466   981         MOVAB   CR_CVT026,R0            ;GET ADDRESS OF 026 TRANSLATION TABLE
                     55   DD   046B   982 130$:    PUSHL   R5                      ;SAVE ADDRESS OF UCB
             51   2C B3   D0   046D   983         MOVL    @IRP$L_SVAPTE(R3),R1    ;GET ADDRESS OF I/O BUFFER
             61   32 A3   2E   0471   984         MOVTC   IRP$W_BCNT(R3),(R1),#0,(R0),IRP$W_BCNT(R3),(R1) ;TRANSLATE
                60   00        0475
             61   32 A3        0477
```

```
                55 8ED0   047A    985          POPL    R5                          ;RETRIEVE ADDRESS OF UCB
           50   01   3C    047D    986 140$:    MOVZWL  #SS$_NORMAL,R0              ;SET NORMAL COMPLETION
      10    7E A5   F0    0480    987          INSV    UCB$W_BCNT(R5),#16,#16,R0 ;INSERT TRANSFER BYTE COUNT
           50   10    .    0484
                51   D4    0486    988 150$:    CLRL    R1                          ;CLEAR SECOND I/O LONGWORD
                           0488    989          REQCOM                              ;COMPLETE REQUEST
                           048E    990
                           048E    991 ;
                           048E    992 ; SET 029 TRANSLATION MODE
                           048E    993 ;
                           048E    994
           00   01   F0    048E    995 160$:    INSV    #CR$K_T029,#CR$V_TMODE,- ;SET 029 TRANSLATION MODE
      44 A5   04         0491    996                  #CR$S_TMODE,UCB$L_DEVDEPEND(R5) ;
                06   11    0494    997          BRB     180$                        ;
                           0496    998
                           0496    999 ;
                           0496   1000 ; SET 026 TRANSLATION MODE
                           0496   1001 ;
                           0496   1002
           00   00   F0    0496   1003 170$:    INSV    #CR$K_T026,#CR$V_TMODE,- ;SET 026 TRANSLATION MODE
      44 A5   04         0499   1004                  #CR$S_TMODE,UCB$L_DEVDEPEND(R5) ;
              FE74   31    049C   1005 180$:    BRW     20$                         ;
```

```
                        049F  1007          .SBTTL  CR11 CARD READER INTDERRUPTS
                        049F  1008 ;+
                        049F  1009 ; CR$INT - CR11 CARD READER INTERRUPTS
                        049F  1010 ;
                        049F  1011 ; THIS ROUTINE IS ENTERED VIA A JSB INSTRUCTION WHEN AN INTERRUPT OCCURS ON A
                        049F  1012 ; CR11 CARD READER CONTROLLER. THE STATE OF THE STACK ON ENTRY IS:
                        049F  1013 ;
                        049F  1014 ;       00(SP) = ADDRESS OF IDB ADDRESS.
                        049F  1015 ;       04(SP) - 24(SP) = SAVED R0 - R5.
                        049F  1016 ;       28(SP) = INTERRUPT PC.
                        049F  1017 ;       32(SP) = INTERRUPT PSL.
                        049F  1018 ;
                        049F  1019 ; INTERRUPT DISPATCHING OCCURS AS FOLLOWS:
                        049F  1020 ;
                        049F  1021 ;       IF THE INTERRUPT IS EXPECTED, THE DRIVER IS CALLED AT ITS
                        049F  1022 ;       INTERRUPT RETURN ADDRESS (UCB$L_FPC).  IF THE INTERRUPT IS
                        049F  1023 ;       NOT EXPECTED AND THE DEVICE IS NOT ALLOCATED, A MESSAGE IS
                        049F  1024 ;       SENT TO THE JOB CONTROLLER TO INFORM IT THAT AN INPUT
                        049F  1025 ;       SYMBIONT PROCESS SHOULD BE CREATED TO READ THE CARDS.
                        049F  1026 ;-
                        049F  1027
                        049F  1028 CR$INT::                                     ;CARD READER INTERRUPT
        53    9E    D0  049F  1029          MOVL    @(SP)+,R3                 ;GET ADDRESS OF IDB
        54    63    7D  04A2  1030          MOVQ    IDB$L_CSR(R3),R4          ;GET CONTROLLER CSR AND OWNER UCB ADDRESS
11 64 A5    01    E5  04A5  1031          BBCC    #UCB$V_INT,UCB$W_STS(R5),10$ ;IF CLR, INTERRUPT NOT EXPECTED
   53    10 A5    D0  04AA  1032          MOVL    UCB$L_FR3(R5),R3          ;RESTORE REMAINING DRIVER CONTEXT
         0C B5    16  04AE  1033          JSB     @UCB$L_FPC(R5)            ;CALL DRIVER
        50    8E    7D  04B1  1034          MOVQ    (SP)+,R0                  ;RESTORE REGISTERS
        52    8E    7D  04B4  1035          MOVQ    (SP)+,R2                  ;
        54    8E    7D  04B7  1036          MOVQ    (SP)+,R4                  ;
                    02  04BA  1037          REI                               ;
                        04BB  1038
                        04BB  1039 ;
                        04BB  1040 ; UNSOLICITED INTERRUPT
                        04BB  1041 ;
                        04BB  1042
        50    64    3C  04BB  1043 10$:     MOVZWL  CR_CSR(R4),R0             ;GET READER STATUS
     64    40 8F    9B  04BE  1044          MOVZBW  #CR_CSR_M_IE,CR_CSR(R4)   ;CLEAR STATUS, ENABLE INTERRUPTS
  50    0400 8F    B3  04C2  1045          BITW    #CR_CSR_M_ONLINE,R0       ;READER TRANSITION TO ONLINE?
              0C    13  04C7  1046          BEQL    20$                       ;IF EQL NO
           5C A5    B5  04C9  1047          TSTW    UCB$W_REFC(R5)            ;DEVICE ASSIGNED OR ALLOCATED?
              07    12  04CC  1048          BNEQ    20$                       ;IF NEQ YES
02 68 A5    00    E2  04CE  1049          BBSS    #UCB$V_JOB,UCB$W_DEVSTS(R5),20$ ;IF SET, MESSAGE ALREADY SENT
              0A    10  04D3  1050          BSBB    30$                       ;SEND MESSAGE TO JOB CONTROLLER
        50    8E    7D  04D5  1051 20$:     MOVQ    (SP)+,R0                  ;RESTORE REGISTERS
        52    8E    7D  04D8  1052          MOVQ    (SP)+,R2                  ;
        54    8E    7D  04DB  1053          MOVQ    (SP)+,R4                  ;
                    02  04DE  1054          REI                               ;
  00000000'GF       16  04DF  1055 30$:     JSB     G^EXE$FORK                ;CREATE FORK PROCESS
        54    02    9A  04E5  1056          MOVZBL  #MSG$_CRUNSOLIC,R4        ;SET MESSAGE TYPE
  00000000'GF       9E  04E8  1057          MOVAB   G^SYS$GL_JOBCTLMB,R3      ;SET ADDRESS OF JOB CONTROLLER MAILBOX
              53        04EE
  00000000'GF       16  04EF  1058          JSB     G^EXE$SNDEVMSG            ;SENT MESSAGE TO JOB CONTROLLER
        04 50       E8  04F5  1059          BLBS    R0,40$                    ;IF LBS SUCCESSFUL NOTIFICATION
   68 A5    01       AA  04F8  1060          BICW    #UCB$M_JOB,UCB$W_DEVSTS(R5) ;CLEAR MESSAGE SENT BIT
                    05  04FC  1061 40$:     RSB                               ;
```

```
                     04FD  1063          .SBTTL  CARD READER INITIALIZATION
                     04FD  1064 ;+
                     04FD  1065 ; CR_INITIAL - CR11 CARD READER INITIALIZATION
                     04FD  1066 ;
                     04FD  1067 ; THIS ROUTINE IS CALLED AT SYSTEM STARTUP AND AFTER A POWER FAILURE. THE CSR
                     04FD  1068 ; ADDRESS OF THE RESPECTIVE CR11 CONTROLLER IS READ TO INSURE ITS PRESENCE ON
                     04FD  1069 ; THE UBA AND THEN CARD READER INTERRUPTS ARE ENABLED.
                     04FD  1070 ;
                     04FD  1071 ; INPUTS:
                     04FD  1072 ;
                     04FD  1073 ;        R4 = CR11 CONTROLLER CSR ADDRESS.
                     04FD  1074 ;        R5 = IDB ADDRESS OF DEVICE UNIT.
                     04FD  1075 ;
                     04FD  1076 ; OUTPUTS:
                     04FD  1077 ;
                     04FD  1078 ;        ALL REGISTERS ARE PRESERVED.
                     04FD  1079 ;-
                     04FD  1080
                     04FD  1081 CR_INITIAL:                              ;CR11 INITIALIZATION
64   40 8F    9B     04FD  1082          MOVZBW  #CR_CSR_M_IE,CR_CSR(R4) ;ENABLE CR11 INTERRUPTS
05   0501  1083          RSB                                             ;
```

```
                     0502  1085          .SBTTL  CARD READER UNIT INITIALIZATION
                     0502  1086 ;+
                     0502  1087 ; CR_CR11_INIT - CARD READER UNIT INITIALIZATION
                     0502  1088 ;
                     0502  1089 ; THIS ROUTINE IS CALLED AT SYSTEM STARTUP AND AFTER A POWER FAILURE. THE
                     0502  1090 ; ONLINE BIT IS SET IN THE DEVICE UCB.
                     0502  1091 ;
                     0502  1092 ; INPUTS:
                     0502  1093 ;
                     0502  1094 ;        R5 = ADDRESS OF DEVICE UCB.
                     0502  1095 ;
                     0502  1096 ; OUTPUTS:
                     0502  1097 ;
                     0502  1098 ;        THE ONLINE BIT IS SET IN THE DEVICE UCB AND THE ADDRESS OF THE UCB
                     0502  1099 ;        IS FILLED INTO THE OWNER FIELD OF THE IDB.
                     0502  1100 ;-
                     0502  1101
                     0502  1102 CR_CR11_INIT:                                ;CARD READER UNIT INITIALIZATION
64 A5    10    A8    0502  1103          BISW    #UCB$M_ONLINE,UCB$W_STS(R5) ;SET UNIT ONLINE
50    24 A5    D0    0506  1104          MOVL    UCB$L_CRB(R5),R0            ;GET ADDRESS OF CRB
50    2C A0    D0    050A  1105          MOVL    CRB$L_INTD+VEC$L_IDB(R0),R0 ;GET ADDRESS OF IDB
04 A0    55    D0    050E  1106          MOVL    R5,IDB$L_OWNER(R0)          ;SET ADDRESS OF DEVICE UCB
                05    0512  1107          RSB                                 ;
                     0513  1108 CR_END:                                      ;ADDRESS OF LAST LOCATION IN DRIVER
                     0513  1109
                     0513  1110          .END
```

```
$$$                     = 00000020 R      02
$$OP                    = 00000002
AT$_UBA                 = 00000001
CR$DDT                    00000000 RG     03
CR$INT                    0000049F RG     03
CR$K_TO26               = 00000000
CR$K_TO29               = 00000001
CR$S_TMODE              = 00000004
CR$V_TMODE              = 00000000
CRB$L_INTD              = 00000024
CR_026                  = 000008A2
CR_029                  = 00000AAA
CR_CANCELIO               0000026C R      03
CR_CR11_INIT              00000502 R      03
CR_CRB1                   00000002
CR_CRB2                   00000004
CR_CSR                    00000000
CR_CSR_M_CRDONE         = 00004000
CR_CSR_M_ERROR          = 00008000
CR_CSR_M_IE             = 00000040
CR_CSR_M_OFFLIN         = 00000100
CR_CSR_M_ONLINE         = 00000400
CR_CSR_M_READ           = 00000001
CR_CSR_V_ERROR          = 0000000F
CR_CSR_V_HCHECK         = 0000000D
CR_CSR_V_MCHECK         = 0000000C
CR_CSR_V_TIMERR         = 0000000B
CR_CVT026                 00000138 R      03
CR_CVT029                 00000038 R      03
CR_END                    00000513 R      03
CR_EOF                  = 00000F0F
CR_FUNCTABLE              00000238 R      03
CR_INITIAL                000004FD R      03
CR_READ                   0000027B R      03
CR_STARTIO                000002F1 R      03
DC$_CARD                = 00000041
DDB$L_DDT               = 0000000C
DEV$M_AVL                 ********    X   02
DEV$M_IDV                 ********    X   02
DEV$M_NNM                 ********    X   02
DEV$M_REC                 ********    X   02
DPT$C_LENGTH            = 00000038
DPT$C_VERSION           = 00000004
DPT$INITAB                00000038 R      02
DPT$REINITAB              00000062 R      02
DPT$TAB                   00000000 R      02
DT$_CR11                = 00000001
DYN$C_CRB               = 00000005
DYN$C_DDB               = 00000006
DYN$C_DPT               = 0000001E
DYN$C_UCB               = 00000010
EXE$ABORTIO               ********    X   03
EXE$ALLOCBUF              ********    X   03
EXE$BUFFRQUOTA            ********    X   03
EXE$FINISHIOC             ********    X   03
EXE$FORK                  ********    X   03
EXE$IOFORK                ********    X   03
EXE$QIODRVPKT             ********    X   03
EXE$READCHK               ********    X   03
EXE$SENSEMODE             ********    X   03
EXE$SETMODE               ********    X   03
EXE$SNDEVMSG              ********    X   03
FUNCTAB_LEN             = 00000034
IDB$L_CSR               = 00000000
IDB$L_OWNER             = 00000004
IO$M_BINARY             = 00000040
IO$M_PACKED             = 00000080
IO$V_BINARY             = 00000006
IO$_READLBLK            = 00000021
IO$_READPBLK            = 0000000C
IO$_READVBLK            = 00000031
IO$_SENSECHAR           = 0000001B
IO$_SENSEMODE           = 00000027
IO$_SETCHAR             = 0000001A
IO$_SETMODE             = 00000023
IO$_VIRTUAL             = 0000003F
IOC$CANCELIO              ********    X   03
IOC$MNTVER                ********    X   03
IOC$REQCOM                ********    X   03
IOC$RETURN                ********    X   03
IOC$WFIKPCH               ********    X   03
IRP$L_MEDIA             = 00000038
IRP$L_SVAPTE            = 0000002C
IRP$S_FCODE             = 00000006
IRP$V_FCODE             = 00000000
IRP$W_BCNT              = 00000032
IRP$W_BOFF              = 00000030
IRP$W_FUNC              = 00000020
JIB$L_BYTCNT            = 00000020
MASKH                   = 00000080
MASKL                   = 08000000
MSG$_CRUNSOLIC          = 00000002
MSG$_DEVOFFLIN          = 00000005
P1                      = 00000000
P2                      = 00000004
P3                      = 00000008
P4                      = 0000000C
P5                      = 00000010
P6                      = 00000014
PCB$L_JIB               = 00000080
PR$_IPL                 = 00000012
SIZ...                  = 00000001
SS$_ABORT               = 0000002C
SS$_CTRLERR             = 00000054
SS$_DATAOVERUN          = 00000838
SS$_ENDOFFILE           = 00000870
SS$_NORMAL              = 00000001
SYS$GL_JOBCTLMB           ********    X   03
SYS$GL_OPRMBX             ********    X   03
UCB$B_CR_COLCNT           00000090
UCB$B_CR_EOFCNT           00000091
UCB$B_CR_EOFCOL           00000092
UCB$B_CR_OFLCNT           00000093
UCB$B_DEVCLASS          = 00000040
```

```
UCB$B_DEVTYPE                   = 00000041
UCB$B_DIPL                      = 0000005E
UCB$B_FIPL                      = 0000000B
UCB$K_CR_LENGTH                 = 00000098
UCB$K_LENGTH                    = 00000090
UCB$L_CRB                       = 00000024
UCB$L_DEVCHAR                   = 00000038
UCB$L_DEVCHAR2                  = 0000003C
UCB$L_DEVDEPEND                 = 00000044
UCB$L_FPC                       = 0000000C
UCB$L_FR3                       = 00000010
UCB$L_SVAPTE                    = 00000078
UCB$M_JOB                       = 00000001
UCB$M_ONLINE                    = 00000010
UCB$V_CANCEL                    = 00000003
UCB$V_INT                       = 00000001
UCB$V_JOB                       = 00000000
UCB$W_BCNT                      = 0000007E
UCB$W_CR_CSR                      00000096
UCB$W_CR_FSTCOL                   00000094
UCB$W_DEVBUFSIZ                 = 00000042
UCB$W_DEVSTS                    = 00000068
UCB$W_ERRCNT                    = 00000082
UCB$W_REFC                      = 0000005C
UCB$W_STS                       = 00000064
VEC$L_IDB                       = 00000008
VEC$L_INITIAL                   = 0000000C
VEC$L_UNITINIT                  = 00000018
```

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	00000098	(152.)	01 (1.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE
$$$105_PROLOGUE	00000077	(119.)	02 (2.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC BYTE
$$$115_DRIVER	00000513	(1299.)	03 (3.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC LONG

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	35	00:00:00.08	00:00:02.17
Command processing	97	00:00:00.51	00:00:06.20
Pass 1	524	00:00:23.55	00:01:16.65
Symbol table sort	0	00:00:03.25	00:00:10.16
Pass 2	199	00:00:04.98	00:00:17.35
Symbol table output	16	00:00:00.14	00:00:00.71
Psect synopsis output	3	00:00:00.02	00:00:00.02
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	877	00:00:32.54	00:01:53.26

The working set limit was 1800 pages.

123849 bytes (242 pages) of virtual memory were used to buffer the intermediate code.
There were 110 pages of symbol table space allocated to hold 2103 non-local and 29 local symbols.
1119 source lines were read in Pass 1, producing 18 object records in Pass 2.
36 pages of virtual memory were used to define 33 macros.

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

Macro library name	Macros defined
_255DUA28:[SYS.OBJ]LIB.MLB;1	20
_255DUA28:[SYSLIB]STARLET.MLB;2	11
TOTALS (all libraries)	31

2350 GETS were required to define 31 macros.

There were no errors, warnings or information messages.

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

SYSQIOREQ

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(1)	76	DECLARATIONS
(1)	131.32	QIO ERROR AND EXCEPTION HANDLING ROUTINES
(1)	165	QUEUE I/O REQUEST
(1)	583	BUILD I/O PACKET FOR PAGE READ/WRITE
(1)	701	COMPLETE I/O OPERATION
(1)	752	QUEUE I/O PACKET TO DRIVER
(1)	775	EXE$ALTQUEPKT - Call driver ALTSTART entry point
(1)	810	QUEUE I/O PACKET TO ACP
(1)	845.10	EXE$QXQPPKT - QUEUE I/O PACKET TO XQP
(1)	847	INSERT I/O PACKET IN UNIT QUEUE
(1)	870	INSERT I/O PACKET IN QUEUE BY PRIORITY

```
                        0000     1          .TITLE  SYSQIOREQ - QUEUE I/O REQUEST SYSTEM SERVICE
;LMP0221                0000    .1          .IDENT  'V03-012'
-1                      0000     3
                        0000     4 ;
                        0000     5 ;*****************************************************************************
                        0000     6 ;*                                                                           *
                        0000     7 ;*  COPYRIGHT (c) 1978, 1980, 1982 BY                                        *
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                        0000    24 ;*                                                                           *
                        0000    25 ;*                                                                           *
                        0000    26 ;*****************************************************************************
                        0000    27 ;
                        0000    28 ;++
                        0000    29 ;
                        0000    30 ; AUTHOR:
                        0000    31 ;
                        0000    32 ;       D. N. CUTLER,   14-JUN-76
                        0000    33 ;
                        0000    34 ; FACILITY:
                        0000    35 ;
                        0000    36 ;       SYSTEM SERVICE QUEUE I/O REQUEST
                        0000    37 ;
                        0000    38 ; MODIFIED BY:
                        0000    39 ;
;LMP0221                 0000    .1 ;       V03-012 LMP0221         L. Mark Pilant,         30-Mar-1984  17:08
;LMP0221                 0000    .2 ;               Remove references to UCB$L_OWNUIC and UCNB$W_VPROT.
;LMP0221                 0000    .3 ;
;SRB0118                 0000    .4 ;       V03-011 SRB0118         Steve Beckhardt         23-Mar-1984
;SRB0118                 0000    .5 ;               Changed waiting for DIOCNT or BIOCNT to wait at IPL 0.
;SRB0118                 0000    .6 ;
;CDS0005                 0000    .7 ;       V03-010 CDS0005         Christian D. Saether    20-Mar-1984
;CDS0005                 0000    .8 ;               Use symbolic definition to locate XQP queue header.
;CDS0005                 0000    .9 ;               Give the XQP ast a priority boost.
;CDS0005                 0000   .10 ;
;SSA0017                 0000   .11 ;       V03-009 SSA0017         Stan Amway              9-Mar-1984
;SSA0017                 0000   .12 ;               Maintain device queue length in UCB.
;SSA0017                 0000   .13 ;               Efficiently supports MONITORs disk class and provides
;SSA0017                 0000   .14 ;               accurate queue lengths for HSC and UDA disks.
;SSA0017                 0000   .15 ;
;LMP0206                 0000   .16 ;       V03-008 LMP0206         L. Mark Pilant,         7-Mar-1984  12:20
;LMP0206                 0000   .17 ;               Only do an access check on the first QIO to the channel for
;LMP0206                 0000   .18 ;               logical and physical requests.
```

```
;LMP0206                0000    .19 ;
;LMP0185                0000    .20 ;       V03-007 LMP0185         L. Mark Pilant,         27-Jan-1984  11:05
;LMP0185                0000    .21 ;               Add support for ACLs on devices.
;LMP0185                0000    .22 ;
;CDS0004                0000    .23 ;       V03-006 CDS0004         Christian D. Saether    20-May-1983
;CDS0004                0000    .24 ;               Get the PID from the PCB instead of the IRP so that
;CDS0004                0000    .25 ;               journalling works (it uses the irp pid field for
;CDS0004                0000    .26 ;               something else).
;CDS0004                0000    .27 ;
;RLRMXBCNTC              0000    .28 ;       V03-005 RLRMXBCNTc      Robert L. Rappaport     28-Mar-1983
;RLRMXBCNTC              0000    .29 ;               Verify IRP$L_DIAGBUF is non-zero before assuming that it
;RLRMXBCNTC              0000    .30 ;               contains the original value of IRP$L_SVAPTE in VIRTUAL_LOGIO.
;RLRMXBCNTC              0000    .31 ;
;CDS0003                0000    .32 ;       V03-004 CDS0003         Christian D. Saether    14-Mar-1983
;CDS0003                0000    .33 ;               Return from EXE$QXQPPKT with status, rather than
;CDS0003                0000    .34 ;               assuming success.
;CDS0003                0000    .35 ;
;CDS0002                0000    .36 ;       V03-003 CDS0002         Christian D. Saether    12-Mar-1983
;CDS0002                0000    .37 ;               Do not insque packet to xqp work queue in EXE$QXQPPKT,
;CDS0002                0000    .38 ;               but rather pass it as the ast parameter and queue it
;CDS0002                0000    .39 ;               in the xqp, if necessary.  This avoids a problem
;CDS0002                0000    .40 ;               where the packet is processed by the xqp before the
;CDS0002                0000    .41 ;               ast is dequeued.
;CDS0002                0000    .42 ;
;CDS0001                0000    .43 ;       V03-002 CDS0001         C Saether               13-Aug-1982
;CDS0001                0000    .44 ;               Changes to send file system packets to XQP.
;CDS0001                0000    .45 ;
;LJK0172                0000    .46 ;       V03-001 LJK0172         Lawrence J. Kenah       18-June-1982
;LJK0172                0000    .47 ;               Count I/O operations in EXE$BLDPKTxxxx to allow file
;LJK0172                0000    .48 ;               expiration to work correctly for mapped files.
-33                     0000     73 ;
                        0000     74 ;--
```

```
                        0000     76          .SBTTL  DECLARATIONS
                        0000     77
                        0000     78 ;
                        0000     79 ; MACRO LIBRARY CALLS
                        0000     80 ;
                        0000     81
                        0000     82          $ACBDEF                         ;DEFINE ACB OFFSETS
                        0000     83          $AQBDEF                         ;DEFINE AQB OFFSETS
                        0000     84          $CADEF                          ;DEFINE CONDITIONAL ASSEMBLY PARAMETERS
                        0000     85          $CCBDEF                         ;DEFINE CCB OFFSETS
;CDS0001                 0000      .1         $CDRPDEF                        ;DEFINE CDRP OFFSETS
;CDS0005                 0000      .2         $DDBDEF                         ;DEFINE DDB OFFSETS
;CDS0005                 0000      .3         $DDTDEF                         ;DEFINE DDT OFFSETS
;CDS0005                 0000      .4         $DEVDEF                         ;DEFINE DEV VALUES
;CDS0005                 0000      .5         $DYNDEF                         ;DEFINE DATA STRUCTURE TYPE CODES
;CDS0005                 0000      .6         $F11BDEF                        ;DEFINE F11BXQP OFFSETS
-4                      0000     90          $IODEF                          ;DEFINE IO FUNCTION CODES
                        0000     91          $IPLDEF                         ;DEFINE INTERRUPT PRIORITY LEVELS
                        0000     92          $IRPDEF                         ;DEFINE IRP OFFSETS
                        0000     93          $PCBDEF                         ;DEFINE PCB OFFSETS
                        0000     94          $PHDDEF                         ;DEFINE PHD OFFSETS
                        0000     95          $PRDEF                          ;DEFINE PROCESSOR REGISTERS
                        0000     96          $PRIDEF                         ;DEFINE PRIORITY CLASS INCREMENTS
                        0000     97          $PRVDEF                         ;DEFINE PRIVILEGE BITS
                        0000     98          $PSLDEF                         ;DEFINE PROCESSOR STATUS FIELDS
                        0000     99          $RSNDEF                         ;DEFINE RESOURCE WAIT NUMBERS
                        0000    100          $SECDEF                         ;DEFINE SEC OFFSETS
                        0000    101          $SSDEF                          ;DEFINE STATUS VALUES
                        0000    102          $UCBDEF                         ;DEFINE UCB OFFSETS
                        0000    103          $VCBDEF                         ;DEFINE VCB OFFSETS
                        0000    104          $WCBDEF                         ;DEFINE WINDOW CONTROL BLOCK OFFSETS
                        0000    105
                        0000    106 ;
                        0000    107 ; LOCAL SYMBOLS
                        0000    108 ;
                        0000    109 ; ARGUMENT LIST OFFSET DEFINITIONS
                        0000    110 ;
                        0000    111
00000004                0000    112 EFN=4                                   ;EVENT FLAG NUMBER
00000008                0000    113 CHAN=8                                  ;I/O CHANNEL NUMBER
0000000C                0000    114 FUNC=12                                 ;I/O FUNCTION CODE
00000010                0000    115 IOSB=16                                 ;ADDRESS OF I/O STATUS BLOCK
00000014                0000    116 ASTADR=20                               ;ADDRESS OF AST SERVICE ROUTINE
00000018                0000    117 ASTPRM=24                               ;AST SERVICE ROUTINE PARAMETER
0000001C                0000    118 P1=28                                   ;FIRST FUNCTION DEPENDENT PARAMETER
00000020                0000    119 P2=32                                   ;SECOND FUNCTION DEPENDENT PARAMETER
00000024                0000    120 P3=36                                   ;THIRD FUNCTION DEPENDENT PARAMETER
00000028                0000    121 P4=40                                   ;FOURTH FUNCTION DEPENDENT PARAMETER
0000002C                0000    122 P5=44                                   ;FIFTH FUNCTION DEPENDENT PARAMETER
00000030                0000    123 P6=48                                   ;SIXTH FUNCTION DEPENDENT PARAMETER
                        0000    124
                        0000    125 ;
                        0000    126 ; FUNCTION DECISION TABLE OFFSET DEFINITIONS
                        0000    127 ;
                        0000    128
00000000                0000    129 LEGAL=0                                 ;LEGAL FUNCTION MASK
00000008                0000    130 IOTYPE=8                                ;I/O FUNCTION TYPE MASK
```

```
                00000010  0000   131 FDTACT=16                                ;ACTION ROUTINE MASKS
;LMP0185                  0000    .1
;LMP0185                  0000    .2 ;
;LMP0185                  0000    .3 ; TABLES FOR DETERMINING THE ACCESS DESIRED, BASED UPON THE I/O FUNCTION
;LMP0185                  0000    .4 ; CODE.  THIS IS NECESSARY FOR THE FIRST TIME THROUGH PROTECTION CHECK DONE
;LMP0185                  0000    .5 ; ON SHARABLE, NON-MOUNTABLE (NON-FILES ORIENTED) DEVICES.
;LMP0185                  0000    .6 ;
;LMP0185                  0000    .7
;LMP0185                  0000    .8          .MACRO  ACCMSK  CODES
;LMP0185                  0000    .9 MASKL    = 0
;LMP0185                  0000   .10 MASKH    = 0
;LMP0185                  0000   .11
;LMP0185                  0000   .12          .IRP    X,<CODES>
;LMP0185                  0000   .13          .IF     GT      <IO$_'X&IO$_VIRTUAL>-31
;LMP0185                  0000   .14 MASKH    = MASKH!<1@<<IO$_'X&IO$_VIRTUAL>-32>>
;LMP0185                  0000   .15          .IFF
;LMP0185                  0000   .16 MASKL    = MASKL!<1@<IO$_'X&IO$_VIRTUAL>>
;LMP0185                  0000   .17          .ENDC;  GT      <IO$_'X&IO$_VIRTUAL>-31
;LMP0185                  0000   .18          .ENDR ; X,<CODES>
;LMP0185                  0000   .19          .LONG   MASKL,MASKH
;LMP0185                  0000   .20          .ENDM   ACCMSK
;LMP0185                  0000   .21
;LMP0185                  0000   .22 READ_ACCESS:
;LMP0185                  0000   .23          ACCMSK  <READPBLK,READLBLK,READVBLK,-
;LMP0185                  0000   .24                   READHEAD,READTRACKD,REREADN,REREADP,-
;LMP0185                  0000   .25                   READPROMPT,TTYREADALL,TTYREADPALL>
;LMP0185                  0008   .26
;LMP0185                  0008   .27 WRITE_ACCESS:
;LMP0185                  0008   .28          ACCMSK  <WRITEPBLK,WRITELBLK,WRITEVBLK,-
;LMP0185                  0008   .29                   WRITECHECK,WRITECHECKH,-
;LMP0185                  0008   .30                   WRITEHEAD,WRITETRACKD,WRITERET>
```

```
;LMP0185                                0010   .32          .SBTTL  QIO ERROR AND EXCEPTION HANDLING ROUTINES
;LMP0185                                0010   .33 ;
;LMP0185                                0010   .34 ; Device is not mountable.  See if it is necessary to do the protection check.
;LMP0185                                0010   .35 ;
;LMP0185                                0010   .36 NOT_FILE_DEV:
;LMP0185          1E 08 A6    02   E2  0010   .37          BBSS    #CCB$V_PROCHKDON,CCB$B_STS(R6),20$      ;XFER IF HERE ALREADY
;LMP0185          19 38 A5    10   E1  0015   .38          BBC     #DEV$V_SHR,UCB$L_DEVCHAR(R5),20$        ;XFER IF NOT SHARABLE
;LMP0185           50    0000'CF   9E  001A   .39          MOVAB   W^EXE$CHKRDACCES,R0     ;SET ADDR OF CHECKING ROUTINE
;LMP0185          0A DD AF    57   E0  001F   .40          BBS     R7,READ_ACCESS,10$      ;XFER IF A READ FUNCTION
;LMP0185           50    0000'CF   9E  0024   .41          MOVAB   W^EXE$CHKWRTACCES,R0    ;SET ADDR OF CHECKING ROUTINE
;LMP0185          05 DB AF    57   E1  0029   .42          BBC     R7,WRITE_ACCESS,20$     ;XFER IF NOT WRITE FUNCTION
;LMP0185                      60   16  002E   .43 10$:      JSB     (R0)                    ;DO PROTECTION CHECK
;LMP0185                   12 50   E9  0030   .44          BLBC    R0,ERRORB               ;XFER IF NOT SUCCESSFUL
;LMP0185                    0092   31  0033   .45 20$:      BRW     CHKDON                  ;ELSE REJOIN MAINLINE CODE
-2                                     0036   134 ;
                                       0036   135 ; MISCELLANEOUS ERROR HANDLING AND EXCEPTION HANDLING ROUTINES.  THESE HAVE
                                       0036   136 ; BEEN MOVED OUT OF LINE TO MAKE THE COMMON PATH NEARLY BRANCH FREE.
                                       0036   137 ;
                                       0036   138
                                       0036   139 CLREF:                                  ;
                           FFC7'   30  0036   140          BSBW    SCH$CLREF               ;CLEAR SPECIFIED EVENT FLAG
                             40    11  0039   141          BRB     VCHAN                   ;CONTINUE WITH QIO
                     50    013C 8F   3C  003B   142 IVCHAN: MOVZWL  #SS$_IVCHAN,R0          ;SET ERROR STATUS
                             03    11  0040   143          BRB     ERRORB                  ;AND ERROR REQUEST
                           50   24   3C  0042   144 PRIVERR: MOVZWL #SS$_NOPRIV,R0          ;SET ERROR STATUS
                              00DF   31  0045   145 ERRORB: BRW     ERROR                   ;AND ERROR REQUEST
                                       0048   146
                                       0048   147 ;
                                       0048   148 ; An access or deaccess operation is pending for this channel.  Wait for
                                       0048   149 ; it to complete, then retry the QIO.
                                       0048   150 ;
                                       0048   151
                                       0048   152 DACSPND:SETIPL  #IPL$_SYNCH              ;SYNCHRONIZE ACCESS TO SYSTEM DATA BASE
                        4C A4    01   3C  004B   153          MOVZWL  #RSN$_ASTWAIT,PCB$L_EFWM(R4) ;SET AST WAIT RESOURCE NUMBER
                     52    0000'CF   7E  004F   154          MOVAQ   W^SCH$GQ_MWAIT,R2       ;SET ADDRESS OF WAIT QUEUE
                             4C A4   E2  0054   155          BBSS    PCB$L_EFWM(R4),W^SCH$GL_RESMASK,10$ ;SET WAITING FLAG
                        00 0000'CF       0057
                                FFA2'   31  005B   156 10$:      BRW     SCH$WAIT                ;WAIT FOR AST
                                       005E   157 ;
                                       005E   158 ; Device is marked spooled.  Acquire intermediate UCB address if virtual funtion.
                                       005E   159 ;
                           57    2F    D1  005E   160 SPOOL:  CMPL    S^#IO$_LOGICAL,R7       ;VIRTUAL I/O FUNCTION?
                                 60    18  0061   161          BGEQ    NSPOOL                  ;IF GEQ NO
                        55    60 A5    D0  0063   162          MOVL    UCB$L_AMB(R5),R5        ;GET INTERMEDIATE DEVICE UCB ADDRESS
                                 5A    11  0067   163          BRB     NSPOOL                  ;
;LMP0185                                0069    .1 ;
;LMP0185                                0069    .2 ; Intermediate branch to the protection checking routine.
;LMP0185                                0069    .3 ;
;LMP0185                                0069    .4 NOT_FILE_DEVB:
;LMP0185                      A5    11  0069    .5          BRB     NOT_FILE_DEV
```

```
006B   165          .SBTTL  QUEUE I/O REQUEST
006B   166 ;+
006B   167 ; EXE$QIOREQ - QUEUE I/O REQUEST
006B   168 ;
006B   169 ; THIS SERVICE PROVIDES THE CAPABILITY TO INITIATE AN I/O OPERATION
006B   170 ; BY QUEUEING A REQUEST TO A DEVICE'S ASSOCIATED DRIVER.  ONCE THE
006B   171 ; OPERATION HAS BEEN INITIATED, CONTROL WILL RETURN TO THE CALLER
006B   172 ; WHO CAN SYNCHRONIZE I/O COMPLETION IN ONE OF THREE WAYS:
006B   173 ;
006B   174 ;       1) SPECIFY THE ADDRESS OF AN AST ROUTINE THAT WILL BE
006B   175 ;          EXECUTED WHEN THE I/O COMPLETES.
006B   176 ;
006B   177 ;       2) WAIT FOR THE SPECIFIED EVENT FLAG TO BE SET.
006B   178 ;
006B   179 ;       3) POLL THE SPECIFIED I/O STATUS BLOCK FOR A COMPLETION
006B   180 ;          STATUS.
006B   181 ;
006B   182 ; THIS ROUTINE VERIFIES THE FUNCTION INDEPENDENT PARAMETERS, ALLOCATES
006B   183 ; AN I/O REQUEST PACKET, COPIES THE FUNCTION INDEPENDENT PARAMETERS AND
006B   184 ; PROCESS INFORMATION TO THE I/O PACKET, CHECKS ACCESS TO THE DEVICE,
006B   185 ; AND CALLS THE DRIVER'S FUNCTION DECISION TABLE ROUTINE(S) THAT CORRESPOND
006B   186 ; TO THE SPECIFIED FUNCTION.  IT IS THEN UP TO THE FDT ROUTINE TO EITHER
006B   187 ; COMPLETE THE REQUEST IMMEDIATELY (EXE$ABORTIO OR EXE$FINISHIO) OR TO
006B   188 ; QUEUE THE I/O REQUEST FOR FURTHER PROCESSING BY THE DRIVER'S STARTIO
006B   189 ; ROUTINE (EXE$QIODRVPKT).
006B   190 ;
006B   191 ; INPUTS:
006B   192 ;
006B   193 ;       EFN(AP) = EVENT FLAG NUMBER.
006B   194 ;       CHAN(AP) = I/O CHANNEL NUMBER.
006B   195 ;       FUNC(AP) = I/O FUNCTION CODE.
006B   196 ;       IOSB(AP) = ADDRESS OF I/O STATUS BLOCK.
006B   197 ;       ASTADR(AP) = ADDRESS OF AST SERVICE ROUTINE.
006B   198 ;       ASTPRM(AP) = AST SERVICE ROUTINE PARAMETER.
006B   199 ;       P1(AP) TO P6(AP) = FUNCTION DEPENDENT PARAMETERS.
006B   200 ;
006B   201 ;       R4 = CURRENT PROCESS PCB ADDRESS.
006B   202 ;
006B   203 ; OUTPUTS:
006B   204 ;
006B   205 ;       R0 LOW BIT CLEAR INDICATES FAILURE TO INITIATE THE I/O REQUEST.
006B   206 ;
006B   207 ;               R0 = SS$_ABORT - A NETWORK LOGICAL LINK WAS BROKEN.
006B   208 ;
006B   209 ;               R0 = SS$_ACCVIO - THE I/O STATUS BLOCK CANNOT BE WRITTEN BY
006B   210 ;                       THE CALLER.
006B   211 ;
006B   212 ;               R0 = SS$_DEVOFFLINE - THE SPECIFIED DEVICE IS OFFLINE.
006B   213 ;
006B   214 ;               R0 = SS$_EXQUOTA - THE PROCESS HAS EXCEEDED ITS BUFFERED I/O
006B   215 ;                       QUOTA, DIRECT I/O QUOTA, OR BUFFERED I/O BYTE COUNT
006B   216 ;                       QUOTA AND HAS DISABLED RESOURCE WAIT MODE.  OR, THE
006B   217 ;                       PROCESS HAS EXCEEDED ITS AST LIMIT QUOTA.
006B   218 ;
006B   219 ;               R0 = SS$_ILLEFC - AN ILLEGAL EVENT FLAG NUMBER WAS SPECIFIED.
006B   220 ;
006B   221 ;               R0 = SS$_INSFMEM - INSUFFICIENT DYNAMIC MEMORY IS AVAILABLE
```

```
                     006B   222 ;                          TO ALLOCATE AN I/O REQUEST PACKET AND THE PROCESS HAS
                     006B   223 ;                          DISABLED RESOURCE WAIT MODE.
                     006B   224 ;
                     006B   225 ;                  R0 = SS$_IVCHAN - AN INVALID CHANNEL NUMBER WAS SPECIFIED.
                     006B   226 ;
                     006B   227 ;                  R0 = SS$_NOPRIV - THE SPECIFIED CHANNEL DOES NOT EXIST OR WAS
                     006B   228 ;                          ASSIGNED FROM A MORE PRIVILEGED ACCESS MODE.  OR, THE
                     006B   229 ;                          PROCESS DOES NOT HAVE THE PRIVILEGE TO PERFORM THE
                     006B   230 ;                          SPECIFIED TYPE OF I/O FUNCTION ON THE DEVICE.
                     006B   231 ;
                     006B   232 ;                  R0 = SS$_UNASEFC - UNASSOCIATED EVENT FLAG CLUSTER SPECIFIED.
                     006B   233 ;
                     006B   234 ;          R0 LOW BIT SET INDICATES SUCCESSFUL COMPLETION.
                     006B   235 ;
                     006B   236 ;                  R0 = SS$_NORMAL - NORMAL COMPLETION.
                     006B   237 ;-
                     006B   238
                OFFC 006B   239          .ENTRY  EXE$QIO,^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                     006D   240 ;
                     006D   241 ; Clear specified event flag.  For local event flags, this is done in line.
                     006D   242 ;
                     006D   243
  53   04 AC   9A   006D   244 QIO:     MOVZBL  EFN(AP),R3              ;GET EVENT FLAG NUMBER
     3F   53   91   0071   245          CMPB    R3,#63                  ;CHECK FOR LOCAL
          C0   1A   0074   246          BGTRU   CLREF                   ;IF NO, MUST DO FULL CLREF
00 50 A4   53   E5   0076   247          BBCC    R3,PCB$L_EFCS(R4),VCHAN ;CLEAR SPECIFIED EVENT FLAG
                     007B   248
                     007B   249 ;
                     007B   250 ; Validate channel number, compute CCB address and acquire UCB address.
                     007B   251 ;
                     007B   252
  FFFF000F 8F   CB   007B   253 VCHAN:  BICL3   #<^XFFFF0000!<CCB$C_LENGTH-1>>,-;FETCH CHANNEL NUMBER AND
   50   08 AC        0081   254                  CHAN(AP),R0             ;CLEAR EXTRANEOUS BITS
          B5   13   0084   255          BEQL    IVCHAN                  ;IF EQL INVALID CHANNEL
          50   B1   0086   256          CMPW    R0,@#CTL$GW_CHINDX      ;LEGAL CHANNEL NUMBER?
  00000000'9F        0088
          AC   1A   008D   257          BGTRU   IVCHAN                  ;IF GTRU NO
     59   50   CE   008F   258          MNEGL   R0,R9                   ;CONVERT TO CHANNEL INDEX
00000000'FF49   9E   0092   259          MOVAB   @CTL$GL_CCBBASE[R9],R6  ;GET ADDRESS OF CORRESPONDING CCB
          56        0099
          53   DC   009A   260          MOVPSL  R3                      ;READ CURRENT PSL
 53   02   16   EF   009C   261          EXTZV   #PSL$V_PRVMOD,#PSL$S_PRVMOD,R3,R11 ;EXTRACT PREVIOUS MODE FIELD
          5B        00A0
 59   59   10   78   00A1   262          ASHL    #16,R9,R9               ;PREPARE CHANNEL INDEX FOR LATER MERGE
   09 A6   5B   91   00A5   263          CMPB    R11,CCB$B_AMOD(R6)      ;CALLER HAVE PRIVILEGE TO ACCESS CHANNEL?
          97   18   00A9   264          BGEQ    PRIVERR                 ;IF GEQ NO
     55   66   D0   00AB   265          MOVL    CCB$L_UCB(R6),R5        ;GET ASSIGNED DEVICE UCB ADDRESS
   96 04 A6   E8   00AE   266          BLBS    CCB$L_WIND(R6),DACSPND  ;IF LBS ACCESS/DEACCESS PENDING
                00B2   267
                     00B2   268 ;
                     00B2   269 ; Isolate function code and begin decoding
                     00B2   270 ;
                     00B2   271
  5A   0C AC   3C   00B2   272          MOVZWL  FUNC(AP),R10            ;GET I/O FUNCTION CODE AND MODIFIERS
 FFFFFFC0 8F   CB   00B6   273          BICL3   #^C<IO$M_FCODE>,R10,R7  ;CLEAR ALL BUT I/O FUNCTION CODE
     57   5A        00BC
9B 38 A5   06   E0   00BE   274          BBS     S^#DEV$V_SPL,UCB$L_DEVCHAR(R5),SPOOL ;IF SET, DEVICE IS SPOOLED
```

```
                                00C3    275
                                00C3    276 ;
                                00C3    277 ; Acquire FDT address.
                                00C3    278 ;
                                00C3    279
;LMP0185        A1 38 A5    0E  E1  00C3     .1 NSPOOL: BBC     #DEV$V_FOD,UCB$L_DEVCHAR(R5),NOT_FILE_DEVB      ;XFER IF NOT MOUNTAB
;LMP0185         50    0088 C5  D0  00C8     .2 CHKDON: MOVL    UCB$L_DDT(R5),R0          ;GET ADDRESS OF DDT
-1                 58    08 A0  D0  00CD    281        MOVL    DDT$L_FDT(R0),R8          ;GET ADDRESS OF FDT
                   37 68    57  E1  00D1    282        BBC     R7,LEGAL(R8),ILLIO        ;IF CLR, ILLEGAL I/O FUNCTION
                39 64 A5    04  E1  00D5    283        BBC     #UCB$V_ONLINE,UCB$W_STS(R5),OFFLINE ;IF CLR, DEVICE OFFLINE
                                00DA    284
                                00DA    285 ;
                                00DA    286 ; Probe and clear IOSB if it is specified.
                                00DA    287 ;
                                00DA    288
                      51    10 AC   D0  00DA    289 PRIOSB: MOVL    IOSB(AP),R1               ;GET ADDRESS OF I/O STATUS BLOCK
                               08   13  00DE    290        BEQL    NOIOSB                    ;IF EQL NONE SPECIFIED
                                    00E0    291        IFNOWRT #8,(R1),ACCVIO            ;CAN I/O STATUS BLOCK BE WRITTEN?
                               61   7C  00E6    292        CLRQ    (R1)                      ;CLEAR I/O STATUS BLOCK
                                00E8    293
                                00E8    294 ;
                                00E8    295 ; Charge appropriate I/O counts depending upon type.  Counts will have to
                                00E8    296 ; be backed out if no I/O packet is available.  Set IPL to block process
                                00E8    297 ; deletion once we are committed.
                                00E8    298 ;
                                00E8    299
                                00E8    300 NOIOSB: SETIPL  #IPL$_ASTDEL              ;PREVENT PROCESS DELETION
                7B 08 A8    57  E1  00EB    301        BBC     R7,IOTYPE(R8),DIRECT      ;IF CLR, DIRECT I/O FUNCTION
                                    00F0    302        ASSUME  IRP$M_BUFIO EQ 1          ;TO ALLOW INCREMENT BELOW
                               59   B6  00F0    303        INCW    R9                        ;SET IRP$M_BUFIO
                          3A A4     B7  00F2    304        DECW    PCB$W_BIOCNT(R4)          ;CHARGE FOR ANOTHER BUFFERED I/O
                               79   18  00F5    305        BGEQ    OK                        ;OK IF NOT NEGATIVE
                          3A A4     3F  00F7    306        PUSHAW  PCB$W_BIOCNT(R4)          ;SET ADDRESS OF QUOTA CELL
                       52     6E    D0  00FA    307 NOCNT:  MOVL    (SP),R2                   ;FETCH QUOTA ADDRESS
                               62   B6  00FD    308        INCW    (R2)                      ;BACKOUT CHARGE
;SRB0118                            00FF     .1        SETIPL  #0                        ;LOWER IPL TO WAIT AT IPL 0
                            FEFB'   30  0102    309        BSBW    EXE$SNGLEQUOTA            ;CHECK UNIT QUOTA OF I/O FUNCTION TYPE
                          1F 50     E9  0105    310        BLBC    R0,ERROR                  ;IF LBC QUOTA EXCEEDED
                               9E   B7  0108    311        DECW    @(SP)+                    ;CHARGE FOR I/O OF TYPE
                               64   11  010A    312        BRB     OK                        ;
                                    010C    313
                50    00F4 8F   3C  010C    314 ILLIO:  MOVZWL  #SS$_ILLIOFUNC,R0          ;SET ILLEGAL I/O FUNCTION STATUS
                               14   11  0111    315        BRB     ERROR                     ;
                                    0113    316
                       57   34    91  0113    317 OFFLINE:CMPB    #IO$_DEACCESS,R7          ;CHECK FOR DEACCESS I/O FUNCTION
                               C2   13  0116    318        BEQL    PRIOSB                    ;ALLOW IT TO PROCEED
                       57   38    91  0118    319        CMPB    #IO$_ACPCONTROL,R7        ;LIKEWISE FOR ACP CONTROL
                               BD   13  011B    320        BEQL    PRIOSB                    ;SO THAT A FILE ON AN OFFLINE DEVICE
                                    011D    321                                          ;MAY BE CLOSED
                50    0084 8F   3C  011D    322        MOVZWL  #SS$_DEVOFFLINE,R0        ;SET DEVICE OFFLINE STATUS
                               03   11  0122    323        BRB     ERROR                     ;
                                    0124    324
                       50   0C   3C  0124    325 ACCVIO: MOVZWL  S^#SS$_ACCVIO,R0          ;SET ACCESS VIOLATION STATUS
                                    0127    326 ERROR:  SETIPL  #0                        ;ALLOW INTERRUPTS
                               50   DD  012A    327        PUSHL   R0                        ;SAVE FINAL STATUS
                     51    60 A4     D0  012C    328        MOVL    PCB$L_PID(R4),R1          ;GET PROCESS ID OF CURRENT PROCESS
                               52   D4  0130    329        CLRL    R2                        ;SET PRIORITY CLASS INCREMENT
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                53    04 AC    9A  0132    330          MOVZBL  EFN(AP),R3              ;GET SPECIFIED EVENT FLAG NUMBER
                       FEC7    30  0136    331          BSBW    SCH$POSTEF             ;POST SPECIFIED EVENT FLAG
                         01    BA  0139    332          POPR    #^M<R0>                ;RESTORE FINAL STATUS
                               04  013B    333          RET                            ;
                                   013C    334
                                   013C    335 ;
                                   013C    336 ; ALLOCATE REQUEST I/O PACKET - WHEN THE LOOKASIDE LIST IS EMPTY.
                                   013C    337 ;
                                   013C    338
                       FEC1'       30  013C    339 ALLOC:  BSBW    EXE$ALLOCIRP           ;ALLOCATE I/O REQUEST PACKET
                      35 50        E8  013F    340          BLBS    R0,SUCCES              ;IF LBS SUCCESSFUL ALLOCATION
                      3A A4        3F  0142    341          PUSHAW  PCB$W_BIOCNT(R4)       ;ASSUME BUFFERED I/O
                      03 59        E8  0145    342          BLBS    R9,NALLOC              ;IF SET, BUFFERED I/O
                      3E A4        3F  0148    343          PUSHAW  PCB$W_DIOCNT(R4)       ;ELSE DIRECT I/O
                         9E        B6  014B    344 NALLOC: INCW    @(SP)+                 ;RESTORE COUNT, SINCE NO I/O STARTED
                         D8        11  014D    345          BRB     ERROR                  ;
                                   014F    346
                                   014F    347 ;
                                   014F    348 ; Convert section index to window address.
                                   014F    349 ;
                                   014F    350
                50     04 A6        32  014F    351 SECTION:CVTWL   CCB$L_WIND(R6),R0       ;SIGN EXTEND SECTION INDEX
                00000000'9F         D0  0153    352          MOVL    @#CTL$GL_PHD,R1        ;GET ADDRESS OF PROCESS HEADER
                        51              0159
                51     20 A1        C0  015A    353          ADDL    PHD$L_PSTBASOFF(R1),R1 ;CALCULATE BASE ADDRESS OF SECTION TABLE
                   0C A140          D0  015E    354          MOVL    SEC$L_WINDOW(R1)[R0],-4(R2)     ;GET ADDRESS OF REAL WINDOW
                      FC A2             0162
                         52        11  0164    355          BRB     NOSECT                 ;
                                   0166    356
-7                    3E A4        3F  0166    364 NODCNT: PUSHAW  PCB$W_DIOCNT(R4)       ;SET FOR DIRECT I/O FUNCTION
                         8F        11  0169    365          BRB     NOCNT                  ;
                                   016B    366
                      3E A4        B7  016B    367 DIRECT: DECW    PCB$W_DIOCNT(R4)       ;CHARGE FOR ANOTHER DIRECT I/O
                         F6        19  016E    368          BLSS    NODCNT                 ;BR IF NONE ALLOWED
                                   0170    369 OK:
            52    0000'DF          0F  0170    370 GTPKT:  REMQUE  @W^IOC$GL_IRPFL,R2     ;GET I/O PACKET FROM LOOK ASIDE LIST
                         C5        1D  0175    371          BVS     ALLOC                  ;IF VS EMPTY LIST
                                   0177    372
                                   0177    373 ;
                                   0177    374 ; BUILD DEVICE INDEPENDENT PART OF I/O PACKET
                                   0177    375 ;
                                   0177    376 ; R2 - IRP Address
                                   0177    377 ; R4 - PCB Address
                                   0177    378 ; R5 - UCB Address
                                   0177    379 ; R6 - CCB Address
                                   0177    380 ; R7 - Function code (original) (transformed)
                                   0177    381 ; R8 - FDT address
                                   0177    382 ; R9 - Channel index @ 16 + (IRP$M_BUFIO -- if buffered I/O)
                                   0177    383 ; R10 - Function code (transformed) (original)
                                   0177    384 ; R11 - Access mode
                                   0177    385 ;
                      0A A6        B6  0177    386 SUCCES: INCW    CCB$W_IOC(R6)          ;INCREMENT OUTSTANDING I/O ON CHANNEL
                                   017A    387          ASSUME  IRP$W_SIZE EQ 8        ;FOR FOLLOWING OPTIMIZATION
                   53    82        7E  017A    388          MOVAQ   (R2)+,R3               ;COPY ADDRESS AND ADD IRP$W_SIZE TO R2
                50    14 AC        7D  017D    389          MOVQ    ASTADR(AP),R0          ;INSERT AST ADDRESS AND PARAMETER
                   008C C4          D0  0181    390          MOVL    PCB$L_ARB(R4),IRP$L_ARB(R3) ;COPY ACCESS RIGHTS BLOCK ADDRESS
                      58 A3             0185
```

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                                  0187   391          ASSUME  IRP$B_RMOD EQ 11          ;FOR SHIFT BELOW
                        50   D5   0187   392          TSTL    R0                        ;CHECK FOR AST
                        07   13   0189   393          BEQL    5$                        ;NONE
                     40 8F   88   018B   394          BISB    #ACB$M_QUOTA,R11          ;NOTE QUOTA CHARGE
                     38 A4   B7   018F   395          DECW    PCB$W_ASTCNT(R4)          ;CHARGE QUOTA
                  5B   18   78   0192   396 5$:      ASHL    #24,R11,R11               ;ALIGN ACCESS MODE
                                  0196   397          ASSUME  IRP$B_TYPE EQ 10          ;FOR BISL BELOW
                        5B   C9   0196   398          BISL3   R11,#<<DYN$C_IRP@16>!IRP$C_LENGTH>,(R2)+ ;INSERT TYPE AND LENGTH
                000A00C4 8F        0198
                        82         019D
                  2C A4   10   9C   019E   399          ROTL    #16,PCB$B_PRIB-3(R4),R11;FETCH AND ALIGN PRIORITY
                        5B         01A2
                                  01A3   400          ASSUME  IRP$L_PID EQ 12           ;
                     82   60 A4   D0   01A3   401          MOVL    PCB$L_PID(R4),(R2)+       ;INSERT PROCESS ID OF CURRENT PROCESS
                     5B   04 AC   90   01A7   402          MOVB    EFN(AP),R11               ;MERGE EVENT FLAG NUMBER
                                  01AB   403
                                  01AB   404          ASSUME  IRP$L_AST EQ 16           ;FOR MOVQ BELOW
                                  01AB   405          ASSUME  IRP$L_ASTPRM EQ 20        ;FOR MOVQ BELOW
                        82   50   7D   01AB   406          MOVQ    R0,(R2)+                  ;INSERT AST ADDRESS AND PARAMETER
                  5B   5B   10   9C   01AE   407          ROTL    #16,R11,R11               ;ALIGN PRIORITY AND EVENT FLAG NUMBER
                                  01B2   408
                                  01B2   409          ASSUME  IRP$L_WIND EQ 24
                     82   04 A6   D0   01B2   410          MOVL    CCB$L_WIND(R6),(R2)+      ;GET WINDOW ADDRESS
                        97   14   01B6   411          BGTR    SECTION                   ;BR IF SECTION INDEX
                                  01B8   412
                                  01B8   413          ASSUME  IRP$L_UCB EQ 28
                        82   55   D0   01B8   414 NOSECT: MOVL    R5,(R2)+                  ;INSERT DEVICE UCB ADDRESS
                                  01BB   415          ASSUME  IRP$W_FUNC EQ 32
                        5B   5A   B0   01BB   416          MOVW    R10,R11                   ;MERGE I/O FUNCTION CODE
                                  01BE   417          ASSUME  IRP$B_EFN EQ 34
                                  01BE   418          ASSUME  IRP$B_PRI EQ 35
                                  01BE   419          ASSUME  IRP$L_IOSB EQ 36
                        82   5B   D0   01BE   420          MOVL    R11,(R2)+                 ;INSERT PRI,EFN,FUNC
                        58   04   C0   01C1   421          ADDL    #FDTACT-12,R8             ;POINT TO ACTION ROUTINE MASKS
                     82   10 AC   D0   01C4   422          MOVL    IOSB(AP),(R2)+            ;INSERT I/O STATUS BLOCK ADDRESS
                        5C   1C   C0   01C8   423          ADDL    #P1,AP                    ;POINT TO FIRST FUNCTION DEPENDENT PARAMETER
                                  01CB   424          ASSUME  IRP$W_CHAN EQ 40
                                  01CB   425          ASSUME  IRP$W_STS EQ 42
                  82   59   10   9C   01CB   426          ROTL    #16,R9,(R2)+              ;INSERT CHANNEL INDEX AND STATUS
                  59   57   01   CB   01CF   427          BICL3   #1,R7,R9                  ;PREPARE FOR VIRTUAL CHECK BELOW
                        82   7C   01D3   428          CLRQ    (R2)+                     ;CLEAR PTE ADDRESS, BYTE OFFSET, AND BYTE CO
                        62   D4   01D5   429          CLRL    (R2)                      ;
;RLRMXBCNTC              4C A3   D4   01D7    .1          CLRL    IRP$L_DIAGBUF(R3)         ;INIT ORIGINAL PTE ADDR (LOG OR VIRT I/O
;SRB0118                          01DA    .2
;SRB0118                          01DA    .3          .IF DF  CA$_MEASURE_IOT
;SRB0118                0000'CF   D5   01DA    .4          TSTL    W^PMS$GL_IOPFMPDB         ;DATA COLLECTION ENABLED?
;SRB0118                     05   13   01DE    .5          BEQL    3$                        ;BR IF NO
;SRB0118                   FE1D'  30   01E0    .6          BSBW    PMS$START_RQ              ;INSERT START OF I/O REQUEST MESSAGE
;SRB0118                     10   11   01E3    .7          BRB     4$                        ;
;SRB0118                          01E5    .8          .ENDC
;SRB0118                          01E5    .9
;SRB0118                          01E5   .10 3$:      SETIPL  #15                       ;DISABLE SOFTWARE INTERRUPTS
;SRB0118                0000'CF   D0   01E8   .11          MOVL    W^PMS$GL_IOPFMSEQ,IRP$L_SEQNUM(R3) ;INSERT PACKET SEQUENCE NUMBER
                          50 A3        01EC
;SRB0118                0000'CF   D6   01EE   .12          INCL    W^PMS$GL_IOPFMSEQ         ;INCREMENT I/O TRANSACTION SEQUENCE NUMBER
;SRB0118                          01F2   .13          SETIPL  #IPL$_ASTDEL              ;ENABLE INTERRUPTS
;SRB0118                 5B   38 A5   D0   01F5   .14 4$:      MOVL    UCB$L_DEVCHAR(R5),R11     ;GET DEVICE CHARACTISTICS FOR MANY
```

```
                                                                ;COMPARES BELOW

-13                                 01F9   443
                                    01F9   444 ;
                                    01F9   445 ; CHECK IF REQUESTING PROCESS HAS PRIVILEGE TO ACCESS DEVICE
                                    01F9   446 ;
                                    01F9   447 ; NOTE: LOW BIT OF FUNCTION CODE WAS CLEARED ABOVE
                                    01F9   448 ;
                                    01F9   449          ASSUME  IO$_READVBLK-IO$_WRITEVBLK EQ 1
;SRB0118                  59  30  D1 01F9    .1          CMPL    S^#IO$_WRITEVBLK,R9     ;VIRTUAL READ OR WRITE?
-1                              35  12 01FC   451          BNEQ    15$                     ;IF NEQ NO
                        0D 5B   0E  E1 01FE   452          BBC     S^#DEV$V_FOD,R11,5$     ;IF CLR, NOT FILE DEVICE
                                    0202   453
                                    0202   454 ;
                                    0202   455 ; THE FOLLOWING TEST IS NECESSITATED BY THE SYSTEM INITIALIZATION SEQUENCE
                                    0202   456 ;
                                    0202   457
                              18 A3 D5 0202   458          TSTL    IRP$L_WIND(R3)          ;WINDOW ADDRESS SPECIFIED?
                                 18 12 0205   459          BNEQ    90$                     ;IF NEQ YES
                           53 5B  13  E1 0207   460          BBC     S^#DEV$V_MNT,R11,60$    ;IF CLR, DEVICE NOT MOUNTED
                           61 5B  18  E1 020B   461          BBC     S^#DEV$V_FOR,R11,80$    ;IF CLR, MOUNTED STRUCTURED
                                    020F   462
                                    020F   463 ;
                                    020F   464 ; CONVERT VIRTUAL READ/WRITE FUNCTION TO ITS LOGICAL COUNTERPART
                                    020F   465 ;
                                    020F   466
                              57  10  C2 020F   467 5$:       SUBL    S^#IO$_READVBLK-IO$_READLBLK,R7 ;CONVERT TO LOGICAL FUNCTION
                           20 A3  10  A2 0212   468          SUBW    S^#IO$_READVBLK-IO$_READLBLK,IRP$W_FUNC(R3) ;
                        00014040  8F  D3 0216   469          BITL    #<DEV$M_SPL!-           ;NOT SPOOLED,
                                  5B       021C
                                           021D   470                  DEV$M_FOD!-             ;NOT FILE DEVICE,
                                           021D   471                  DEV$M_SHR>,R11          ;AND NOT SHARABLE
                                    14  12 021D   472          BNEQ    15$                     ;BR IF SATISFIED
                                    021F   473 ;
                                    021F   474 ; CHECK IF AST QUOTA IS EXCEEDED
                                    021F   475 ;
                                    021F   476
                              38 A4 B5 021F   477 90$:       TSTW    PCB$W_ASTCNT(R4)        ;AST QUEUE ENTRY QUOTA EXCEEDED?
                                 40 19 0222   478          BLSS    75$                     ;IF LEQ YES
                                    0224   479
                                    0224   480 ;
                                    0224   481 ; SCAN FUNCTION DECISION TABLE CALLING EACH SELECTED ACTION ROUTINE WITH:
                                    0224   482 ;
                                    0224   483 ;       R0 = ADDRESS OF ACTION ROUTINE ENTRY POINT.
                                    0224   484 ;       R1 = SCRATCH.
                                    0224   485 ;       R2 = SCRATCH.
                                    0224   486 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                                    0224   487 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                                    0224   488 ;       R5 = ASSIGNED DEVICE UCB ADDRESS.
                                    0224   489 ;       R6 = ADDRESS OF CCB.
                                    0224   490 ;       R7 = I/O FUNCTION CODE BIT NUMBER.
                                    0224   491 ;       R8 = FDT DISPATCH ADDRESS. (UPDATED TO POINT TO ACTION ROUTINE MASKS)
                                    0224   492 ;       R9 = SCRATCH.
                                    0224   493 ;       R10 = SCRATCH.
                                    0224   494 ;       R11 = SCRATCH.
                                    0224   495 ;       AP = ADDRESS OF FIRST FUNCTION DEPENDENT PARAMETER.
                                    0224   496 ;
                                    0224   497 ;       NB: in the Guide to Writing a Device Driver, we document the contents
                                    0224   498 ;       of R0 as being the address of the FDT action routine entry point.
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                                0224    499 ;       This is the only reason that the dispatch code below does not read:
                                0224    500 ;                JSB     @8(R8)
                                0224    501 ;       Should future gererations wish to modify FDT dispatching to use the
                                0224    502 ;       single dispatch instruction, they must bear the responsibility for
                                0224    503 ;       breaking user written drivers.
                                0224    504
                    58    0C    C0  0224    505 110$:   ADDL    #12,R8                  ;POINT TO NEXT FUNCTION MASK
                 F9 68    57    E1  0227    506         BBC     R7,(R8),110$            ;IF CLR, THEN ACTION NOT SELECTED
                 50    08 A8    D0  022B    507         MOVL    8(R8),R0                ;GET ADDRESS OF ACTION ROUTINE
                          60    16  022F    508         JSB     (R0)                    ;CALL ACTION ROUTINE
                          F1    11  0231    509         BRB     110$                    ;
                                0233    510
                                0233    511 ;
                                0233    512 ; CONTINUE DECODING FUNCTIONS OTHER THAN VIRTUAL READ/WRITE
                                0233    513 ;
                                0233    514
                    57    2F    D1  0233    515 15$:    CMPL    S^#IO$_LOGICAL,R7       ;VIRTUAL I/O FUNCTION?
                          38    19  0236    516         BLSS    80$                     ;IF LSS YES
                                0238    517
                                0238    518 ;
                                0238    519 ; LOGICAL OR PHYSICAL I/O FUNCTION
                                0238    520 ;
                                0238    521
                                0238    522         IFPRIV  PHY_IO,80$              ;PROCESS HAVE PHYSICAL I/O PRIVILEGE?
                    57    1F    D1  023E    523         CMPL    S^#IO$_PHYSICAL,R7      ;PHYSICAL I/O FUNCTION?
                          6E    19  0241    524         BLSS    20$                     ;IF LSS NO
                                0243    525         IFNPRIV LOG_IO,60$              ;PROCESS HAVE LOGICAL I/O PRIVILEGE?
;LMP0206     22 08 A6    04    E2  0249     .1         BBSS    #CCB$V_PHYCHKDON,CCB$B_STS(R6),80$      ;XFER IF CHECK DONE
;LMP0221      5A    0000'CF    9E  024E     .2         MOVAB   W^EXE$CHKPHYACCES,R10   ;SET FOR PHYSICAL I/O FUNCTION CHECK
;LMP0221                 6C    11  0253     .3         BRB     30$                     ;
;LMP0221                               0255     .4
;LMP0221        17 5B    10    E1  0255     .5 40$:    BBC     S^#DEV$V_SHR,R11,80$    ;IF CLR, DEVICE NOT SHAREABLE
;LMP0221                               0259     .6 50$:                             ; R4 - PCB ADDRESS
;LMP0221                               0259     .7                                  ; R5 - UCB ADDRESS
-7                      6A    16  0259    533         JSB     (R10)                   ;CHECK ACCESS TO VOLUME
                     12 50    E8  025B    534         BLBS    R0,80$                  ;IF LBS ACCESS ALLOWED
                  50    24    3C  025E    535 60$:    MOVZWL  #SS$_NOPRIV,R0          ;SET NO PRIVILEGE STATUS
                     00FC    31  0261    536 70$:    BRW     EXE$ABORTIO             ;
                     10 A3    D5  0264    537 75$:    TSTL    IRP$L_AST(R3)           ;DOES THIS REQUEST NEED AN AST?
                        BB    13  0267    538         BEQL    110$                    ;NO, THEN CAN'T BE QUOTA EXCEEDED.
                  50    1C    3C  0269    539         MOVZWL  #SS$_EXQUOTA,R0         ;AST QUOTA EXCEEDED
                        F3    11  026C    540         BRB     70$                     ;
;LMP0206                E5    11  026E     .1 77$:    BRB     40$                     ;INTERMEDIATE BRANCH
                                0270    541 ;
                                0270    542 ; PROCESS HAS ACCESS TO DEVICE
                                0270    543 ;
                                0270    544
                    57    1F    D1  0270    545 80$:    CMPL    S^#IO$_PHYSICAL,R7      ;LOGICAL OR VIRTUAL I/O FUNCTION?
                          AA    19  0273    546         BLSS    90$                     ;IF LSS YES
                 0100 8F    A8  0275    547         BISW    #IRP$M_PHYSIO,IRP$W_STS(R3) ;SET PHYSICAL I/O FLAG
                   2A A3        0279
                 59    14 AC    D0  027B    548         MOVL    <P6-P1>(AP),R9          ;GET ADDRESS OF DIAGNOSTIC BUFFER
                        9E    13  027F    549         BEQL    90$                     ;IF EQL THEN NOT SPECIFIED
                                0281    550 ;
                                0281    551 ; Process diagnostic buffer parameter
                                0281    552 ;
                                0281    553         IFNPRIV DIAGNOSE,60$            ;PROCESS HAVE PRIVILEGE TO DIAGNOSE?
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                51   0088 C5    D0   0287    554          MOVL    UCB$L_DDT(R5),R1          ;GET ADDRESS OF DDT
                  51   14 A1    3C   028C    555          MOVZWL  DDT$W_DIAGBUF(R1),R1      ;GET SIZE OF DIAGNOSTIC BUFFER
;LMP0206                 1C    13   0290     .1          BEQL    130$                      ;IF EQL NO DIAGNOSTIC FUNCTIONS
-1                       53    DD   0292    557          PUSHL   R3                        ;SAVE I/O PACKET ADDRESS
                      FD69     30   0294    558          BSBW    EXE$ALLOCBUF              ;ALLOCATE DIAGNOSTIC BUFFER
                         53 8ED0   0297    559          POPL    R3                        ;RETRIEVE I/O PACKET ADDRESS
                       C4 50     E9   029A    560          BLBC    R0,70$                    ;IF LBC ALLOCATION FAILURE
                   4C A3   52     D0   029D    561          MOVL    R2,IRP$L_DIAGBUF(R3)      ;SAVE ADDRESS OF DIAGNOSTIC BUFFER
                   82   0C A2     9E   02A1    562          MOVAB   12(R2),(R2)+              ;SET POINTER TO DATA AREA
                      62   59     D0   02A5    563          MOVL    R9,(R2)                   ;SAVE USER ADDRESS OF DIAGNOSTIC BUFFER
                      0080 8F     A8   02A8    564          BISW    #IRP$M_DIAGBUF,IRP$W_STS(R3) ;SET DIAGNOSTIC BUFFER PRESENT
                        2A A3          02AC
                         FF6E     31   02AE    565 130$:    BRW     90$
                                       02B1    566 ;
                                       02B1    567 ; LOGICAL I/O FUNCTION
                                       02B1    568 ;
                                       02B1    569
                                       02B1    570 20$:     IFPRIV  LOG_IO,130$               ;PROCESS HAVE LOGICAL I/O PRIVILEGE?
;LMP0206        B4 08 A6     03     E2   02B7     .1          BBSS    #CCB$V_LOGCHKDON,CCB$B_STS(R6),80$  ;XFER IF CHECK DONE
                 5A   0000'CF     9E   02BC    571          MOVAB   W^EXE$CHKLOGACCES,R10     ;SET FOR LOGICAL I/O FUNCTION CHECK
                                       02C1    572
                                       02C1    573 ;
                                       02C1    574 ; PHYSICAL OR LOGICAL I/O FUNCTION - CHECK ACCESSIBILITY OF DEVICE
                                       02C1    575 ;
                                       02C1    576
                   99 5B     06     E0   02C1    577 30$:     BBS     S^#DEV$V_SPL,R11,60$      ;IF SET, SPOOLED DEVICE
;LMP0206            A5 5B     0E     E1   02C5     .1          BBC     S^#DEV$V_FOD,R11,77$      ;IF CLR, NOT FILE DEVICE
-1                 91 5B     13     E1   02C9    579          BBC     S^#DEV$V_MNT,R11,60$      ;IF CLR, DEVICE NOT MOUNTED
                   8D 5B     18     E1   02CD    580          BBC     S^#DEV$V_FOR,R11,60$      ;IF CLR, MOUNTED STRUCTURED
                         FF85     31   02D1    581          BRW     50$                       ;
```

```
02D4    583          .SBTTL  BUILD I/O PACKET FOR PAGE READ/WRITE
02D4    584 ;+
02D4    585 ; EXE$BUILDPKTR - BUILD I/O PACKET FOR PAGE READ
02D4    586 ; EXE$BUILDPKTW - BUILD I/O PACKET FOR PAGE WRITE
02D4    587 ; EXE$BLDPKTSWPR - BUILD I/O PACKET FOR SWAP READ
02D4    588 ; EXE$BLDPKTSWPW - BUILD I/O PACKET FOR SWAP WRITE
02D4    589 ; EXE$BLDPKTGSR - BUILD I/O PACKET FOR SHARED MEMORY GLOBAL SECTION READ
02D4    590 ; EXE$BLDPKTGSW - BUILD I/O PACKET FOR SHARED MEMORY GLOBAL SECTION WRITE
02D4    591 ;
02D4    592 ; THIS ROUTINE IS CALLED TO FILL OUT AND QUEUE AN I/O PACKET
02D4    593 ; FOR A SWAPPING OR PAGING READ OR WRITE.
02D4    594 ;
02D4    595 ; INPUTS:
02D4    596 ;
02D4    597 ;       R0 = VIRTUAL BLOCK NUMBER
02D4    598 ;       R1 = NUMBER OF BYTES TO TRANSFER (PAGE INCREMENTS)
02D4    599 ;       R2 = WINDOW ADDRESS FOR MAPPING VBN TO LBN
02D4    600 ;       R3 = SYSTEM VIRTUAL ADDRESS OF PAGE TABLE ENTRY
02D4    601 ;       R4 = CURRENT PROCESS CONTROL BLOCK ADDRESS
02D4    602 ;            PCB$W_DIOCNT(R4) IS ASSUMED GREATER THAN ZERO
02D4    603 ;            AND MUST BE CHECKED BY THE CALLER.
02D4    604 ;       R5 = I/O REQUEST PACKET ADDRESS
02D4    605 ;            WITH THE FOLLOWING FIELDS ALREADY FILLED IN
02D4    606 ;
02D4    607 ;       IRP$W_SIZE(R5) AND IRP$B_TYPE(R5)
02D4    608 ;           FOR ENTRY AT EXE$BUILDPKTW, EXE$BLDPKTGSR, AND EXE$BLDPKTGSW,
02D4    609 ;               THESE ARE FILLED IN BY THE CALL.  FOR ALL OTHER ENTRY POINTS
02D4    610 ;               THEY ARE FILLED IN BY THIS CODE.
02D4    611 ;       IRP$L_AST(R5) =
02D4    612 ;            FOR PAGE READ CASE - SYSTEM VIRTUAL ADDRESS OF SLAVE (PROCESS)
02D4    613 ;               PAGE TABLE ENTRY FOR THE CASE OF A GLOBAL PAGE READ.
02D4    614 ;               THIS MUST BE 0 FOR A SYSTEM OR PROCESS PAGE READ.
02D4    615 ;            FOR PAGE WRITE CASE - STANDARD QI/O AST ADDRESS
02D4    616 ;            FOR SWAPIO CASE - THIS PARAMETER IS CURRENTLY NOT USED
02D4    617 ;
02D4    618 ;       IRP$L_ASTPRM(R5) =
02D4    619 ;            FOR PAGE READ CASE - THE CONTENTS OF THE FAULTED PAGE TABLE ENTRY
02D4    620 ;               USED TO RECOVER THE ORIGINAL BACKING STORE ADDRESS WHEN A PAGE
02D4    621 ;               READ ERROR OCCURRED FOR A COPY ON REFERENCE PAGE.
02D4    622 ;            FOR PAGE WRITE CASE - STANDARD QI/O AST PARAMETER
02D4    623 ;            FOR SWAPIO CASE - ADDRESS OF KERNEL AST ROUTINE TO CALL
02D4    624 ;
02D4    625 ;       IRP$B_PRI(R5) = THE PRIORITY AT WHICH THE TRANSFER IS TO BE QUEUED
02D4    626 ;
02D4    627 ;       IRP$B_RMOD(R5) =
02D4    628 ;           FOR PAGE WRITE CASE - STANDARD QI/O MODE OF REQUESTER
02D4    629 ;           FOR ALL OTHER CASES - CONTAINS GARBAGE WHICH IS IGNORED
02D4    630 ;
02D4    631 ;       IRP$B_EFN(R5)  =
02D4    632 ;           FOR PAGE WRITE CASE - STANDARD QI/O EVENT FLAG NUMBER
02D4    633 ;           FOR ALL OTHER CASES - CONTAINS GARBAGE WHICH IS IGNORED
02D4    634 ;
02D4    635 ;       IRP$L_IOSB(R5) =
02D4    636 ;           FOR PAGE WRITE CASE - STANDARD QI/O I/O STATUS BLOCK ADDRESS
02D4    637 ;           FOR ALL OTHER CASES - CONTAINS GARBAGE WHICH IS IGNORED
02D4    638 ;
02D4    639 ; OUTPUTS:
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```
                                02D4   640 ;
                                02D4   641 ;       R4,R5 ALTERED
                                02D4   642 ;-
                                02D4   643
                                02D4   644          .ENABL  LSB
;LJK0172                        02D4    .1
;LJK0172                        02D4    .2 ; Note that the differentiation between READ and WRITE operations is
;LJK0172                        02D4    .3 ; encoded in the setting of the IRP$M_FUNC bit.
;LJK0172                        02D4    .4 ;
;LJK0172                        02D4    .5 ;       IRP$M_FUNC = 1 => IO$_READPBLK  ; Read operation
;LJK0172                        02D4    .6 ;       IRP$M_FUNC = 0 => IO$_WRITEPBLK ; Write operation
;LJK0172                        02D4    .7
;LJK0172                        02D4    .8 EXE$BLDPKTGSR::                          ;BUILD PACKET FOR SHMGSD READ
;LJK0172  00520000 8F    DD     02D4    .9          PUSHL   #<IRP$M_SWAPIO ! IRP$M_VIRTUAL ! IRP$M_FUNC>@16
;LJK0172           30    11     02DA   .10          BRB     20$                         ;TYPE/SIZE ALREADY SET IN PACKET
;LJK0172                        02DC   .11
;LJK0172                        02DC   .12 EXE$BLDPKTGSW::                          ;BUILD PACKET FOR SHMGSD WRITE
;LJK0172  00500000 8F    DD     02DC   .13          PUSHL   #<IRP$M_SWAPIO ! IRP$M_VIRTUAL>@16
;LJK0172           28    11     02E2   .14          BRB     20$                         ;TYPE/SIZE ALREADY SET IN PACKET
;LJK0172                        02E4   .15
;LJK0172                        02E4   .16 EXE$BLDPKTSWPR::                         ;BUILD SWAP READ PACKET
;LJK0172  00520000 8F    DD     02E4   .17          PUSHL   #<IRP$M_SWAPIO ! IRP$M_VIRTUAL ! IRP$M_FUNC>@16
;LJK0172           16    11     02EA   .18          BRB     10$                         ;
;LJK0172                        02EC   .19
;LJK0172                        02EC   .20 EXE$BLDPKTSWPW::                         ;BUILD SWAP WRITE PACKET
;LJK0172  00500000 8F    DD     02EC   .21          PUSHL   #<IRP$M_SWAPIO ! IRP$M_VIRTUAL>@16
;LJK0172           0E    11     02F2   .22          BRB     10$                         ;
;LJK0172                        02F4   .23
;LJK0172                        02F4   .24 EXE$BUILDPKTW::                          ;BUILD I/O PACKET FOR PAGE WRITE
;LJK0172  00140000 8F    DD     02F4   .25          PUSHL   #<IRP$M_PAGIO ! IRP$M_VIRTUAL>@16
;LJK0172           10    11     02FA   .26          BRB     20$                         ;
;LJK0172                        02FC   .27
;LJK0172                        02FC   .28 EXE$BUILDPKTR::                          ;BUILD I/O PACKET FOR PAGE READ
;LJK0172  00160000 8F    DD     02FC   .29          PUSHL   #<IRP$M_PAGIO ! IRP$M_VIRTUAL ! IRP$M_FUNC>@16
;LJK0172                        0302   .30
;LJK0172  000A00C4 8F    F0     0302   .31 10$:     INSV    #<DYN$C_IRP@16 ! IRP$C_LENGTH>,- ;SET SIZE
;LJK0172       18   00          0308   .32                 #0,#24,IRP$W_SIZE(R5)   ;AND TYPE OF PACKET
                 08 A5          030A
;LJK0172    2C A5    53    D0   030C   .33 20$:     MOVL    R3,IRP$L_SVAPTE(R5)     ;SYSTEM VIRTUAL ADR OF PAGE TABLE ENTRY
;LJK0172    4C A5    53    D0   0310   .34          MOVL    R3,IRP$L_DIAGBUF(R5)    ;NEED COPY OF ORIGINAL FOR SEGMENTED XFERS
;LJK0172       53    55    D0   0314   .35          MOVL    R5,R3                   ;PACKET ADDRESS TO R3
;LJK0172  6E    01    11    EE   0317   .36          EXTV    #<IRP$V_FUNC+16>,#1,(SP),R5
                    55          031B
;LJK0172                        031C   .37
;LJK0172                        031C   .38 ; R5 = -1 for read
;LJK0172                        031C   .39 ; R5 =  0 for write
;LJK0172                        031C   .40
;LJK0172                        031C   .41          ASSUME  <IO$_WRITEPBLK + 1> EQ IO$_READPBLK
;LJK0172                        031C   .42          ASSUME  <WCB$L_WRITES - 4> EQ WCB$L_READS
;LJK0172                        031C   .43
;LJK0172         28 A245  D6    031C   .44          INCL    WCB$L_WRITES(R2)[R5]    ;USE CODE TO BUMP READ OR WRITE COUNT
;LJK0172         0B    55 A3    0320   .45          SUBW3   R5,#IO$_WRITEPBLK,IRP$W_FUNC(R3) ;SET REAL FUNCTION CODE
                   20 A3        0323
;LJK0172  0000FFFF 8F    CB     0325   .46          BICL3   #^XFFFF,(SP)+,R5        ;GET STATUS BITS AND CLEAR CHANNEL
            55    8E           032B
;LJK0172                        032D   .47
;LJK0172                        032D   .48          ASSUME  IRP$W_STS EQ IRP$W_CHAN+2
```

```
;LJK0172
-33
                                 032D    .49
          28 A3    55    D0     032D    678          MOVL    R5,IRP$W_CHAN(R3)          ;SET CHANNEL AND STATUS
          55    10 A2    D0     0331    679          MOVL    WCB$L_ORGUCB(R2),R5        ;GET UCB ADDRESS FROM WINDOW
          1C A3    55    D0     0335    680          MOVL    R5,IRP$L_UCB(R3)           ;SET UCB ADDRESS
       0C A3    60 A4    D0     0339    681          MOVL    PCB$L_PID(R4),IRP$L_PID(R3) ;PROCESS ID FROM PCB
          48 A3    50    D0     033E    682          MOVL    R0,IRP$L_SEGVBN(R3)        ;STARTING VIRTUAL BLOCK NUMBER
          18 A3    52    D0     0342    683          MOVL    R2,IRP$L_WIND(R3)          ;WINDOW ADDRESS
             008C C4    D0     0346    684          MOVL    PCB$L_ARB(R4),IRP$L_ARB(R3) ;ACCESS RIGHTS BLOCK ADDRESS
               58 A3          034A
                              034C    685
               30 A3    B4     034C    686          CLRW    IRP$W_BOFF(R3)             ;ZERO BYTE OFFSET
          32 A3    51    D0     034F    687          MOVL    R1,IRP$L_BCNT(R3)          ;SET BYTE COUNT
               40 A3    D4     0353    688          CLRL    IRP$L_ABCNT(R3)            ;ZERO ACCUMULATED BYTE COUNT
          44 A3    51    D0     0356    689          MOVL    R1,IRP$L_OBCNT(R3)         ;SET ORIGINAL BYTE COUNT
                              035A    690
                              035A    691          .IF     DF,CA$_MEASURE_IOT
                              035A    692
                    FCA3'     30     035A    693          BSBW    PMS$START_RQ               ;INSERT START OF I/O REQUEST MESSAGE
                              035D    694
                              035D    695          .ENDC
                              035D    696
                    FCA0'     31     035D    697          BRW     IOC$QNXTSEG1               ;QUEUE THE FIRST SEGMENT OF THE I/O REQUEST
                              0360    698                                                     ;AND RETURN
                              0360    699          .DSABL  LSB
```

```
                     0360   701          .SBTTL  COMPLETE I/O OPERATION
                     0360   702 ;+
                     0360   703 ; EXE$ABORTIO - ABORT I/O OPERATION
                     0360   704 ;
                     0360   705 ; THIS ROUTINE IS JUMPED TO FROM A FUNCTION DECISION TABLE ACTION ROUTINE
                     0360   706 ; TO FINISH AN I/O OPERATION WITHOUT RETURNING THE FINAL I/O STATUS.
                     0360   707 ;
                     0360   708 ; EXE$FINISHIO - FINISH I/O OPERATION
                     0360   709 ;
                     0360   710 ; THIS ROUTINE IS JUMPED TO FROM A FUNCTION DECISION TABLE ACTION ROUTINE
                     0360   711 ; TO FINISH AN I/O OPERATION AND RETURN THE FINAL I/O STATUS.
                     0360   712 ;
                     0360   713 ; EXE$FINISHIOC - FINISH I/O OPERATION WITH SECOND I/O STATUS LONGWORD CLEARED
                     0360   714 ;
                     0360   715 ; THIS ROUTINE IS JUMPED TO FROM A FUNCTION DESCISION TABLE ACTION ROUTINE
                     0360   716 ; TO FINISH AN I/O OPERATION AND RETURN THE FINAL I/O STATUS WITH THE
                     0360   717 ; SECOND I/O STATUS LONGWORD CLEARED.
                     0360   718 ;
                     0360   719 ; INPUTS:
                     0360   720 ;
                     0360   721 ;       R0 = FIRST LONGWORD OF FINAL I/O STATUS.
                     0360   722 ;       R1 = SECOND LONGWORD OF FINAL I/O STATUS.
                     0360   723 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                     0360   724 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                     0360   725 ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                     0360   726 ;
                     0360   727 ; OUTPUTS:
                     0360   728 ;
                     0360   729 ;       THE FINAL I/O STATUS IS STORED IN THE I/O PACKET AND THE PACKET IS
                     0360   730 ;       INSERTED IN THE I/O POST PROCESSING QUEUE. A SOFTWARE INTERRUPT
                     0360   731 ;       IS GENERATED TO INITIATE I/O POST PROCESSING AND THE FIRST WORD
                     0360   732 ;       OF THE FINAL I/O STATUS IS RETURNED AS THE SERVICE STATUS.
                     0360   733 ;-
                     0360   734
                     0360   735          .ENABL  LSB
                     0360   736 EXE$ABORTIO::                          ;ABORT I/O OPERATION
        24 A3   D4   0360   737          CLRL    IRP$L_IOSB(R3)         ;CLEAR ADDRESS OF I/O STATUS BLOCK
11 0B A3    06   E5   0363   738          BBCC    #ACB$V_QUOTA,IRP$B_RMOD(R3),10$ ;IF CLR, NO AST SPECIFIED
        38 A4   B6   0368   739          INCW    PCB$W_ASTCNT(R4)       ;UPDATE AVAILABLE AST QUEUE ENTRIES
           0C   11   036B   740          BRB     10$                    ;
                     036D   741 EXE$FINISHIOC::                         ;FINISH I/O OPERATION CLEAR SECOND LONGWORD
           51   D4   036D   742          CLRL    R1                     ;CLEAR SECOND I/O STATUS LONGWORD
                     036F   743 EXE$FINISHIO::                          ;FINISH I/O OPERATION
        70 A5   D6   036F   744          INCL    UCB$L_OPCNT(R5)        ;INCREMENT OPERATIONS COMPLETED
   38 A3    50   7D   0372   745          MOVQ    R0,IRP$L_MEDIA(R3)     ;STORE FINAL I/O STATUS
      50    01   3C   0376   746          MOVZWL  S^#SS$_NORMAL,R0       ;SET NORMAL COMPLETION STATUS
0000'DF    63   0E   0379   747 10$:     INSQUE  (R3),@W^IOC$GL_PSBL    ;INSERT I/O PACKET IN POST PROCESS QUEUE
                     037E   748          SOFTINT #IPL$_IOPOST           ;INITIATE SOFTWARE INTERRUPT
           39   11   0381   749          BRB     QIORETURN              ;
                     0383   750          .DSABL  LSB
```

```
                0383   752          .SBTTL  QUEUE I/O PACKET TO DRIVER
                0383   753 ;+
                0383   754 ; EXE$QIODRVPKT - QUEUE I/O PACKET TO DRIVER
                0383   755 ;
                0383   756 ; THIS ROUTINE IS JUMPED TO FROM A FUNCTION DECISION TABLE ACTION ROUTINE
                0383   757 ; TO QUEUE AN I/O PACKET TO THE APPROPRIATE DRIVER.
                0383   758 ;
                0383   759 ; INPUTS:
                0383   760 ;
                0383   761 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                0383   762 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                0383   763 ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                0383   764 ;
                0383   765 ; OUTPUTS:
                0383   766 ;
                0383   767 ;       THE I/O PACKET IS QUEUED BY PRIORITY IN THE APPROPRIATE DEVICE
                0383   768 ;       QUEUE AND A NORMAL COMPLETION STATUS IS RETURNED.
                0383   769 ;-
                0383   770
                0383   771 EXE$QIODRVPKT::                          ;QUEUE I/O PACKET
66    10        0383   772          BSBB    EXE$INSIOQ              ;INSERT I/O PACKET IN DEVICE QUEUE
32    11        0385   773          BRB     EXE$QIORETURN           ;
```

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                     0387   775          .SBTTL  EXE$ALTQUEPKT - Call driver ALTSTART entry point
                     0387   776
                     0387   777 ;
                     0387   778 ; EXE$ALTQUEPKT - activates a driver at its ALTSTART entry point
                     0387   779 ;
                     0387   780 ; Routine description:
                     0387   781 ;
                     0387   782 ;       Locates and calls a driver entry point supplied as an alternate
                     0387   783 ;       START I/O entry point. Does not test for unit busy before the
                     0387   784 ;       call. Exits by returning to caller.
                     0387   785 ;
                     0387   786 ;       The routine expects to gain control at or below driver fork
                     0387   787 ;       level. The routine raises to driver fork IPL before the call,
                     0387   788 ;       and restores the previous IPL before returning to its caller.
                     0387   789 ;
                     0387   790 ; Inputs:
                     0387   791 ;
                     0387   792 ;       R3      - address of packet or buffer
                     0387   793 ;       R5      - address of UCB
                     0387   794 ;
                     0387   795 ; Outputs:
                     0387   796 ;
                     0387   797 ;       Control returns to the requesting process.
                     0387   798 ;
                     0387   799 ;       The routine destroys R0-R1.
                     0387   800 ;
                     0387   801 ;--
                     0387   802
                     0387   803 EXE$ALTQUEPKT::                          ; Start I/O in driver.
                     0387   804          DSBINT  UCB$B_FIPL(R5)          ; Raise to fork IPL.
50   0088 C5    D0   038E   805          MOVL    UCB$L_DDT(R5),R0        ; Get address of unit's DDT.
       1C B0    16   0393   806          JSB     @DDT$L_ALTSTART(R0)     ; Call alternate start I/O routine.
                     0396   807          ENBINT                          ; Reenable interrupts.
                05   0399   808          RSB                             ; Return to caller.
```

```
                                039A   810          .SBTTL  QUEUE I/O PACKET TO ACP
                                039A   811 ;+
                                039A   812 ; EXE$QIOACPPKT - QUEUE I/O PACKET TO ACP
                                039A   813 ;
                                039A   814 ; THIS ROUTINE IS JUMPED TO FROM A FUNCTION DECISION TABLE ACTION ROUTINE
;CDS0001                        039A    .1 ; TO QUEUE AN I/O PACKET TO THE APPROPRIATE ACP OR XQP.
-1                              039A   816 ;
                                039A   817 ; INPUTS:
                                039A   818 ;
                                039A   819 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                                039A   820 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                                039A   821 ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                                039A   822 ;
                                039A   823 ;       CURRENT IPL MUST BE AT SYNCH OR HIGHER LEVEL.
                                039A   824 ;
                                039A   825 ; OUTPUTS:
                                039A   826 ;
                                039A   827 ;       R4 ALTERED
;CDS0001                        039A    .1 ;       THE I/O PACKET IS QUEUED AT THE END OF THE APPROPRIATE ACP OR XQP QUEUE
-1                              039A   829 ;       AND A NORMAL COMPLETION STATUS IS RETURNED.
                                039A   830 ;-
                                039A   831
                                039A   832 EXE$QIOACPPKT::                              ;QUEUE I/O PACKET TO ACP
          52   34 A5    D0      039A   833          MOVL    UCB$L_VCB(R5),R2           ;GET ADDRESS OF VCB
          52   10 A2    D0      039E   834          MOVL    VCB$L_AQB(R2),R2           ;GET ADDRESS OF ACP AQB
;CDS0001       0C A2    D5      03A2    .1          TSTL    AQB$L_ACPPID(R2)           ;GET ADDRESS OF AQB
;CDS0001            19  13      03A5    .2          BEQL    XQP                        ;EQL IF IT'S FOR XQP
                   60  10      03A7   835          BSBB    EXE$INSERTIRP              ;INSERT I/O PACKET IN ACP QUEUE
                   0E  12      03A9   836          BNEQ    EXE$QIORETURN              ;IF NEQ NOT FIRST ENTRY IN QUEUE
          51   0C A2    D0      03AB   837          MOVL    AQB$L_ACPPID(R2),R1        ;GET ACP PROCESS ID
                FC4E'  30      03AF   838          BSBW    SCH$WAKE                   ;WAKE UP ACP PROCESS
               04 50   E8      03B2   839          BLBS    R0,EXE$QIORETURN           ;IF LBS ACP STILL PRESENT
                               03B5   840          BUG_CHECK NONEXSTACP               ;NONEXISTENT ACP PROCESS
                               03B9   841 EXE$QIORETURN::                             ;QUEUE I/O REQUEST COMPLETION STATUS RETURN
             50    01   3C      03B9   842          MOVZWL  #SS$_NORMAL,R0             ;SET NORMAL COMPLETION STATUS
                               03BC   843 QIORETURN:                                  ;RETURN SPECIFIED STATUS
                               03BC   844          SETIPL  #0                         ;ALLOW ALL INTERRUPTS
                          04   03BF   845          RET                                ;
;CDS0005                        03C0    .1 XQP:
;CDS0005         55   60 A3    9E      03C0    .2          MOVAB   IRP$L_FQFL(R3), R5 ;USE CDRP PART OF IRP AS ACB
;CDS0005                        03C4    .3          SETIPL  #IPL$_ASTDEL               ;ALLOW PAGEFAULTS
;CDS0005              F2 AF    9F      03C7    .4          PUSHAB  QIORETURN          ;RETURN ADDRESS FROM EXE$QXQPPKT
;CDS0005                        03CA    .5 ;
;CDS0005                        03CA    .6 ; FALL THROUGH TO XQP QUEUEING ROUTINE IMMEDIATELY FOLLOWING.
;CDS0005                        03CA    .7 ; RSB FROM THIS ROUTINE RETURNS TO EXIT ABOVE.
;CDS0005                        03CA    .8 ;
;CDS0005                        03CA    .9
;CDS0005                        03CA   .10          .SBTTL  EXE$QXQPPKT - QUEUE I/O PACKET TO XQP
;CDS0005                        03CA   .11 ;+
;CDS0005                        03CA   .12 ; EXE$QXQPPKT - INSERT I/O PACKET IN XQP QUEUE
;CDS0005                        03CA   .13 ;
;CDS0005                        03CA   .14 ; THIS ROUTINE IS CALLED TO INSERT AN I/O PACKET IN THE XQP QUEUE
;CDS0005                        03CA   .15 ; AND START THE THREAD OF EXECUTION IF IT IS THE ONLY REQUEST.
;CDS0005                        03CA   .16 ;
;CDS0005                        03CA   .17 ; CALLING SEQUENCE:
;CDS0005                        03CA   .18 ;       BSB/JSB EXE$QXQPPKT - THIS IS EITHER CALLED FROM QIO OR
;CDS0005                        03CA   .19 ;       AS A SPECIAL KERNEL AST INVOKED BY IOPOST.
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```
;CDS0005                                03CA    .20 ;
;CDS0005                                03CA    .21 ; INPUTS:
;CDS0005                                03CA    .22 ;
;CDS0005                                03CA    .23 ;       R4 = CURRENT PROCESS PCB ADDRESS.
;CDS0005                                03CA    .24 ;       R5 = ADDRESS OF TEMP ACB PART OF IRP.
;CDS0005                                03CA    .25 ;
;CDS0005                                03CA    .26 ; OUTPUTS:
;CDS0005                                03CA    .27 ;
;CDS0005                                03CA    .28 ;       R0 = status from SCH$QAST.
;CDS0005                                03CA    .29 ;
;CDS0005                                03CA    .30 ;       IF SUCCESS:
;CDS0005                                03CA    .31 ;       A KERNEL AST IS QUEUED TO THE DISPATCH ROUTINE OF THE XQP
;CDS0005                                03CA    .32 ;       IF NO PACKETS WERE ALREADY ON THE REQUEST QUEUE OF THE XQP.
;CDS0005                                03CA    .33 ;
;CDS0005                                03CA    .34 ;       THIS ROUTINE MUST BE CALLED AT IPL ASTDEL SO THAT THE
;CDS0005                                03CA    .35 ;       IRP CANNOT BE LOST (BECAUSE OF PROCESS DELETION) UNTIL IT
;CDS0005                                03CA    .36 ;       IS PLACED ON THE XQP REQUEST QUEUE.
;CDS0005                                03CA    .37 ;
;CDS0005                                03CA    .38 ;-
;CDS0005                                03CA    .39
;CDS0005                                03CA    .40 EXE$QXQPPKT::
;CDS0005          00000000'GF   D0      03CA    .41         MOVL    G^CTL$GL_F11BXQP, R0    ;ADDR OF XQP QUEUE HEAD
                           50           03D0
;CDS0005        14 A5    A0 A5   9E     03D1    .42         MOVAB   CDRP$L_IOQFL(R5), -     ;ADDRESS OF IRP
;CDS0005                                03D6    .43                 ACB$L_ASTPRM(R5)        ;IS AST PARAMETER.
;CDS0005                  20    90      03D6    .44         MOVB    #PSL$C_KERNEL!ACB$M_NODELETE,- ;KERNEL MODE, DON'T DELETE IRP
;CDS0005                0B A5           03D8    .45                 ACB$B_RMOD(R5)
;CDS0005        0C A5    60 A4   D0     03DA    .46         MOVL    PCB$L_PID(R4), ACB$L_PID(R5) ;COPY PID.
;CDS0005        10 A5    08 A0   D0     03DF    .47         MOVL    F11B$L_DISPATCH(R0), ACB$L_AST(R5) ;XQP DISPATCHER ADDRESS.
;CDS0005              52    02   D0     03E4    .48         MOVL    #PRI$_RESAVL, R2        ;SAME AS AFTER WAITING FOR A LOCK.
;CDS0005                 FC16'   30     03E7    .49         BSBW    SCH$QAST                ;QUEUE THE AST.
;CDS0005                         05     03EA    .50         RSB                             ;AND RETURN
```

```
                                03EB   847          .SBTTL  INSERT I/O PACKET IN UNIT QUEUE
                                03EB   848 ;+
                                03EB   849 ; EXE$INSIOQ - INSERT I/O PACKET IN UNIT QUEUE
                                03EB   850 ;
                                03EB   851 ; THIS ROUTINE IS CALLED TO INSERT AN I/O PACKET IN A UNIT QUEUE AND CALL
                                03EB   852 ; THE APPROPRIATE I/O DRIVER IF THE UNIT IS NOT BUSY.
                                03EB   853 ;
                                03EB   854 ; INPUTS:
                                03EB   855 ;
                                03EB   856 ;        R3 = ADDRESS OF I/O REQUEST PACKET.
                                03EB   857 ;        R5 = UCB ADDRESS OF DEVICE UNIT.
                                03EB   858 ;-
                                03EB   859
                                03EB   860 EXE$INSIOQ::                                 ;INSERT IN I/O QUEUE
                                03EB   861          DSBINT  UCB$B_FIPL(R5)              ;RAISE IPL TO FORK LEVEL
;SSA0017                   6A A5   B6  03F2    .1          INCW    UCB$W_QLEN(R5)          ; Bump device queue length
              05 64 A5     08   E2  03F5   862          BBSS    #UCB$V_BSY,UCB$W_STS(R5),10$ ;IF SET, THEN DEVICE IS BUSY
                        FC03     30  03FA   863          BSBW    IOC$INITIATE            ;INITIATE I/O FUNCTION
                          06     11  03FD   864          BRB     20$                     ;
                52    4C A5     DE  03FF   865 10$:      MOVAL   UCB$L_IOQFL(R5),R2      ;GET ADDRESS OF I/O QUEUE LISTHEAD
                          04     10  0403   866          BSBB    EXE$INSERTIRP           ;INSERT I/O PACKET IN DEVICE QUEUE
                                     0405   867 20$:      ENBINT                          ;ENABLE INTERRUPTS
                                05   0408   868          RSB                             ;
```

```
                     0409   870          .SBTTL  INSERT I/O PACKET IN QUEUE BY PRIORITY
                     0409   871 ;+
                     0409   872 ; EXE$INSERTIRP - INSERT I/O PACKET IN QUEUE BY PRIORITY
                     0409   873 ;
                     0409   874 ; THIS ROUTINE IS CALLED TO INSERT AN I/O PACKET IN A SPECIFIED QUEUE BY
                     0409   875 ; PRIORITY.
                     0409   876 ;
                     0409   877 ; INPUTS:
                     0409   878 ;
                     0409   879 ;       R2 = ADDRESS OF QUEUE LISTHEAD.
                     0409   880 ;       R3 = ADDRESS OF I/O PACKET.
                     0409   881 ;
                     0409   882 ;       CURRENT IPL MUST BE THE FORK LEVEL OF THE RESPECTIVE DRIVER PROCESS
                     0409   883 ;       OR HIGHER.
                     0409   884 ;
                     0409   885 ; OUTPUTS:
                     0409   886 ;
                     0409   887 ;       THE I/O PACKET IS INSERTED IN THE SPECIFIED QUEUE BY PRIORITY AND
                     0409   888 ;       THE 'Z' CONDITION CODE IS RETURNED TO THE CALLER.
                     0409   889 ;
                     0409   890 ;               'Z' = 1 = ENTRY WAS FIRST ENTRY IN THE QUEUE.
                     0409   891 ;
                     0409   892 ;               'Z' = 0 = ENTRIES WERE ALREADY IN THE QUEUE.
                     0409   893 ;
                     0409   894 ;       R2 AND R3 ARE PRESERVED ACROSS THE CALL.
                     0409   895 ;-
                     0409   896
                     0409   897 EXE$INSERTIRP::                          ;INSERT I/O PACKET IN QUEUE BY PRIORITY
          51   52   D0  0409   898          MOVL    R2,R1                 ;COPY LISTHEAD ADDRESS
     51    04 A1   D0  040C   899 10$:      MOVL    IRP$L_IOQBL(R1),R1    ;GET ADDRESS OF NEXT ENTRY
          51   52   D1  0410   900          CMPL    R2,R1                 ;END OF QUEUE?
               07   13  0413   901          BEQL    20$                   ;IF EQL YES
23 A1    23 A3   91  0415   902          CMPB    IRP$B_PRI(R3),IRP$B_PRI(R1) ;NEW ENTRY PRIORITY GREATER?
               F0   1F  041A   903          BLSSU   10$                   ;IF LSS YES
          61   63   0E  041C   904 20$:     INSQUE  IRP$L_IOQFL(R3),IRP$L_IOQFL(R1) ;INSERT PACKET IN I/O QUEUE
               05   041F   905          RSB                           ;
                     0420   906
                     0420   907          .END
```

```
ACB$B_RMOD                      = 0000000B
ACB$L_AST                       = 00000010
ACB$L_ASTPRM                    = 00000014
ACB$L_PID                       = 0000000C
ACB$M_NODELETE                  = 00000020
ACB$M_QUOTA                     = 00000040
ACB$V_QUOTA                     = 00000006
ACCVIO                            00000124 R      01
ALLOC                             0000013C R      01
AQB$L_ACPPID                    = 0000000C
ASTADR                          = 00000014
ASTPRM                          = 00000018
BUG$_NONEXSTACP                   ********    X   01
CCB$B_AMOD                      = 00000009
CCB$B_STS                       = 00000008
CCB$C_LENGTH                    = 00000010
CCB$L_UCB                       = 00000000
CCB$L_WIND                      = 00000004
CCB$V_LOGCHKDON                 = 00000003
CCB$V_PHYCHKDON                 = 00000004
CCB$V_PROCHKDON                 = 00000002
CCB$W_IOC                       = 0000000A
CDRP$L_IOQFL                    = FFFFFFA0
CHAN                            = 00000008
CHKDON                            000000C8 R      01
CLREF                             00000036 R      01
CTL$GL_CCBBASE                    ********    X   01
CTL$GL_F11BXQP                    ********    X   01
CTL$GL_PHD                        ********    X   01
CTL$GW_CHINDX                     ********    X   01
DACSPND                           00000048 R      01
DDT$L_ALTSTART                  = 0000001C
DDT$L_FDT                       = 00000008
DDT$W_DIAGBUF                   = 00000014
DEV$M_FOD                       = 00004000
DEV$M_SHR                       = 00010000
DEV$M_SPL                       = 00000040
DEV$V_FOD                       = 0000000E
DEV$V_FOR                       = 00000018
DEV$V_MNT                       = 00000013
DEV$V_SHR                       = 00000010
DEV$V_SPL                       = 00000006
DIRECT                            0000016B R      01
DYN$C_IRP                       = 0000000A
EFN                             = 00000004
ERROR                             00000127 R      01
ERRORB                            00000045 R      01
EXE$ABORTIO                       00000360 RG     01
EXE$ALLOCBUF                      ********    X   01
EXE$ALLOCIRP                      ********    X   01
EXE$ALTQUEPKT                     00000387 RG     01
EXE$BLDPKTGSR                     000002D4 RG     01
EXE$BLDPKTGSW                     000002DC RG     01
EXE$BLDPKTSWPR                    000002E4 RG     01
EXE$BLDPKTSWPW                    000002EC RG     01
EXE$BUILDPKTR                     000002FC RG     01
EXE$BUILDPKTW                     000002F4 RG     01
EXE$CHKLOGACCES                   ********    X   01
EXE$CHKPHYACCES                   ********    X   01
EXE$CHKRDACCES                    ********    X   01
EXE$CHKWRTACCES                   ********    X   01
EXE$FINISHIO                      0000036F RG     01
EXE$FINISHIOC                     0000036D RG     01
EXE$INSERTIRP                     00000409 RG     01
EXE$INSIOQ                        000003EB RG     01
EXE$QIO                           0000006B RG     01
EXE$QIOACPPKT                     0000039A RG     01
EXE$QIODRVPKT                     00000383 RG     01
EXE$QIORETURN                     000003B9 RG     01
EXE$QXQPPKT                       000003CA RG     01
EXE$SNGLEQUOTA                    ********    X   01
F11B$L_DISPATCH                 = 00000008
FDTACT                          = 00000010
FUNC                            = 0000000C
GTPKT                             00000170 R      01
ILLIO                             0000010C R      01
IO$M_FCODE                      = 0000003F
IO$_ACPCONTROL                  = 00000038
IO$_DEACCESS                    = 00000034
IO$_LOGICAL                     = 0000002F
IO$_PHYSICAL                    = 0000001F
IO$_READHEAD                    = 0000000E
IO$_READLBLK                    = 00000021
IO$_READPBLK                    = 0000000C
IO$_READPROMPT                  = 00000037
IO$_READTRACKD                  = 00000010
IO$_READVBLK                    = 00000031
IO$_REREADN                     = 00000016
IO$_REREADP                     = 00000017
IO$_TTYREADALL                  = 0000003A
IO$_TTYREADPALL                 = 0000003B
IO$_VIRTUAL                     = 0000003F
IO$_WRITECHECK                  = 0000000A
IO$_WRITECHECKH                 = 00000018
IO$_WRITEHEAD                   = 0000000D
IO$_WRITELBLK                   = 00000020
IO$_WRITEPBLK                   = 0000000B
IO$_WRITERET                    = 00000018
IO$_WRITETRACKD                 = 0000000F
IO$_WRITEVBLK                   = 00000030
IOC$GL_IRPFL                      ********    X   01
IOC$GL_PSBL                       ********    X   01
IOC$INITIATE                      ********    X   01
IOC$QNXTSEG1                      ********    X   01
IOSB                            = 00000010
IOTYPE                          = 00000008
IPL$_ASTDEL                     = 00000002
IPL$_IOPOST                     = 00000004
IPL$_SYNCH                      = 00000008
IRP$B_EFN                       = 00000022
IRP$B_PRI                       = 00000023
IRP$B_RMOD                      = 0000000B
IRP$B_TYPE                      = 0000000A
IRP$C_LENGTH                    = 000000C4
```

```
IRP$L_ABCNT             = 00000040
IRP$L_ARB               = 00000058
IRP$L_AST               = 00000010
IRP$L_ASTPRM            = 00000014
IRP$L_BCNT              = 00000032
IRP$L_DIAGBUF           = 0000004C
IRP$L_FQFL              = 00000060
IRP$L_IOQBL             = 00000004
IRP$L_IOQFL             = 00000000
IRP$L_IOSB              = 00000024
IRP$L_MEDIA             = 00000038
IRP$L_OBCNT             = 00000044
IRP$L_PID               = 0000000C
IRP$L_SEGVBN            = 00000048
IRP$L_SEQNUM            = 00000050
IRP$L_SVAPTE            = 0000002C
IRP$L_UCB               = 0000001C
IRP$L_WIND              = 00000018
IRP$M_BUFIO             = 00000001
IRP$M_DIAGBUF           = 00000080
IRP$M_FUNC              = 00000002
IRP$M_PAGIO             = 00000004
IRP$M_PHYSIO            = 00000100
IRP$M_SWAPIO            = 00000040
IRP$M_VIRTUAL           = 00000010
IRP$V_FUNC              = 00000001
IRP$W_BOFF              = 00000030
IRP$W_CHAN              = 00000028
IRP$W_FUNC              = 00000020
IRP$W_SIZE              = 00000008
IRP$W_STS               = 0000002A
IVCHAN                    0000003B R      01
LEGAL                   = 00000000
MASKH                   = 00010001
MASKL                   = 0100AC00
NALLOC                    0000014B R      01
NOCNT                     000000FA R      01
NODCNT                    00000166 R      01
NOIOSB                    000000E8 R      01
NOSECT                    000001B8 R      01
NOT_FILE_DEV              00000010 R      01
NOT_FILE_DEVB             00000069 R      01
NSPOOL                    000000C3 R      01
OFFLINE                   00000113 R      01
OK                        00000170 R      01
P1                      = 0000001C
P2                      = 00000020
P3                      = 00000024
P4                      = 00000028
P5                      = 0000002C
P6                      = 00000030
PCB$B_PRIB              = 0000002F
PCB$L_ARB               = 0000008C
PCB$L_EFCS              = 00000050
PCB$L_EFWM              = 0000004C
PCB$L_PID               = 00000060
PCB$Q_PRIV              = 00000084
PCB$W_ASTCNT            = 00000038
PCB$W_BIOCNT            = 0000003A
PCB$W_DIOCNT            = 0000003E
PHD$L_PSTBASOFF         = 00000020
PMS$GL_IOPFMPDB           ********    X   01
PMS$GL_IOPFMSEQ           ********    X   01
PMS$START_RQ              ********    X   01
PR$_IPL                 = 00000012
PR$_SIRR                = 00000014
PRI$_RESAVL             = 00000002
PRIOSB                    000000DA R      01
PRIVERR                   00000042 R      01
PRV$V_DIAGNOSE          = 00000006
PRV$V_LOG_IO            = 00000007
PRV$V_PHY_IO            = 00000016
PSL$C_KERNEL            = 00000000
PSL$S_PRVMOD            = 00000002
PSL$V_PRVMOD            = 00000016
QIO                       0000006D R      01
QIORETURN                 000003BC R      01
READ_ACCESS               00000000 R      01
RSN$_ASTWAIT            = 00000001
SCH$CLREF                 ********    X   01
SCH$GL_RESMASK            ********    X   01
SCH$GQ_MWAIT              ********    X   01
SCH$POSTEF                ********    X   01
SCH$QAST                  ********    X   01
SCH$WAIT                  ********    X   01
SCH$WAKE                  ********    X   01
SEC$L_WINDOW            = 0000000C
SECTION                   0000014F R      01
SPOOL                     0000005E R      01
SS$_ACCVIO              = 0000000C
SS$_DEVOFFLINE          = 00000084
SS$_EXQUOTA             = 0000001C
SS$_ILLIOFUNC           = 000000F4
SS$_IVCHAN              = 0000013C
SS$_NOPRIV              = 00000024
SS$_NORMAL              = 00000001
SUCCES                    00000177 R      01
UCB$B_FIPL              = 0000000B
UCB$L_AMB               = 00000060
UCB$L_DDT               = 00000088
UCB$L_DEVCHAR           = 00000038
UCB$L_IOQFL             = 0000004C
UCB$L_OPCNT             = 00000070
UCB$L_VCB               = 00000034
UCB$V_BSY               = 00000008
UCB$V_ONLINE            = 00000004
UCB$W_QLEN              = 0000006A
UCB$W_STS               = 00000064
VCB$L_AQB               = 00000010
VCHAN                     0000007B R      01
WCB$L_ORGUCB            = 00000010
WCB$L_READS             = 00000024
WCB$L_WRITES            = 00000028
WRITE_ACCESS              00000008 R      01
```

```
XQP                             000003C0 R      01
```

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

PSECT name	Allocation	PSECT No.	Attributes
. ABS .	00000000 (0.)	00 (0.)	NOPIC USR CON ABS LCL NOSHR NOEXE NORD NOWRT NOVEC BYTE
. BLANK .	00000420 (1056.)	01 (1.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC BYTE
ABS	00000000 (0.)	02 (2.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE

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

Phase	Page faults	CPU Time	Elapsed Time
Initialization	9	00:00:00.09	00:00:00.54
Command processing	77	00:00:00.67	00:00:06.51
Pass 1	608	00:00:26.37	00:02:38.99
Symbol table sort	0	00:00:03.89	00:00:18.56
Pass 2	250	00:00:06.58	00:00:34.76
Symbol table output	29	00:00:00.21	00:00:00.37
Psect synopsis output	6	00:00:00.03	00:00:00.14
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	983	00:00:37.87	00:03:39.88

```
The working set limit was 1650 pages.
139110 bytes (272 pages) of virtual memory were used to buffer the intermediate code.
There were 140 pages of symbol table space allocated to hold 2591 non-local and 27 local symbols.
1039 source lines were read in Pass 1, producing 18 object records in Pass 2.
42 pages of virtual memory were used to define 41 macros.
```

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

Macro library name	Macros defined
_255DUA28:[SYS.OBJ]LIB.MLB;1	26
_255DUA28:[SYSLIB]STARLET.MLB;2	11
TOTALS (all libraries)	37

```
2723 GETS were required to define 37 macros.

There were no errors, warnings or information messages.

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

SYSQIOFDT

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```
                        0000     1          .TITLE  SYSQIOFDT - SYSTEM SERVICE QUEUE I/O FDT SUBROUTINES
;WMC0001                0000    .1          .IDENT  'V03-009'
-1                      0000     3
                        0000     4 ;
                        0000     5 ;*****************************************************************************
                        0000     6 ;*                                                                           *
                        0000     7 ;*  COPYRIGHT (c) 1978, 1980, 1982 BY                                        *
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                        0000    24 ;*                                                                           *
                        0000    25 ;*                                                                           *
                        0000    26 ;*****************************************************************************
                        0000    27 ;
                        0000    28 ; D. N. CUTLER 15-SEP-76
                        0000    29 ;
                        0000    30 ; MODIFIED BY:
                        0000    31 ;
;WMC0001                 0000    .1 ;       V03-009 WMC0001         Wayne Cardoza           23-Apr-1984
;WMC0001                 0000    .2 ;               Add a comment warning about general use of EXE$IORSNWAIT.
;WMC0001                 0000    .3 ;
;ROW0259                 0000    .4 ;       V03-008 ROW0259         Ralph O. Weber          20-NOV-1983
;ROW0259                 0000    .5 ;               For IO$_PACKACK operations passing through EXE$LCLDSKVALID,
;ROW0259                 0000    .6 ;               always allow the PACKACK request to go to the driver when
;ROW0259                 0000    .7 ;               UCB$V_VALID in UCB$L_STS is clear, regardless of any other
;ROW0259                 0000    .8 ;               conditions.  However, UCB$V_LCL_VALID and UCB$B_ONLCNT must
;ROW0259                 0000    .9 ;               still be correctly adjusted.  This is believed to allow
;ROW0259                 0000   .10 ;               PACKACKs to fail and be retried.
;ROW0259                 0000   .11 ;
;SSA00002                0000   .12 ;       V03-007 SSA00002        Stan Amway              30-SEP-1983
;SSA00002                0000   .13 ;               Modified BACKOUT_QIO to call new routine PMS$ABORT_RQ
;SSA00002                0000   .14 ;               to insure complete traces of I/O activity.
;SSA00002                0000   .15 ;
;ROW0224                 0000   .16 ;       V03-006 ROW0224         Ralph O. Weber          15-SEP-1983
;ROW0224                 0000   .17 ;               Change EXE$LCLDSKVALID to alter UCB$B_ONLCNT either up or down
;ROW0224                 0000   .18 ;               only if the local processor has not already performed such an
;ROW0224                 0000   .19 ;               alteration.  Use UCB$V_LCL_VALID in UCB$L_STS to determine
;ROW0224                 0000   .20 ;               state of device with respect to the local processor.
;ROW0224                 0000   .21 ;
;PRD0030                 0000   .22 ;       V03-005 PRD0030         Paul R. DeStefano       09-Sep-1983
;PRD0030                 0000   .23 ;               Added EXE$LCLDSKVALID routine to track disk online count
;PRD0030                 0000   .24 ;               and local valid status.
;PRD0030                 0000   .25 ;
;ROW0192                 0000   .26 ;       V03-004 ROW0192         Ralph O. Weber          20-AUG-1983
```

```
;ROW0192                    0000   .27 ;               Fix EXE$WRITE and EXE$READ to allow longword byte counts.
;ROW0192                    0000   .28 ;               This should allow virtual disk transfers to exceed 65K bytes.
;ROW0192                    0000   .29 ;               (This will be distributed in V3.5 as SYS ECO 65.)
;ROW0192                    0000   .30 ;
;ROW49973                   0000   .31 ;       V03-003 ROW49973        Ralph O. Weber          29-OCT-1982
;ROW49973                   0000   .32 ;               Change calling requirements for EXE$IORSNWAIT from an entry
;ROW49973                   0000   .33 ;               IPL of IPL$_SYNCH to an entry IPL of IPL$_ASTDEL.  Have the
;ROW49973                   0000   .34 ;               call to BACKOUT_QIO made at IPL$_ASTDEL.  Then, raise to
;ROW49973                   0000   .35 ;               IPL$_SYNCH to perform scheduler operations.  This eliminates
;ROW49973                   0000   .36 ;               undesirable page faults at an IPL above IPL$_ASTDEL when
;ROW49973                   0000   .37 ;               BACKOUT_QIO references a channel control block.
;ROW49973                   0000   .38 ;
;PRD0030                    0000   .39 ;       V03-002 ROW49577        Ralph O. Weber          27-SEP-1982
;PRD0030                    0000   .40 ;       ECO 25  Change EXE$SETCHAR and EXE$SETMODE to return SS$_ILLIOFUNC if
;PRD0030                    0000   .41 ;               UCB$B_DEVCLASS equals DC$_DISK.  This is to prohibit SETMODE
;PRD0030                    0000   .42 ;               (set mode) and SETCHAR (set characteristics) functions on disk
;PRD0030                    0000   .43 ;               devices.  On disk devices, those functions overwrite the disk
;PRD0030                    0000   .44 ;               geometry information which results in abbarant system
;PRD0030                    0000   .45 ;               behavior.
-35                         0000    67 ;
                            0000    68 ; SYSTEM SERVICE QUEUE I/O FUNCTION DECISION TABLE SUBROUTINES
                            0000    69 ;
                            0000    70 ; MACRO LIBRARY CALLS
                            0000    71 ;
                            0000    72
                            0000    73          $ACBDEF                         ;DEFINE ACB OFFSETS
                            0000    74          $CCBDEF                         ;DEFINE CCB OFFSETS
;ROW49973                   0000    .1          $DCDEF                          ;DEFINE DEVICE CLASSES
;ROW49973                   0000    .2          $DEVDEF                         ;DEFINE DEVICE CHARACTERISTICS
;ROW49973                   0000    .3          $IODEF                          ;DEFINE I/O FUNCTION CODES
;ROW49973                   0000    .4          $IPLDEF                         ;DEFINE SYSTEM IPLS
;ROW49973                   0000    .5          $IRPDEF                         ;DEFINE IRP OFFSETS
;ROW49973                   0000     6          $PCBDEF                         ;DEFINE PCB VALUES
;ROW49973                   0000    .7          $PRDEF                          ;DEFINE PROCESSOR REGISTERS
-4                          0000    79          $SSDEF                          ;DEFINE SYSTEM STATUS VALUES
                            0000    80          $UCBDEF                         ;DEFINE UCB OFFSETS
                            0000    81          $VADEF                          ;DEFINE VIRTUAL ADDRESS FIELDS
                            0000    82          $SFDEF                          ;DEFINE CALL FRAME
                            0000    83
                            0000    84 ;
                            0000    85 ; LOCAL SYMBOLS
                            0000    86 ;
                            0000    87 ; ARGUMENT LIST OFFSET DEFINITIONS
                            0000    88 ;
                            0000    89
                  00000000  0000    90 P1=0                                    ;FIRST FUNCTION DEPENDENT PARAMETER
                  00000004  0000    91 P2=4                                    ;SECOND FUNCTION DEPENDENT PARAMETER
                  00000008  0000    92 P3=8                                    ;THIRD FUNCTION DEPENDENT PARAMETER
                  0000000C  0000    93 P4=12                                   ;FOURTH FUNCTION DEPENDENT PARAMETER
                  00000010  0000    94 P5=16                                   ;FIFTH FUNCTION DEPENDENT PARAMETER
                  00000014  0000    95 P6=20                                   ;SIXTH FUNCTION DEPENDENT PARAMETER
```

```
                                0000     97          .SBTTL  PLACE PROCESS IN I/O RESOURCE WAIT
                                0000     98 ;+
                                0000     99 ; EXE$IORSNWAIT - PLACE PROCESS IN I/O RESOURCE WAIT
                                0000    100 ;
                                0000    101 ; FUNCTIONAL DESCRIPTION:
                                0000    102 ;
                                0000    103 ; THIS ROUTINE IS USED BY FDT PROCEEDURES TO RE-START A QIO REQUEST
                                0000    104 ; AFTER A RESOURCE WAIT. THE CURRENT I/O IS CLEANED UP AND THE PRE-QIO
                                0000    105 ; STACK IS SET UP. THEN THE PROCESS IS PLACED IN THE WAIT STATE.
                                0000    106 ; IF THE PROCESS DOES NOT HAVE RESOURCE WIAT ENABLED, THE I/O IS ABORTED
                                0000    107 ; WITH A STATUS SPECIFIED BY THE CALLER.
                                0000    108 ;
;WMC0001                         0000     .1 ; **CAUTION** THIS ROUTINE IS NOT CALLED AT SYNCH SO THE RESOURCE MAY ALREADY
;WMC0001                         0000     .2 ; HAVE BEEN DECLARED AVAILABLE.  THIS ROUTINE SHOULD ONLY BE USED FOR RESOURCES
;WMC0001                         0000     .3 ; WHICH ARE GUARANTEED TO BE PERIODICALLY (TIMESCHDL) DECLARED AVAILABLE.
;WMC0001                         0000     .4 ;
;WMC0001                         0000     .5 ;
;WMC0001                         0000     .6 ; IMPLICIT INPUTS:
;WMC0001                         0000     .7 ;
;ROW49973                        0000     .8 ;       CALLER MUST BE AT IPL=IPL$_ASTDEL
-4                              0000    113 ;
                                0000    114 ; INPUTS:
                                0000    115 ;
                                0000    116 ;       R0 = STATUS TO RETURN IF NO WAIT REQUESTED
                                0000    117 ;       R1 = RESOURCE NUMBER TO WAIT FOR
                                0000    118 ;       R3 = ADDRESS OF CURRENT PACKET
                                0000    119 ;       R4 = ADDRESS OF THE CURRENT PCB
                                0000    120 ;       R6 = ADDRESS OF CHANNEL CONTROL BLOCK
                                0000    121 ;
                                0000    122 ; OUTPUTS:
                                0000    123 ;
                                0000    124 ;       R0,R1,R2,R3 ARE USED.
                                0000    125 ;
                                0000    126 ;       CONTROL IS TRANSFERED TO EXE$ABORTIO IF NO RESOURCE WAIT
                                0000    127 ;       HAS BEEN REQUESTED,
                                0000    128 ;
                                0000    129 ;       OR TO SCH$WAIT IF RESOURCE WAIT IS REQUESTED.
                                0000    130 ;
                                0000    131 ;-
                                0000    132
                                0000    133 EXE$IORSNWAIT::                             ;PLACE PROCESS IN RESOURCE WAIT
          21 24 A4    0A    E0  0000    134         BBS     #PCB$V_SSRWAIT,PCB$L_STS(R4),50$ ;BR IF NO WAIT REQUEST
;ROW49973                 51   DD  0005     .1         PUSHL   R1                      ;REMEMBER RESOURCE NUMBER
;ROW49973               00F5   30  0007     .2         BSBW    BACKOUT_QIO             ;CLEANUP QIO
;ROW49973                       000A     .3         SETIPL  #IPL$_SYNCH             ;SYNCHRONIZE WITH SCHEDULER DATABASE
;ROW49973             4C A4    6E  9A  000D     .4         MOVZBL  (SP),PCB$L_EFWM(R4)     ;SET UP WAIT MARKER
-3                 0000'CF    8E  E2  0011    138         BBSS    (SP)+,W^SCH$GL_RESMASK,30$ ;INDICATE PROCESS IS WAITING
                                00  0016
             5C    08 AD    D0  0017    139 30$:    MOVL    SF$L_SAVE_AP(FP),AP     ;RESTORE PRE-QIO ARGUMENT LIST POINTER
                5E    5D    D0  001B    140         MOVL    FP,SP                   ;CLEAN STACK BACK TO CALL FRAME
          52    0000'CF    7E  001E    141         MOVAQ   W^SCH$GQ_MWAIT,R2       ;ADDRESS WAIT LIST
                   FFDA'   31  0023    142         BRW     SCH$WAIT                ;PLACE PROCESS IN WAIT STATE
                               0026    143 ;
                               0026    144 ; NO RESOURCE WAIT REQUESTED - ABORT THE I/O
                               0026    145 ;
                   FFD7'   31  0026    146 50$:    BRW     EXE$ABORTIO             ;
```

```
                     0029   148          .SBTTL  ONE PARAMETER FUNCTION PROCESSING
                     0029   149 ;+
                     0029   150 ; EXE$ONEPARM - ONE PARAMETER FUNCTION PROCESSING
                     0029   151 ;
                     0029   152 ; THIS ROUTINE IS CALLED FROM THE FUNCTION DECISION TABLE DISPATCHER TO
                     0029   153 ; PROCESS A ONE PARAMETER FUNCTION THAT REQUIRES NO SPECIAL CHECKING.
                     0029   154 ;
                     0029   155 ; INPUTS:
                     0029   156 ;
                     0029   157 ;       R0 = SCRATCH.
                     0029   158 ;       R1 = SCRATCH.
                     0029   159 ;       R2 = SCRATCH.
                     0029   160 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                     0029   161 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                     0029   162 ;       R5 = ASSIGNED DEVICE UCB ADDRESS.
                     0029   163 ;       R6 = ADDRESS OF CCB.
                     0029   164 ;       R7 = I/O FUNCTION CODE BIT NUMBER.
                     0029   165 ;       R8 = FUNCTION DECISION TABLE DISPATCH ADDRESS.
                     0029   166 ;       R9 = SCRATCH.
                     0029   167 ;       R10 = SCRATCH.
                     0029   168 ;       R11 = SCRATCH.
                     0029   169 ;       AP = ADDRESS OF FIRST FUNCTION DEPENDENT PARAMETER.
                     0029   170 ;
                     0029   171 ; OUTPUTS:
                     0029   172 ;
                     0029   173 ; ***TBS***
                     0029   174 ;-
                     0029   175
                     0029   176          .ENABL  LSB
                     0029   177 EXE$ONEPARM::                                ;ONE PARAMETER FUNCTION PROCESSING
38 A3   6C   D0      0029   178          MOVL    P1(AP),IRP$L_MEDIA(R3)      ;STORE PARAMETER IN MEDIA ADDRESS
        03   11      002D   179          BRB     10$                         ;
```

```
                     002F    181          .SBTTL  ZERO PARAMETER FUNCTION PROCESSING
                     002F    182 ;+
                     002F    183 ; EXE$ZEROPARAM - ZERO PARAMETER FUNCTION PROCESSING
                     002F    184 ;
                     002F    185 ; THIS ROUTINE IS CALLED FROM THE FUNCTION DECISION TABLE DISPATCHER TO
                     002F    186 ; PROCESS A ZERO PARAMETER FUNCTION THAT REQUIRES NO ADDITION CHECKING.
                     002F    187 ;
                     002F    188 ; INPUTS:
                     002F    189 ;
                     002F    190 ;       R0 = SCRATCH.
                     002F    191 ;       R1 = SCRATCH.
                     002F    192 ;       R2 = SCRATCH.
                     002F    193 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                     002F    194 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                     002F    195 ;       R5 = ASSIGNED DEVICE UCB ADDRESS.
                     002F    196 ;       R6 = ADDRESS OF CCB.
                     002F    197 ;       R7 = I/O FUNCTION CODE BIT NUMBER.
                     002F    198 ;       R8 = FUNCTION DECISION TABLE DISPATCH ADDRESS.
                     002F    199 ;       R9 = SCRATCH.
                     002F    200 ;       R10 = SCRATCH.
                     002F    201 ;       R11 = SCRATCH.
                     002F    202 ;       AP = ADDRESS OF FIRST FUNCTION DEPENDENT PARAMETER.
                     002F    203 ;
                     002F    204 ; OUTPUTS:
                     002F    205 ;
                     002F    206 ; ***TBS***
                     002F    207 ;-
                     002F    208
                     002F    209 EXE$ZEROPARM::                          ;ZERO PARAMETER FUNCTION PROCESSING
38 A3   D4           002F    210          CLRL    IRP$L_MEDIA(R3)        ;CLEAR PARAMETER
 FFCB'  31           0032    211 10$:     BRW     EXE$QIODRVPKT          ;QUEUE I/O PACKET TO DRIVER
                     0035    212          .DSABL  LSB
```

```
;ROW0224                                0035     .1          .SBTTL  LOCAL DISK VALID FUNCTION PROCESSING
;ROW0224                                0035     .2 ;+
;ROW0224                                0035     .3 ; EXE$LCLDSKVALID - LOCAL DISK VALID FUNCTION FROCESSING
;ROW0224                                0035     .4 ;
;ROW0224                                0035     .5 ;       This routine is called from the function decision table dispatcher to
;ROW0224                                0035     .6 ;       process functions which affect the online count and local valid status
;ROW0224                                0035     .7 ;       of a disk.
;ROW0224                                0035     .8 ;
;ROW0224                                0035     .9 ;       If the function is the first local pack acknowedge function
;ROW0224                                0035    .10 ;       (UCB$V_LCL_VALID is clear), the online count, UCB$B_ONLCNT, is
;ROW0224                                0035    .11 ;       incremented and UCB$V_LCL_VALID is set.  If the online count was
;ROW0224                                0035    .12 ;       previously zero, the I/O packet is queued to the driver for further
;ROW0259                                0035    .13 ;       PACKACK processing.  If the online count was not previously zero but
;ROW0259                                0035    .14 ;       the UCB$V_VALID bit is clear, the I/O packet is also queued to the
;ROW0259                                0035    .15 ;       driver for further processing.
;ROW0224                                0035    .16 ;
;ROW0224                                0035    .17 ;       If the function is the first local available or unload function
;ROW0224                                0035    .18 ;       (UCB$V_LCL_VALID is set), the online count, UCB$B_ONLCNT, is
;ROW0224                                0035    .19 ;       decremented and UCB$V_LCL_VALID is cleared.  If the decremented online
;ROW0224                                0035    .20 ;       count is zero, the I/O packet is queued to the driver for further
;ROW0224                                0035    .21 ;       AVAILABLE or UNLOAD processing.
;ROW0224                                0035    .22 ;
;ROW0224                                0035    .23 ; INPUTS:
;ROW0224                                0035    .24 ;
;ROW0224                                0035    .25 ;       R0 = SCRATCH.
;ROW0224                                0035    .26 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
;ROW0224                                0035    .27 ;       R5 = ASSIGNED DEVICE UCB ADDRESS.
;ROW0224                                0035    .28 ;       R7 = I/O FUNCTION CODE BIT NUMBER.
;ROW0224                                0035    .29 ;
;ROW0224                                0035    .30 ; OUTPUTS:
;ROW0224                                0035    .31 ;
;ROW0224                                0035    .32 ;       UCB$B_ONLCNT is altered to reflect the number of hosts which have set
;ROW0224                                0035    .33 ;       the drive online (i.e. issued PACKACK functions to the drive).
;ROW0224                                0035    .34 ;
;ROW0224                                0035    .35 ;       UCB$V_LCL_VALID in UCB$L_STS is set for PACKACK functions and cleared
;ROW0224                                0035    .36 ;       for AVAILABLE or UNLOAD functions.
;ROW0224                                0035    .37 ;-
;ROW0224                                0035    .38
;ROW0224                                0035    .39 EXE$LCLDSKVALID::                           ; LOCAL DISK VALID FUNCTION PROCESSING.
;ROW0224                                0035    .40
;ROW0224          08    57    91      0035    .41         CMPB    R7, #IO$_PACKACK            ; Pack acknowledge function?
;ROW0224                1B    12      0038    .42         BNEQ    50$                         ; Branch if not a PACKACK.
;ROW0224     0E 64 A5   11    E2      003A    .43         BBSS    #UCB$V_LCL_VALID, -         ; Is this the first local PACKACK?
;ROW0259                                 003F    .44                 UCB$L_STS(R5), 20$          ; Branch if not first local PACKACK.
;ROW0224                                 003F    .45         SETIPL  #IPL$_SCS                   ; Synchronize with the MSCP server.
;ROW0224          00AE C5   96      0042    .46         INCB    UCB$B_ONLCNT(R5)            ; Increment online count.
;ROW0224      01  00AE C5   91      0046    .47         CMPB    UCB$B_ONLCNT(R5), #1        ; Is this the first cluster PACKACK?
;ROW0259                05   13      004B    .48         BEQL    30$                         ; Branch if first cluster PACKACK.
;ROW0259     11 64 A5   0B    E0      004D    .49 20$:    BBS     #UCB$V_VALID, -             ; Is the volume already valid?
;ROW0259                                 0052    .50                 UCB$L_STS(R5), 80$          ; Branch if volume is already valid.
;ROW0259                                 0052    .51
;ROW0259                                 0052    .52
;ROW0259            FFAB'  31      0052    .53 30$:    BRW     EXE$QIODRVPKT               ; For first cluster PACKACK, last
;ROW0259                                 0055    .54                                         ; cluster UNLOAD or AVAILABLE, or
;ROW0259                                 0055    .55                                         ; truely invalid volume, ask driver
;ROW0259                                 0055    .56                                         ; to really perform the function.
;ROW0224                                 0055    .57
```

```
;ROW0224                                 0055   .58 50$:                                ; UNLOAD and AVAILABLE come here.
;ROW0224          09 64 A5    11   E5    0055   .59         BBCC    #UCB$V_LCL_VALID, -  ; First local UNLOAD or AVAILABLE?
;ROW0224                                 005A   .60                 UCB$L_STS(R5), 80$   ; Branch if not first.
;ROW0224                                 005A   .61         SETIPL  #IPL$_SCS            ; Synchronize with MSCP server.
;ROW0224                00AE C5    97   005D   .62         DECB    UCB$B_ONLCNT(R5)     ; Decrement online count.
;ROW0224                     EF    13   0061   .63         BEQL    30$                  ; Branch if the online count is zero.
;ROW0224                                 0063   .64
;ROW0224                                 0063   .65 80$:                                ; For requests which are not being
;ROW0224                                 0063   .66                                     ; passed on to the driver.
;ROW0224                50   01    3C   0063   .67         MOVZWL  #SS$_NORMAL, R0      ; Set normal completion status.
;ROW0224                   FF97'  31   0066   .68         BRW     EXE$FINISHIOC        ; Finish I/O operation.
```

```
                                0069   214          .SBTTL  READ AND WRITE FUNCTION PROCESSING
                                0069   215 ;+
                                0069   216 ; EXE$READ - READ FUNCTION PROCESSING
                                0069   217 ; EXE$WRITE - WRITE FUNCTION PROCESSING
                                0069   218 ; EXE$MODIFY - MODIFY FUNCTION PROCESSING
                                0069   219 ;
                                0069   220 ; THESE ROUTINES ARE CALLED FROM THE FUNCTION DECISION TABLE DISPATCHER TO
                                0069   221 ; PROCESS A READ OR WRITE PHYSICAL OR LOGICAL FUNCTION.
                                0069   222 ; EXE$MODIFY IS USED FOR FUNCTIONS THAT READ AND WRITE MEMORY.
                                0069   223 ;
                                0069   224 ; INPUTS:
                                0069   225 ;
                                0069   226 ;       R0 = SCRATCH.
                                0069   227 ;       R1 = SCRATCH.
                                0069   228 ;       R2 = SCRATCH.
                                0069   229 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                                0069   230 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                                0069   231 ;       R5 = ASSIGNED DEVICE UCB ADDRESS.
                                0069   232 ;       R6 = ADDRESS OF CCB.
                                0069   233 ;       R7 = I/O FUNCTION CODE BIT NUMBER.
                                0069   234 ;       R8 = FUNCTION DECISION TABLE DISPATCH ADDRESS.
                                0069   235 ;       R9 = SCRATCH.
                                0069   236 ;       R10 = SCRATCH.
                                0069   237 ;       R11 = SCRATCH.
                                0069   238 ;       AP = ADDRESS OF FIRST FUNCTION DEPENDENT PARAMETER.
                                0069   239 ;
                                0069   240 ; OUTPUTS:
                                0069   241 ;
                                0069   242 ; ***TBS***
                                0069   243 ;-
                                0069   244
                                0069   245          .ENABL  LSB
                                0069   246 EXE$MODIFY::                                ;MODIFY FUNCTION PROCESSING
          52   A1'AF   DE      0069   247          MOVAL   B^EXE$MODIFYLOCK,R2        ;SET ADDRESS OF BUFFER CHECK ROUTINE
               04   11         006D   248          BRB     5$
                               006F   249 EXE$READ::                                  ;READ FUNCTION PROCESSING
          52   9B'AF   DE      006F   250          MOVAL   B^EXE$READLOCK,R2          ;SET ADDRESS OF BUFFER CHECK ROUTINE
       04 2A A3    01   E3      0073   251 5$:      BBCS    #IRP$V_FUNC,IRP$W_STS(R3),10$ ;SET READ FUNCTION STATUS
                               0078   252 EXE$WRITE::                                 ;WRITE FUNCTION PROCESSING
          52   9E'AF   DE      0078   253          MOVAL   B^EXE$WRITELOCK,R2         ;SET ADDRESS OF BUFFER CHECK ROUTINE
       3C A3    0C AC   D0      007C   254 10$:     MOVL    P4(AP),IRP$B_CARCON(R3) ;INSERT CARRIAGE CONTROL BYTE
             06    00   ED      0081   255          CMPZV   #IRP$V_FCODE,#IRP$S_FCODE,- ;PHYSICAL I/O FUNCTION?
          1F   20 A3           0084   256                  IRP$W_FUNC(R3),#IO$_PHYSICAL ;
               04   15         0087   257          BLEQ    20$                        ;IF LEQ YES
               15   A2         0089   258          SUBW    #IO$_READLBLK-IO$_READPBLK,- ;CONVERT TO PHYSICAL FUNCTION
                20 A3           008B   259                  IRP$W_FUNC(R3)          ;
;ROW0192       51   04 AC   D0      008D    .1 20$:     MOVL    P2(AP),R1          ;GET NUMBER OF BYTES TO TRANSFER
-1             05   13         0091   261          BEQL    30$                        ;IF EQL NONE
            50   6C   D0      0093   262          MOVL    P1(AP),R0                  ;GET STARTING VIRTUAL ADDRESS OF TRANSFER
               62   16         0096   263          JSB     (R2)                       ;CHECK BUFFER AND LOCK IN MEMORY
             FF65'  31         0098   264 30$:     BRW     EXE$QIODRVPKT              ;QUEUE I/O PACKET TO DRIVER
                               009B   265          .DSABL  LSB
```

```
                009B    267          .SBTTL  READ AND WRITE FUNCTION BUFFER CHECK AND LOCK ROUTINES
                009B    268 ;+
                009B    269 ; EXE$READLOCK - CHECK BUFFER FOR READ ACCESSIBILITY AND LOCK
                009B    270 ; EXE$WRITELOCK - CHECK BUFFER FOR WRITE ACCESSIBILITY AND LOCK
                009B    271 ; EXE$MODIFYLOCK - CHECK BUFFER FOR READ ACCESSIBILITY AND LOCK
                009B    272 ;
                009B    273 ; THESE ROUTINES ARE CALLED TO CHECK THE ACCESSIBILITY OF AN I/O BUFFER AND
                009B    274 ; TO LOCK THE BUFFER IN MEMORY FOR A DIRECT MEMORY TRANSFER.
                009B    275 ;
                009B    276 ; INPUTS:
                009B    277 ;
                009B    278 ;       R0 = STARTING ADDRESS OF I/O BUFFER.
                009B    279 ;       R1 = LENGTH OF TRANSFER IN BYTES.
                009B    280 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                009B    281 ;       R6 = ADDRESS OF CCB.
                009B    282 ;
                009B    283 ; OUTPUTS:
                009B    284 ;
                009B    285 ;       THE I/O BUFFER IS CHECKED FOR THE PROPER ACCESSIBILITY. IF THE
                009B    286 ;       CHECK SUCCEEDS, THEN THE BUFFER IS LOCKED IN MEMORY AND THE STARTING
                009B    287 ;       ADDRESS OF THE PAGE TABLE ENTRIES THAT MAP THE TRANSFER IS STORED
                009B    288 ;       IN THE I/O PACKET. ELSE THE I/O IS COMPLETED WITH A STATUS OF
                009B    289 ;       ACCESS VIOLATION.
                009B    290 ;-
                009B    291
                009B    292 EXE$READLOCK::                          ;CHECK BUFFER FOR READ FUNCTION AND LOCK
 11     10      009B    293          BSBB    EXE$READLOCKR          ;EXE$READLOCKR RETURNS NORMALLY ON
                009D    294                                         ;SUCCESS, VIA COROUTINE CALL ON FAILURE
      05        009D    295          RSB                            ;RETURNS TO CALLER ON SUCCESS, TO
                009E    296                                         ;EXE$READLOCKR ON FAILURE
                009E    297
                009E    298 EXE$WRITELOCK::                         ;CHECK BUFFER FOR WRITE FUNCTION AND LOCK
 15     10      009E    299          BSBB    EXE$WRITELOCKR         ;EXE$WRITELOCKR RETURNS NORMALLY ON
                00A0    300                                         ;SUCCESS, VIA COROUTINE CALL ON FAILURE
      05        00A0    301          RSB                            ;RETURNS TO CALLER ON SUCCESS, TO
                00A1    302                                         ;EXE$WRITELOCKR ON FAILURE
                00A1    303
                00A1    304 EXE$MODIFYLOCK::                        ;CHECK BUFFER FOR MODIFY FUNCTION AND LOCK
 01     10      00A1    305          BSBB    EXE$MODIFYLOCKR        ;EXE$MODIFYLOCKR RETURNS NORMALLY ON
                00A3    306                                         ;SUCCESS, VIA COROUTINE CALL ON FAILURE
      05        00A3    307          RSB                            ;RETURNS TO CALLER ON SUCCESS, TO
                00A4    308                                         ;EXE$MODIFYLOCKR ON FAILURE
```

```
                     00A4   310          .SBTTL  READ AND WRITE BUFFER CHECK AND LOCK AND RETURN ROUTINES
                     00A4   311 ;+
                     00A4   312 ; EXE$READLOCKR - CHECK BUFFER FOR READ ACCESSIBILITY AND LOCK AND RETURN
                     00A4   313 ;                 ON ERROR
                     00A4   314 ; EXE$WRITELOCKR - CHECK BUFFER FOR WRITE ACCESSIBILITY AND LOCK AND RETURN
                     00A4   315 ;                  ON ERROR
                     00A4   316 ; EXE$MODIFYLOCKR - CHECK BUFFER FOR READ ACCESSIBILITY AND LOCK AND RETURN
                     00A4   317 ;                   ON ERROR
                     00A4   318 ;
                     00A4   319 ; THESE ROUTINES ARE CALLED TO CHECK THE ACCESSIBILITY OF AN I/O BUFFER
                     00A4   320 ; AND TO LOCK THE BUFFER IN MEMORY FOR A DIRECT MEMORY TRANSFER.  IN
                     00A4   321 ; ADDITION, THESE ROUTINES PERFORM A COROUTINE CALL IF THERE IS AN ERROR
                     00A4   322 ; OR ANY PAGES HAVE TO BE FAULTED IN.  THE PURPOSE OF THE COROUTINE
                     00A4   323 ; CALL IS TO ALLOW THE CALLER TO PERFORM ANY NECESSARY CLEANUP BEFORE
                     00A4   324 ; THE QIO IS BACKED UP OR ABORTED.  THESE ROUTINES ARE TYPICALLY CALLED
                     00A4   325 ; BY DRIVERS THAT MUST LOCK MULTIPLE AREAS INTO MEMORY.  SINCE THESE
                     00A4   326 ; ROUTINES CANNOT UNLOCK AREAS PREVIOUSLY LOCKED, THE COROUTINE CALL ALLOWS
                     00A4   327 ; THE CALLER (THE DRIVER) TO UNLOCK PREVIOUSLY LOCKED AREAS (AND PERFORM
                     00A4   328 ; ANY OTHER CLEANUP) AND THEN RETURN HERE TO BACK UP OR ABORT THE I/O.
                     00A4   329 ;
                     00A4   330 ; EXE$MODIFYLOCKR IS USED WHEN THE BUFFER WILL BE READ AND WRITTEN BY THE
                     00A4   331 ; I/O DEVICE.  IT DISABLES AN OPTIMIZATION IN MMG$IOLOCK WHICH IS USED
                     00A4   332 ; WHEN THE BUFFER IS ONLY WRITTEN.
                     00A4   333 ;
                     00A4   334 ; INPUTS:
                     00A4   335 ;
                     00A4   336 ;       R0 = STARTING ADDRESS OF I/O BUFFER.
                     00A4   337 ;       R1 = LENGTH OF BUFFER IN BYTES.
                     00A4   338 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                     00A4   339 ;       R6 = ADDRESS OF CCB.
                     00A4   340 ;
                     00A4   341 ; OUTPUTS:
                     00A4   342 ;
                     00A4   343 ;       THE I/O BUFFER IS CHECKED FOR THE PROPER ACCESSIBILITY.  IF THE
                     00A4   344 ;       CHECK SUCCEEDS, THEN THE BUFFER IS LOCKED IN MEMORY AND THE STARTING
                     00A4   345 ;       ADDRESS OF THE PAGE TABLE ENTRIES THAT MAP THE TRANSFER IS STORED
                     00A4   346 ;       IN THE I/O PACKET.
                     00A4   347 ;
                     00A4   348 ;       R0 = RETURN CODE
                     00A4   349 ;
                     00A4   350 ;       NOTE THAT IF THERE ARE NO ERRORS AND NO PAGES HAVE TO BE FAULTED
                     00A4   351 ;       IN, THEN THESE ROUTINES RETURN NORMALLY.  HOWEVER, IF THERE IS AN
                     00A4   352 ;       ERROR OR A PAGE HAS TO BE FAULTED IN, THEN THE CALLER IS CALLED
                     00A4   353 ;       BY A COROUTINE CALL.  THE CALLER'S RSB THEN RETURNS HERE WHERE
                     00A4   354 ;       THE QIO IS EITHER BACKED UP OR ABORTED.  NOTE THAT IN THIS CASE
                     00A4   355 ;       THE CALLER'S ERROR HANDLING CODE MUST PRESERVE ALL REGISTERS,
                     00A4   356 ;       INCLUDING R0 AND R1.
                     00A4   357 ;-
                     00A4   358          .ENABL  LSB
                     00A4   359 EXE$MODIFYLOCKR::                    ;CHECK BUFFER FOR MODIFY FUNCTION AND LOCK
           50   DD  00A4   360          PUSHL   R0                  ;SAVE STARTING ADDRESS OF BUFFER
         009D   30  00A6   361          BSBW    EXE$READCHKR        ;CHECK BUFFER FOR READ FUNCTION
      52 04   C8  00A9   362          BISL    #4,R2               ;DISABLE OPTIMIZATION IN MMG$IOLOCK
         0C   11  00AC   363          BRB     10$
                  00AE   364
                  00AE   365 EXE$READLOCKR::                      ;CHECK BUFFER FOR READ FUNCTION AND LOCK
           50   DD  00AE   366          PUSHL   R0                  ;SAVE STARTING ADDRESS OF BUFFER
```

```
                0093    30  00B0   367          BSBW    EXE$READCHKR                ;CHECK BUFFER FOR READ FUNCTION
                  05    11  00B3   368          BRB     10$
                        00B5   369
                        00B5   370 EXE$WRITELOCKR::                                ;CHECK BUFFER FOR WRITE FUNCTION AND LOCK
                  50    DD  00B5   371          PUSHL   R0                          ;SAVE STARTING ADDRESS OF BUFFER
                00EA    30  00B7   372          BSBW    EXE$WRITECHKR               ;CHECK BUFFER FOR WRITE FUNCTION
              1A 50     E9  00BA   373 10$:     BLBC    R0,15$                      ;BRANCH IF ERROR
                 50 8ED0    00BD   374          POPL    R0                          ;RESTORE STARTING ADDRESS OF BUFFER
50            FE00 8F     AB  00C0   375          BICW3   #^C<VA$M_BYTE>,R0,IRP$W_BOFF(R3) ;SET BYTE OFFSET IN PAGE
              3D A3             00C5
                  53    DD  00C7   376          PUSHL   R3                          ;SAVE ADDRESS OF I/O PACKET
                FF34'   30  00C9   377          BSBW    MMG$IOLOCK                  ;LOCK PAGES FOR I/O
            53    8E    D0  00CC   378          MOVL    (SP)+,R3                    ;RETRIEVE ADDRESS OF I/O PACKET
              08 50     E9  00CF   379          BLBC    R0,20$                      ;IF LBC LOCK FAILURE
        2C A3   51      D0  00D2   380          MOVL    R1,IRP$L_SVAPTE(R3)         ;INSERT ADDRESS OF FIRST PTE IN PACKET
                        05  00D6   381          RSB                                 ;
            5E  04      C0  00D7   382 15$:     ADDL    #4,SP                       ;THROW AWAY OLD R0
                9E      16  00DA   383 20$:     JSB     @(SP)+                      ;COROUTINE CALL TO CLEANUP
                50      D5  00DC   384          TSTL    R0                          ;ERRORS ENCOUNTERED?
                1C      12  00DE   385          BNEQ    50$                         ;IF NEQ YES
                51      DD  00E0   386          PUSHL   R1                          ;SAVE VIRTUAL ADDRESS OF PAGE TO FAULT
                1B      10  00E2   387          BSBB    BACKOUT_QIO                 ;CLEANUP QIO
                02      BA  00E4   388          POPR    #^M<R1>                     ;RETRIEVE VIRTUAL ADDRESS OF PAGE TO FAULT
            5E  5D      D0  00E6   389          MOVL    FP,SP                       ;TRIM STACK BACK TO CHANGE MODE FRAME
        5C    08    AD    7D  00E9   390          MOVQ    8(FP),AP                    ;RESTORE USER ARGUMENT AND FRAME POINTERS
            5E  00'     C0  00ED   391          ADDL    S^#EXE$C_CMSTKSZ,SP         ;REMOVE CHANGE MODE CALL FRAME FROM STACK
50          8E  04      C3  00F0   392          SUBL3   #4,(SP)+,R0                 ;CALCULATE RESTART ADDRESS
              F8'AF     9F  00F4   393          PUSHAB  B^40$                       ;SET NEW RETURN ADDRESS
                        02  00F7   394          REI                                 ;
                61      95  00F8   395 40$:     TSTB    (R1)                        ;FAULT USER BUFFER AGAIN
                60      17  00FA   396          JMP     (R0)                        ;REPEAT SYSTEM SERVICE
              FF01'     31  00FC   397 50$:     BRW     EXE$ABORTIO                 ;ABORT I/O REQUEST
                        00FF   398          .DSABL  LSB
```

```
                        00FF   400          .SBTTL  BACKOUT A QIO
                        00FF   401 ;+
                        00FF   402 ; BACKOUT_QIO - BACKOUT A QIO
                        00FF   403 ;
                        00FF   404 ; THIS ROUTINE IS CALLED TO BACKOUT A QIO.  IT DECREMENTS THE CHANNEL I/O
                        00FF   405 ; COUNT, INCREMENTS THE DIRECT OR BUFFERED I/O COUNT, DEALLOCATES THE
                        00FF   406 ; DIAGNOSTIC BUFFER (IF PRESENT), OPTIONALLY INCREMENTS THE AST COUNT, AND
                        00FF   407 ; FINALLY DEALLOCATES THE IRP.
                        00FF   408 ;
                        00FF   409 ; INPUTS:
                        00FF   410 ;
                        00FF   411 ;        R3 = ADDRESS OF I/O REQUEST PACKET
                        00FF   412 ;        R4 = CURRENT PROCESS PCB ADDRESS
                        00FF   413 ;        R6 = ADDRESS OF CCB
                        00FF   414 ;
                        00FF   415 ; OUTPUTS:
                        00FF   416 ;
                        00FF   417 ;        R0 - R3 = CLOBBERED
                        00FF   418 ;
                        00FF   419 ;-
                        00FF   420
                        00FF   421 BACKOUT_QIO:                                 ;BACKOUT A QIO
;SSA00002          FEFE'  30  00FF    .1          BSBW    PMS$ABORT_RQ         ;RECORD ABORT IF I/O MONITORING ENABLED
                    0A A6  B7  0102   422          DECW    CCB$W_IOC(R6)        ;DECREMENT CHANNEL I/O COUNT
              05 2A A3   00  E1  0105   423          BBC     #IRP$V_BUFIO,IRP$W_STS(R3),10$ ;BR IF NOT BUFFERED I/O
                    3A A4  B6  010A   424          INCW    PCB$W_BIOCNT(R4)     ;ADJUST COUNT OF BUFFERED I/O
                       03  11  010D   425          BRB     20$                  ;CONTINUE
                    3E A4  B6  010F   426 10$:     INCW    PCB$W_DIOCNT(R4)     ;ADJUST DIRECT I/O COUNT
              0C 2A A3   07  E1  0112   427 20$:     BBC     #IRP$V_DIAGBUF,IRP$W_STS(R3),30$  ;BR. IF NO DIAGNOSTIC BUFFER
                 50   4C A3  D0  0117   428          MOVL    IRP$L_DIAGBUF(R3),R0 ;GET ADDRESS OF DIAGNOSTIC BUFFER
                       53  DD  011B   429          PUSHL   R3                   ;SAVE R3
                    FEE0'  30  011D   430          BSBW    EXE$DEANONPAGED      ;DEALLOCATE DIAGNOSTIC BUFFER
                       53 8ED0 0120   431          POPL    R3                   ;RESTORE R3
              03 0B A3   06  E1  0123   432 30$:     BBC     #ACB$V_QUOTA,IRP$B_RMOD(R3),40$ ;BR IF AST NOT REQUESTED
                    38 A4  B6  0128   433          INCW    PCB$W_ASTCNT(R4)     ;ADJUST AST COUNT
                 50   53  D0  012B   434 40$:     MOVL    R3,R0                ;DEALLOCATE PACKET
                    FECF'  30  012E   435          BSBW    EXE$DEANONPAGED      ;
                           05  0131   436          RSB
```

```
                     0132   438          .SBTTL  CHECK BUFFER ACCESSIBILITY FOR READ FUNCTION
                     0132   439 ;+
                     0132   440 ; EXE$READCHK - CHECK BUFFER ACCESSIBILITY FOR READ FUNCTION
                     0132   441 ;
                     0132   442 ; THIS ROUTINE IS CALLED TO CHECK BUFFER ACCESSIBILITY FOR A READ I/O
                     0132   443 ; FUNCTION.
                     0132   444 ;
                     0132   445 ; INPUTS:
                     0132   446 ;
                     0132   447 ;       R0 = ADDRESS OF BUFFER.
                     0132   448 ;       R1 = SIZE OF TRANSFER IN BYTES.
                     0132   449 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                     0132   450 ;
                     0132   451 ; OUTPUTS:
                     0132   452 ;
                     0132   453 ;       IF BUFFER IS NOT WRITE ACCESSIBLE, THEN THE I/O REQUEST IS TERM-
                     0132   454 ;       INATED VIA EXE$IOFINISH WITH A STATUS OF SS$_ACCVIO.
                     0132   455 ;
                     0132   456 ;       IF BUFFER IS WRITE ACCESSIBLE, THEN THE FOLLOWING VALUES ARE RE-
                     0132   457 ;       TURNED:
                     0132   458 ;
                     0132   459 ;               R0 = ADDRESS OF BUFFER.
                     0132   460 ;               R1 = SIZE OF TRANSFER IN BYTES.
                     0132   461 ;               R2 = READ FUNCTION INDICATOR (1).
                     0132   462 ;               R3 = ADDRESS OF I/O REQUEST PACKET.
                     0132   463 ;
                     0132   464 ;               IRP$W_BCNT(R3) = SIZE OF TRANSFER IN BYTES.
                     0132   465 ;               IRP$W_FUNC(R3) = READ.
                     0132   466 ;-
                     0132   467
                     0132   468          .ENABL  LSB
                     0132   469 EXE$READCHK::                          ;CHECK BUFFER FOR READ FUNCTION
50   DD              0132   470          PUSHL   R0                     ;SAVE ADDRESS OF BUFFER
10   10              0134   471          BSBB    EXE$READCHKR           ;CHECK BUFFER
04   11              0136   472          BRB     10$
```

```
                     0138    474          .SBTTL  CHECK BUFFER ACCESSIBILITY FOR WRITE FUNCTION
                     0138    475 ;+
                     0138    476 ; EXE$WRITECHK - CHECK BUFFER ACCESSIBILITY FOR WRITE FUNCTION
                     0138    477 ;
                     0138    478 ; THIS ROUTINE IS CALLED TO CHECK BUFFER ACCESSIBILITY FOR A WRITE I/O
                     0138    479 ; FUNCTION.
                     0138    480 ;
                     0138    481 ; INPUTS:
                     0138    482 ;
                     0138    483 ;       R0 = ADDRESS OF BUFFER.
                     0138    484 ;       R1 = SIZE OF TRANSFER IN BYTES.
                     0138    485 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                     0138    486 ;
                     0138    487 ; OUTPUTS:
                     0138    488 ;
                     0138    489 ;       IF BUFFER IS NOT READ ACCESSIBLE, THEN THE I/O REQUEST IS TERM-
                     0138    490 ;       INATED VIA EXE$IOFINISH WITH A STATUS OF SS$_ACCVIO.
                     0138    491 ;
                     0138    492 ;       IF BUFFER IS READ ACCESSIBLE, THEN THE FOLLOWING VALUES ARE RE-
                     0138    493 ;       TURNED:
                     0138    494 ;
                     0138    495 ;               R0 = ADDRESS OF BUFFER.
                     0138    496 ;               R1 = SIZE OF TRANSFER IN BYTES.
                     0138    497 ;               R2 = WRITE FUNCTION INDICATOR (0).
                     0138    498 ;               R3 = ADDRESS OF I/O REQUEST PACKET.
                     0138    499 ;
                     0138    500 ;               IRP$W_BCNT(R3) = SIZE OF TRANSFER IN BYTES.
                     0138    501 ;               IRP$W_FUNC(R3) = WRITE.
                     0138    502 ;-
                     0138    503
                     0138    504 EXE$WRITECHK::                          ;CHECK BUFFER FOR WRITE FUNCTION
       50    DD      0138    505          PUSHL   R0                     ;SAVE ADDRESS OF BUFFER
       68    10      013A    506          BSBB    EXE$WRITECHKR          ;CHECK BUFFER
    03 50    E8      013C    507 10$:     BLBS    R0,20$                 ;BRANCH IF SUCCESS
     FEBE'   31      013F    508          BRW     EXE$ABORTIO            ;ABORT I/O
       50 8ED0       0142    509 20$:     POPL    R0                     ;RESTORE ADDRESS OF BUFFER
          05         0145    510          RSB
                     0146    511          .DSABL  LSB
```

```
                     0146   513          .SBTTL  CHECK BUFFER ACCESSIBILITY FOR READ FUNCTION AND RETURN
                     0146   514 ;+
                     0146   515 ; EXE$READCHKR - CHECK BUFFER ACCESSIBILITY FOR READ FUNCTION AND RETURN
                     0146   516 ;
                     0146   517 ; THIS ROUTINE IS CALLED TO CHECK BUFFER ACCESSIBILITY FOR A READ I/O
                     0146   518 ; FUNCTION.  STATUS IS RETURNED IN R0.
                     0146   519 ;
                     0146   520 ; INPUTS:
                     0146   521 ;
                     0146   522 ;        R0 = ADDRESS OF BUFFER.
                     0146   523 ;        R1 = SIZE OF TRANSFER IN BYTES.
                     0146   524 ;        R3 = ADDRESS OF I/O REQUEST PACKET.
                     0146   525 ;
                     0146   526 ; OUTPUTS:
                     0146   527 ;
                     0146   528 ;        IF THE BUFFER IS NOT WRITE ACCESSIBLE, THEN THE FOLLOWING
                     0146   529 ;        VALUE IS RETURNED:
                     0146   530 ;
                     0146   531 ;        R0 = SS$_ACCVIO
                     0146   532 ;
                     0146   533 ;        IF BUFFER IS WRITE ACCESSIBLE, THEN THE FOLLOWING VALUES ARE RE-
                     0146   534 ;        TURNED:
                     0146   535 ;
                     0146   536 ;                R0 = SS$_NORMAL
                     0146   537 ;                R1 = SIZE OF TRANSFER IN BYTES.
                     0146   538 ;                R2 = READ FUNCTION INDICATOR (1).
                     0146   539 ;                R3 = ADDRESS OF I/O REQUEST PACKET.
                     0146   540 ;
                     0146   541 ;                IRP$L_BCNT(R3) = SIZE OF TRANSFER IN BYTES.
                     0146   542 ;                IRP$W_FUNC(R3) = READ.
                     0146   543 ;-
                     0146   544
                     0146   545          .ENABL  LSB
                     0146   546 EXE$READCHKR::                           ; CHECK BUFFER FOR READ FUNCTION
  32 A3    51   D0   0146   547          MOVL    R1,IRP$L_BCNT(R3)       ; SAVE R1
           0F   10   014A   548          BSBB    10$                     ; CHECK ACCESS
  51    32 A3   D0   014C   549          MOVL    IRP$L_BCNT(R3),R1       ; RESTORE R1
        07 50   E9   0150   550          BLBC    R0,5$                   ; IF LBC, NO ACCESS
  2A A3    02   A8   0153   551          BISW    #IRP$M_FUNC,IRP$W_STS(R3) ; SET READ FUNCTION
     52    01   D0   0157   552          MOVL    #1,R2                   ; SET READ FUNCTION INDICATOR
                     015A   553 5$:       RSB
                     015B   554
     51    50   C0   015B   555 10$:      ADDL    R0,R1                   ; ENDING ADDRESS OF BUFFER
50   01FF 8F   AA   015E   556          BICW    #VA$M_BYTE,R0           ; TRUNCATE TO START OF PAGE
     51    50   C2   0163   557          SUBL    R0,R1                   ; CALCULATE LENGTH OF BUFFER TO PROBE
52   FE00 8F   32   0166   558          CVTWL   #-^X200,R2              ; SET ADDRESS ADJUSTMENT CONSTANT
     51    51   F7   016B   559 15$:      CVTLW   R1,R1                   ; GREATER THAN 32k?
           13   1D   016E   560          BVS     30$                     ; IF VS, YES; CHECK BY CHUNKS
                     0170   561
                     0170   562 20$:      IFNOWRT R1,(R0),ACCVIO          ; CAN ENDS OF USER'S BUFFER BE WRITTEN?
     50    52   C2   0176   563          SUBL    R2,R0                   ; CALCULATE VA OF NEXT PAGE
  51    6142   3E   0179   564          MOVAW   (R1)[R2],R1             ; CALCULATE NEW LENGTH
           F1   14   017D   565          BGTR    20$                     ; IF GTR THEN MORE TO TEST
     50    01   3C   017F   566          MOVZWL  #SS$_NORMAL,R0          ; INDICATE SUCCESS
                     0182   567          RSB                             ;  AND RETURN
                     0183   568
     7E    50   7D   0183   569 30$:      MOVQ    R0,-(SP)                ; SAVE CURRENT VALUES ON STACK
```

```
                51    7E00 8F    3C   0186   570          MOVZWL  #^X7E00,R1          ; SIZE OF CHUNK USED STEPPING THRU BUF.
                                        018B   571                                  ;  (32K - 1 PAGE)
                      6E   51    C0   018B   572          ADDL    R1,(SP)           ; ADVANCE ADDRESS BY THIS AMOUNT
                  04  AE   51    C2   018E   573          SUBL    R1,4(SP)          ; DECREASE COUNT
                           DC    10   0192   574          BSBB    20$               ; PROBE CHUNK
                        05 50    E9   0194   575          BLBC    R0,ACCVIO1        ; IF LBC, NO ACCESS
                      50   8E    7D   0197   576          MOVQ    (SP)+,R0          ; POP PRE-ADJUSTED VALUES OFF STACK
                           CF    11   019A   577          BRB     15$               ; SEE IF LENGTH NOW LT 32K
                                        019C   578
                                        019C   579 ACCVIO1:
                      5E   08    C0   019C   580          ADDL    #8,SP
                                 05   019F   581          RSB
                                        01A0   582 ACCVIO:
                      50   0C    3C   01A0   583          MOVZWL  #SS$_ACCVIO,R0
                                 05   01A3   584          RSB
                                        01A4   585
```

```
                        01A4    587          .SBTTL  CHECK BUFFER ACCESSIBILITY FOR WRITE FUNCTION AND RETURN
                        01A4    588 ;+
                        01A4    589 ; EXE$WRITECHKR - CHECK BUFFER ACCESSIBILITY FOR WRITE FUNCTION AND RETURN
                        01A4    590 ;
                        01A4    591 ; THIS ROUTINE IS CALLED TO CHECK BUFFER ACCESSIBILITY FOR A WRITE I/O
                        01A4    592 ; FUNCTION.  STATUS IS RETURNED IN R0
                        01A4    593 ;
                        01A4    594 ; INPUTS:
                        01A4    595 ;
                        01A4    596 ;       R0 = ADDRESS OF BUFFER.
                        01A4    597 ;       R1 = SIZE OF TRANSFER IN BYTES.
                        01A4    598 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                        01A4    599 ;
                        01A4    600 ; OUTPUTS:
                        01A4    601 ;
                        01A4    602 ;       IF BUFFER IS NOT READ ACCESSIBLE, THEN THE FOLLOWING VALUE IS
                        01A4    603 ;       RETURNED:
                        01A4    604 ;
                        01A4    605 ;       R0 = SS$_ACCVIO
                        01A4    606 ;
                        01A4    607 ;       IF BUFFER IS READ ACCESSIBLE, THEN THE FOLLOWING VALUES ARE RE-
                        01A4    608 ;       TURNED:
                        01A4    609 ;
                        01A4    610 ;               R0 = SS$_NORMAL
                        01A4    611 ;               R1 = SIZE OF TRANSFER IN BYTES.
                        01A4    612 ;               R2 = WRITE FUNCTION INDICATOR (0).
                        01A4    613 ;               R3 = ADDRESS OF I/O REQUEST PACKET.
                        01A4    614 ;
                        01A4    615 ;               IRP$L_BCNT(R3) = SIZE OF TRANSFER IN BYTES.
                        01A4    616 ;               IRP$W_FUNC(R3) = WRITE.
                        01A4    617 ;-
                        01A4    618
                        01A4    619 EXE$WRITECHKR::                             ;CHECK BUFFER FOR WRITE FUNCTION
  32 A3    51    D0    01A4    620          MOVL    R1,IRP$L_BCNT(R3)          ; SAVE R1
           0A    10    01A8    621          BSBB    40$                        ; CHECK ACCESS
  51    32 A3    D0    01AA    622          MOVL    IRP$L_BCNT(R3),R1          ; RESTORE R1
        02 50    E9    01AE    623          BLBC    R0,35$                     ; IF LBC, NO ACCESS
           52    D4    01B1    624          CLRL    R2                         ; SET WRITE FUNCTION INDICATOR
                 05    01B3    625 35$:     RSB
                       01B4    626
     51    50    C0    01B4    627 40$:     ADDL    R0,R1                      ; ENDING ADDRESS OF BUFFER
50   01FF 8F    AA    01B7    628          BICW    #VA$M_BYTE,R0              ; TRUNCATE TO START OF PAGE
     51    50    C2    01BC    629          SUBL    R0,R1                      ; CALCULATE LENGTH OF BUFFER TO PROBE
52   FE00 8F    32    01BF    630          CVTWL   #-^X200,R2                 ; SET ADDRESS ADJUSTMENT CONSTANT
     51    51    F7    01C4    631 45$:     CVTLW   R1,R1                      ; GREATER THAN 32k?
           13    1D    01C7    632          BVS     60$                        ; IF VS, YES; CHECK BY CHUNKS
                       01C9    633
                       01C9    634 50$:     IFNORD  R1,(R0),ACCVIO             ; CAN ENDS OF USER'S BUFFER BE READ?
     50    52    C2    01CF    635          SUBL    R2,R0                      ; CALCULATE VA OF NEXT PAGE
  51    6142    3E    01D2    636          MOVAW   (R1)[R2],R1                ; CALCULATE NEW LENGTH
           F1    14    01D6    637          BGTR    50$                        ; IF GTR THEN MORE TO TEST
     50    01    3C    01D8    638          MOVZWL  #SS$_NORMAL,R0             ; INDICATE SUCCESS
                 05    01DB    639          RSB                                ;  AND RETURN
                       01DC    640
     7E    50    7D    01DC    641 60$:     MOVQ    R0,-(SP)                   ; SAVE CURRENT VALUES ON STACK
51   7E00 8F    3C    01DF    642          MOVZWL  #^X7E00,R1                 ; SIZE OF CHUNK USED STEPPING THRU BUF.
                       01E4    643                                             ;  (32K - 1 PAGE)
```

```
                6E   51    C0  01E4   644          ADDL    R1,(SP)                 ; ADVANCE ADDRESS BY THIS AMOUNT
            04  AE   51    C2  01E7   645          SUBL    R1,4(SP)                ; DECREASE COUNT
                     DC    10  01EB   646          BSBB    50$                     ; PROBE CHUNK
                   AC 50   E9  01ED   647          BLBC    R0,ACCVIO1              ; IF LBC, NO ACCESS
                50   8E    7D  01F0   648          MOVQ    (SP)+,R0                ; POP PRE-ADJUSTED VALUES OFF STACK
                     CF    11  01F3   649          BRB     45$                     ; SEE IF LENGTH NOW LT 32K
                               01F5   650          .DSABL  LSB
```

```
                                01F5   652          .SBTTL  SET DEVICE MODE AND CHARACTERISTICS FUNCTIONS (AT FDT LEVEL)
                                01F5   653 ;+
                                01F5   654 ; EXE$SETCHAR - SET DEVICE MODE AND CHARACTERISTICS FUNCTIONS (AT FDT LEVEL)
                                01F5   655 ;
                                01F5   656 ; THIS ROUTINE PLACES THE NEW CHARACTERISTICS SPECIFIED BY THE QUADWORD POINTED
                                01F5   657 ; TO BY P1 INTO THE SECOND AND THIRD LONGWORDS OF THE DEVICE UCB.
                                01F5   658 ;
                                01F5   659 ; INPUTS:
                                01F5   660 ;
                                01F5   661 ;       R0 = SCRATCH.
                                01F5   662 ;       R1 = SCRATCH.
                                01F5   663 ;       R2 = SCRATCH.
                                01F5   664 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                                01F5   665 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                                01F5   666 ;       R5 = ASSIGNED DEVICE UCB ADDRESS.
                                01F5   667 ;       R6 = ADDRESS OF CCB.
                                01F5   668 ;       R7 = I/O FUNCTION CODE BIT NUMBER.
                                01F5   669 ;       R8 = FUNCTION DECISION TABLE DISPATCH ADDRESS.
                                01F5   670 ;       R9 = SCRATCH.
                                01F5   671 ;       R10 = SCRATCH.
                                01F5   672 ;       R11 = SCRATCH.
                                01F5   673 ;       AP = ADDRESS OF FIRST FUNCTION DEPENDENT PARAMETER.
                                01F5   674 ;
                                01F5   675 ; OUTPUTS:
                                01F5   676 ;
                                01F5   677 ;       THE CHARACTERISTICS SPECIFIED BY THE QUADWORD POINTER TO BY P1 ARE STORED
                                01F5   678 ;       IN THE SECOND AND THIRD LONGWORDS OF THE DEVICE UCB.
;ROW49577                       01F5    .1 ;
;ROW49577                       01F5    .2 ; COMPLETION CODES:
;ROW49577                       01F5    .3 ;
;ROW49577                       01F5    .4 ;       SS$_NORMAL - SUCCESSFUL
;ROW49577                       01F5    .5 ;       SS$_ACCVIO - BUFFER ACCESS VIOLATION
;ROW49577                       01F5    .6 ;       SS$_ILLIOFUNC - FUNCTION IS ILLEGAL ON DISK DEVICES
;PRD0030                        01F5    .7 ;-
;PRD0030                        01F5    .8
;PRD0030                        01F5    .9          .ENABL  LSB
;PRD0030                        01F5   .10 EXE$SETCHAR::                                ;SET DEVICE MODE AND CHARACTERISTICS
;ROW49577                 1E    10  01F5   .11          BSBB    CHECK_SET               ;IS THIS SET FUNCTION VAILD?
-6                  57   23    D1  01F7   685          CMPL    #IO$_SETMODE,R7         ;SET MODE FUNCTION?
                         04    13  01FA   686          BEQL    10$                     ;IF EQL YES
                40 A5    61    B0  01FC   687          MOVW    (R1),UCB$B_DEVCLASS(R5) ;SET DEVICE TYPE AND CLASS
            42 A5    02 A1    B0  0200   688 10$:      MOVW    2(R1),UCB$W_DEVBUFSIZ(R5) ;SET DEFAULT BUFFER SIZE
            44 A5    04 A1    D0  0205   689          MOVL    4(R1),UCB$L_DEVDEPEND(R5) ;SET DEVICE CHARACTERISTICS
                     2A       11  020A   690          BRB     20$                     ;
```

```
                                020C    692          .SBTTL  SET DEVICE MODE AND CHARACTERISTICS FUNCTIONS
                                020C    693 ;+
                                020C    694 ; EXE$SETMODE - SET DEVICE CHARACTERISTICS AND MODE
                                020C    695 ;
                                020C    696 ; FUNCTIONAL DESCRIPTION:
                                020C    697 ;
                                020C    698 ; THIS ROUTINE PLACES THE NEW CHARACTERISTICS SPECIFIED BY P1 INTO
                                020C    699 ; THE I/O PACKET FOR INSERTION INTO THE UCB WHEN THE UNIT IS IDLE.
                                020C    700 ; THE INPUT DATA IS IN THE FORM RETURNED BY $GTCHAN. THE SPECIFIED BUFFER
                                020C    701 ; IS ASSUMED TO BE 12 BYTES IN LENGTH. THE P2 LENGTH SPECIFIER IS IGNORED.
                                020C    702 ;
                                020C    703 ; THE NEW CHARACTERISTICS ARE PLACED IN IRP$L_MEDIA/MEDIA+4 AND THE
                                020C    704 ; PACKET IS QUEUED VIA EXE$QIODRVPKT.
                                020C    705 ;
                                020C    706 ; INPUTS:
                                020C    707 ;
                                020C    708 ;       R3 = I/O PACKET ADDRESS
                                020C    709 ;       R4 = CURRENT PCB
                                020C    710 ;       R5 = ACB ADDRESS
                                020C    711 ;       R6 = ASSIGNED CCB ADDRESS
                                020C    712 ;       AP = ADDRESS OF THE QIO ARGUMEMT P1
                                020C    713 ;
                                020C    714 ; OUTPUTS:
                                020C    715 ;
                                020C    716 ;       R0 = STATUS OF THE OPERATION
                                020C    717 ;       R3+ ARE PRESERVED.
                                020C    718 ;
                                020C    719 ; COMPLETION CODES:
                                020C    720 ;
                                020C    721 ;       SS$_NORMAL - SUCCESSFUL
                                020C    722 ;       SS$_ACCVIO - BUFFER ACCESS VIOLATION
;ROW49577                       020C     .1 ;       SS$_ILLIOFUNC - FUNCTION IS ILLEGAL ON DISK DEVICES
;PRD0030                        020C     .2 ;-
;PRD0030                        020C     .3
;PRD0030                        020C     .4 EXE$SETMODE::                                ;SET DEVICE MODE AND CHARACTERISTICS
;ROW49577            07   10   020C     .5          BSBB    CHECK_SET                   ;IS THIS SET FUNCTION VAILD?
;PRD0030       38 A3 61   7D   020E     .6          MOVQ    (R1),IRP$L_MEDIA(R3)        ;INSERT CHARACTERISTICS IN I/O PACKET
;PRD0030          FDEB'   31   0212     .7          BRW     EXE$QIODRVPKT               ;QUEUE THE PACKET
;PRD0030                  0215     .8
;ROW49577                 0215     .9 CHECK_SET:
;ROW49577       40 A5 01   91   0215    .10          CMPB    #DC$_DISK, UCB$B_DEVCLASS(R5) ; Is this a disk device?
;ROW49577             0A   13   0219    .11          BEQL    91$                         ; Branch if disk; they can't be set.
;ROW49577          51 6C   D0   021B    .12          MOVL    P1(AP), R1                  ; Get buffer address.
;ROW49577                  021E    .13          IFNORD  #8, (R1), 93$               ; Branch if no read access to buffer.
;ROW49577             05   0224    .14          RSB                                 ; Else, all is ok; return to caller.
;ROW49577                  0225    .15
;ROW49577       50 00F4 8F   3C   0225    .16 91$:     MOVZWL  #SS$_ILLIOFUNC, R0          ; Setup illegal I/O function status.
;ROW49577             03   11   022A    .17          BRB     99$                         ; or
;ROW49577          50 0C   3C   022C    .18 93$:     MOVZWL  #SS$_ACCVIO, R0             ; Setup access violation status.
;ROW49577             FDCE'   31   022F    .19 99$:     BRW     EXE$ABORTIO                 ; Then blow the I/O request away.
```

```
                                01F5   652          .SBTTL  SET DEVICE MODE AND CHARACTERISTICS FUNCTIONS (AT FDT LEVEL)
                                01F5   653 ;+
                                01F5   654 ; EXE$SETCHAR - SET DEVICE MODE AND CHARACTERISTICS FUNCTIONS (AT FDT LEVEL)
                                01F5   655 ;
                                01F5   656 ; THIS ROUTINE PLACES THE NEW CHARACTERISTICS SPECIFIED BY THE QUADWORD POINTED
                                01F5   657 ; TO BY P1 INTO THE SECOND AND THIRD LONGWORDS OF THE DEVICE UCB.
                                01F5   658 ;
                                01F5   659 ; INPUTS:
                                01F5   660 ;
                                01F5   661 ;       R0 = SCRATCH.
                                01F5   662 ;       R1 = SCRATCH.
                                01F5   663 ;       R2 = SCRATCH.
                                01F5   664 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                                01F5   665 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                                01F5   666 ;       R5 = ASSIGNED DEVICE UCB ADDRESS.
                                01F5   667 ;       R6 = ADDRESS OF CCB.
                                01F5   668 ;       R7 = I/O FUNCTION CODE BIT NUMBER.
                                01F5   669 ;       R8 = FUNCTION DECISION TABLE DISPATCH ADDRESS.
                                01F5   670 ;       R9 = SCRATCH.
                                01F5   671 ;       R10 = SCRATCH.
                                01F5   672 ;       R11 = SCRATCH.
                                01F5   673 ;       AP = ADDRESS OF FIRST FUNCTION DEPENDENT PARAMETER.
                                01F5   674 ;
                                01F5   675 ; OUTPUTS:
                                01F5   676 ;
                                01F5   677 ;       THE CHARACTERISTICS SPECIFIED BY THE QUADWORD POINTER TO BY P1 ARE STORED
                                01F5   678 ;       IN THE SECOND AND THIRD LONGWORDS OF THE DEVICE UCB.
;ROW49577                       01F5    .1 ;
;ROW49577                       01F5    .2 ; COMPLETION CODES:
;ROW49577                       01F5    .3 ;
;ROW49577                       01F5    .4 ;       SS$_NORMAL - SUCCESSFUL
;ROW49577                       01F5    .5 ;       SS$_ACCVIO - BUFFER ACCESS VIOLATION
;ROW49577                       01F5    .6 ;       SS$_ILLIOFUNC - FUNCTION IS ILLEGAL ON DISK DEVICES
;PRD0030                        01F5    .7 ;-
;PRD0030                        01F5    .8
;PRD0030                        01F5    .9          .ENABL  LSB
;PRD0030                        01F5   .10 EXE$SETCHAR::                            ;SET DEVICE MODE AND CHARACTERISTICS
;ROW49577                 1E    10  01F5   .11          BSBB    CHECK_SET           ;IS THIS SET FUNCTION VAILD?
-6                 57    23    D1  01F7   685          CMPL    #IO$_SETMODE,R7     ;SET MODE FUNCTION?
                         04    13  01FA   686          BEQL    10$                 ;IF EQL YES
                40 A5    61    B0  01FC   687          MOVW    (R1),UCB$B_DEVCLASS(R5) ;SET DEVICE TYPE AND CLASS
            42 A5    02 A1    B0  0200   688 10$:      MOVW    2(R1),UCB$W_DEVBUFSIZ(R5) ;SET DEFAULT BUFFER SIZE
            44 A5    04 A1    D0  0205   689          MOVL    4(R1),UCB$L_DEVDEPEND(R5) ;SET DEVICE CHARACTERISTICS
                         2A    11  020A   690          BRB     20$                 ;
```

```
                                020C   692          .SBTTL  SET DEVICE MODE AND CHARACTERISTICS FUNCTIONS
                                020C   693 ;+
                                020C   694 ; EXE$SETMODE - SET DEVICE CHARACTERISTICS AND MODE
                                020C   695 ;
                                020C   696 ; FUNCTIONAL DESCRIPTION:
                                020C   697 ;
                                020C   698 ; THIS ROUTINE PLACES THE NEW CHARACTERISTICS SPECIFIED BY P1 INTO
                                020C   699 ; THE I/O PACKET FOR INSERTION INTO THE UCB WHEN THE UNIT IS IDLE.
                                020C   700 ; THE INPUT DATA IS IN THE FORM RETURNED BY $GTCHAN. THE SPECIFIED BUFFER
                                020C   701 ; IS ASSUMED TO BE 12 BYTES IN LENGTH. THE P2 LENGTH SPECIFIER IS IGNORED.
                                020C   702 ;
                                020C   703 ; THE NEW CHARACTERISTICS ARE PLACED IN IRP$L_MEDIA/MEDIA+4 AND THE
                                020C   704 ; PACKET IS QUEUED VIA EXE$QIODRVPKT.
                                020C   705 ;
                                020C   706 ; INPUTS:
                                020C   707 ;
                                020C   708 ;       R3 = I/O PACKET ADDRESS
                                020C   709 ;       R4 = CURRENT PCB
                                020C   710 ;       R5 = ACB ADDRESS
                                020C   711 ;       R6 = ASSIGNED CCB ADDRESS
                                020C   712 ;       AP = ADDRESS OF THE QIO ARGUMEMT P1
                                020C   713 ;
                                020C   714 ; OUTPUTS:
                                020C   715 ;
                                020C   716 ;       R0 = STATUS OF THE OPERATION
                                020C   717 ;       R3+ ARE PRESERVED.
                                020C   718 ;
                                020C   719 ; COMPLETION CODES:
                                020C   720 ;
                                020C   721 ;       SS$_NORMAL - SUCCESSFUL
                                020C   722 ;       SS$_ACCVIO - BUFFER ACCESS VIOLATION
;ROW49577                       020C    .1 ;       SS$_ILLIOFUNC - FUNCTION IS ILLEGAL ON DISK DEVICES
;PRD0030                        020C    .2 ;-
;PRD0030                        020C    .3
;PRD0030                        020C    .4 EXE$SETMODE::                                ;SET DEVICE MODE AND CHARACTERISTICS
;ROW49577            07   10   020C    .5          BSBB    CHECK_SET                   ;IS THIS SET FUNCTION VAILD?
;PRD0030       38 A3   61   7D   020E    .6          MOVQ    (R1),IRP$L_MEDIA(R3)        ;INSERT CHARACTERISTICS IN I/O PACKET
;PRD0030          FDEB'   31   0212    .7          BRW     EXE$QIODRVPKT               ;QUEUE THE PACKET
;PRD0030                      0215    .8
;ROW49577                     0215    .9 CHECK_SET:
;ROW49577       40 A5   01   91   0215   .10          CMPB    #DC$_DISK, UCB$B_DEVCLASS(R5) ; Is this a disk device?
;ROW49577             0A   13   0219   .11          BEQL    91$                         ; Branch if disk; they can't be set.
;ROW49577          51   6C   D0   021B   .12          MOVL    P1(AP), R1                  ; Get buffer address.
;ROW49577                      021E   .13          IFNORD  #8, (R1), 93$               ; Branch if no read access to buffer.
;ROW49577                 05   0224   .14          RSB                                 ; Else, all is ok; return to caller.
;ROW49577                     0225   .15
;ROW49577       50   00F4 8F   3C   0225   .16 91$:     MOVZWL  #SS$_ILLIOFUNC, R0          ; Setup illegal I/O function status.
;ROW49577             03   11   022A   .17          BRB     99$                         ; or
;ROW49577          50   0C   3C   022C   .18 93$:     MOVZWL  #SS$_ACCVIO, R0             ; Setup access violation status.
;ROW49577             FDCE'   31   022F   .19 99$:     BRW     EXE$ABORTIO                 ; Then blow the I/O request away.
```

```
                     0232   735          .SBTTL  SENSE DEVICE MODE AND CHARACTERISTICS FUNCTIONS
                     0232   736 ;+
                     0232   737 ; EXE$SENSEMODE - SENSE DEVICE MODE AND CHARACTERISTICS FUNCTIONS
                     0232   738 ;
                     0232   739 ; THIS ROUTINE OBTAINS THE CURRENT DEVICE MODE/CHARACTERISTICS FROM THE DEVICE
                     0232   740 ; DEPENDENT CHARACTERISTICS LONGWORD IN THE UCB AND IMMEDIATELY COMPLETES THE
                     0232   741 ; I/O OPERATION WITH THE SECOND LONGWORD OF THE FINAL I/O STATUS EQUAL TO THE
                     0232   742 ; DEVICE DEPENDENT CHARACTERSITICS.
                     0232   743 ;
                     0232   744 ; INPUTS:
                     0232   745 ;
                     0232   746 ;       R0 = SCRATCH.
                     0232   747 ;       R1 = SCRATCH.
                     0232   748 ;       R2 = SCRATCH.
                     0232   749 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                     0232   750 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                     0232   751 ;       R5 = ASSIGNED DEVICE UCB ADDRESS.
                     0232   752 ;       R6 = ADDRESS OF CCB.
                     0232   753 ;       R7 = I/O FUNCTION CODE BIT NUMBER.
                     0232   754 ;       R8 = FUNCTION DECISION TABLE DISPATCH ADDRESS.
                     0232   755 ;       R9 = SCRATCH.
                     0232   756 ;       R10 = SCRATCH.
                     0232   757 ;       R11 = SCRATCH.
                     0232   758 ;       AP = ADDRESS OF FIRST FUNCTION DEPENDENT PARAMETER.
                     0232   759 ;
                     0232   760 ; OUTPUTS:
                     0232   761 ;
                     0232   762 ;       THE DEVICE DEPENDENT CHARACTERISTICS ARE OBTAINED FROM THE UCB AND
                     0232   763 ;       THE I/O IS COMPLETED WITH THE SECOND I/O STATUS LONGWORD EQUAL TO THE
                     0232   764 ;       DEVICE CHARACTERISTICS.
                     0232   765 ;-
                     0232   766
                     0232   767 EXE$SENSEMODE::                          ;SENSE DEVICE MODE/CHARACTERISTICS
51   44 A5    D0     0232   768          MOVL    UCB$L_DEVDEPEND(R5),R1  ;GET DEVICE DEPENDENT CHARACTERSITICS
  50    01    3C     0236   769 20$:     MOVZWL  #SS$_NORMAL,R0          ;SET NORMAL COMPLETION STATUS
     FDC4'    31     0239   770          BRW     EXE$FINISHIO            ;FINISH I/O OPERATION
                     023C   771          .DSABL  LSB
```

```
                     023C   773          .SBTTL  CARRIAGE CONTROL INTERPRETATION
                     023C   774 ;+
                     023C   775 ; EXE$CARRIAGE - INTERPRET CARRIAGE CONTROL SPECIFIER
                     023C   776 ;
                     023C   777 ; FUNCTIONAL DESCRIPTION:
                     023C   778 ;
                     023C   779 ; THIS ROUTINE IS USED BY THE LINE PRINTER DRIVER AND THE TERMINAL
                     023C   780 ; DRIVER TO INTERPRET THE CARRIAGE CONTROL SPECIFIER IN IRP$B_CARCON .
                     023C   781 ; NOTE THAT IRP$B_CARCON IS USED AS A LONGWORD!
                     023C   782 ;
                     023C   783 ; THE SPECIFIER IS AS FOLLOWS:
                     023C   784 ;
                     023C   785 ;       .BYTE 1 -- FORTRAN CARRIAGE CONTROL CHARACTER IF NOT 0
                     023C   786 ;       .BYTE 2 -- ***** IGNORED *****
                     023C   787 ;       .BYTE 3 -- PREFIX CARRIAGE CONTROL
                     023C   788 ;       .BYTE 4 -- SUFFIX CARRIAGE CONTROL
                     023C   789 ;
                     023C   790 ; THE PRE/SUF FIELDS ARE AS FOLLOWS
                     023C   791 ;
                     023C   792 ;       IF BIT 7=0 THEN BITS 6-0 ARE THE NUMBER OF NEWLINES TO INSERT.
                     023C   793 ;       IF BIT 7=1 AND BIT 6=0 THEN BITS 4-0 ARE THE ASCII CHARACTER TO
                     023C   794 ;                                   OUTPUT. ASCII SET C0 OR C1 IS SPECIFIED BY BIT 5.
                     023C   795 ;       IF BIT 7=1 AND BIT 6=1 THEN BITS 5-0 ARE THE PRINTER CHANNEL NUMBER
                     023C   796 ;
                     023C   797 ; ASCII SET C0 IS ASSUMED AND BIT 6 IS IGNORED IF BIT 7=0.
                     023C   798 ;
                     023C   799 ; INPUTS:
                     023C   800 ;
                     023C   801 ;       R3 = ADDRESS OF THE I/O PACKET
                     023C   802 ;       R5 = ADDRESS OF THE UCB
                     023C   803 ;
                     023C   804 ; OUTPUTS:
                     023C   805 ;
                     023C   806 ;       IRP$B_CARCON IS SET UP TO REFLECT THE PRE/SUF CHARACTERS TO SEND.
                     023C   807 ;
                     023C   808 ;       BYTE 0 = NUMBER OF CHARACTERS TO SEND
                     023C   809 ;       BYTE 1 = CHARACTER, IF 0 THEN NEWLINE
                     023C   810 ;
                     023C   811 ;       IRP$B_CARCON+2 HAS THE SUFFIX CONTROL.
                     023C   812 ;
                     023C   813 ;       R0,R1 ARE USED.
                     023C   814 ;
                     023C   815 ;-
                     023C   816 ;
                     023C   817 ; LOCAL DATA TABLE
                     023C   818 ;
                     023C   819 CCTABLE:                             ; CARRIAGE CONTROL TO FORTRAN MATCH TABLE
0D 01 00 01          023C   820          .BYTE   1,0,1,13           ; SPACE => 1 NL, 1 CR
          20         0240   821          .ASCII  / /
0D 01 00 02          0241   822          .BYTE   2,0,1,13           ; "0" => 2 NL, 1 CR
          30         0245   823          .ASCII  /0/
0D 01 0C 01          0246   824          .BYTE   1,12,1,13          ; "1" => 1 FF, 1 CR
          31         024A   825          .ASCII  /1/
0D 01 00 00          024B   826          .BYTE   0,0,1,13           ; "+" => NOTHING, 1 CR
          2B         024F   827          .ASCII  /+/
00 00 00 01          0250   828          .BYTE   1,0,0,0            ; "$" => 1 NL, NOTHING
          24         0254   829          .ASCII  /$/
```

```
                OD 01 00 01  0255   830          .BYTE   1,0,1,13                ; DEFAULT => 1 NL, 1 CR
                      00     0259   831          .BYTE   0                       ; TABLE END
                             025A   832 ;
                             025A   833 ;
                             025A   834 ;
                             025A   835 EXE$CARRIAGE::                           ; INTERPRET CARRIAGE CONTROL
51      3C A3        9A      025A   836          MOVZBL  IRP$B_CARCON(R3),R1     ; GET FORTRAN SPECIFIER
                12   13      025E   837          BEQL    20$                    ; IF EQL THEN TRY PRE/SUF
50      D9 AF        9E      0260   838          MOVAB   B^CCTABLE,R0           ; ADDRESS MATCH TABLE
3C A3      80        D0      0264   839 10$:     MOVL    (R0)+,IRP$B_CARCON(R3) ; ASSUME MATCH
                60   95      0268   840          TSTB    (R0)                   ; END OF TABLE?
                05   13      026A   841          BEQL    15$                    ; IF EQL THEN YES
   51           80   91      026C   842          CMPB    (R0)+,R1               ; MATCH?
                F3   12      026F   843          BNEQ    10$                    ; NO THEN SEARCH
                05   05      0271   844 15$:     RSB                            ; ELSE RETURN
                             0272   845 ;
                             0272   846 ; PRE/SUF CARRIAGE CONTROL
                             0272   847 ;
51      3E A3        9A      0272   848 20$:     MOVZBL  IRP$B_CARCON+2(R3),R1  ; GET PREFIX SPECIFIER
                02   13      0276   849          BEQL    30$                    ; IF EQL THEN NONE
                19   10      0278   850          BSBB    100$                   ; INTERPRET THE SPECIFIER
3C A3           51   90      027A   851 30$:     MOVB    R1,IRP$B_CARCON(R3)    ; INSERT NUMBER
3D A3           50   90      027E   852          MOVB    R0,IRP$B_CARCON+1(R3)  ; INSERT CHARACTER
51      3F A3        9A      0282   853          MOVZBL  IRP$B_CARCON+3(R3),R1  ; GET SUFFIX SPECIFIER
                02   13      0286   854          BEQL    40$                    ; IF EQL THEN NONE
                09   10      0288   855          BSBB    100$                   ; CONVERT THE SPECIFIER
3E A3           51   90      028A   856 40$:     MOVB    R1,IRP$B_CARCON+2(R3)  ; INSERT NUMBER
3F A3           50   90      028E   857          MOVB    R0,IRP$B_CARCON+3(R3)  ; INSERT CHARACTER
                05   05      0292   858          RSB                            ; RETURN
                             0293   859 ;
                             0293   860 ; SUBROUTINE TO INTERPRET PRE/SUF SPECIFIER
                             0293   861 ;
                50   D4      0293   862 100$:    CLRL    R0                     ; ASSUME NEWLINE
08 51           07   E1      0295   863          BBC     #7,R1,110$             ; IF BIT 7 CLEAR THEN DONE
51      E0 8F        8B      0299   864          BICB3   #^X0E0,R1,R0           ; REMOVE OTHER BITS
                50           029D
   51           01   9A      029E   865          MOVZBL  #1,R1                  ; SET ONE CHARACTER
                05   05      02A1   866 110$:    RSB                            ; RETURN
                             02A2   867
                             02A2   868          .END
```

```
ACB$V_QUOTA                     = 00000006
ACCVIO                            000001A0 R      01
ACCVIO1                           0000019C R      01
BACKOUT_QIO                       000000FF R      01
CCB$W_IOC                       = 0000000A
CCTABLE                           0000023C R      01
CHECK_SET                         00000215 R      01
DC$_DISK                        = 00000001
EXE$ABORTIO                       ********    X   01
EXE$CARRIAGE                      0000025A RG     01
EXE$C_CMSTKSZ                     ********    X   01
EXE$DEANONPAGED                   ********    X   01
EXE$FINISHIO                      ********    X   01
EXE$FINISHIOC                     ********    X   01
EXE$IORSNWAIT                     00000000 RG     01
EXE$LCLDSKVALID                   00000035 RG     01
EXE$MODIFY                        00000069 RG     01
EXE$MODIFYLOCK                    000000A1 RG     01
EXE$MODIFYLOCKR                   000000A4 RG     01
EXE$ONEPARM                       00000029 RG     01
EXE$QIODRVPKT                     ********    X   01
EXE$READ                          0000006F RG     01
EXE$READCHK                       00000132 RG     01
EXE$READCHKR                      00000146 RG     01
EXE$READLOCK                      0000009B RG     01
EXE$READLOCKR                     000000AE RG     01
EXE$SENSEMODE                     00000232 RG     01
EXE$SETCHAR                       000001F5 RG     01
EXE$SETMODE                       0000020C RG     01
EXE$WRITE                         00000078 RG     01
EXE$WRITECHK                      00000138 RG     01
EXE$WRITECHKR                     000001A4 RG     01
EXE$WRITELOCK                     0000009E RG     01
EXE$WRITELOCKR                    000000B5 RG     01
EXE$ZEROPARM                      0000002F RG     01
IO$_PACKACK                     = 00000008
IO$_PHYSICAL                    = 0000001F
IO$_READLBLK                    = 00000021
IO$_READPBLK                    = 0000000C
IO$_SETMODE                     = 00000023
IPL$_SCS                        = 00000008
IPL$_SYNCH                      = 00000008
IRP$B_CARCON                    = 0000003C
IRP$B_RMOD                      = 0000000B
IRP$L_BCNT                      = 00000032
IRP$L_DIAGBUF                   = 0000004C
IRP$L_MEDIA                     = 00000038
IRP$L_SVAPTE                    = 0000002C
IRP$M_FUNC                      = 00000002
IRP$S_FCODE                     = 00000006
IRP$V_BUFIO                     = 00000000
IRP$V_DIAGBUF                   = 00000007
IRP$V_FCODE                     = 00000000
IRP$V_FUNC                      = 00000001
IRP$W_BOFF                      = 00000030
IRP$W_FUNC                      = 00000020
IRP$W_STS                       = 0000002A
MMG$IOLOCK                        ********    X   01
P1                              = 00000000
P2                              = 00000004
P3                              = 00000008
P4                              = 0000000C
P5                              = 00000010
P6                              = 00000014
PCB$L_EFWM                      = 0000004C
PCB$L_STS                       = 00000024
PCB$V_SSRWAIT                   = 0000000A
PCB$W_ASTCNT                    = 00000038
PCB$W_BIOCNT                    = 0000003A
PCB$W_DIOCNT                    = 0000003E
PMS$ABORT_RQ                      ********    X   01
PR$_IPL                         = 00000012
SCH$GL_RESMASK                    ********    X   01
SCH$GQ_MWAIT                      ********    X   01
SCH$WAIT                          ********    X   01
SF$L_SAVE_AP                    = 00000008
SS$_ACCVIO                      = 0000000C
SS$_ILLIOFUNC                   = 000000F4
SS$_NORMAL                      = 00000001
UCB$B_DEVCLASS                  = 00000040
UCB$B_ONLCNT                    = 000000AE
UCB$L_DEVDEPEND                 = 00000044
UCB$L_STS                       = 00000064
UCB$V_LCL_VALID                 = 00000011
UCB$V_VALID                     = 0000000B
UCB$W_DEVBUFSIZ                 = 00000042
VA$M_BYTE                       = 000001FF
```

Psect synopsis

PSECT name	Allocation	PSECT No.	Attributes
. ABS .	00000000 (0.)	00 (0.)	NOPIC USR CON ABS LCL NOSHR NOEXE NORD NOWRT NOVEC BYTE
. BLANK .	000002A2 (674.)	01 (1.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC BYTE
ABS	00000000 (0.)	02 (2.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	15	00:00:00.07	00:00:02.88
Command processing	91	00:00:00.73	00:00:09.00
Pass 1	454	00:00:18.08	00:01:39.32
Symbol table sort	0	00:00:02.73	00:00:14.75
Pass 2	168	00:00:04.66	00:00:30.16
Symbol table output	10	00:00:00.11	00:00:00.36
Psect synopsis output	2	00:00:00.03	00:00:00.04
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	743	00:00:26.42	00:02:36.51

The working set limit was 1650 pages.
98202 bytes (192 pages) of virtual memory were used to buffer the intermediate code.
There were 100 pages of symbol table space allocated to hold 1840 non-local and 44 local symbols.
969 source lines were read in Pass 1, producing 15 object records in Pass 2.
23 pages of virtual memory were used to define 22 macros.

Macro library statistics

Macro library name	Macros defined
_255DUA28:[SYS.OBJ]LIB.MLB;1	10
_255DUA28:[SYSLIB]STARLET.MLB;2	9
TOTALS (all libraries)	19

1922 GETS were required to define 19 macros.

There were no errors, warnings or information messages.

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

IOSUBNPAG

Table of contents

(3)	172	CANCEL I/O ON CHANNEL
(4)	204.2	Handle Last Channel Deassign
(5)	276	FILL DIAGNOSTIC BUFFER
(6)	307	RELEASE I/O CHANNEL
(7)	362	REQUEST I/O CHANNEL
(8)	422	I/O Request Completion Processing for Class Drivers
(9)	470	I/O REQUEST COMPLETION PROCESSING
(10)	560	MOUNT VERIFICATION HELPER
(11)	593	INITIATE I/O FUNCTION ON DEVICE
(12)	631	Allocate Buffered Data Path
(14)	718	Release Buffered Data Path
(15)	778	REQUEST AND ALLOCATE UNIBUS MAP REGISTERS FOR CLASS DRIVER
(16)	817.2	REQUEST UNIBUS MAP REGISTERS
(17)	862	ALLOCATE UNIBUS MAP REGISTERS
(18)	967	Allocate a specific set of UNIBUS Map Registers
(19)	1074	Permanently Allocate UNIBUS Map Registers
(21)	1197	Release UNIBUS Map Registers
(23)	1397	RETURN TO CALLER
(24)	1416	WAITFOR INTERRUPT OR TIMEOUT AND KEEP CHANNEL
(25)	1450	WAITFOR INTERRUPT OR TIMEOUT AND RELEASE CHANNEL
(26)	1486	ALLOCATE SYSTEM PAGE TABLE
(27)	1521	CONVERT DEVICE NAME AND UNIT
(28)	1623	BROADCAST TO A TERMINAL
(29)	1734.2	SCAN THE I/O DATA BASE
(30)	1734.62	SCAN THE I/O DATA BASE BOTH PRIMARY & SECONDARY PATHS
(31)	1734.133	IOC$CTRLINIT - Call driver controller init. routine
(32)	1734.198	IOC$UNITINIT - Call driver unit init. routine
(33)	1734.277	Parse Device Name String
(34)	1734.458	Search I/O Database for Device
(35)	1734.622	Continue I/O Database Search
(36)	1734.672	Check UCB Against Search Rules

```
                        0000     1          .TITLE  IOSUBNPAG - NONPAGED I/O RELATED SUBROUTINES
;WMC0002                0000    .1          .IDENT  'V03-033'
;WMC0002                0000    .2
-1                      0000     3 ;******************************************************************************
                        0000     4 ;*                                                                            *
                        0000     5 ;*  COPYRIGHT (c) 1978, 1980, 1982 BY                                         *
                        0000     6 ;*  DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASSACHUSETTS.                    *
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                        0000     8 ;*                                                                            *
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                        0000    22 ;*                                                                            *
                        0000    23 ;*                                                                            *
                        0000    24 ;******************************************************************************
                        0000    25 ;
                        0000    26 ; D. N. CUTLER 13-JUN-76
                        0000    27 ;
                        0000    28 ;
                        0000    29 ; NONPAGED I/O RELATED SUBROUTINES
                        0000    30 ;
;ACG0399                0000    .1 ; MODIFIED BY:
;ACG0399                0000    .2 ;
;WMC0002                0000    .3 ;       V03-033 WMC0002         Wayne Cardoza           03-May-1984
;WMC0002                0000    .4 ;               Add support for MNTVERPND bit.
;WMC0002                0000    .5 ;
;RAS0300                0000    .6 ;       V03-032 RAS0300         Ron Schaefer            2-May-1984
;RAS0300                0000    .7 ;               Change IOC$CVT_DEVNAM to only prefix cluster node names if
;RAS0300                0000    .8 ;               the DEV$V_NNM device characteristic is set in UCB$L_DEVCHAR2.
;RAS0300                0000    .9 ;               Add additional itemcode (4) to IOC$CVT_DEVNAM to provide
;RAS0300                0000   .10 ;               the device name string sans unit number.
;RAS0300                0000   .11 ;
;TMK0001                0000   .12 ;       V03-031 TMK0001         Todd M. Katz            23-Apr-1984
;TMK0001                0000   .13 ;               Remove the $LOGDEF data definitions.
;TMK0001                0000   .14 ;
;RLRPDTADP              0000   .15 ;       V03-030 RLRPDTADP       Robert L. Rappaport     9-Apr-1984
;RLRPDTADP              0000   .16 ;               Modify entrypoints used for allocating and deallocating
;RLRPDTADP              0000   .17 ;               Buffered Data Paths and UNIBUS Map Registers for UQPORTS (UDA),
;RLRPDTADP              0000   .18 ;               to pickup pointer for ADP from PDT$L_ADP(R4).
;RLRPDTADP              0000   .19 ;
;ACG0414                0000   .20 ;       V03-029 ACG0414         Andrew C. Goldstein,    30-Mar-1984  15:49
;ACG0414                0000   .21 ;               Minor parse and searching fixes in IOC$SEARCH...
;ACG0414                0000   .22 ;               add IOC$V_ALLOC to force allocation
;ACG0414                0000   .23 ;
;ACG0406                0000   .24 ;       V03-028 ACG0406         Andrew C. Goldstein,    16-Mar-1984  15:42
;ACG0406                0000   .25 ;               Fix bugs in searching for allocation class
;ACG0406                0000   .26 ;
```

```
;ACG0399                0000    .27 ;       V03-027 ACG0399         Andrew C. Goldstein,    24-Feb-1984  22:28
;ACG0399                0000    .28 ;               Add IOC$LAST_CHAN subroutine, and move in internal I/O
;ACG0399                0000    .29 ;               database parse and search routines, so they can be called
;ACG0399                0000    .30 ;               by IPC.
;ACG0399                0000    .31 ;
;RLRMAPSP               0000    .32 ;       V03-026 RLRMAPSP        Robert L. Rappaport     15-Feb-1984
;RLRMAPSP               0000    .33 ;               Correct bug in BEQL destination in IOC$ALOUBAMAPSP that is
;RLRMAPSP               0000    .34 ;               only triggered if the range specified, coincides with the
;RLRMAPSP               0000    .35 ;               exact end of an extent of map registers.
;RLRMAPSP               0000    .36 ;
;ROW0292                0000    .37 ;       V03-025 ROW0292         Ralph O. Weber          4-FEB-1984
;ROW0292                0000    .38 ;               Fix branch displacements broken by movement of EXE$MOUNTVER to
;ROW0292                0000    .39 ;               SYSLOAxxx.
;ROW0292                0000    .40 ;
;KPL0001                0000    .41 ;       V03-024 KPL0001         Peter Lieberwirth       7-Nov-1983
;KPL0001                0000    .42 ;               Add paths for new processors to CPUDISP invocation.
;KPL0001                0000    .43 ;
;ROW0244                0000    .44 ;       V03-023 ROW0244         Ralph O. Weber          17-OCT-1983
;ROW0244                0000    .45 ;               Change the IOC$CVT_DEVNAM name string formation rules to
;ROW0244                0000    .46 ;               eliminate _$1$TTA0: and other allocation class based names
;ROW0244                0000    .47 ;               for devices which can never be dual pathed.  See routine
;ROW0244                0000    .48 ;               comments for details of current operation mode.
;ROW0244                0000    .49 ;
;ROW0239                0000    .50 ;       V03-022 ROW0239         Ralph O. Weber          11-OCT-1983
;ROW0239                0000    .51 ;               Fix IOC$CVT_DEVNAM to not insert node name or trailing dollar
;ROW0239                0000    .52 ;               sign when node name is null.  Also correct comments describing
;ROW0239                0000    .53 ;               the R4 argument to IOC$CVT_DEVNAM.
;ROW0239                0000    .54 ;
;ROW0234                0000    .55 ;       V03-021 ROW0234         Ralph O. Weber          5-OCT-1983
;ROW0234                0000    .56 ;               Change IOC$CVT_DEVNAM to produce $allocation-class$device
;ROW0234                0000    .57 ;               strings completely in ASCII, when allocation class output is
;ROW0234                0000    .58 ;               requested.  In the process rip up the whole thing because that
;ROW0234                0000    .59 ;               was the only way to get something that worked and didn't
;ROW0234                0000    .60 ;               occupy all non-page memory
;ROW0234                0000    .61 ;
;TCM0005                0000    .62 ;       V03-020 TCM0005         Trudy C. Matthews       5-OCT-1983
;TCM0005                0000    .63 ;               Add IOC$SCAN_IODB_2P which is functionally the same as
;TCM0005                0000    .64 ;               IOC$SCAN_IOCB except that both primary and secondary paths to
;TCM0005                0000    .65 ;               a device are scanned.
;TCM0005                0000    .66 ;
;KDM0084                0000    .67 ;       V03-019 KDM0084         Kathleen D. Morse       26-Sep-1983
;KDM0084                0000    .68 ;               Added MicroVAX I support to CPUDISP macros.
;KDM0084                0000    .69 ;
;ROW0221                0000    .70 ;       V03-018 ROW0221         Ralph O. Weber          8-SEP-1983
;ROW0221                0000    .71 ;               Change IOC$UNITINIT to look for a unit initialization routine
;ROW0221                0000    .72 ;               in the DDT before looking in the CRB.  See the note in the
;ROW0221                0000    .73 ;               routine's header for details.
;ROW0221                0000    .74 ;
;ROW0203                0000    .75 ;       V03-017 ROW0203         Ralph O. Weber          5-AUG-1983
;ROW0203                0000    .76 ;               Add two new routines IOC$CTRLINIT and IOC$UNITINIT.  These are
;ROW0203                0000    .77 ;               the proscribed mechanism for calling device driver controller
;ROW0203                0000    .78 ;               and unit initialization routines.  These routines correctly
;ROW0203                0000    .79 ;               setup for, locate, and call the appropriate driver routines.
;ROW0203                0000    .80 ;
;TCM0004                0000    .81 ;       V03-016 TCM0004         Trudy C. Matthews       26-Jul-1983
;TCM0004                0000    .82 ;               Change IOC$CVT_DEVNAM to return the <allocation_class>+
;TCM0004                0000    .83 ;               <devnam> form of device name if R4 > 0.
```

```
;TCM0004                0000    .84 ;
;RLRBYTEOFF             0000    .85 ;       V03-015 RLRBYTEOFF      Robert L. Rappaport     27-Jun-1983
;RLRBYTEOFF             0000    .86 ;               Correct error in IOC$REQDATAPUDA.  Error is that this
;RLRBYTEOFF             0000    .87 ;               routine has operated in a NOWAIT mode, that is, if no
;RLRBYTEOFF             0000    .88 ;               Buffered Datapath was available, we just used the
;RLRBYTEOFF             0000    .89 ;               Direct Datapath.  Unfortunately, this doesn't work on
;RLRBYTEOFF             0000    .90 ;               780's and 790's if the user buffer is located at an
;RLRBYTEOFF             0000    .91 ;               odd byte address since Byte Offset doesn't work on the
;RLRBYTEOFF             0000    .92 ;               Direct Datapath for the UNIBUS Adapters on these
;RLRBYTEOFF             0000    .93 ;               processors.
;RLRBYTEOFF             0000    .94 ;
;LMPBUILD               0000    .95 ;       V03-014 LMPBUILD        L. Mark Pilant,         26-Jun-1983  23:11
;LMPBUILD               0000    .96 ;               Change references from TTY$K_WB_HDRLEN to TTY$K_WB_LENGTH.
;LMPBUILD               0000    .97 ;
;TCM0003                0000    .98 ;       V03-013 TCM0003         Trudy C. Matthews       17-Jun-1983
;TCM0003                0000    .99 ;               Change the way cluster-style device names are conditionally
;TCM0003                0000   .100 ;               returned, such that cluster-style names are returned for
;TCM0003                0000   .101 ;               local disk devices if the system is participating in a
;TCM0003                0000   .102 ;               cluster (routine IOC$CVT_DEVNAM).
;TCM0003                0000   .103 ;
;TCM0002                0000   .104 ;       V03-012 TCM0002         Trudy C. Matthews       09-Jun-1983
;TCM0002                0000   .105 ;               Fix bug in TCM0001.
;TCM0002                0000   .106 ;
;TCM0001                0000   .107 ;       V03-011 TCM0001         Trudy C. Matthews       21-Apr-1983
;TCM0001                0000   .108 ;               Add new parameter to IOC$CVT_DEVNAM that allows caller
;TCM0001                0000   .109 ;               to specify whether he wants the node name returned for
;TCM0001                0000   .110 ;               local devices or not.
;TCM0001                0000   .111 ;
;ROW0188                0000   .112 ;       V03-010 ROW0188         Ralph O. Weber          30-APR-1983
;ROW0188                0000   .113 ;               Fix broken branches to PMS$ routines.
;ROW0188                0000   .114 ;
;KTA3022                0000   .115 ;       V03-009 KTA3022         Kerbey T. Altmann       29-Dec-1982
;KTA3022                0000   .116 ;               Enhance KTA3018. Add new routine to scan the IO
;KTA3022                0000   .117 ;               data base and return the blocks.
;KTA3022                0000   .118 ;
;ROW0140                0000   .119 ;       V03-008 ROW0140         Ralph O. Weber          18-NOV-1982
;ROW0140                0000   .120 ;               Cause IOC$DALOCUBAMAP to give non-fatal INCONSTATE,
;ROW0140                0000   .121 ;               "Inconsistant UBA data base" bugcheck if number of map
;ROW0140                0000   .122 ;               registers to deallocate is zero.
;ROW0140                0000   .123 ;
;MLJ0101                0000   .124 ;       V03-007 MLJ0101         Martin L. Jack          11-Nov-1982
;MLJ0101                0000   .125 ;               Add $SBDEF.
;MLJ0101                0000   .126 ;
;KTA3018                0000   .127 ;       V03-006 KTA3018         Kerbey T. Altmann       01-Nov-1982
;KTA3018                0000   .128 ;               Modify CVT_DEVNAME for new IO database.
;KTA3018                0000   .129 ;
;ROW0130                0000   .130 ;       V03-005 ROW0130         Ralph O. Weber           5-OCT-1982
;ROW0130                0000   .131 ;               Remove IOC$DELMBX whose functionality is replaced by new
;ROW0130                0000   .132 ;               routines in module UCBCREDEL.
;ROW0130                0000   .133 ;
;KDM0002                0000   .134 ;       V03-004 KDM0002         Kathleen D. Morse       28-Jun-1982
;KDM0002                0000   .135 ;               Added $DCDEF.
;KDM0002                0000   .136 ;
;RLR0003                0000   .137 ;       V03-003 RLR0003         Robert L. Rappaport     1-June-1982
;RLR0003                0000   .138 ;               Correct errors in UNIBUS map register allocation and
;RLR0003                0000   .139 ;               deallocation that occur when the number of active
;RLR0003                0000   .140 ;               descriptors is zero.  Errors were in IOC$ALOUBAMAPSP
```

```
;RLR0003                0000  .141 ;                (allocation error), IOC$ALOUBAPRM (allocation error),
;RLR0003                0000  .142 ;                and IOC$DALOCUBAMAP (deallocation error).  The error
;RLR0003                0000  .143 ;                in IOC$DALOCUBAMAP is corrected in a patch to V3.1.
;RLR0003                0000  .144 ;
;RLR0002                0000  .145 ;        V03-002 RLR0002         Robert L. Rappaport     22-May-1982
;RLR0002                0000  .146 ;                Remove IOC$REQMAPREGN and all comments that reference it.
;RLR0002                0000  .147 ;
;RLR0001                0000  .148 ;        V03-001 RLR0001 Robert L. Rappaport      22-May-1982
;RLR0001                0000  .149 ;                Correct error in UNIBUS map register allocation that
;RLR0001                0000. .150 ;                doubly allocated registers when the number of active
;RLR0001                0000  .151 ;                descriptors was zero.
;RLR0001                0000  .152 ;                This bug corrected in patch to V3.1.
;RLR0001                0000  .153 ;
```

```
-114                    0000   145 ;
                        0000   146 ;
                        0000   147 ; MACRO LIBRARY CALLS
                        0000   148 ;
                        0000   149
                        0000   150          $ADPDEF                 ;DEFINE ADP OFFSETS
                        0000   151          $CADEF                  ;DEFINE CONDITIONAL ASSEMBLY PARAMETERS
;ACG0399                0000    .1          $CANDEF                 ;DEFINE CANCEL I/O REASON CODES
;ACG0399                0000    .2          $CDRPDEF                ;DEFINE CLASS DRIVER I/O REQUEST PACKET
;ACG0399                0000    .3          $CRBDEF                 ;DEFINE CRB OFFSETS
;KDM0002                0000    .4          $DCDEF                  ;DEFINE DEVICE CLASSES
-2                      0000   154          $DDBDEF                 ;DEFINE DDB OFFSETS
                        0000   155          $DDTDEF                 ;DEFINE DDT OFFSETS
                        0000   156          $DEVDEF                 ;DEFINE DEVICE CHARACTERISTICS FLAGS
                        0000   157          $DYNDEF                 ;DEFINE DYNAMIC POOL BLOCK TYPES
                        0000   158          $EMBDEF                 ;DEFINE EMB OFFSETS
                        0000   159          $IDBDEF                 ;DEFINE IDB OFFSETS
;TMK0001                0000    .1          $IOCDEF                 ;DEFINE IOC$SEARCHxxx FLAGS
;TMK0001                0000    .2          $IPLDEF                 ;DEFINE INTERRUPT PRIORITY LEVELS
;TMK0001                0000    .3          $IRPDEF                 ;DEFINE IRP OFFSETS
;TMK0001                0000    .4          $JIBDEF                 ;DEFINE JIB OFFSETS
;TMK0001                0000    .5          $LCKDEF                 ;DEFINE LOCK MANAGER SYMBOLS
;TMK0001                0000    .6          $MSCPDEF                ;DEFINE MSCP STRUCTURES
;TMK0001                0000    .7          $PCBDEF                 ;DEFINE PCB OFFSETS
;TMK0001                0000    .8          $PDTDEF                 ;Define PDT offsets
;TMK0001                0000    .9          $PRDEF                  ;DEFINE PROCESSOR REGISTERS
;TMK0001                0000   .10          $PRVDEF                 ;DEFINE PRIVILEGE BITS
;MLJ0101                0000   .11          $SBDEF                  ; Define system block offsets
;ACG0399                0000   .12          $SSDEF                  ;DEFINE SYSTEM STATUS CODES
;ACG0399                0000   .13          $TTYDEF                 ;DEFINE TERMINAL WRITE PACKET OFFSETS
;ACG0399                0000   .14          $UBMDDEF                ;Define UNIBUS Map Descriptor structure
;ACG0399                0000   .15          $UCBDEF                 ;DEFINE UCB OFFSETS
;ACG0399                0000   .16          $VECDEF                 ;DEFINE CRB VECTOR OFFSETS
```

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```
                     0000    172          .SBTTL  CANCEL I/O ON CHANNEL
                     0000    173 ;+
                     0000    174 ; IOC$CANCELIO - CANCEL I/O ON CHANNEL
                     0000    175 ;
                     0000    176 ; THIS ROUTINE IS A DEVICE INDEPENDENT CANCEL I/O ROUTINE THAT CONDITIONALLY
                     0000    177 ; MARKS THE UCB SUCH THAT THE CURRENT I/O REQUEST WILL BE CANCELED IF CONDITIONS
                     0000    178 ; WARRANT SUCH A ACTION.
                     0000    179 ;
                     0000    180 ; INPUTS:
                     0000    181 ;
                     0000    182 ;       R2 = NEGATIVE OF THE CHANNEL NUMBER.
                     0000    183 ;       R3 = CURRENT IO PACKET.
                     0000    184 ;       R4 = PCB ADDRESS.
                     0000    185 ;       R5 = UCB ADDRESS.
                     0000    186 ;
                     0000    187 ; OUTPUTS:
                     0000    188 ;
                     0000    189 ;       IF THE DEVICE IS BUSY, THE REQUEST IS FOR THE CURRENT PROCESS, AND
                     0000    190 ;       THE I/O WAS ISSUED FROM THE DESIGNATED CHANNEL, THEN THE CANCEL I/O
                     0000    191 ;       BIT IS SET IN THE CORRESPONDING UCB.
                     0000    192 ;
                     0000    193 ;       R2, R3, R4, AND R5 ARE PRESERVED ACROSS CALL.
                     0000    194 ;-
                     0000    195
                 00000000    196          .PSECT  WIONONPAGED
                     0000    197 IOC$CANCELIO::                              ;CANCEL I/O ON CHANNEL
11 64 A5    08   E1  0000    198          BBC     #UCB$V_BSY,UCB$W_STS(R5),10$ ;IF CLR, DEVICE NOT BUSY
60 A4     0C A3   D1  0005    199          CMPL    IRP$L_PID(R3),PCB$L_PID(R4) ;PROCESS ID MATCH?
              0A   12  000A    200          BNEQ    10$                         ;IF NEQ NO
   28 A3      52   B1  000C    201          CMPW    R2,IRP$W_CHAN(R3)           ;CHANNEL NUMBER MATCH
              04   12  0010    202          BNEQ    10$                         ;IF NEQ NO
   64 A5      08   A8  0012    203          BISW    #UCB$M_CANCEL,UCB$W_STS(R5) ;SET CANCEL PENDING
                   05  0016    204 10$:     RSB                                 ;
```

```
;ACG0399                                0017    .2          .SBTTL  Handle Last Channel Deassign
;ACG0399                                0017    .3
;ACG0399                                0017    .4 ;+
;ACG0399                                0017    .5 ; IOC$LAST_CHAN - Last Channel Deassign Specific
;ACG0399                                0017    .6 ; IOC$LAST_CHAN_AMBX - Last Assoc. MBX Channel Deassign Specific
;ACG0399                                0017    .7 ;
;ACG0399                                0017    .8 ; Functional Description:
;ACG0399                                0017    .9 ;
;ACG0399                                0017   .10 ;       Common functions done on last channel deassignment are handled.  The
;ACG0399                                0017   .11 ;       driver's cancel I/O routine is called with an appropriate reason code
;ACG0399                                0017   .12 ;       (CAN$C_DASSGN for regular deassign, or CAN$C_AMBXDGN for associated
;ACG0399                                0017   .13 ;       mailboxes).  If after the cancel routine finished UCB$V_DELETEUCB is
;ACG0399                                0017   .14 ;       set, the UCB is credited and deleted.
;ACG0399                                0017   .15 ;
;ACG0399                                0017   .16 ; Inputs:
;ACG0399                                0017   .17 ;
;ACG0399                                0017   .18 ;       R5      UCB address
;ACG0399                                0017   .19 ;       R2      Channel index (LAST_CHAN only)
;ACG0399                                0017   .20 ;
;ACG0399                                0017   .21 ; Outputs:
;ACG0399                                0017   .22 ;
;ACG0399                                0017   .23 ;       R0 thru R3 destroyed.
;ACG0399                                0017   .24 ;       If appropriate, UCB is deallocated.
;ACG0399                                0017   .25 ;
;ACG0399                                0017   .26 ;-
;ACG0399                                0017   .27
;ACG0399                                0017   .28          .ENABLE LSB
;ACG0399                                0017   .29
;ACG0399                                0017   .30 IOC$LAST_CHAN_AMBX::
;ACG0399                 52      7C     0017   .31          CLRQ    R2                      ; Clear unused cancel inputs.
;ACG0399              58 02      9A     0019   .32          MOVZBL  #CAN$C_AMBXDGN, R8      ; Set cancel reason code.
;ACG0399                 07      11     001C   .33          BRB     10$
;ACG0399                                001E   .34
;ACG0399                                001E   .35 IOC$LAST_CHAN::
;ACG0399           53    58 A5    D0     001E   .36          MOVL    UCB$L_IRP(R5), R3       ; Get active packet address.
;ACG0399              58 01      9A     0022   .37          MOVZBL  #CAN$C_DASSGN, R8       ; Set cancel reason code.
;ACG0399                                0025   .38
;ACG0399        50    0088 C5    D0     0025   .39 10$:     MOVL    UCB$L_DDT(R5), R0       ; Get DDT address.
;ACG0399                                002A   .40          SETIPL  UCB$B_FIPL(R5)          ; Raise to fork IPL.
;ACG0399                 0C B0    16     002E   .41          JSB     @DDT$L_CANCEL(R0)       ; Call driver's cancel I/O routine.
;ACG0399                                0031   .42          SETIPL  #IPL$_ASTDEL            ; Lower IPL.
;ACG0399        1A 38 A5    17     E0     0034   .43          BBS     #DEV$V_ALL, -           ; Branch if still allocated
;ACG0399                                0039   .44                  UCB$L_DEVCHAR(R5),30$
;ACG0399          00100004 8F     D3     0039   .45          BITL    #DEV$M_TRM!DEV$M_MBX, - ; Is this a terminal, remote terminal
;ACG0399                 38 A5          003F
;ACG0399                                0041   .46                  UCB$L_DEVCHAR(R5)       ; or mailbox?
;ACG0399                 05      13     0041   .47          BEQL    20$                     ; Branch if not.
;ACG0399        00 38 A5    07     E4     0043   .48          BBSC    #DEV$V_OPR, -           ; Else, clear OPR bit.
;ACG0399                                0048   .49                  UCB$L_DEVCHAR(R5), 20$  ; This is an implicit operator disable.
;ACG0399                 10      E1     0048   .50 20$:     BBC     #UCB$V_DELETEUCB,-      ; Branch if UCB not to be deleted.
;ACG0399              06 64 A5           004A   .51                  UCB$L_STS(R5), 30$
;ACG0399                    FFB0'   30     004D   .52          BSBW    IOC$CREDIT_UCB          ; Else credit UCB quotas,
;ACG0399                    FFAD'   30     0050   .53          BSBW    IOC$DELETE_UCB          ; and delete the UCB.
;ACG0399                            05     0053   .54 30$:     RSB
;ACG0399                                0054   .55
;ACG0399                                0054   .56          .DISABLE LSB
```

```
-71                                     0054   276          .SBTTL  FILL DIAGNOSTIC BUFFER
                                        0054   277 ;+
                                        0054   278 ; IOC$DIAGBUFILL - FILL DIAGNOSTIC BUFFER
                                        0054   279 ;
                                        0054   280 ; THIS ROUTINE IS CALLED AT THE END OF AN I/O OPERATION, BUT BEFORE RELEASING
                                        0054   281 ; THE I/O CHANNEL, TO FILL THE FINAL DEVICE PARAMETERS INTO AN INTERNAL DIAG-
                                        0054   282 ; NOSTIC BUFFER IF ONE IS SPECIFIED.
                                        0054   283 ;
                                        0054   284 ; INPUTS:
                                        0054   285 ;
                                        0054   286 ;       R4 = ADDRESS OF DEVICE CSR REGISTER.
                                        0054   287 ;       R5 = DEVICE UNIT UCB ADDRESS.
                                        0054   288 ;
                                        0054   289 ; OUTPUTS:
                                        0054   290 ;
                                        0054   291 ;       IF A DIAGNOSTIC BUFFER WAS SPECIFIED IN THE ORIGINAL REQUEST, THEN
                                        0054   292 ;       THE COMPLETION TIME, FINAL ERROR COUNTERS, AND DEVICE REGISTERS ARE
                                        0054   293 ;       FILLED INTO THE DIAGNOSTIC BUFFER.
                                        0054   294 ;-
                                        0054   295
                                        0054   296 IOC$DIAGBUFILL::                          ;FILL DIAGNOSTIC BUFFER
    53    58 A5    D0                   0054   297          MOVL    UCB$L_IRP(R5),R3         ;GET ADDRESS OF I/O PACKET
1B 2A A3    07    E1                   0058   298          BBC     #IRP$V_DIAGBUF,IRP$W_STS(R3),10$ ;IF CLR, NO DIAGNOSTIC BUFFER
    50    4C B3    D0                   005D   299          MOVL    @IRP$L_DIAGBUF(R3),R0    ;GET ADDRESS OF INTERNAL BUFFER DATA AREA
       50    08    C0                   0061   300          ADDL    #8,R0                    ;POINT PAST START TIME
 00000000'EF       7D                   0064   301          MOVQ    EXE$GQ_SYSTIME,(R0)+     ;INSERT COMPLETION TIME
             80                         006A
 80    0080 C5     3C                   006B   302          MOVZWL  UCB$B_ERTCNT(R5),(R0)+   ;INSERT FINAL ERROR COUNTERS
 52    0088 C5     D0                   0070   303          MOVL    UCB$L_DDT(R5),R2         ;GET ADDRESS OF DDT
          10 B2    16                   0075   304          JSB     @DDT$L_REGDUMP(R2)       ;CALL DEVICE SPECIFIC REGISTER DUMP ROUTINE
                   05                   0078   305 10$:     RSB                              ;
```

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                        0079   307          .SBTTL  RELEASE I/O CHANNEL
                        0079   308 ;+
                        0079   309 ; IOC$RELCHAN - RELEASE ALL I/O CHANNELS
                        0079   310 ; IOC$RELSCHAN - RELEASE SECONDARY I/O CHANNEL
                        0079   311 ;
                        0079   312 ; THIS ROUTINE IS CALLED AT THE END OF AN I/O OPERATION TO RELEASE ALL
                        0079   313 ; CHANNELS THE I/O WAS BEING PERFORMED ON.
                        0079   314 ;
                        0079   315 ; INPUTS:
                        0079   316 ;
                        0079   317 ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                        0079   318 ;
                        0079   319 ; OUTPUTS:
                        0079   320 ;
                        0079   321 ;       THE CHANNELS ARE RELEASED AND AN ATTEMPT IS MADE TO REMOVE THE NEXT
                        0079   322 ;       WAITING DRIVER PROCESS FROM EACH CHANNEL QUEUE. IF A DRIVER PROCESS
                        0079   323 ;       IS WAITING, THEN THE CHANNEL IS ASSIGNED TO THAT DRIVER PROCESS AND
                        0079   324 ;       IT IS CALLED VIA A JSB TO ITS CHANNEL WAIT RETURN ADDRESS. WHEN THE
                        0079   325 ;       CALLED DRIVER PROCESS RETURNS, A RETURN IS MADE TO THE DRIVER PROCESS
                        0079   326 ;       THAT RELEASED THE CHANNEL. IF THERE IS NO DRIVER PROCESS WAITING FOR
                        0079   327 ;       THE CHANNEL, THEN THE CHANNEL STATUS IS SET TO IDLE.
                        0079   328 ;
                        0079   329 ;       R3 AND R4 ARE PRESERVED ACROSS CALL.
                        0079   330 ;-
                        0079   331
                        0079   332          .ENABL  LSB
                        0079   333 IOC$RELSCHAN::                          ;RELEASE SECONDARY I/O CHANNEL
    50    24 A5   D0    0079   334          MOVL    UCB$L_CRB(R5),R0        ;GET ADDRESS OF PRIMARY CRB
    50    20 A0   D0    007D   335          MOVL    CRB$L_LINK(R0),R0       ;GET ADDRESS OF SECONARY CRB
          10      11    0081   336          BRB     20$                     ;
                        0083   337 IOC$RELCHAN::                           ;RELEASE I/O CHANNEL
    50    24 A5   D0    0083   338          MOVL    UCB$L_CRB(R5),R0        ;GET ADDRESS OF PRIMARY CRB
    50    20 A0   D0    0087   339          MOVL    CRB$L_LINK(R0),R0       ;GET ADDRESS OF SECONDARY CRB
          02      13    008B   340          BEQL    10$                     ;IF EQL NONE
          04      10    008D   341          BSBB    20$                     ;RELEASE SECONDARY CHANNEL
    50    24 A5   D0    008F   342 10$:     MOVL    UCB$L_CRB(R5),R0        ;GET ADDRESS OF PRIMARY CRB
25 0E A0    00    E1    0093   343 20$:     BBC     #CRB$V_BSY,CRB$B_MASK(R0),30$ ;IF CLR, THEN CHANNEL NOT BUSY
    51    2C A0   D0    0098   344          MOVL    CRB$L_INTD+VEC$L_IDB(R0),R1 ;GET ADDRESS OF IDB
    04 A1   55    D1    009C   345          CMPL    R5,IDB$L_OWNER(R1)      ;DRIVER PROCESS OWN CHANNEL?
          1B      12    00A0   346          BNEQ    30$                     ;IF NEQ NO
    52    00 B0   0F    00A2   347          REMQUE  @CRB$L_WQFL(R0),R2      ;GET ADDRESS OF NEXT DRIVER FORK BLOCK
          16      1D    00A6   348          BVS     40$                     ;IF VS NO DRIVER PROCESS WAITING
          38      BB    00A8   349          PUSHR   #^M<R3,R4,R5>           ;SAVE CONTEXT OF CURRENT DRIVER PROCESS
       55    52   D0    00AA   350          MOVL    R2,R5                   ;COPY ADDRESS OF DRIVER PROCESS FORK BLOCK
    53    10 A5   D0    00AD   351          MOVL    UCB$L_FR3(R5),R3        ;LOAD WAITING DRIVER PROCESS CONTEXT
       54    61   D0    00B1   352          MOVL    IDB$L_CSR(R1),R4        ;SET ASSIGNED CHANNEL CSR ADDRESS
    04 A1   55    D0    00B4   353          MOVL    R5,IDB$L_OWNER(R1)      ;SET ADDRESS OF OWNER PROCESS UCB
       0C   B5    16    00B8   354          JSB     @UCB$L_FPC(R5)          ;CALL DRIVER AT CHANNEL WAIT RETURN ADDRESS
          38      BA    00BB   355          POPR    #^M<R3,R4,R5>           ;RESTORE PREVIOUS DRIVER PROCESS CONTEXT
                  05    00BD   356 30$:     RSB                             ;
       04 A1      D4    00BE   357 40$:     CLRL    IDB$L_OWNER(R1)         ;CLEAR OWNER UNIT UCB ADDRESS
    0E A0   01    8A    00C1   358          BICB    #CRB$M_BSY,CRB$B_MASK(R0) ;CLEAR CHANNEL BUSY
                  05    00C5   359          RSB                             ;
                        00C6   360          .DSABL  LSB
```

-1

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                        00C6   362          .SBTTL  REQUEST I/O CHANNEL
                        00C6   363 ;+
                        00C6   364 ; IOC$REQPCHANH - REQUEST PRIMARY I/O CHANNEL HIGH PRIORITY
                        00C6   365 ; IOC$REQSCHANH - REQUEST SECONDARY I/O CHANNEL HIGH PRIORITY
                        00C6   366 ; IOC$REQPCHANL - REQUEST PRIMARY I/O CHANNEL LOW PRIORITY
                        00C6   367 ; IOC$REQSCHANL - REQUEST SECONDARY I/O CHANNEL LOW PRIORITY
                        00C6   368 ;
                        00C6   369 ; THESE ROUTINES ARE CALLED TO REQUEST AN I/O CHANNEL TO PERFORM AN I/O
                        00C6   370 ; OPERATION ON.
                        00C6   371 ;
                        00C6   372 ; INPUTS:
                        00C6   373 ;
                        00C6   374 ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                        00C6   375 ;       04(SP) = RETURN ADDRESS OF CALLER'S CALLER.
                        00C6   376 ;
                        00C6   377 ; OUTPUTS:
                        00C6   378 ;
                        00C6   379 ;       IF THE SPECIFIED I/O CHANNEL IS IDLE, THEN IT IS IMMEDIATELY
                        00C6   380 ;       ASSIGNED TO THE CURRENT DRIVER PROCESS. ELSE THE DRIVER PROCESS
                        00C6   381 ;       CONTEXT IS SAVED IN ITS FORK BLOCK, THE FORK BLOCK IS INSERTED
                        00C6   382 ;       IN THE CHANNEL WAIT QUEUE, AND A RETURN TO THE DRIVER PROCESS'
                        00C6   383 ;       CALLER IS EXECUTED.
                        00C6   384 ;
                        00C6   385 ;       WHEN THE CHANNEL IS ASSIGNED, THE CSR ADDRESS OF THE ASSIGNED
                        00C6   386 ;       CONTROLLER IS RETURNED TO THE CALLER IN REGISTER R4.
                        00C6   387 ;
                        00C6   388 ;       R3 IS PRESERVED ACROSS CALL.
                        00C6   389 ;-
                        00C6   390
                        00C6   391          .ENABL  LSB
                        00C6   392 IOC$REQSCHANH::                              ;REQUEST SECONDARY I/O CHANNEL HIGH PRIORITY
    50    24 A5    D0   00C6   393          MOVL    UCB$L_CRB(R5),R0           ;GET ADDRESS OF PRIMARY CRB
    50    20 A0    D0   00CA   394          MOVL    CRB$L_LINK(R0),R0          ;GET ADDRESS OF SECONDARY CRB
             0E    11   00CE   395          BRB     10$                        ;
                        00D0   396 IOC$REQSCHANL::                              ;REQUEST SECONDARY I/O CHANNEL LOW PRIORITY
    50    24 A5    D0   00D0   397          MOVL    UCB$L_CRB(R5),R0           ;GET ADDRESS OF PRIMARY CRB
    50    20 A0    D0   00D4   398          MOVL    CRB$L_LINK(R0),R0          ;GET ADDRESS OF SECONDARY CRB
             0D    11   00D8   399          BRB     20$                        ;
                        00DA   400 IOC$REQPCHANH::                              ;REQUEST PRIMARY I/O CHANNEL HIGH PRIORITY
    50    24 A5    D0   00DA   401          MOVL    UCB$L_CRB(R5),R0           ;GET ADDRESS OF PRIMARY CRB
    52    50       D0   00DE   402 10$:     MOVL    R0,R2                      ;SET ADDDRESS OF WAIT QUEUE LISTHEAD
             08    11   00E1   403          BRB     30$                        ;
                        00E3   404 IOC$REQPCHANL::                              ;REQUEST PRIMARY I/O CHANNEL LOW PRIORITY
    50    24 A5    D0   00E3   405          MOVL    UCB$L_CRB(R5),R0           ;GET ADDRESS OF PRIMARY CRB
    52    04 A0    D0   00E7   406 20$:     MOVL    CRB$L_WQBL(R0),R2          ;GET ADDRESS OF LAST ENTRY IN QUEUE
    51    2C A0    D0   00EB   407 30$:     MOVL    CRB$L_INTD+VEC$L_IDB(R0),R1 ;GET ADDRESS OF IDB
08 0E A0    00    E2   00EF   408          BBSS    #CRB$V_BSY,CRB$B_MASK(R0),40$ ;IF SET, THEN CHANNEL BUSY
    54    61    D0   00F4   409          MOVL    IDB$L_CSR(R1),R4           ;SET ASSIGNED CHANNEL CSR ADDRESS
    04 A1    55    D0   00F7   410          MOVL    R5,IDB$L_OWNER(R1)         ;SET OWNER UCB ADDRESS
             05    00FB   411          RSB                                ;
    10 A5    53    D0   00FC   412 40$:     MOVL    R3,UCB$L_FR3(R5)           ;SAVE R3 IN FORK BLOCK
       0C A5 8ED0   0100   413          POPL    UCB$L_FPC(R5)              ;SAVE CHANNEL WAIT RETURN ADDRESS
    62    65    0E   0104   414          INSQUE  UCB$L_FQFL(R5),CRB$L_WQFL(R2) ;INSERT DRIVER PROCESS IN CHANNEL WAIT
    04 A1    55    D1   0107   415          CMPL    R5,IDB$L_OWNER(R1)         ;CURRENT DRIVER PROCESS OWNER?
             03    12   010B   416          BNEQ    50$                        ;IF NEQ, BRANCH TO RETURN
          FF73     31   010D   417          BRW     IOC$RELCHAN                ;IF EQL BRW TO RELEASE CHANNELS
                        0110   418 50$:
```

```
 05  0110   419          RSB                             ;
     0111   420          .DSABL  LSB
```

```
-1                                      0111   422          .SBTTL  I/O Request Completion Processing for Class Drivers
                                        0111   423
                                        0111   424 ;+
                                        0111   425 ; IOC$ALTREQCOM - I/O Request Complete Alternate Entry.
                                        0111   426 ;
                                        0111   427 ; This routine is entered when an I/O operation is completed on one
                                        0111   428 ;       one of the devices using the disk or tape class drivers.
                                        0111   429 ;       The packet is inserted in the I/O finish queue for I/O post
                                        0111   430 ;       processing.
                                        0111   431 ;
                                        0111   432 ; INPUTS:
                                        0111   433 ;
                                        0111   434 ;       R0 = First  longword of I/O status
                                        0111   435 ;       R1 = Second longword of I/O status
                                        0111   436 ;       R5 = CDRP address
                                        0111   437 ;
                                        0111   438 ; OUTPUTS:
                                        0111   439 ;
                                        0111   440 ;       The I/O packet is inserted in the I/O Post Processing Queue,
                                        0111   441 ;       a Software interrupt is requested to initiate I/O Post
                                        0111   442 ;       Processing.
                                        0111   443 ;-
                                        0111   444
                                        0111   445 IOC$ALTREQCOM::
                53   A0 A5    9E       0111   446          MOVAB   CDRP$L_IOQFL(R5),R3     ; R3 => IRP section of CDRP. This is
                                        0115   447                                          ;  for compatibility with rest of QIO
                                        0115   448                                          ;  logic.
                55   1C A3    D0       0115   449          MOVL    IRP$L_UCB(R3),R5        ; R5 => UCB.
                     70 A5    D6       0119   450          INCL    UCB$L_OPCNT(R5)         ; Increment operations completed
                                        011C   451
                     15 50    E9       011C   452          BLBC    R0,20$                  ; LBC implies I/O error, so goto call
                                        011F   453                                          ;  MOUNT VERIFICATION just in case.
                                        011F   454 10$:
                38 A3    50    7D       011F   455          MOVQ    R0,IRP$L_MEDIA(R3)      ; Save final I/O status in IRP.
                                        0123   456
                                        0123   457          .IF DF  CA$_MEASURE_IOT
                                        0123   458
;ROW0188         00000000'GF    16       0123    .1          JSB     G^PMS$END_IO            ; Insert end of I/O transaction message
-1                                      0129   460
                                        0129   461          .ENDC
                                        0129   462
                       63    0E       0129   463          INSQUE  (R3),@L^IOC$GL_PSBL     ; Insert packet in POST process queue
                00000000'FF             012B
                                        0130   464          SOFTINT #IPL$_IOPOST            ; Initiate SOFTWARE INTERRUPT
                             05         0133   465          RSB
                                        0134   466 20$:
;ROW0292         00000000'GF    16       0134    .1          JSB     G^EXE$MOUNTVER          ; If LBC, call MOUNT VERIFICATION.
;ACG0399                  E3    11       013A    .2          BRB     10$                     ; Go back to normal flow.
```

```
-3                                      013C   470          .SBTTL  I/O REQUEST COMPLETION PROCESSING
                                        013C   471 ;+
                                        013C   472 ; IOC$REQCOM - I/O REQUEST COMPLETE
                                        013C   473 ;
                                        013C   474 ; THIS ROUTINE IS ENTERED WHEN AN I/O OPERATION IS COMPLETED ON A
                                        013C   475 ; DEVICE UNIT. THE FINAL I/O STATUS IS STORED IN THE ASSOCIATED I/O
                                        013C   476 ; PACKET AND THE PACKET IS INSERTED IN THE I/O FINISH QUEUE FOR
                                        013C   477 ; I/O POST PROCESSING. DEVICE UNIT BUSY IS CLEARED AND AN ATTEMPT
                                        013C   478 ; IS MADE TO START ANOTHER I/O REQUEST ON THE DEVICE UNIT.
                                        013C   479 ;
                                        013C   480 ; IF THE I/O REQUEST COMPLETED WITH AN ERROR, AND THE DEVICE IS
                                        013C   481 ; A DISK, THEN BRANCH TO THE MOUNT VERIFICATION CODE, WHICH WILL
                                        013C   482 ; DETERMINE IF THE SITUATION REQUIRES MOUNT VERIFICATION.
                                        013C   483 ;
                                        013C   484 ; IF MOUNT VERIFICATION IS IN PROGRESS, NO FURTHER I/O REQUESTS WILL
                                        013C   485 ; BE INITIATED.  THIS HAS A SIDE EFFECT OF KEEPING THE 'BSY' BIT IN
                                        013C   486 ; WHATEVER STATE IT IS CURRENTLY IN.  FOR CONVENTIONAL DISK DRIVERS,
                                        013C   487 ; THE BSY BIT WILL BE LEFT ON, WHICH WILL BLOCK $QIO FROM INITIATING
                                        013C   488 ; ANY NEW I/O ON THE DEVICE.  FOR THE DISK CLASS DRIVER, THE BUSY
                                        013C   489 ; BIT WILL BE OFF, WHICH WILL ALLOW $QIO TO INITIATE NEW I/O.
                                        013C   490 ;
                                        013C   491 ; INPUTS:
                                        013C   492 ;
                                        013C   493 ;       R0 = FIRST LONGWORD OF I/O STATUS.
                                        013C   494 ;       R1 = SECOND LONGWORD OF I/O STATUS.
                                        013C   495 ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                                        013C   496 ;
                                        013C   497 ; OUTPUTS:
                                        013C   498 ;
                                        013C   499 ;       THE I/O PACKET IS INSERTED IN THE I/O POST PROCESSING QUEUE
                                        013C   500 ;       AND DEVICE UNIT BUSY IS CLEARED. A SOFTWARE INTERRUPT IS
                                        013C   501 ;       REQUESTED TO INITIATE I/O POST PROCESSING.
                                        013C   502 ;-
                                        013C   503
                                        013C   504          .ENABL  LSB
                                        013C   505 IOC$REQCOM::                            ;I/O DONE PROCESSING
1C 64 A5    02    E5                    013C   506          BBCC    #UCB$V_ERLOGIP,UCB$W_STS(R5),10$ ;IF CLR, ERROR LOG NOT IN PROGRESS
 52    0094 C5    D0                    0141   507          MOVL    UCB$L_EMB(R5),R2         ;GET ADDRESS OF ERROR MESSAGE BUFFER
1A A2    64 A5    B0                    0146   508          MOVW    UCB$W_STS(R5),EMB$W_DV_STS(R2) ;INSERT FINAL DEVICE STATUS
      0080 C5    B0                    014B   509          MOVW    UCB$B_ERTCNT(R5),EMB$B_DV_ERTCNT(R2) ;INSERT FINAL ERROR COUNTERS
        10 A2                          014F
   12 A2    50    7D                    0151   510          MOVQ    R0,EMB$Q_DV_IOSB(R2)     ;INSERT FINAL I/O STATUS
            50    DD                    0155   511          PUSHL   R0                       ;SAVE R0
         FEA6'    30                    0157   512          BSBW    ERL$RELEASEMB            ;RELEASE ERROR MESSAGE BUFFER
            50 8ED0                     015A   513          POPL    R0                       ;RESTORE R0
   53    58 A5    D0                    015D   514 10$:     MOVL    UCB$L_IRP(R5),R3         ;GET ADDRESS OF I/O PACKET
         70 A5    D6                    0161   515          INCL    UCB$L_OPCNT(R5)          ;INCREMENT OPERATIONS COMPLETED
         2A 50    E9                    0164   516          BLBC    R0,DISKCHK               ;IF I/O ERROR, CHECK FOR DISK DEVICE
                                        0167   517 ;
                                        0167   518 ; DO NOT SAVE THE I/O STATUS IN THE IRP UNTIL IT HAS BEEN DECIDED THAT
                                        0167   519 ; MOUNT VERIFICATION IS NOT NECESSARY.  THIS IS TO AVOID OVERWRITING THE
                                        0167   520 ; PHYSICAL DISK ADDRESS STORED IN THE IRP AT OFFSET IRP$L_MEDIA.
                                        0167   521 ;
   38 A3    50    7D                    0167   522 20$:     MOVQ    R0,IRP$L_MEDIA(R3)       ;STORE FINAL I/O STATUS
                                        016B   523
                                        016B   524          .IF DF  CA$_MEASURE_IOT
                                        016B   525
```

```
                00000000'EF   D5  016B   526          TSTL    L^PMS$GL_IOPFMPDB       ;DATA COLLECTION ENABLED?
                        36    12  0171   527          BNEQ    DO_PMS                  ;BRANCH IF YES
                              0173   528
                              0173   529          .ENDC
                              0173   530
                        63    0E  0173   531 PMSEND: INSQUE  (R3),@L^IOC$GL_PSBL     ;INSERT PACKET IN POST PROCESS QUEUE
                00000000'FF       0175
                              017A   532          SOFTINT #IPL$_IOPOST            ;INITIATE SOFTWARE INTERRUPT
                        0E    E0  017D   533          BBS     #UCB$V_MNTVERIP,-       ;BRANCH IF MOUNT VERIFICATION IN PROGRESS
;WMC0002                 2F 64 A5      017F    .1                 UCB$W_STS(R5),MNTVERPNDCHK ;(NOTE THIS LEAVES 'BSY' AS IS)
-1                   53    4C B5  0F  0182   535 NXTIRP: REMQUE  @UCB$L_IOQFL(R5),R3     ;REMOVE I/O PACKET FROM DEVICE UNIT QUEUE
                        4C    1C  0186   536          BVC     IOC$INITIATE            ;IF VC INITIATE NEXT FUNCTION
                   0100 8F    AA  0188   537          BICW    #UCB$M_BSY,UCB$W_STS(R5) ;CLEAR UNIT BUSY
                      64 A5       018C
                              018E   538 RELEASE:                                    ;RELEASE ALL CHANNELS
                      FEF2    31  018E   539          BRW     IOC$RELCHAN             ;
                              0191   540 ;
                              0191   541 ; IF THIS IS A DISK DEVICE, CALL THE MOUNT VERIFICATION ROUTINE
                              0191   542 ; TO DETERMINE IF MOUNT VERIFICATION IS NECESSARY.  IF NOT, CONTROL
                              0191   543 ; WILL RETURN, AND THE REQUEST WILL BE COMPLETED IN THE NORMAL MANNER.
                              0191   544 ;
                              0191   545 DISKCHK:
                         01   91  0191   546          CMPB    #DC$_DISK,-             ;IS THIS DEVICE A DISK?
                      40 A5       0193   547                  UCB$B_DEVCLASS(R5)      ;
                         D0   12  0195   548          BNEQ    20$                     ;BRANCH IF NOT
;WMC0002                 13   E5  0197    .1          BBCC    #UCB$V_MNTVERPND,-      ;CHECK FOR MOUNT VERIFICATION PENDING
;WMC0002              05 64 A5      0199    .2                 UCB$L_STS(R5),30$       ;IF NOT, JUST ENTER MOUNT VERIFICATION
;WMC0002                 0E   E5  019C    .3          BBCC    #UCB$V_MNTVERIP,-       ;CLEAR IN-PROGRESS BIT BEFORE CALL
;WMC0002              00 64 A5      019E    .4                 UCB$L_STS(R5),30$       ; SO IT WILL REALLY START
;WMC0002         00000000'GF   16  01A1    .5 30$:     JSB     G^EXE$MOUNTVER          ;START MOUNT VERIFICATION
;RLRMAPSP                BE   11  01A7    .6          BRB     20$                     ;COMPLETE I/O REQUEST
;RLRMAPSP                         01A9    .7
;RLRMAPSP                         01A9    .8          .IF DF  CA$_MEASURE_IOT
;RLRMAPSP                         01A9    .9
;ROW0188         00000000'GF   16  01A9   .10 DO_PMS: JSB     G^PMS$END_IO            ;INSERT END OF I/O TRANSACTION MESSAGE
;WMC0002                 C2   11  01AF   .11          BRB     PMSEND                  ;REJOIN COMMON CODE
;WMC0002                          01B1   .12
;WMC0002                          01B1   .13          .ENDC
;WMC0002                          01B1   .14 ;
;WMC0002                          01B1   .15 ; THE MOUNT-VERIFICATION-PENDING BIT IS USED TO INDICATE THAT A DISK SHOULD GO
;WMC0002                          01B1   .16 ; INTO MOUNT VERIFICATION AS SOON AS THE CURRENT I/O IS DONE.  THIS IS INTENDED
;WMC0002                          01B1   .17 ; FOR USE IN A CLUSTER TO STALL I/O WHEN QUORUM IS LOST.
;WMC0002                          01B1   .18 ;
;WMC0002                          01B1   .19 MNTVERPNDCHK:
;WMC0002                 13   E5  01B1   .20          BBCC    #UCB$V_MNTVERPND,-      ;CHECK FOR MOUNT VERIFICATION PENDING
;WMC0002              D8 64 A5      01B3   .21                 UCB$L_STS(R5),RELEASE   ;IF NOT, JUST CLEAN UP
;WMC0002                 01   91  01B6   .22          CMPB    #DC$_DISK,-             ;IS THIS DEVICE A DISK?
;WMC0002                 40 A5    01B8   .23                  UCB$B_DEVCLASS(R5)      ;
;WMC0002                 D2   12  01BA   .24          BNEQ    RELEASE                 ;BRANCH IF NOT
;WMC0002                 0E   E5  01BC   .25          BBCC    #UCB$V_MNTVERIP,-       ;CLEAR IN-PROGRESS BIT BEFORE CALL
;WMC0002              00 64 A5      01BE   .26                 UCB$L_STS(R5),40$
;WMC0002                 53   D4  01C1   .27 40$:     CLRL    R3                      ;NO IRP PASSED TO MOUNT VERIFICATION
;WMC0002         00000000'GF   16  01C3   .28          JSB     G^EXE$MOUNTVER          ;TRY TO START MOUNT VERIFICATION
;WMC0002                 B7   11  01C9   .29          BRB     NXTIRP                  ;WASN'T NECESSARY
;WMC0002                          01CB   .30
;WMC0002                          01CB   .31          .DSABL  LSB
```

```
-11                                 01CB    560          .SBTTL  MOUNT VERIFICATION HELPER
                                    01CB    561 ;++
                                    01CB    562 ; IOC$MNTVER    - Assist driver with mount verification.
                                    01CB    563 ;
                                    01CB    564 ; This routine is called by EXE$MOUNTVER to perform some driver-specific
                                    01CB    565 ; actions necessary for mount verification.  This routine is used by non-
                                    01CB    566 ; CLASS drivers, and is called by default if EXE$MOUNTVER finds the address
                                    01CB    567 ; of IOC$RETURN in DDT$L_MNTVER.
                                    01CB    568 ;
                                    01CB    569 ; Inputs:
                                    01CB    570 ;
                                    01CB    571 ;       R3      = IRP address or 0
                                    01CB    572 ;       R5      = UCB address
                                    01CB    573 ;
                                    01CB    574 ; Outputs:
                                    01CB    575 ;
                                    01CB    576 ;       None.
                                    01CB    577 ;
                                    01CB    578 ; Side effects:
                                    01CB    579 ;
                                    01CB    580 ;       If R3 contains an IRP address, the IRP will be queued to the
                                    01CB    581 ;       head of the UCB's IRP work queue.  If R3 contains is zero, then
                                    01CB    582 ;       remove the IRP from the head of the UCB's work queue and attempt
                                    01CB    583 ;       to initiate the I/O.
                                    01CB    584 ;--
                                    01CB    585
                                    01CB    586 IOC$MNTVER::                        ;Driver-specific mount verification code
                          53    D5  01CB    587          TSTL    R3                 ;Check IRP address
                          B3    13  01CD    588          BEQL    NXTIRP             ;Branch if none
                          63    0E  01CF    589          INSQUE  IRP$L_IOQFL(R3),-  ;Requeue the IRP
                        4C A5       01D1    590                  UCB$L_IOQFL(R5)    ;
                              05    01D3    591          RSB                        ;Return
```

```
-1                                      01D4    593          .SBTTL  INITIATE I/O FUNCTION ON DEVICE
                                        01D4    594 ;+
                                        01D4    595 ; IOC$INITIATE - INITIATE NEXT FUNCTION ON DEVICE
                                        01D4    596 ;
                                        01D4    597 ; THIS ROUTINE IS CALLED TO INITIATE THE NEXT FUNCTION ON A DEVICE BY CLEARING
                                        01D4    598 ; STATUS BITS, SETTING THE OPERATION START TIME IF A DIAGNOSTIC BUFFER IS
                                        01D4    599 ; SPECIFIED, AND CALLING THE DRIVER AT ITS START I/O ENTRY POINT.
                                        01D4    600 ;
                                        01D4    601 ; INPUTS:
                                        01D4    602 ;
                                        01D4    603 ;       R3 = ADDRESS OF I/O REQUEST PACKET.
                                        01D4    604 ;       R5 = DEVICE UNIT UCB ADDRESS.
                                        01D4    605 ;
                                        01D4    606 ; OUTPUTS:
                                        01D4    607 ;
                                        01D4    608 ;       CANCEL I/O, POWERFAIL, AND TIME OUT STATUS BITS ARE CLEARED, THE
                                        01D4    609 ;       CURRENT SYSTEM TIME IS FILLED INTO THE INTERNAL DIAGNOSTIC BUFFER
                                        01D4    610 ;       IF ONE IS SPECIFIED, AND THE DRIVER IS CALLED AT ITS START I/O ENTRY
                                        01D4    611 ;       POINT.
                                        01D4    612 ;-
                                        01D4    613
                                        01D4    614 IOC$INITIATE::                              ;INITIATE I/O FUNCTION
                58 A5    53    D0      01D4    615          MOVL    R3,UCB$L_IRP(R5)           ;SAVE I/O PACKET ADDRESS
                                        01D8    616
                                        01D8    617          .IF DF  CA$_MEASURE_IOT
                                        01D8    618
;ROW0188          00000000'GF    16      01D8     .1          JSB     G^PMS$START_IO             ;INSERT START OF I/O TRANSACTION MESSAGE
-1                                      01DE    620
                                        01DE    621          .ENDC
                                        01DE    622
             78 A5    2C A3    7D      01DE    623          MOVQ    IRP$L_SVAPTE(R3),UCB$L_SVAPTE(R5) ;COPY TRANSFER PARAMETERS
                   0048 8F    AA      01E3    624          BICW    #UCB$M_CANCEL!UCB$M_TIMOUT,UCB$W_STS(R5) ;CLEAR CANCEL AND TIME OUT
                      64 A5            01E7
             0B 2A A3    07    E1      01E9    625          BBC     #IRP$V_DIAGBUF,IRP$W_STS(R3),10$ ;IF CLR, NO DIAGNOSTIC BUFFER
                50    4C B3    D0      01EE    626          MOVL    @IRP$L_DIAGBUF(R3),R0      ;GET ADDRESS OF DIAGNOSTIC BUFFER DATA AREA
                00000000'EF    7D      01F2    627          MOVQ    EXE$GQ_SYSTIME,(R0)        ;INSERT I/O OPERATION START TIME
                         60            01F8
              50    0088 C5    D0      01F9    628 10$:     MOVL    UCB$L_DDT(R5),R0           ;GET ADDRESS OF DRIVER DISPATCH TABLE
                      00 B0    17      01FE    629          JMP     @DDT$L_START(R0)           ;START I/O OPERATION
```

```
-1                                      0201    631          .SBTTL  Allocate Buffered Data Path
                                        0201    632 ;+
                                        0201    633 ; ALLOCATE BUFFERED DATA PATH CODE -
                                        0201    634 ;
                                        0201    635 ; IOC$REQDATAP - Entrypoint (called from traditional drivers) where caller
                                        0201    636 ;       wishes to be queued (using UCB fork block) if no buffered data path
                                        0201    637 ;       is available at the time of the call.
                                        0201    638 ; INPUT:
                                        0201    639 ;               R5 => UCB.
                                        0201    640 ;
                                        0201    641 ; IOC$REQDATAPNW - Entrypoint to call when caller does not want to wait for
                                        0201    642 ;       unavailable data path.
                                        0201    643 ; INPUT:
                                        0201    644 ;               R5 => UCB
                                        0201    645 ;
                                        0201    646 ; IOC$REQDATAPUDA - Entrypoint (called from UDA port driver) where CDRP
                                        0201    647 ;       is used as the source of information about the request and where
                                        0201    648 ;       the caller does not want to wait for unavailable datapath.
                                        0201    649 ;
                                        0201    650 ; INPUT:
;RLRPDTADP                              0201     .1 ;               R4 => PDT
                                        0201    651 ;               R5 => CDRP
                                        0201    652 ;-
                                        0201    653
                                        0201    654 IOC$REQDATAP::
                        10   10         0201    655          BSBB    IOC$REQDATAPNW          ; Try to alloc. and get control after.
                    0C  50   E8         0203    656          BLBS    R0,10$                  ; LBS implies allocation success.
                                        0206    657
                10  A5   53   7D       0206    658          MOVQ    R3,UCB$L_FR3(R5)        ; Save driver context in UCB fork block.
                    0C  A5 8ED0         020A    659          POPL    UCB$L_FPC(R5)           ; Save caller's return point.
                        65   0E         020E    660          INSQUE  UCB$L_FQFL(R5),-        ; Queue fork block to resource wait queue.
                    18  B1             0210    661                  @ADP$L_DPQBL(R1)        ;  Assumes IOC$ALODATAP saves R1=>ADP.
                        05             0212    662 10$:     RSB                             ; Return to caller or caller's caller.
                                        0213    663
                                        0213    664 IOC$REQDATAPNW::
                50   24  A5   D0       0213    665          MOVL    UCB$L_CRB(R5),R0                ; R0=>CRB.
                51   38  A0   D0       0217    666          MOVL    CRB$L_INTD+VEC$L_ADP(R0),R1     ; R1=>ADP (pass to IOC$ALODATAP)
                52   34  A0   9E       021B    667          MOVAB   CRB$L_INTD+VEC$W_MAPREG(R0),R2  ; R2=>UBMD   "    "       "
                                        021F    668
                        40   11         021F    669          BRB     IOC$ALODATAP            ; NOWAIT, RSB from IOC$ALODATAP
                                        0221    670                                          ;  returns to our caller.
                                        0221    671 IOC$REQDATAPUDA::
;RLRPDTADP      51   00E0  C4   D0       0221     .1          MOVL    PDT$L_ADP(R4),R1        ; R1=>ADP (pass to IOC$ALODATAP)
;RLRPDTADP        52   3C  A5   9E       0226     .2          MOVAB   CDRP$L_UBARSRCE(R5),R2  ; R2=>UBMD   "    "       "
;RLRPDTADP                              022A     .3
;RLRBYTEOFF              35   10         022A     .4          BSBB    IOC$ALODATAP            ; Call to allocate a data path.
;RLRBYTEOFF          2D  50   E8         022C     .5          BLBS    R0,20$                  ; LBS means we got one.
;RLRBYTEOFF        29  D0  A5   E9       022F     .6          BLBC    CDRP$W_BOFF(R5),20$     ; LBC means, user buffer is on an
;RLRBYTEOFF                             0233     .7                                          ;  even byte address so we can use
;RLRBYTEOFF                             0233     .8                                          ;  the Direct Data Path.
;RLRBYTEOFF                             0233     .9
;RLRBYTEOFF                             0233    .10 ; Here we have a transfer to a user buffer located at an odd byte address.
;RLRBYTEOFF                             0233    .11 ; On those processors which support Byte Offset on the Direct Datapath, we
;RLRBYTEOFF                             0233    .12 ; can continue processing.  On other processors, we must wait for a buffered
;RLRBYTEOFF                             0233    .13 ; datapath.
;RLRBYTEOFF                             0233    .14
;KPL0001                                0233    .15          CPUDISP <<780,10$>,-            ; On 11-780 we wait.
```

```
;KPL0001                          0233   .16                  <750,20$>,-             ; On 11-750 we continue.
;KPL0001                          0233   .17                  <730,20$>,-             ; On 11-730 we continue.
;KPL0001                          0233   .18                  <790,10$>,-             ; On 11-790 we wait.
;KPL0001                          0233   .19                  <8SS,10$>,-             ; On SCORPIO we wait.
;KPL0001                          0233   .20                  <8NN,10$>,-             ; On NAUTILUS we wait.
;KPL0001                          0233   .21                  <UV1,30$>>              ; On MicroVAX we bugcheck.
;KPL0001                          024D   .22
;KPL0001          10 A5   53  7D  024D   .23 10$:   MOVQ      R3,CDRP$L_FR3(R5)       ; Save driver context in CDRP fork block.
;RLRBYTEOFF          0C A5 8ED0  0251   .24         POPL      CDRP$L_FPC(R5)          ; Save caller's return point.
;RLRBYTEOFF          28 B5   B6  0255   .25         INCW      @CDRP$L_RWCPTR(R5)      ; Increment RWAITCNT.
;RLRBYTEOFF             65   0E  0258   .26         INSQUE    CDRP$L_FQFL(R5),-       ; Queue fork block to resource wait queue.
;RLRBYTEOFF          18 B1       025A   .27                   @ADP$L_DPQBL(R1)        ;  Assumes IOC$ALODATAP saves R1=>ADP.
;RLRBYTEOFF                      025C   .28 20$:
;RLRBYTEOFF                05    025C   .29         RSB                               ; Return to caller or caller's caller.
;RLRBYTEOFF                      025D   .30
;KDM0084                         025D   .31 30$:   BUG_CHECK       IVBYTEALGN,FATAL
```

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```
                                0261    681 ; IOC$ALODATAP - Common subroutine called by above routines to allocate
                                0261    682 ;       a UNIBUS buffered datapath.
                                0261    683 ;
                                0261    684 ; INPUTS:
                                0261    685 ;       R1 => ADP wherein the datapath allocation bit map is stored.
                                0261    686 ;       R2 => UBA mapping descriptor in user's data structure.
                                0261    687 ;
                                0261    688 ; OUTPUTS:
                                0261    689 ;       R0 LBS - implies allocation success
                                0261    690 ;                datapath field in R2 => UBA mapping descriptor is set to the
                                0261    691 ;                       number of the datapath allocated.
                                0261    692 ;                appropriate bit in datapath allocation bit map is cleared.
                                0261    693 ;       R0 LBC - implies allocation failure.
                                0261    694 ;
                                0261    695
                                0261    696 IOC$ALODATAP:
                          07    E0  0261    697         BBS     #VEC$V_PATHLOCK,-       ; If this user has a permanently allocated
                    17 03 A2        0263    698                 UBMD$B_DATAPATH(R2),10$ ;  datapath, branch around to success.
                                0266    699
                                0266    700         ASSUME  ADP$C_NUMDATAP  EQ  16
                          00    EA  0266    701         FFS     #0,-                    ; Find first available datapath,
                          10        0268    702                 #ADP$C_NUMDATAP,-       ;  according to bit map.  Note failure
                       60 A1        0269    703                 ADP$W_DPBITMAP(R1),-    ;  leaves R0 with the value "16", an
                          50        026B    704                 R0                      ;  even number with the low bit clear.
                          12    13  026C    705         BEQL    20$                     ; EQL implies failure.
                                026E    706
                          50    F0  026E    707         INSV    R0,-                    ; Upon success, R0 has number of the
                                0270    708                 #VEC$V_DATAPATH,-       ;  available datapath to allocate.
                    05    00        0270    709                 #VEC$S_DATAPATH,-       ;  So we update the user's datapath
                      03 A2         0272    710                 UBMD$B_DATAPATH(R2)     ;  descriptor pointed at by R2.
                                0274    711
          04 60 A1    50    E4  0274    712         BBSC    R0,ADP$W_DPBITMAP(R1),10$; And we update the bit map.
                                0279    713         BUG_CHECK INCONSTATE            ; We shouldn't be here obviously.
                                027D    714
                    50    01    D0  027D    715 10$:    MOVL    S^#SS$_NORMAL,R0        ; Indicate allocation success.
                                05  0280    716 20$:    RSB                             ; And we return to our caller.
```

```
-1                                      0281   718          .SBTTL  Release Buffered Data Path
                                        0281   719 ;+
                                        0281   720 ; RELEASE BUFFERED DATA PATH CODE -
                                        0281   721 ;
                                        0281   722 ; IOC$RELDATAPUDA - Entry point called from UDA port driver in response
                                        0281   723 ;       to an UNMAP call.  Here the data as to the buffered data path
                                        0281   724 ;       is in the CDRP.
                                        0281   725 ;
                                        0281   726 ; INPUTS:
;RLRPDTADP                              0281    .1 ;       R4 => PDT
                                        0281   727 ;       R5 => CDRP
                                        0281   728 ;
                                        0281   729 ; IOC$RELDATAP - Entry point called from traditional drivers to release
                                        0281   730 ;       the buffered datapath described in CRB$L_INTD+VEC$B_DATAPATH.
                                        0281   731 ;
                                        0281   732 ; INPUTS:
                                        0281   733 ;       R5 => UCB
                                        0281   734 ;
                                        0281   735 ; OUTPUTS:
                                        0281   736 ;       Datapath re-allocated (if any waiters). R0, R1, and R2 modified.
                                        0281   737 ; NOTE: Since calls to IOC$REQDATAPUDA are NOWAIT, fork blocks dequeued
                                        0281   738 ;       here from ADP$L_DPQFL are guaranteed to be UCB's.
                                        0281   739 ;
                                        0281   740
                                        0281   741 IOC$RELDATAPUDA::
;RLRPDTADP          51    00E0 C4   D0  0281    .1          MOVL    PDT$L_ADP(R4),R1        ; R1 => ADP.
;RLRPDTADP            52    3C A5   9E  0286    .2          MOVAB   CDRP$L_UBARSRCE(R5),R2  ; R2 => UBMD.
;RLRPDTADP                   0C     11  028A    .3          BRB     RELDATAP_COMMON
;RLRPDTADP                               028C    .4 IOC$RELDATAP::
;RLRPDTADP            50     24 A5   D0  028C    .5          MOVL    UCB$L_CRB(R5),R0                ; R0 => CRB.
;RLRPDTADP            52     34 A0   9E  0290    .6          MOVAB   CRB$L_INTD+VEC$W_MAPREG(R0),R2  ; R2 => UBMD.
;RLRPDTADP            51     38 A0   D0  0294    .7          MOVL    CRB$L_INTD+VEC$L_ADP(R0),R1     ; R1 => ADP.
;RLRPDTADP                               0298    .8 RELDATAP_COMMON:
-9                   50     03 A2   98  0298   751          CVTBL   UBMD$B_DATAPATH(R2),R0          ; Get datapath designator.
                              36     15  029C   752          BLEQ    10$                             ; If LSS permanent assignment.
                                        029E   753                                                  ; If EQL we had NO datapath to
                                        029E   754                                                  ;  release.
                              00     F0  029E   755          INSV    #0,-                            ; Zero datapath number.
                        05    00         02A0   756                  #VEC$V_DATAPATH,#VEC$S_DATAPATH,-
                          03  A2         02A2   757                  UBMD$B_DATAPATH(R2)
;RLRBYTEOFF                   00     EF  02A4    .1          EXTZV   #VEC$V_DATAPATH,-       ; Extract datapath number.
;RLRBYTEOFF          52   50    05         02A6    .2                  #VEC$S_DATAPATH,R0,R2   ;
;RLRBYTEOFF            50   14 B1   0F     02A9    .3          REMQUE  @ADP$L_DPQFL(R1),R0     ; R0 => next driver fork block
;RLRBYTEOFF                   26     1D  02AD    .4          BVS     20$                     ; If VS no driver process waiting
;RLRBYTEOFF                               02AF    .5
;RLRBYTEOFF              7E   53     7D  02AF    .6          MOVQ    R3,-(SP)                ; Save R3, R4, R5
;RLRBYTEOFF                   55     DD  02B2    .7          PUSHL   R5
;RLRBYTEOFF              55   50     D0  02B4    .8          MOVL    R0,R5                   ; R5 => driver fork block.
;RLRBYTEOFF                   10     91  02B7    .9          CMPB    #DYN$C_UCB,-            ; See if we dequeued a UCB or a CDRP.
;RLRBYTEOFF                0A A5         02B9   .10                  UCB$B_TYPE(R5)
;RLRBYTEOFF                   22     12  02BB   .11          BNEQ    30$                     ; NEQ implies a CDRP.
;RLRBYTEOFF                               02BD   .12
;RLRBYTEOFF                               02BD   .13 ; Here we have R5 => UCB.
;RLRBYTEOFF                               02BD   .14
;RLRBYTEOFF          51     24 A5   D0  02BD   .15          MOVL    UCB$L_CRB(R5),R1        ; R1 => CRB.
;RLRBYTEOFF                               02C1   .16
;RLRBYTEOFF                   52     F0  02C1   .17          INSV    R2,-                    ; Store assigned datapath #
```

```
;RLRBYTEOFF                              02C3    .18                     #VEC$V_DATAPATH,-       ;  in CRB.
;RLRBYTEOFF                        05    00      02C3    .19             #VEC$S_DATAPATH,-
;RLRBYTEOFF                          37  A1      02C5    .20             CRB$L_INTD+VEC$B_DATAPATH(R1)
;RLRBYTEOFF                                      02C7    .21
;RLRBYTEOFF                  53    10  A5  7D    02C7    .22     MOVQ    UCB$L_FR3(R5),R3        ; Restore driver context.
;RLRBYTEOFF                        0C  B5  16    02CB    .23     JSB     @UCB$L_FPC(R5)          ; Call back waiting driver.
;RLRBYTEOFF                                      02CE    .24 5$:
;RLRBYTEOFF                            55 8ED0   02CE    .25     POPL    R5                      ; Restore deallocator's R5,R4,R3
;RLRBYTEOFF                  53        8E  7D    02D1    .26     MOVQ    (SP)+,R3                ;
;RLRBYTEOFF                                05    02D4    .27 10$:RSB                             ; Return to deallocator.
;RLRBYTEOFF            FA 60 A1        52  E3    02D5    .28 20$:BBCS    R2,-
;RLRBYTEOFF                                      02DA    .29             ADP$W_DPBITMAP(R1),10$  ; Set datapath bit and exit
;RLRBYTEOFF                                      02DA    .30     BUG_CHECK INCONSTATE            ; Inconsistent state.
;RLRBYTEOFF                                05    02DE    .31     RSB                             ;
;RLRBYTEOFF                                      02DF    .32
;RLRBYTEOFF                                      02DF    .33 ; Here we have R5 => CDRP.
;RLRBYTEOFF                                      02DF    .34
;RLRBYTEOFF                                      02DF    .35 30$:
;RLRBYTEOFF                            52    F0  02DF    .36     INSV    R2,-                    ; Store assigned datapath #
;RLRBYTEOFF                                      02E1    .37             #VEC$V_DATAPATH,-       ;  in CDRP field.
;RLRBYTEOFF                        05    00      02E1    .38             #VEC$S_DATAPATH,-
;RLRBYTEOFF                          3F  A5      02E3    .39             CDRP$L_UBARSRCE+UBMD$B_DATAPATH(R5)
;RLRBYTEOFF                                      02E5    .40
;RLRBYTEOFF      00000000'EF             16      02E5    .41     JSB     SCS$RESUMEWAITR         ; Resume waiting thread and any backed
;RLRBYTEOFF                                      02EB    .42                                     ;  up IRP's.
;RLRBYTEOFF                            E1    11  02EB    .43     BRB     5$                      ; Branch back to resume deallocator's
;RLRBYTEOFF                                      02ED    .44                                     ;  thread.
```

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```
                        02ED    778          .SBTTL  REQUEST AND ALLOCATE UNIBUS MAP REGISTERS FOR CLASS DRIVER
                        02ED    779 ;+
                        02ED    780 ; IOC$REQMAPUDA - REQUEST AND ALLOCATE UNIBUS MAP REGISTERS FOR CLASS DRIVER
                        02ED    781 ;
                        02ED    782 ; THIS ROUTINE IS CALLED TO ALLOCATE UBA MAP REGISTERS AND TO MARK THE ALLOCATION
                        02ED    783 ; IN THE UBA MAP REGISTER ALLOCATION DATA STRUCTURES.
                        02ED    784 ;
                        02ED    785 ; INPUTS:
                        02ED    786 ;
                        02ED    787 ;       R4 = ADDRESS OF PORT DESCRIPTOR TABLE.
                        02ED    788 ;       R5 = ADDRESS OF CLASS DRIVER REQUEST PACKET (CDRP).
                        02ED    789 ;
                        02ED    790 ; OUTPUTS:
                        02ED    791 ;
                        02ED    792 ;       IF MAP REGISTERS ARE ALLOCATED FOR THE CDRP, THE APPROPRIATE FIELDS
                        02ED    793 ;       IN THE CDRP ARE MODIFIED TO INDICATE WHICH REGISTERS, AND THE NUMBER
                        02ED    794 ;       OF REGISTERS THAT HAVE BEEN ALLOCATED.  ALSO THE ALLOCATION DATA
                        02ED    795 ;       STRUCTURE IN THE ADP IS MODIFIED.
                        02ED    796 ;
                        02ED    797 ;       IF MAP REGISTERS CANNOT BE ALLOCATED AT THIS TIME, THE CDRP IS
                        02ED    798 ;       QUEUED ONTO THE RESOURCE WAIT LIST AND THE UCB$W_RWAITCNT IS
                        02ED    799 ;       INCREMENTED.
                        02ED    800 ;
                        02ED    801 ;-
                        02ED    802
                        02ED    803 IOC$REQMAPUDA::
                  25 10 02ED    804          BSBB    IOC$ALOMAPUDA                  ; Allocate UBA map registers for class drive
                        02EF    805                                                 ; Call to allocate map registers if availabl
                        02EF    806                                                 ;  Returns R2 => ADP.
                        02EF    807 ; If here, low bit of R0 tells us whether we were successful in the allocation
                        02EF    808 ;       attempt.
                        02EF    809
               0F 50    E8 02EF    810          BLBS    R0,10$                      ; Branch around if successful.
            10 A5 53    7D 02F2    811          MOVQ    R3,CDRP$L_FR3(R5)           ; Save driver process context
               28 B5    B6 02F6    812          INCW    @CDRP$L_RWCPTR(R5)          ; One more CDRP, on this UCB, awaiting
                        02F9    813                                                 ;  resources.
            0C A5 8ED0  02F9    814          POPL    CDRP$L_FPC(R5)              ; Save map register wait return address
                  65    0E 02FD    815          INSQUE  CDRP$L_FQFL(R5),-
               34 B2          02FF    816                  @ADP$L_MRQBL(R2)       ; Insert process in map register wait queue
                     05 0301    817 10$:     RSB                                 ;
```

```
;ACG0399                        0302    .2          .SBTTL  REQUEST UNIBUS MAP REGISTERS
;ACG0399                        0302    .3 ;+
;ACG0399                        0302    .4 ; IOC$REQMAPREG - REQUEST UNIBUS MAP REGISTERS
-5                              0302   823 ;
                                0302   824 ; THIS ROUTINE IS CALLED TO REQUEST UNIBUS MAP REGISTERS TO PERFORM AN
                                0302   825 ; I/O TRANSFER.
                                0302   826 ;
                                0302   827 ; INPUTS:
                                0302   828 ;
-1                              0302   830 ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                                0302   831 ;       04(SP) = RETURN ADDRESS OF CALLER'S CALLER.
                                0302   832 ;
                                0302   833 ;       IT IS ASSUMED THAT THE CALLER OWNS THE I/O CHANNEL ON WHICH THE
                                0302   834 ;       TRANSFER IS TO OCCUR ON.
                                0302   835 ;
                                0302   836 ; OUTPUTS:
                                0302   837 ;
                                0302   838 ;       IF MAP REGISTERS HAVE BEEN PERMANENTLY ASSIGNED TO THE ASSOCIATED
                                0302   839 ;       I/O CHANNEL, THEN CONTROL IS IMMEDIATELY RETURNED TO THE CALLER.
                                0302   840 ;       ELSE AN ATTEMPT IS MADE TO ALLOCATE THE REQUESTED NUMBER OF MAP REG-
                                0302   841 ;       ISTERS. IF SUFFICIENT CONTIGUOUS MAP REGISTERS ARE FOUND, THEN THEY
                                0302   842 ;       ARE ASSIGNED TO THE ASSOCIATED I/O CHANNEL AND CONTROL IS RETURNED
                                0302   843 ;       TO THE CALLER. ELSE THE DRIVER PROCESS CONTEXT IS SAVED IN ITS FORK
                                0302   844 ;       BLOCK, THE FORK BLOCK IS INSERTED IN THE MAP REGISTER WAIT QUEUE,
                                0302   845 ;       AND A RETURN TO THE DRIVER PROCESS' CALLER IS EXECUTED.
                                0302   846 ;-
                                0302   847
;KTA3018                        0302    .1 IOC$REQMAPREG::                          ;REQUEST UNIBUS MAP REGISTERS
;KTA3018                 3A  10 0302    .2          BSBB    IOC$ALOUBAMAP           ; ALLOCATE UBA MAP REGISTER
;KTA3018              0C 50  E8 0304    .3          BLBS    R0,10$                  ;IF LBS SUCCESSFUL ALLOCATION
;KTA3018           10 A5  53  7D 0307    .4          MOVQ    R3,UCB$L_FR3(R5)        ;SAVE DRIVER PROCESS CONTEXT
;KTA3018              0C A5 8ED0 030B    .5          POPL    UCB$L_FPC(R5)           ;SAVE MAP REGISTER WAIT RETURN ADDRESS
;KTA3018           34 B2  65  0E 030F    .6          INSQUE  UCB$L_FQFL(R5),@ADP$L_MRQBL(R2) ;INSERT PROCESS IN MAP REGISTER WAIT
;KTA3018                  05  0313    .7 10$:     RSB                             ;
```

```
-14                                     0314   862          .SBTTL  ALLOCATE UNIBUS MAP REGISTERS
                                        0314   863 ;+
                                        0314   864 ; IOC$ALOUBAMAP - ALLOCATE UBA MAP REGISTERS (CRB DATABASE SPECIFIED)
                                        0314   865 ; IOC$ALOUBAMAPN - ALLOCATE UBA MAP REGISTERS (ARGUMENT SPECIFIED)
                                        0314   866 ; IOC$ALOMAPUDA - ALLOCATE UBA MAP REGISTERS (FOR CLASS DRIVER(S))
                                        0314   867 ;
                                        0314   868 ; This routine is called to allocate uba map registers and to mark the allocation
                                        0314   869 ;       in the map register allocation structure located in the ADP.  The state
                                        0314   870 ;       of the UNIBUS map registers is maintained in a set of descriptors
                                        0314   871 ;       that describe contiguous extents of allocatable (i.e. free) map
                                        0314   872 ;       registers.  A map register descriptor consists of the
                                        0314   873 ;       corresponding elements of two distinct arrays (of one word items)
                                        0314   874 ;       located in the ADP.  These arrays, ADP$W_MRNREGARY and ADP$W_MRFREGARY,
                                        0314   875 ;       contain the number of map registers and the first map register in each
                                        0314   876 ;       contiguous extent of free map registers.  These arrays are each
                                        0314   877 ;       preceeded by a one word field containing all 1's (-1) so that compares
                                        0314   878 ;       made against the "previous" descriptor fail when the current desciptor
                                        0314   879 ;       is the one whose index is zero.
                                        0314   880 ;
                                        0314   881 ;       ADP$L_MRACTMDRS maintains the number of active descriptors, i.e. the
                                        0314   882 ;       number of elements of each array which contain valid data.
                                        0314   883 ;
                                        0314   884 ; INPUTS: (FOR IOC$ALOUBAMAP AND ALOUBAMAPN)
                                        0314   885 ;       R3 = NUMBER OF MAP REGISTERS TO ALLOCATE (IOC$ALOUBAMAPN only).
                                        0314   886 ;       R5 = DEVICE UNIT UCB ADDRESS.
                                        0314   887 ;
                                        0314   888 ; INPUT:  (FOR IOC$ALOMAPUDA)
;RLRPDTADP                              0314    .1 ;       R4 => PDT
                                        0314   889 ;       R5 => CDRP
                                        0314   890 ;
                                        0314   891 ; OUTPUTS:
                                        0314   892 ;       R0 = SUCCESS INDICATION.
                                        0314   893 ;       R2 => ADP
                                        0314   894 ;-
                                        0314   895          .enabl  lsb
                                        0314   896 IOC$ALOMAPUDA:
                7E    53    7D          0314   897          MOVQ    R3,-(SP)                ; Save R3,R4,R5
                      55    DD          0317   898          PUSHL   R5                      ;
                                        0319   899
;RLRPDTADP         52    00E0 C4    D0  0319    .1          MOVL    PDT$L_ADP(R4),R2        ; R2 => ADP before we modify R4.
;RLRPDTADP                               031E    .2
;RLRPDTADP            53    D2 A5    D0  031E    .3          MOVL    CDRP$L_BCNT(R5),R3      ; Get transfer byte count
;RLRPDTADP            54    D0 A5    3C  0322    .4          MOVZWL  CDRP$W_BOFF(R5),R4      ; Get byte offset in page
;RLRPDTADP       53    03FF C344    9E  0326    .5          MOVAB   ^X3FF(R3)[R4],R3        ; Calculate highest relative byte and round
;RLRPDTADP            53    F7 8F    78  032C    .6          ASHL    #-9,R3,R3               ; Calculate number of map registers required
                           53          0330
-8                                      0331   908
                51    3C A5    9E  0331   909          MOVAB   CDRP$L_UBARSRCE(R5),R1  ; R1 => UBMD.
                           2F    11  0335   910          BRB     COMMON_ALOUBAMAP        ; Branch to common code.
                                        0337   911
                                        0337   912 IOC$ALOUBAMAPN::                      ;ALLOCATE UBA MAP REGISTERS ARGUMENT SPECIFI
                7E    53    7D  0337   913          MOVQ    R3,-(SP)                ; Save R3,R4,R5
                      55    DD  033A   914          PUSHL   R5                      ;
                      18    11  033C   915          BRB     5$                      ;
                                033E   916
                                033E   917 IOC$ALOUBAMAP::                       ;ALLOCATE UBA MAP REGISTERS CRB SPECIFIED
                7E    53    7D  033E   918          MOVQ    R3,-(SP)                ; Save R3,R4,R5
```

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                55   DD  0341   919          PUSHL   R5                              ;
                                  0343   920
            53   7E A5   3C  0343   921          MOVZWL  UCB$W_BCNT(R5),R3           ;GET TRANSFER BYTE COUNT
            54   7C A5   3C  0347   922          MOVZWL  UCB$W_BOFF(R5),R4           ;GET BYTE OFFSET IN PAGE
        53   03FF C344   9E  034B   923          MOVAB   ^X3FF(R3)[R4],R3            ;CALCULATE HIGHEST RELATIVE BYTE AND ROUND
            53   F7 8F   78  0351   924          ASHL    #-9,R3,R3                   ;CALCULATE NUMBER OF MAP REGISTERS REQUIRED
                53           0355
                                  0356   925 5$:
            51   24 A5   D0  0356   926          MOVL    UCB$L_CRB(R5),R1                    ; R1 => CRB.
            52   38 A1   D0  035A   927          MOVL    CRB$L_INTD+VEC$L_ADP(R1),R2         ; R2 => ADP.
            51   34 A1   9E  035E   928          MOVAB   CRB$L_INTD+VEC$W_MAPREG(R1),R1      ; R1 => UBMD.
                    0F   E0  0362   929          BBS     #VEC$V_MAPLOCK,-                    ; If SET, already permanently
                38 61        0364   930                  UBMD$W_MAPREG(R1),40$               ;  allocated, so branch around.
                                  0366   931
                                  0366   932 ; Here:
                                  0366   933 ;       R1 => UBMD - caller's structure where we record registers allocated
                                  0366   934 ;       R2 => ADP
                                  0366   935 ;       R3 =  number of map registers to allocate
                                  0366   936 ;
                                  0366   937
                                  0366   938 COMMON_ALOUBAMAP:
;RLR0001            5C A2   D5  0366    .1          TSTL    ADP$L_MRACTMDRS(R2)         ; Test for zero active descriptors.
;RLR0001                13   13  0369    .2          BEQL    15$                         ; EQL implies no registers available.
                        53   D6  036B   939          INCL    R3                          ; Round up request to next multiple
                    53   01   8A  036D   940          BICB    #1,R3                       ;  of 2.
                        55   D4  0370   941          CLRL    R5                          ; Establish loop variable.
                                  0372   942 10$:
                64 A245     53   B1  0372   943          CMPW    R3,ADP$W_MRNREGARY(R2)[R5]  ; See if enough regs described here.
                        09   15  0377   944          BLEQ    20$                         ; LEQ implies YES.
                                  0379   945
                F4 55   5C A2   F2  0379   946          AOBLSS  ADP$L_MRACTMDRS(R2),R5,10$  ; Else branch back and continue
                                  037E    .1 15$:
;RLR0001                 50   D4  037E   947          CLRL    R0                          ; If here, allocation failure.
                        1F   11  0380   948          BRB     50$                         ; Branch around to return.
                                  0382   949 20$:
            61   015E C245   B0  0382   950          MOVW    ADP$W_MRFREGARY(R2)[R5],-   ; Allocate from low end of extent
                                  0388   951                  UBMD$W_MAPREG(R1)           ;  by copying 1st map reg. #.
                02 A1   53   90  0388   952          MOVB    R3,UBMD$B_NUMREG(R1)        ; Set # of map regs allocated.
                64 A245     53   A2  038C   953          SUBW    R3,ADP$W_MRNREGARY(R2)[R5]  ; Subtract out # regs allocated.
                        05   12  0391   954          BNEQ    30$                         ; NEQ implies extent not empty,
                                  0393   955                                              ;   branch around deallocate.
                    0129     30  0393   956          BSBW    DEALLOC_DESCRIP             ; Call to deallocate descriptor.
                        06   11  0396   957          BRB     40$                         ;  And branch back to return.
                                  0398   958 30$:
            015E C245   53   A0  0398   959          ADDW    R3,ADP$W_MRFREGARY(R2)[R5]  ; Bump descriptor past
                                  039E   960                                              ;  allocated registers.
                50   01   D0  039E   961 40$:   MOVL    S^#SS$_NORMAL,R0        ; Indicate success.
                    55 8ED0  03A1   962 50$:   POPL    R5                      ; Restore R5,R4,R3
                53   8E   7D  03A4   963          MOVQ    (SP)+,R3                ;
                        05   03A7   964          RSB
                             03A8   965          .dsabl  lsb
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-1                                      03A8   967          .SBTTL  Allocate a specific set of UNIBUS Map Registers
                                        03A8   968 ;+
                                        03A8   969 ; IOC$ALOUBAMAPSP
                                        03A8   970 ;
                                        03A8   971 ; This routine is called to allocate a specific set of UNIBUS Map Registers.
                                        03A8   972 ;
                                        03A8   973 ; INPUTS:
                                        03A8   974 ;       R3 =  # of map registers to allocate
                                        03A8   975 ;       R4 =  # of first map register to allocate
                                        03A8   976 ;       R5 => UCB
                                        03A8   977 ;
                                        03A8   978 ; OUTPUTS:
                                        03A8   979 ;       R0 =  Success or failure indication
                                        03A8   980 ;               Note R0, R1 and R2 modified.
                                        03A8   981 ;-
                                        03A8   982
                                        03A8   983 IOC$ALOUBAMAPSP::
                7E    53    7D        03A8   984          MOVQ    R3,-(SP)                ; Save R3,R4,R5
                      55    DD        03AB   985          PUSHL   R5                      ;
                                        03AD   986
              50    24 A5    D0       03AD   987          MOVL    UCB$L_CRB(R5),R0                ; R0 => CRB.
              52    38 A0    D0       03B1   988          MOVL    CRB$L_INTD+VEC$L_ADP(R0),R2     ; R2 => ADP.
              51    34 A0    9E       03B5   989          MOVAB   CRB$L_INTD+VEC$W_MAPREG(R0),R1  ; R1 => UBA mapping descriptor.
                                        03B9   990
;RLR0003             5C A2    D5       03B9    .1          TSTL    ADP$L_MRACTMDRS(R2)     ; Test for zero active descriptors.
;RLR0003                2C    13       03BC    .2          BEQL    30$                     ; EQL implies no registers available.
                    05 54    E9       03BE   991          BLBC    R4,10$                  ; Prepare to round DOWN to even boundary.
                54     01    8A       03C1   992          BICB    #1,R4                   ; Clear low bit if set and
                       53    D6       03C4   993          INCL    R3                      ;  then increment # of registers to allocate
                                        03C6   994 10$:
                       53    D6       03C6   995          INCL    R3                      ; Prepare to round UP to even # of registers
                53     01    8A       03C8   996          BICB    #1,R3                   ;
                                        03CB   997
                       55    D4       03CB   998          CLRL    R5                      ; R5 will be index register.
                                        03CD   999 20$:
          015E C245    54    B1       03CD  1000          CMPW    R4,ADP$W_MRFREGARY(R2)[R5]      ; Are registers we want in
                                        03D3  1001                                          ;  current extent?
                       15    19       03D3  1002          BLSS    30$                     ; LSS means current extent is beyond the
                                        03D5  1003                                          ;  desired registers. Therefore they are
                                        03D5  1004                                          ;  not availiable and we have failed.
                       46    13       03D5  1005          BEQL    50$                     ; EQL means they are at the beginning
                                        03D7  1006                                          ;  of the current extent.
                                        03D7  1007
                                        03D7  1008 ; Here the registers we want are either within the middle of the current
                                        03D7  1009 ;       extent or else beyond the current extent.
                                        03D7  1010
             015E C245    A1       03D7  1011          ADDW3   ADP$W_MRFREGARY(R2)[R5],-       ; R0 = 1st register beyond
          50    64 A245               03DC
                                        03E0  1012                  ADP$W_MRNREGARY(R2)[R5],R0       ;  current extent.
                50    54    B1       03E0  1013          CMPW    R4,R0                   ; Are we in current extent?
                      09    19       03E3  1014          BLSS    40$                     ; LSS means YES, in current.
          E3 55    5C A2    F2       03E5  1015          AOBLSS  ADP$L_MRACTMDRS(R2),R5,20$      ; Loop thru all extents.
                                        03EA  1016 30$:                                     ; Failure if we fall thru.
                       50    D4       03EA  1017          CLRL    R0                      ; Set failure code.
                       52    11       03EC  1018          BRB     80$                     ; And branch to return.
                                        03EE  1019 40$:
                                        03EE  1020
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                                03EE  1021 ; Here the first register we want is greater than the first register of
                                03EE  1022 ;       current extent (defined by R5 = index) and is less than or equal to
                                03EE  1023 ;       the last register of the extent. R0 contains the # of the register just
                                03EE  1024 ;       beyond the current extent.  In other words,
                                03EE  1025 ;
                                03EE  1026 ;       ADP$W_MRFREGARY(R2)[R5] < R4 < R0
                                03EE  1027
                50    54   A2   03EE  1028         SUBW    R4,R0                   ; R0 = length of subextent based at R4.
                53    50   B1   03F1  1029         CMPW    R0,R3                   ; Compare to # of registers needed.
                      F4   19   03F4  1030         BLSS    30$                     ; LSS means failure.
                                03F6  1031
                61    54   B0   03F6  1032         MOVW    R4,UBMD$W_MAPREG(R1)    ; Success. Fill in user's descriptor
              02 A1   53   90   03F9  1033         MOVB    R3,UBMD$B_NUMREG(R1)    ;  with base register and # of registers.
                                03FD  1034
                                03FD  1035 ;       SUBW3   ADP$W_MRFREGARY(R2)[R5],R4,-    ; Distance from beginning of
                                03FD  1036 ;               ADP$W_MRNREGARY(R2)[R5]         ;  extent to R4 is new length.
           64 A245   50   A2   03FD  1037         SUBW    R0,ADP$W_MRNREGARY(R2)[R5]      ; Equivalent result.
                                0402  1038
                50    53   A2   0402  1039         SUBW    R3,R0                   ; R0 = # regs. left in sub-extent.
;RLRMAPSP              36   13   0405    .1       BEQL    70$                     ; EQL means we do not have to allocate
-1                              0407  1041                                         ;  and fill a new extent descriptor.
                      55   D6   0407  1042         INCL    R5                      ; R5 = index of new extent descriptor.
                7E    50   B0   0409  1043         MOVW    R0,-(SP)                ; Save length of new extent. .
                    00C9   30   040C  1044         BSBW    ALLOC_DESCRIP           ; Call to allocate a new descriptor.
                                040F  1045
                53    54   A1   040F  1046         ADDW3   R4,R3,ADP$W_MRFREGARY(R2)[R5]   ; Fill in new descriptor with
              015E C245          0412
           64 A245   8E   B0   0416  1047         MOVW    (SP)+,ADP$W_MRNREGARY(R2)[R5]   ;  1st register and # registers.
                     20   11   041B  1048         BRB     70$                     ; Branch around to success.
                                041D  1049 50$:
                                041D  1050
                                041D  1051 ; Here the first register we want is equal to the first register of the current
                                041D  1052 ;       extent (defined by index register R5).  In other words,
                                041D  1053 ;
                                041D  1054 ;       R4 = ADP$W_MRFREGARY(R2)[R5]
                                041D  1055
           64 A245   53   B1   041D  1056         CMPW    R3,ADP$W_MRNREGARY(R2)[R5]      ; See if we have enough registers.
                     C6   14   0422  1057         BGTR    30$                     ; GTR implies failure.
                                0424  1058
                61    54   B0   0424  1059         MOVW    R4,UBMD$W_MAPREG(R1)    ; Success.  Fill in user's descriptor
              02 A1   53   B0   0427  1060         MOVW    R3,UBMD$B_NUMREG(R1)    ;  with 1st register and # allocated.
                                042B  1061
           64 A245   53   A2   042B  1062         SUBW    R3,ADP$W_MRNREGARY(R2)[R5]      ; Update current descriptor.
                     08   13   0430  1063         BEQL    60$                     ; EQL means current extent now
                                0432  1064                                         ;  empty. Go to deallocate.
         015E C245   53   A0   0432  1065         ADDW    R3,ADP$W_MRFREGARY(R2)[R5]      ; If not empty, update 1st register.
                     03   11   0438  1066         BRB     70$                     ; Branch around deallocate.
                                043A  1067 60$:
                    0082   30   043A  1068         BSBW    DEALLOC_DESCRIP                 ; Deallocate system descriptor.
                50    01   D0   043D  1069 70$:    MOVL    S^#SS$_NORMAL,R0        ; Set success indicator.
                      55 8ED0   0440  1070 80$:    POPL    R5                      ; Restore R5,R4,R3
                53    8E   7D   0443  1071         MOVQ    (SP)+,R3                ;
                           05   0446  1072         RSB                             ; And return to caller.
```

-1

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                                0447  1074          .SBTTL  Permanently Allocate UNIBUS Map Registers
                                0447  1075 ;+
                                0447  1076 ; IOC$ALOUBAMAPRM  - Permanently Allocate UBA Map Registers (CRB Database Specified)
                                0447  1077 ; IOC$ALOUBAMAPRMN - Permanently Allocate UBA Map Registers (Argument Specified)
                                0447  1078 ;
                                0447  1079 ; This routine is called to permanently allocate UNIBUS map registers.
                                0447  1080 ;       Here we allocate the map registers from the highest numbered
                                0447  1081 ;       available registers.
                                0447  1082 ;
                                0447  1083 ; INPUTS:
                                0447  1084 ;       R3 =  # Registers to allocate (IOC$ALOUBAMAPRMN only)
                                0447  1085 ;       R5 => UCB
                                0447  1086 ;
                                0447  1087 ; OUTPUTS:
                                0447  1088 ;       R0 = Success indication
                                0447  1089 ;
                                0447  1090 ;-
                                0447  1091
                                0447  1092          .enabl  LSB
                                0447  1093 IOC$ALOUBMAPRMN::
          7E    53    7D      0447  1094          MOVQ    R3,-(SP)                ;ALLOCATE UBA MAP REGISTERS ARGUMENT SPECIFI
                55    DD      044A  1095          PUSHL   R5                      ; Save R3,R4,R5
                                044C  1096                                         ;
                18    11      044C  1097          BRB     5$                      ;
                                044E  1098 IOC$ALOUBMAPRM::                        ;ALLOCATE UBA MAP REGISTERS CRB SPECIFIED
          7E    53    7D      044E  1099          MOVQ    R3,-(SP)                ; Save R3,R4,R5
                55    DD      0451  1100          PUSHL   R5                      ;
                                0453  1101
     53   7E A5    3C      0453  1102          MOVZWL  UCB$W_BCNT(R5),R3       ;GET TRANSFER BYTE COUNT
     54   7C A5    3C      0457  1103          MOVZWL  UCB$W_BOFF(R5),R4       ;GET BYTE OFFSET IN PAGE
53   03FF C344    9E      045B  1104          MOVAB   ^X3FF(R3)[R4],R3        ;CALCULATE HIGHEST RELATIVE BYTE AND ROUND
     53   F7 8F    78      0461  1105          ASHL    #-9,R3,R3               ;CALCULATE NUMBER OF MAP REGISTERS REQUIRED
               53           0465
                            0466  1106 5$:
     51   24 A5    D0      0466  1107          MOVL    UCB$L_CRB(R5),R1                ; R1 => CRB
     52   38 A1    D0      046A  1108          MOVL    CRB$L_INTD+VEC$L_ADP(R1),R2     ; R2 => ADP
     51   34 A1    9E      046E  1109          MOVAB   CRB$L_INTD+VEC$W_MAPREG(R1),R1  ; R1 => UBMD.
             0F     E0      0472  1110          BBS     #VEC$V_MAPLOCK,-                ; If SET, already permanently
          38 61            0474  1111                  UBMD$W_MAPREG(R1),30$           ;  allocated, so branch around.
                            0476  1112
               53    D6      0476  1113          INCL    R3                      ; Round up request to next multiple
          53   01    8A      0478  1114          BICB    #1,R3                   ;  of 2.
     55   5C A2    D0      047B  1115          MOVL    ADP$L_MRACTMDRS(R2),R5  ; R5 = index beyond last MRD.
;RLR0003        0A    13      047F    .1        BEQL    15$                     ; EQL implies no registers available.
;RLR0002                    0481    .2 10$:
;RLR0002 62 A245      53    B1      0481    .3        CMPW    R3,ADP$W_MRNREGARY-2(R2)[R5]    ; See if enough regs described here.
;RLR0002              07    15      0486    .4        BLEQ    20$                     ; LEQ implies YES.
;RLR0002                    0488    .5
;RLR0002        F6 55    F5      0488    .6        SOBGTR  R5,10$                  ; Else branch back and continue
;RLR0003                    048B    .7 15$:
-5                 50    D4      048B  1121          CLRL    R0                      ; If here, allocation failure.
                   22    11      048D  1122          BRB     40$                     ; Branch around to return.
                                048F  1123 20$:
     015C C245    A1      048F  1124          ADDW3   ADP$W_MRFREGARY-2(R2)!R5],-     ; Calculate register # beyond
50   62 A245              0494
                            0498  1125                  ADP$W_MRNREGARY-2(R2)[R5],R0    ;  last extent.
     50   53    A2      0498  1126          SUBW    R3,R0                           ; We allocate from high end. R0
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                        049B  1127                                          ;  contains 1st reg. to alloc.
      61   50    B0     049B  1128          MOVW    R0,UBMD$W_MAPREG(R1)    ; Record 1st register allocated.
61    8000 8F    A8     049E  1129          BISW    #VEC$M_MAPLOCK,UBMD$W_MAPREG(R1);  and mark it permanent.
  02 A1    53    90     04A3  1130          MOVB    R3,UBMD$B_NUMREG(R1)    ; Set # of map regs allocated.
62 A245    53    A2     04A7  1131          SUBW    R3,ADP$W_MRNREGARY-2(R2)[R5]  ; Subtract out # regs allocated.
           0A    13     04AC  1132          BEQL    50$                     ; EQL implies descriptor not
                        04AE  1133                                          ;  valid; branch to deallocate.
                        04AE  1134 30$:
      50   01    D0     04AE  1135          MOVL    S^#SS$_NORMAL,R0        ; Indicate success.
                        04B1  1136 40$:
           55 8ED0      04B1  1137          POPL    R5                      ; Restore R5,R4,R3
      53   8E    7D     04B4  1138          MOVQ    (SP)+,R3                ;
                 05     04B7  1139          RSB
                        04B8  1140 50$:
           55    D7     04B8  1141          DECL    R5                      ; R5 = index of descriptor to dealloc.
         0002    30     04BA  1142          BSBW    DEALLOC_DESCRIP         ; Call to deallocate descriptor.
           EF    11     04BD  1143          BRB     30$                     ;  And branch back to return.
                        04BF  1144          .dsabl  lsb
```

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-1                                      04BF   1146 ;+
                                        04BF   1147 ; DEALLOC_DESCRIP - Common internal subroutine called to deallocate
                                        04BF   1148 ;       a UBA Map Register descriptor.
                                        04BF   1149 ;
                                        04BF   1150 ; INPUTS:
                                        04BF   1151 ;       R2 => ADP
                                        04BF   1152 ;       R5 =  index of descriptor to deallocate.
                                        04BF   1153 ; OUTPUTS:
                                        04BF   1154 ;       The UBA Map Allocation structures are updated by contracting
                                        04BF   1155 ;               descriptors over the deallocated one.
                                        04BF   1156 ;       Register R5 is modified.
                                        04BF   1157 ;-
                                        04BF   1158
                                        04BF   1159 DEALLOC_DESCRIP:
                5C A2   D7              04BF   1160         DECL    ADP$L_MRACTMDRS(R2)     ; Dec ement # active descriptors.
                                        04C2   1161 10$:
              66 A245   B0              04C2   1162         MOVW    ADP$W_MRNREGARY+2(R2)[R5],-     ; Move data towards lower index
              64 A245                   04C6
                                        04C9   1163                 ADP$W_MRNREGARY(R2)[R5]         ;  to fill up hole.
            0160 C245   B0              04C9   1164         MOVW    ADP$W_MRFREGARY+2(R2)[R5],-     ;
            015E C245                   04CE
                                        04D2   1165                 ADP$W_MRFREGARY(R2)[R5]         ;
        EB 55   5C A2   F2              04D2   1166         AOBLSS  ADP$L_MRACTMDRS(R2),R5,10$      ; Loop thru rest of active MDRS.
                        05              04D7   1167         RSB
                                        04D8   1168
                                        04D8   1169 ;+
                                        04D8   1170 ; ALLOC_DESCRIP - Common internal subroutine to allocate a UBA map register
                                        04D8   1171 ;       descriptor in the middle of the range of descriptors.
                                        04D8   1172 ;
                                        04D8   1173 ; INPUTS:
                                        04D8   1174 ;       R2 => ADP
                                        04D8   1175 ;       R5 =  index of where we must allocate descriptor
                                        04D8   1176 ; OUTPUTS:
                                        04D8   1177 ;       Allocation is accomplished by creating a hole in each of the arrays
                                        04D8   1178 ;               by moving descriptor items to the next higher element.
                                        04D8   1179 ;       Note R0 is modified.
                                        04D8   1180 ;-
                                        04D8   1181
                                        04D8   1182 ALLOC_DESCRIP:
          50    5C A2   D0              04D8   1183         MOVL    ADP$L_MRACTMDRS(R2),R0          ; R0 = # active descriptors.
                                        04DC   1184 10$:
             55   50     D1              04DC   1185         CMPL    R0,R5                           ; Have we finished?
                  13     15              04DF   1186         BLEQ    20$                             ; LEQ implies YES.
              62 A240    B0              04E1   1187         MOVW    ADP$W_MRNREGARY-2(R2)[R0],-     ; Starting from ends of arrays,
              64 A240                    04E5
                                        04E8   1188                 ADP$W_MRNREGARY(R2)[R0]         ;  copy # register items.
                                        04E8   1189
            015C C240   B0              04E8   1190         MOVW    ADP$W_MRFREGARY-2(R2)[R0],-     ;
            015E C240                   04ED
                                        04F1   1191                 ADP$W_MRFREGARY(R2)[R0]         ;
                E8 50   F5              04F1   1192         SOBGTR  R0,10$                          ; And loop back until we reach
                                        04F4   1193                                                 ;  the hole we have created.
                5C A2   D6              04F4   1194 20$:    INCL    ADP$L_MRACTMDRS(R2)             ; Increment # active descriptors.
                        05              04F7   1195         RSB                                     ; Return to caller
```

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-1                                      04F8  1197          .SBTTL  Release UNIBUS Map Registers
                                        04F8  1198 ;+
                                        04F8  1199 ; IOC$RELMAPUDA - RELEASE UNIBUS MAP REGISTERS (CALLED FROM UDA PORT DRIVER)
                                        04F8  1200 ; IOC$RELMAPREG - RELEASE UNIBUS MAP REGISTERS
                                        04F8  1201 ;
                                        04F8  1202 ; This routine is called to release UNIBUS map registers that were previously
                                        04F8  1203 ; assigned for an I/O transfer.
                                        04F8  1204 ;
                                        04F8  1205 ; INPUTS:
                                        04F8  1206 ;   (For IOC$RELMAPUDA only)
                                        04F8  1207 ;
;RLRPDTADP                              04F8    .1 ;       R4 => PDT
                                        04F8  1208 ;       R5 => CDRP
                                        04F8  1209 ;
                                        04F8  1210 ;   (For IOC$RELMAPREG call only)
                                        04F8  1211 ;
                                        04F8  1212 ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                                        04F8  1213 ;
                                        04F8  1214 ;       It is assumed that the caller still owns the I/O channel on which
                                        04F8  1215 ;       the transfer took place.
                                        04F8  1216 ;
                                        04F8  1217 ; OUTPUTS:
                                        04F8  1218 ;
                                        04F8  1219 ;       If the mapping registers have been permanently assigned to the asso-
                                        04F8  1220 ;       ciated I/O channel (only possible for IOC$RELMAPREG), then control
                                        04F8  1221 ;       is immediately returned to the caller.  Else the mapping registers are
                                        04F8  1222 ;       released (via a call to IOC$DALOCUBAMAP) and we then go into a loop
                                        04F8  1223 ;       removing waiting driver processes from the Map Register Wait Queue
                                        04F8  1224 ;       until either the Queue is completely drained or we run out of map
                                        04F8  1225 ;       registers to satisfy the needs of a given waiting driver process.
                                        04F8  1226 ;       Driver processes waiting here have their context stored in either
                                        04F8  1227 ;       a UCB fork block or a CDRP fork block and the processing required to
                                        04F8  1228 ;       resume each of these types of driver process is slightly different.
                                        04F8  1229 ;       What is done for each is to allocate the required map registers
                                        04F8  1230 ;       (via a call to IOC$ALOUBAMPA for UCB threads and via a call to
                                        04F8  1231 ;       IOC$ALOUBAMAP for CDRP threads) and to resume the waiting driver
                                        04F8  1232 ;       process.  Resuming a UCB thread is done by restoring register
                                        04F8  1233 ;       context and JSB'ing to the saved PC.  Resuming a CDRP thread is
                                        04F8  1234 ;       accomplished by calling SCS$RESUMEWAITR.
                                        04F8  1235 ;-
                                        04F8  1236          .enabl  lsb
                                        04F8  1237 IOC$RELMAPUDA::
                7E    53    7D  04F8  1238          MOVQ    R3,-(SP)                ; Save R3-R6
                7E    55    7D  04FB  1239          MOVQ    R5,-(SP)                ;
                                  04FE  1240
;RLRPDTADP     52    00E0 C4     D0  04FE    .1          MOVL    PDT$L_ADP(R4),R2        ; R2 => ADP.
;RLRPDTADP           56    52    D0  0503    .2          MOVL    R2,R6                   ; R6 => ADP also.
-4                                      0506  1245
              53     3C A5    9E  0506  1246          MOVAB   CDRP$L_UBARSRCE(R5),R3  ; R3 => UBMD.
                 54     63    3C  050A  1247          MOVZWL  UBMD$W_MAPREG(R3),R4    ; R4 has 1st mapreg #.
              53     02 A3    9A  050D  1248          MOVZBL  UBMD$B_NUMREG(R3),R3    ; R3 has # of mapregs.
                       1E    11  0511  1249          BRB     10$                     ; Branch to common code.
                                  0513  1250
                                  0513  1251 IOC$RELMAPREG::                         ; Release unibus map registers
              51     24 A5    D0  0513  1252          MOVL    UCB$L_CRB(R5),R1        ; R1 => CRB.
                       0F    E0  0517  1253          BBS     #VEC$V_MAPLOCK,-        ; If SET, permanent allocation so branch.
                 3D 34 A1          051A  1254                  CRB$L_INTD+VEC$W_MAPREG(R1),50$
```

```
                7E   53   7D  051C  1255          MOVQ    R3,-(SP)                ; Save R3-R6
                7E   55   7D  051F  1256          MOVQ    R5,-(SP)                ;
                          0522  1257
          52    38 A1     D0  0522  1258          MOVL    CRB$L_INTD+VEC$L_ADP(R1),R2 ;GET ADDRESS OF ADP
             56    52     D0  0526  1259          MOVL    R2,R6                   ;SAVE ADDRESS OF ADP
          54    34 A1     3C  0529  1260          MOVZWL  CRB$L_INTD+VEC$W_MAPREG(R1),R4 ;GET STARTING MAP REGISTER NUMBER
          53    36 A1     9A  052D  1261          MOVZBL  CRB$L_INTD+VEC$B_NUMREG(R1),R3 ;GET NUMBER OF REGISTERS TO DEALLOC
                          0531  1262 10$:
                0034      30  0531  1263          BSBW    IOC$DALOCUBAMAP         ; Free up UBA map resources.
                          0534  1264 20$:
          55    30 B6     0F  0534  1265          REMQUE  @ADP$L_MRQFL(R6),R5     ;GET ADDRESS OF NEXT DRIVER FORK BLOCK
                   19     1D  0538  1266          BVS     40$                     ;IF VS NO DRIVER PROCESS WAITING
                          053A  1267
                   10     91  053A  1268          CMPB    #DYN$C_UCB,-            ; See if we dequeued a UCB or a CDRP.
                0A A5           053C  1269                  UCB$B_TYPE(R5)
                   1A     12  053E  1270          BNEQ    REALLOC_CD_MAPREGS      ; NEQ implies a CDRP.
                          0540  1271
                 FDFB     30  0540  1272          BSBW    IOC$ALOUBAMAP           ;SEARCH MAP REGISTER BITMAP AND ALLOCATE
                09 50     E9  0543  1273          BLBC    R0,30$                  ;IF LBC ALLOCATION FAILURE
          53    10 A5     7D  0546  1274          MOVQ    UCB$L_FR3(R5),R3        ;RESTORE DRIVE PROCESS CONTEXT
                0C B5     16  054A  1275          JSB     @UCB$L_FPC(R5)          ;CALL DRIVER AT MAP REGISTER WAIT RETURN ADD
                   E5     11  054D  1276          BRB     20$                     ;
       30 A6       65     0E  054F  1277 30$:     INSQUE  UCB$L_FQFL(R5),ADP$L_MRQFL(R6) ;REINSERT DRIVER PROCESS AT FRONT OF
             55    8E     7D  0553  1278 40$:     MOVQ    (SP)+,R5                ; Restore R3-R6
             53    8E     7D  0556  1279          MOVQ    (SP)+,R3                ;
                   05     05  0559  1280 50$:     RSB                             ;
                          055A  1281
                          055A  1282 REALLOC_CD_MAPREGS:                          ; Reallocate mapregs to a class driver
                          055A  1283                                              ;  process.
                 FDB7     30  055A  1284          BSBW    IOC$ALOMAPUDA           ; Allocate map registers if we can.
                EF 50     E9  055D  1285          BLBC    R0,30$                  ; LBC implies allocation failure, branch
                          0560  1286
00000000'EF               16  0560  1287          JSB     SCS$RESUMEWAITR         ; Resume waiting thread and any backed
                          0566  1288                                              ;  up IRP's.
                   CC     11  0566  1289          BRB     20$                     ; Branch back to try and allocate more
                          0568  1290                                              ;  UNIBUS map registers.
                          0568  1291          .dsabl  lsb
```

```
-1                                      0568  1293 ;+
                                        0568  1294 ; IOC$DALOCUBAMAP - Common internal subroutine to update the UBA Map allocation
                                        0568  1295 ;       structures to include the map registers specified here among the
                                        0568  1296 ;       available map registers.
                                        0568  1297 ;
                                        0568  1298 ; INPUTS:
                                        0568  1299 ;       R2 => ADP
                                        0568  1300 ;       R3 =  # map registers to free.
                                        0568  1301 ;       R4 =  first map register to free.
                                        0568  1302 ;
                                        0568  1303 ; OUTPUTS:
                                        0568  1304 ;       The UBA Map Allocation structures are updated.
                                        0568  1305 ;
                                        0568  1306 ;       Registers R0, R1 and R5 are modified.
                                        0568  1307 ;
                                        0568  1308 ;-
                                        0568  1309
                                        0568  1310 IOC$DALOCUBAMAP:
                          55    D4      0568  1311          CLRL    R5                          ; Initialize loop variable.
                    51    53    54    C1  056A  1312          ADDL3   R4,R3,R1                    ; R1 = map register beyond extent.
;ROW0140                         53    D5  056E    .1          TSTL    R3                      ; Is the # of regs. to deallocate zero?
;ROW0140                         62    13  0570    .2          BEQL    90$                     ; Branch to bugcheck if zero.
;RLR0003                   5C    A2    D5  0572    .3          TSTL    ADP$L_MRACTMDRS(R2)     ; Test for zero active descriptors.
;RLR0003                         4E    13  0575    .4          BEQL    50$                     ; EQL implies no registers available.
                                        0577  1313 10$:
                  015E  C245            51  B1  0577  1314          CMPW    R1,ADP$W_MRFREGARY(R2)[R5]      ; See if map registers to free
                                        057D  1315                                                  ;  are before those described
                                        057D  1316                                                  ;  by current descriptor.
                                              07  15  057D  1317          BLEQ    20$                     ; LEQ implies yes.
                                        057F  1318
                        F3    55    5C  A2  F2  057F  1319          AOBLSS  ADP$L_MRACTMDRS(R2),R5,10$      ; Else branch back and try next.
                                              2B  11  0584  1320          BRB     40$                     ; If here, registers to free
                                        0586  1321                                                  ;  beyond those described by
                                        0586  1322                                                  ;  last descriptor. So branch
                                        0586  1323                                                  ;  to try and absorb at end of
                                        0586  1324                                                  ;  last descriptor.
                                        0586  1325 20$:
                                              29  12  0586  1326          BNEQ    40$                 ; NEQ implies that although we alloca-
                                        0588  1327                                                  ;  registers before the current des-
                                        0588  1328                                                  ;  criptor, we are not contiguous with
                                        0588  1329                                                  ;  it.  So we branch to try and absorb
                                        0588  1330                                                  ;  these registers in the previous one.
                                        0588  1331
                                        0588  1332 ; Here we can absorb the registers in the current descriptor.
                                        0588  1333
                              62  A245  A1  0588  1334          ADDW3   ADP$W_MRNREGARY-2(R2)[R5],-     ; Calculate end of previous
                  50    015C  C245          058C
                                        0591  1335                  ADP$W_MRFREGARY-2(R2)[R5],R0     ;  extent and move to R0.
                                    54  50  B1  0591  1336          CMPW    R0,R4                       ; Does it coincide with start
                                        0594  1337                                                  ;  of this extent?
                                              0C  13  0594  1338          BEQL    30$                     ; EQL implies yes.
                                        0596  1339
                                        0596  1340 ; Here we have the most likely case. The map registers that we are freeing can
                                        0596  1341 ;       be absorbed into the top of the current descriptor but not also in the
                                        0596  1342 ;       previous descriptor.
                                        0596  1343
                  015E  C245            54  B0  0596  1344          MOVW    R4,ADP$W_MRFREGARY(R2)[R5]      ; First register freed becomes
```

```
                                059C  1345                                                    ;  first register of current
                                059C  1346                                                    ;  descriptor.
                64 A245   53  A0  059C  1347          ADDW    R3,ADP$W_MRNREGARY(R2)[R5]      ; Number of registers is sum of
                                05A1  1348                                                    ;  registers freed and registers
                                05A1  1349                                                    ;  previously described here.
                              05  05A1  1350          RSB
                                05A2  1351
                                05A2  1352 ; Here we have the case where the map registers being freed fall between two
                                05A2  1353 ;       discontiguous blocks and exactly span the difference.  We then can
                                05A2  1354 ;       describe the entire group with one descriptor, and so we also
                                05A2  1355 ;       deallocate the current descriptor.  Note new combined descriptor
                                05A2  1356 ;       will still begin at same map register number so we do NOT alter
                                05A2  1357 ;       this item.
                                05A2  1358
                                05A2  1359 30$:
                62 A245   53  A0  05A2  1360          ADDW    R3,ADP$W_MRNREGARY-2(R2)[R5]    ; Partial sum of registers
                                05A7  1361                                                    ;  being freed and previous ones.
                     64 A245  A0  05A7  1362          ADDW    ADP$W_MRNREGARY(R2)[R5],-       ; Now add in registers described
                     62 A245      05AB
                                05AE  1363                  ADP$W_MRNREGARY-2(R2)[R5]       ;  in current descriptor.
                                05AE  1364
                         FF0E  31  05AE  1365          BRW     DEALLOC_DESCRIP                 ; BRW to subroutine and let it
                                05B1  1366                                                    ;  return to our caller.
                                05B1  1367
                                05B1  1368 ; Here we cannot absorb the freed map registers in the current descriptor.
                                05B1  1369 ;       We test to see if we can absorb them in the previous descriptor.
                                05B1  1370
                                05B1  1371 40$:
                     62 A245  A1  05B1  1372          ADDW3   ADP$W_MRNREGARY-2(R2)[R5],-     ; Calculate end of previous
           50   015C C245        05B5
                                05BA  1373                  ADP$W_MRFREGARY-2(R2)[R5],R0     ;  extent and move to R0.
                      54  50  B1  05BA  1374          CMPW    R0,R4                           ; See if contigous with previous.
                          06  12  05BD  1375          BNEQ    50$                             ; NEQ implies NO.
                                05BF  1376
                62 A245   53  A0  05BF  1377          ADDW    R3,ADP$W_MRNREGARY-2(R2)[R5]    ; Sum # of registers in extent.
                              05  05C4  1378          RSB
                                05C5  1379
                                05C5  1380 ; Here we must allocate a new descriptor to describe the map registers we
                                05C5  1381 ;       are freeing.  Conditions at this time are as follows:
                                05C5  1382 ;
                                05C5  1383 ;               R2 => ADP
                                05C5  1384 ;               R3 =  # registers to free
                                05C5  1385 ;               R4 =  first register to free
                                05C5  1386 ;               R5 =  index of where we must allocate descriptor
                                05C5  1387 ;
                                05C5  1388 ;       Allocation is accomplished by calling subroutine ALLOC_DESCRIP
                                05C5  1389 ;
                                05C5  1390
                                05C5  1391 50$:
                         FF10  30  05C5  1392          BSBW    ALLOC_DESCRIP                   ; Alloc R5 = index of descriptor.
                  64 A245   53  B0  05C8  1393          MOVW    R3,ADP$W_MRNREGARY(R2)[R5]      ; Fill in allocated descriptor.
           015E C245   54       B0  05CD  1394          MOVW    R4,ADP$W_MRFREGARY(R2)[R5]      ;
                              05  05D3  1395          RSB
;ROW0140                        05D4    .1
;ROW0140                        05D4    .2 90$:     BUG_CHECK INCONSTATE                ; Non-fatal bugcheck on zero map
;ROW0140                        05D8    .3                                              ; registers deallocation attempts.
;ROW0140                      05  05D8    .4          RSB                                 ; Then ignore deallocate request.
```

-1

```
                05D9  1397          .SBTTL  RETURN TO CALLER
                05D9  1398 ;+
                05D9  1399 ; IOC$RETURN - RETURN TO CALLER
                05D9  1400 ;
                05D9  1401 ; THIS ROUTINE IS CALLED AS A RESULT OF A DDT DISPATCH TO A NULL ENTRY. ITS
                05D9  1402 ; FUNCTION IS MERELY TO RETURN TO ITS CALLER.
                05D9  1403 ;
                05D9  1404 ; INPUTS:
                05D9  1405 ;
                05D9  1406 ;        NONE.
                05D9  1407 ;
                05D9  1408 ; OUTPUTS:
                05D9  1409 ;
                05D9  1410 ;        NONE.
                05D9  1411 ;-
                05D9  1412
                05D9  1413 IOC$RETURN::                         ;RETURN TO CALLER
 05             05D9  1414          RSB                        ;
```

```
-1                                      05DA  1416          .SBTTL  WAITFOR INTERRUPT OR TIMEOUT AND KEEP CHANNEL
                                        05DA  1417 ;+
                                        05DA  1418 ; IOC$WFIKPCH - WAITFOR INTERRUPT OR TIMEOUT AND KEEP CHANNEL
                                        05DA  1419 ;
                                        05DA  1420 ; THIS ROUTINE IS CALLED TO SOFTWARE ENABLE INTERRUPTS AND TIMEOUT ON
                                        05DA  1421 ; A DEVICE UNIT AND TO KEEP THE CHANNEL. THIS ROUTINE CAN BE CALLED AT
                                        05DA  1422 ; EITHER FORK OR DEVICE INTERRUPT LEVEL.
                                        05DA  1423 ;
                                        05DA  1424 ; INPUTS:
                                        05DA  1425 ;
                                        05DA  1426 ;       00(SP) = RETURN ADDRESS OF CALLER.
                                        05DA  1427 ;       04(SP) = TIMEOUT VALUE IN SECONDS.
                                        05DA  1428 ;       08(SP) = IPL TO LOWER TO AFTER SETTING WAIT.
                                        05DA  1429 ;       12(SP) = RETURN ADDRESS OF CALLER'S CALLER.
                                        05DA  1430 ;
                                        05DA  1431 ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                                        05DA  1432 ;
                                        05DA  1433 ; OUTPUTS:
                                        05DA  1434 ;
                                        05DA  1435 ;       THE TIMEOUT VALUE IS COMPUTED AND STORED IN DUE TIME, REGISTERS R3 AND
                                        05DA  1436 ;       R4 ALONG WITH THE RETURN PC ARE SAVED IN THE FORK BLOCK, INTERRUPTS AND
                                        05DA  1437 ;       TIMEOUT ARE ENABLED, AND A RETURN TO THE CALLER'S CALLER IS EXECUTED.
                                        05DA  1438 ;-
                                        05DA  1439
                                        05DA  1440 IOC$WFIKPCH::                            ;WAITFOR INTERRUPT/TIMEOUT AND KEEP CHANNEL
     6E    02    C0                   05DA  1441          ADDL    #2,(SP)                   ;CALCULATE OFFSET TO NORMAL RETURN
 10  A5    53    7D                   05DD  1442          MOVQ    R3,UCB$L_FR3(R5)          ;SAVE REGISTERS R3 AND R4
       0C  A5  8ED0                   05E1  1443          POPL    UCB$L_FPC(R5)             ;SAVE INTERRUPT RETURN ADDRESS
 64  A5    03    A8                   05E5  1444          BISW    #UCB$M_INT!UCB$M_TIM,UCB$W_STS(R5) ;ENABLE INTERRUPT AND TIMEOUT
           8E    C1                   05E9  1445          ADDL3   (SP)+,L^EXE$GL_ABSTIM,UCB$L_DUETIM(R5) ;SET TIMEOUT TIME
00000000'EF                           05EB
       6C  A5                         05F0
     0040  8F    AA                   05F2  1446          BICW    #UCB$M_TIMOUT,UCB$W_STS(R5) ;CLEAR UNIT TIMED OUT
       64  A5                         05F6
                                      05F8  1447          ENBINT                            ;ENABLE INTERRUPTS
                 05                   05FB  1448          RSB                               ;
```

-1

```
                        05FC  1450          .SBTTL  WAITFOR INTERRUPT OR TIMEOUT AND RELEASE CHANNEL
                        05FC  1451 ;+
                        05FC  1452 ; IOC$WFIRLCH - WAITFOR INTERRUPT OR TIMEOUT AND RELEASE CHANNEL
                        05FC  1453 ;
                        05FC  1454 ; THIS ROUTINE IS CALLED TO SOFTWARE ENABLE INTERRUPTS AND TIMEOUT ON A DEVICE
                        05FC  1455 ; UNIT AND TO RELEASE THE CHANNEL. THIS ROUTINE CAN ONLY BE CALLED AT FORK LEVEL.
                        05FC  1456 ;
                        05FC  1457 ; INPUTS:
                        05FC  1458 ;
                        05FC  1459 ;        00(SP) = RETURN ADDRESS OF CALLER.
                        05FC  1460 ;        04(SP) = TIMEOUT VALUE IN SECONDS.
                        05FC  1461 ;        08(SP) = IPL TO LOWER TO AFTER SETTING WAIT.
                        05FC  1462 ;        12(SP) = RETURN ADDRESS OF CALLER'S CALLER.
                        05FC  1463 ;
                        05FC  1464 ;        R5 = UCB ADDRESS OF DEVICE UNIT.
                        05FC  1465 ;
                        05FC  1466 ; OUTPUTS:
                        05FC  1467 ;
                        05FC  1468 ;        THE TIMEOUT VALUE IS COMPUTED AND STORED IN DUE TIME, REGISTERS R3 AND
                        05FC  1469 ;        R4 ALONG WITH THE RETURN PC ARE SAVED IN THE FORK BLOCK, INTERRUPTS AND
                        05FC  1470 ;        TIMEOUT ARE ENABLED, THE CHANNEL IS RELEASED, AND A RETURN TO THE CALLER'S
                        05FC  1471 ;        CALLER IS EXECUTED.
                        05FC  1472 ;-
                        05FC  1473
                        05FC  1474 IOC$WFIRLCH::                            ;WAITFOR INTERRUPT/TIMEOUT AND RELEASE CHANN
    6E    02    C0      05FC  1475          ADDL    #2,(SP)                 ;CALCULATE OFFSET TO NORMAL RETURN
 10 AE    53    7D      05FF  1476          MOVQ    R3,UCB$L_FR3(R5)        ;SAVE REGISTERS R3 AND R4
    0C A5 8ED0          0603  1477          POPL    UCB$L_FPC(R5)           ;SAVE INTERRUPT RETURN ADDRESS
64 A5    03    A8      0607  1478          BISW    #UCB$M_INT!UCB$M_TIM,UCB$W_STS(R5) ;ENABLE INTERRUPT AND TIMEOUT
       8E    C1      060B  1479          ADDL3   (SP)+,L^EXE$GL_ABSTIM,UCB$L_DUETIM(R5) ;SET TIMEOUT TIME
00000000'EF         060D
    6C A5           0612
  0040 8F    AA      0614  1480          BICW    #UCB$M_TIMOUT,UCB$W_STS(R5) ;CLEAR UNIT TIMED OUT
    64 A5           0618
                    061A  1481          ENBINT                          ;ENABLE INTERRUPTS
     FA63   31      061D  1482          BRW     IOC$RELCHAN             ;RELEASE ALL CHANNELS AND RETURN TO CALLER
                    0620  1483
                    0620  1484
```

```
-1                                      0620  1486          .SBTTL  ALLOCATE SYSTEM PAGE TABLE
                                        0620  1487 ;+
                                        0620  1488 ; IOC$ALLOSPT - ALLOCATE SYSTEM PAGE TABLE
                                        0620  1489 ;
                                        0620  1490 ; THIS ROUTINE ALLOCATES SYSTEM PAGE TABLE (SPT) ENTRIES.
                                        0620  1491 ;
                                        0620  1492 ; INPUTS:
                                        0620  1493 ;
                                        0620  1494 ;       R1 = NUMBER OF SPT ENTRIES TO BE ALLOCATED
                                        0620  1495 ;
                                        0620  1496 ;       BOO$GL_SPTFREL = LOWEST FREE VPN
                                        0620  1497 ;       BOO$GL_SPTFREH = HIGHEST FREE VPN
                                        0620  1498 ;
                                        0620  1499 ;       IT IS ASSUMED THAT THE CALLER IS RUNNING AT IPL$_SYNCH.
                                        0620  1500 ;
                                        0620  1501 ; OUTPUTS:
                                        0620  1502 ;
                                        0620  1503 ;       R0 = SUCCESS INDICATION.
                                        0620  1504 ;       R2 = STARTING PAGE NUMBER ALLOCATED (SVPN).
                                        0620  1505 ;       R3 = ADDRESS OF BASE OF SYSTEM PAGE TABLE (MMG$GL_SPTBASE).
                                        0620  1506 ;
                                        0620  1507 ;       R1 IS PRESERVED ACROSS CALL.
                                        0620  1508 ;-
                                        0620  1509 IOC$ALLOSPT::                            ;ALLOCATE SYSTEM PAGE TABLE
                             50   D4    0620  1510          CLRL    R0                      ;ASSUME FAILURE
                00000000'EF   D0    0622  1511          MOVL    L^BOO$GL_SPTFREL,R2     ;GET NEXT AVAILABLE SYSTEM VPN
                             52         0628
                53   52      51   C1    0629  1512          ADDL3   R1,R2,R3                ;COMPUTE NEXT WITH THIS ALLOCATION
                             53   D1    062D  1513          CMPL    R3,L^BOO$GL_SPTFREH     ;ARE THERE ENOUGH AVAILABLE?
                00000000'EF         062F
                             10   1E    0634  1514          BGEQU   10$                     ;BR IF NO
                             53   D0    0636  1515          MOVL    R3,L^BOO$GL_SPTFREL     ;MARK THE ENTRIES ALLOCATED
                00000000'EF         0638
                00000000'EF   D0    063D  1516          MOVL    L^MMG$GL_SPTBASE,R3     ;GET ADDR OF BASE OF SPT
                             53         0643
                             50   D6    0644  1517          INCL    R0                      ;SET SUCCESS
                                        0646  1518 10$:
                                  05    0646  1519          RSB                             ;
```

```
-1                      0647  1521          .SBTTL  CONVERT DEVICE NAME AND UNIT
                        0647  1522 ;+
                        0647  1523 ; IOC$CVT_DEVNAM - Convert device name and unit
                        0647  1524 ;
                        0647  1525 ; This routine is called to convert a device name and unit number to a physical
                        0647  1526 ; device name string.
                        0647  1527 ;
                        0647  1528 ; Inputs:
                        0647  1529 ;
                        0647  1530 ;       The caller is assumed to have PROBEd the output buffer for write access.
                        0647  1531 ;       The I/O data base is locked for read access.  This means that the caller
                        0647  1532 ;       owns the I/O data base mutex and/or is at IPL SYNCH or higher.
                        0647  1533 ;
                        0647  1534 ;       R0 = length of output buffer.
                        0647  1535 ;       R1 = address of output buffer.
;RAS0300                0647    .1 ;       R4 = name string formation mode, one of:
;RAS0300                0647    .2 ;           -1 (DVI$_DEVNAM) -- a name suitable for displays
;RAS0300                0647    .3 ;              for non-local devices, return node$ddcn
;RAS0300                0647    .4 ;              for local devices:
;RAS0300                0647    .5 ;                  if in cluster and file oriented device, return node$ddcn
;RAS0300                0647    .6 ;                  otherwise, return ddcn
;RAS0300                0647    .7 ;            0 (DVI$_FULLDEVNAM) -- a name with appropriate node information
;RAS0300                0647    .8 ;              if allocation class not zero and file oriented device, return
;RAS0300                0647    .9 ;                      $alloclass$ddcn
;RAS0300                0647   .10 ;              otherwise, return node$ddcn
;RAS0300                0647   .11 ;            1 (DVI$_ALLDEVNAM) -- a name with allocation class information
;RAS0300                0647   .12 ;              if allocation class not zero, return $alloclass$ddcn
;RAS0300                0647   .13 ;              otherwise, return node$ddcn
;RAS0300                0647   .14 ;            2 (no GETDVI item code) -- an old fashioned name
;RAS0300                0647   .15 ;              return ddcn
;RAS0300                0647   .16 ;            3 (no GETDVI item code) -- a secondary path name for displays
;RAS0300                0647   .17 ;              same as -1 except secondary path name returned
;RAS0300                0647   .18 ;            4 (no GETDVI item code) -- path controller name for displays
;RAS0300                0647   .19 ;              same as -1 except no unit number is appended
;RAS0300                0647   .20 ;           Note: if the node name string is null, node$ is not returned.
                        0647  1536 ;       R5 = address of device UCB.
                        0647  1537 ;
                        0647  1538 ; Outputs:
                        0647  1539 ;
                        0647  1540 ;       The device name and unit number are converted and stored in the specified
                        0647  1541 ;       output buffer. The following register values are returned:
                        0647  1542 ;
                        0647  1543 ;               R0 = Final conversion status.
;ROW0234                0647    .1 ;                       SS$_NORMAL or
;ROW0234                0647    .2 ;                       SS$_BUFFEROVF (an alternate success status which
;ROW0234                0647    .3 ;                               indicates that the supplied buffer could not
;ROW0234                0647    .4 ;                               hold the device name string)
;ROW0234                0647    .5 ;               R1 = Length of conversion string.  R1 = 0 if the alternate
;ROW0234                0647    .6 ;                    path name was requested but none exists.
;KPL0001                0647    .7 ;-
;KPL0001                0647    .8
;RAS0300                0647    .9 ;
;RAS0300                0647   .10 ; Working storage (offsets from R7)
;RAS0300                0647   .11 ;
;RAS0300                0647   .12          $OFFSET 0,POSITIVE,< -
;RAS0300                0647   .13                  <BINNUM,8>, -           ;Binary value to convert to ASCII
;RAS0300                0647   .14                  -       ; add new working storage cells before this line
```

```
                                0647   .15                <RESR0>, -              ;Result R0
                                0647   .16                <RESR1>, -              ;Result R1
                                0647   .17                <SCRLEN,0> -            ;amount of working storage
                                0647   .18                <RESR2>, -              ;saved R2
                                0647   .19                <RESR3>, -              ;saved R3
                                0647   .20                <RESR4>, -              ;saved R4
                                0647   .21                >
                                0000       BINNUM:
                                0008       RESR0:
                                000C.      RESR1:
                                0010       SCRLEN:
                                0010       RESR2:
                                0014       RESR3:
                                0018       RESR4:
                                0647   .22
                                0647   .23 IOC$CVT_DEVNAM::                        ;Convert device name and unit
                                0647   .24
                     00FC 8F    BB  0647   .25         PUSHR   #^M<R2,R3,R4,R5,R6,R7>  ;Save registers
                                064B   .26 ;
                                064B   .27 ; Push a quadword onto the stack.  The quadword will land
                                064B   .28 ; on the stack so that when the POPR at the end of the routine
                                064B   .29 ; is executed, R0 will contain the routine value, and R1 will
                                064B   .30 ; contain the length of the formatted device name.
                                064B   .31 ;
                  7E    01    7D  064B   .32         MOVQ    #SS$_NORMAL,-(SP)       ;Put a 1 and a 0 on the stack
                        7E    7C  064E   .33         CLRQ    -(SP)                   ;Init binary number working area.
                                0650   .34         ASSUME  SCRLEN EQ 16
                  57    5E    D0  0650   .35         MOVL    SP, R7                  ;Setup result R0 and R1 pointer in R7.
                                0653   .36 ;
                                0653   .37 ; Precede the device name with a "_" (underscore character) to
                                0653   .38 ; indicate that this is a physical device name.
                                0653   .39 ;
               53   5F 8F    9A  0653   .40         MOVZBL  #^A/_/,R3               ;Put underscore character in R3
                     00B4    30  0657   .41         BSBW    PUTCHAR                 ;Put it in the output buffer
                                065A   .42 ;
                                065A   .43 ; Check for a possible nodename. If it exists, determine which format
                                065A   .44 ; of name was requested by the caller.
                                065A   .45 ;
               56   28 A5    D0  065A   .46         MOVL    UCB$L_DDB(R5),R6        ;Get DDB address
               52   34 A6    D0  065E   .47         MOVL    DDB$L_SB(R6),R2         ;Get System Block address
                        5D    13  0662   .48         BEQL    LOCAL_NAME              ;None, leave
                        09    E1  0664   .49         BBC     #DEV$V_NNM,-            ;Branch if nodename not wanted
                                0666   .50                 UCB$L_DEVCHAR2(R5),LOCAL_NAME
                  58 3C A5      0669   .51         CASE    R4, -                   ;Dispatch on type of output requested:
                                0669   .52                 limit=#-1, displist=< -
                                0669   .53                 DISPLAY_NAME, -         ; -1 ==> node$dev: for disks, else dev:
                                0669   .54                 FULL_NAME, -            ;  0 ==> $allocls$dev: or node$dev:
                                0669   .55                 ALLOC_NAME, -           ;  1 ==> $allocls$dev: or node$dev:
                                0669   .56                 LOCAL_NAME, -           ;  2 ==> just dev:
                                0669   .57                 SECONDARY_NAME, -       ;  3 ==> secondary path
                                0669   .58                 DISPLAY_NAME -          ;  4 ==> same as -1 sans unit number
                                0669   .59                 >
                        5B    11  067B   .60         BRB     EXDVNM                  ; All others are NOPs.
                                067D   .61
                                067D   .62 FULL_NAME:
            33 38 A5    0E    E1  067D   .63         BBC     #DEV$V_FOD, -           ;A file oriented device?
                                0682   .64                 UCB$L_DEVCHAR(R5), -
```

```
;ROW0244                                0682   .65                 ADD_NODE                ;Branch if not file oriented device.
;ROW0244                                0682   .66
;RAS0300                                0682   .67 ALLOC_NAME:
;RAS0300                                0682   .68
;RAS0300          67    3C A6    9A     0682   .69         MOVZBL  DDB$L_ALLOCLS(R6), -    ;Setup allocation class value
;RAS0300                                0686   .70                 BINNUM(R7)              ; for conversion.
;RAS0300                 2D    13       0686   .71         BEQL    ADD_NODE                ;If none return node+device name.
;RAS0300               0080    30       0688   .72         BSBW    PUTDOLLAR               ;Prepend allocation class with a '$'
;RAS0300                 58    10       068B   .73         BSBB    PUTNUM                  ;Convert allocation class number to
;RAS0300                                068D   .74                                         ;ASCII and put it in the buffer
;RAS0300                 30    11       068D   .75         BRB     ADD_DOLLAR              ;Append dollar sign to alloc. class
;RAS0300                                068F   .76                                         ; and add device name to buffer.
;RAS0300                                068F   .77
;RAS0300                                068F   .78 SECONDARY_NAME:
;RAS0300                 04    E1       068F   .79         BBC     #DEV$V_2P,-             ;Branch if device not dual-pathed.
;RAS0300              3C A5               0691   .80                 UCB$L_DEVCHAR2(R5),-    ; (I.E. there is no secondary path to
;RAS0300                 4C               0693   .81                 NO_SECONDARY            ; return.)
;RAS0300       56   00A0 C5    D0       0694   .82         MOVL    UCB$L_DP_DDB(R5),R6     ;Get secondary DDB.
;RAS0300                 45    13       0699   .83         BEQL    NO_SECONDARY            ;Branch to no sec. path if none.
;RAS0300          52    34 A6    D0     069B   .84         MOVL    DDB$L_SB(R6),R2         ;Get alternate SB.
;RAS0300                                069F   .85
;RAS0300                                069F   .86 DISPLAY_NAME:
;RAS0300                 52    D1       069F   .87         CMPL    R2,#SCS$GA_LOCALSB      ;Is it the perm local system block?
;                 00000000'8F            06A1
;RAS0300                 0D    12       06A6   .88         BNEQ    ADD_NODE                ;Return node+devnam for non-local devs.
;RAS0300                                06A8   .89         IFNOCLSTR LOCAL_NAME            ;Return devnam if not part of a cluster.
;ROW0244       0C 38 A5    0E    E1       06B0   .90         BBC     #DEV$V_FOD, -           ;A file oriented device?
;ROW0244                                06B5   .91                 UCB$L_DEVCHAR(R5), -
;ROW0244                                06B5   .92                 LOCAL_NAME              ;Branch if not a file oriented device.
;ROW0234                                06B5   .93                                         ;Its a local disk in a cluster: return
;ROW0234                                06B5   .94                                         ;node+device name format.
;ROW0234                                06B5   .95 ;
;ROW0234                                06B5   .96 ; Return node name plus device name.  Copy node name to buffer and
;ROW0234                                06B5   .97 ; suffix with a "$" before moving in rest of device name.
;ROW0234                                06B5   .98 ;
;ROW0234                                06B5   .99 ADD_NODE:
;ROW0234          52    44 A2    9E     06B5   .100        MOVAB   SB$T_NODENAME(R2),R2    ;Point to name field
;ROW0239                 62    95       06B9   .101        TSTB    (R2)                    ;Is the node name null?
;ROW0239                 04    13       06BB   .102        BEQL    LOCAL_NAME              ;Skip inserting node name, if its null.
;RAS0300                 3E    10       06BD   .103        BSBB    PUTASCIC                ;Copy counted ASCII str. to output buf.
;RAS0300                                06BF   .104 ADD_DOLLAR:
;RAS0300                 4A    10       06BF   .105        BSBB    PUTDOLLAR               ;Append dollar sign to node name
;RAS0300                                06C1   .106 ;
;RAS0300                                06C1   .107 ; Copy device name to buffer.
;RAS0300                                06C1   .108 ;
;RAS0300                                06C1   .109 LOCAL_NAME:
;RAS0300          52    14 A6    9E     06C1   .110        MOVAB   DDB$T_NAME(R6),R2       ;Get address of ASCIC device name.
;RAS0300                 36    10       06C5   .111        BSBB    PUTASCIC                ;Copy counted ASCII str. to output buf.
;RAS0300          04    18 A7    B1     06C7   .112        CMPW    RESR4(R7),#4            ;Do we want the unit number?
;RAS0300                 0B    13       06CB   .113        BEQL    EXDVNM                  ;Nope
;RAS0300          67    54 A5    3C     06CD   .114        MOVZWL  UCB$W_UNIT(R5), -       ;Setup device unit number for
;RAS0300                                06D1   .115                BINNUM(R7)              ; converstion to ASCII.
;RAS0300                 12    10       06D1   .116        BSBB    PUTNUM                  ;Convert unit number to ASCII.
;RAS0300                                06D3   .117 ;
;RAS0300                                06D3   .118 ; Terminate the device name with a ":" (colon).
;RAS0300                                06D3   .119 ;
;RAS0300             53    3A    9A     06D3   .120        MOVZBL  #^A/:/,R3               ;Put a ":" in R3
```

```
;RAS0300                36   10   06D6  .121          BSBB    PUTCHAR                 ;Put the ":" in output buffer
;RAS0300                           06D8  .122 ;
;RAS0300                           06D8  .123 ; Clean up the stack and exit.  The stack has been set up so that
;RAS0300                           06D8  .124 ; the proper values will be stored in R0 and R1 by the POPR.
;RAS0300                           06D8  .125 ;
;RAS0300           5E    08   C0   06D8  .126 EXDVNM: ADDL    #RESR0,SP               ;Remove everything upto result R0
;RAS0300                           06DB  .127                                         ;from the stack
;RAS0300           00FF  8F   BA   06DB  .128          POPR    #^M<R0,R1,R2,R3,R4,R5,R6,R7> ;Restore registers
;RAS0300                     05    06DF  .129          RSB                             ;Return
;RAS0300                           06E0  .130
;RAS0300                           06E0  .131 ;
;RAS0300                           06E0  .132 ; Come here when the secondary device name was requested but none exists.
;RAS0300                           06E0  .133 ;
;RAS0300                           06E0  .134 NO_SECONDARY:
;RAS0300             0C    A7   D4   06E0  .135          CLRL    RESR1(R7)               ;Clear count of characters
;RAS0300                F3   11   06E3  .136          BRB     EXDVNM                  ;and return.
;RAS0300                           06E5  .137
;RAS0300                           06E5  .138
;RAS0300                           06E5  .139 ;++
;RAS0300                           06E5  .140 ; The following code is a local subroutine to convert binary to ASCII and
;RAS0300                           06E5  .141 ; put the ASCII equivalent in the output name buffer.
;RAS0300                           06E5  .142 ;
;RAS0300                           06E5  .143 ; Inputs:
;RAS0300                           06E5  .144 ;
;RAS0300                           06E5  .145 ;       BINNUM(R7)      binary number to be converted (a quadword with high
;RAS0300                           06E5  .146 ;                       longword zeroed
;RAS0300                           06E5  .147 ;
;RAS0300                           06E5  .148 ; Outputs:
;RAS0300                           06E5  .149 ;       The number at BINNUM(R7) is converted to ASCII and stored in the
;RAS0300                           06E5  .150 ;       device name buffer.
;RAS0300                           06E5  .151 ;--
;RAS0300                           06E5  .152 PUTNUM:
;RAS0300           53    01   8E   06E5  .153          MNEGB   #1, R3                  ;Get end-of-number marker.
;RAS0300           7E    53   90   06E8  .154 10$:     MOVB    R3, -(SP)               ;Move digit/marker to scratch.
;RAS0300     67    67    0A   7B   06EB  .155          EDIV    #10, BINNUM(R7), -      ;Divide number by 10, overwrite number
                      53         06EF
;RAS0300                           06F0  .156                  BINNUM(R7), R3          ;with quotient, put remainder in R3.
;RAS0300                F6   12   06F0  .157          BNEQ    10$                     ;If quotient not zero, go save this
;RAS0300                           06F2  .158                                         ; digit and get the next one.
;RAS0300                           06F2  .159 ;
;RAS0300                           06F2  .160 ; Get digits -- most significant first (then saved ones), convert them to
;RAS0300                           06F2  .161 ; ASCII, and put them in the output buffer
;RAS0300                           06F2  .162 ;
;RAS0300           53    30   80   06F2  .163 50$:     ADDB    #^A/0/, R3              ;Convert binary digit to ASCII
;RAS0300                17   10   06F5  .164          BSBB    PUTCHAR                 ;Copy digit to output buffer
;RAS0300           53    8E   90   06F7  .165          MOVB    (SP)+, R3               ;Get another digit
;RAS0300                F6   18   06FA  .166          BGEQ    50$                     ;Branch if the end
;RAS0300                     05    06FC  .167          RSB
;RAS0300                           06FD  .168
;RAS0300                           06FD  .169 ;++
;RAS0300                           06FD  .170 ; The following code is a local subroutine to copy a counted ASCII string
;RAS0300                           06FD  .171 ; to the output name buffer.
;RAS0300                           06FD  .172 ;
;RAS0300                           06FD  .173 ; Inputs:
;RAS0300                           06FD  .174 ;
;RAS0300                           06FD  .175 ;       R2      Beginning address of a counted ASCII string
;RAS0300                           06FD  .176 ;
```

```
;RAS0300                                 06FD  .177 ; Outputs:
;RAS0300                                 06FD  .178 ;       The counted ASCII string pointed to by R2 is copied to the device
;RAS0300                                 06FD  .179 ;       name buffer.
;RAS0300                                 06FD  .180 ;--
;RAS0300                                 06FD  .181 PUTASCIC:
;RAS0300                  54    82   9A   06FD  .182         MOVZBL  (R2)+, R4               ;Get counted string length.
;RAS0300                        08   13   0700  .183         BEQL    90$                     ;If no characters, leave.
;RAS0300                  53    82   90   0702  .184 5$:     MOVB    (R2)+, R3               ;Move one byte to output buffer.
;RAS0300                        07   10   0705  .185         BSBB    PUTCHAR                 ;Put the character in the output buffer.
;RAS0300                     F8 54   F5   0707  .186         SOBGTR  R4, 5$                  ;Branch if more to copy.
;RAS0300                        05   070A  .187 90$:     RSB                             ;All done, return.
-59                                     070B  1603
                                        070B  1604 ;++
                                        070B  1605 ;
                                        070B  1606 ; The following code is a local subroutine to place a given
                                        070B  1607 ; byte in the output buffer.  A count is kept of all characters
                                        070B  1608 ; placed in the output buffer.  If the output buffer is full,
;KPL0001                                 070B    .1 ; the byte is not copied, the count is not increased, and the
;KPL0001                                 070B    .2 ; return status for IOC$CVT_DEVNAM is changed to SS$_BUFFEROVF
;KPL0001                                 070B    .3 ; (an alternate success status).
;KPL0001                                 070B    .4 ;
;KPL0001                                 070B    .5 ; Inputs:
;KPL0001                                 070B    .6 ;       R0      Count of unstored character slots remaining in output buffer
;KPL0001                                 070B    .7 ;       R1      Address of next unused character slot in output buffer
;KPL0001                                 070B    .8 ;       R3      Character to be placed in the buffer
;KPL0001                                 070B    .9 ;
;KPL0001                                 070B   .10 ; Implicit inputs:
;KPL0001                                 070B   .11 ;       RESR0(R7)       longword holding final IOC$CVT_DEVNAM status
;KPL0001                                 070B   .12 ;       RESR1(R7)       longword holding final IOC$CVT_DEVNAM count of
;KPL0001                                 070B   .13 ;                               characters stored in the buffer (to be
;KPL0001                                 070B   .14 ;                               returned in R1
;KPL0001                                 070B   .15 ;
;KPL0001                                 070B   .16 ; Outputs:
;KPL0001                                 070B   .17 ;       None.
;KPL0001                                 070B   .18 ;
;KPL0001                                 070B   .19 ; Implicit outputs:
;KPL0001                                 070B   .20 ;       If R0 >= zero:
;KPL0001                                 070B   .21 ;               R0              <== R0 - 1
;KPL0001                                 070B   .22 ;               (R1)            <== R3
;KPL0001                                 070B   .23 ;               R1              <== R1 + 1
;KPL0001                                 070B   .24 ;               RESR1(R7)       <== RESR1(R7) + 1
;KPL0001                                 070B   .25 ;       otherwise:
;KPL0001                                 070B   .26 ;               RESR0(R7)       <== SS$_BUFFEROVF
;KPL0001                                 070B   .27 ;++
;KPL0001                                 070B   .28 ; PUTDOLLAR is an internal routine which is the equivalent of:
;KPL0001                                 070B   .29 ;
;KPL0001                                 070B   .30 ;       MOVB    #^A/$/, R3
;KPL0001                                 070B   .31 ;       BSBB    PUTCHAR
;KPL0001                                 070B   .32 ;--
;KPL0001                                 070B   .33 PUTDOLLAR:
;KPL0001                  53    24   90   070B  .34         MOVB    #^A/$/, R3              ;Setup to put "$" in output buffer.
;KPL0001                                 070E  .35 PUTCHAR:
;KPL0001                        50   D7   070E  .36         DECL    R0                      ;Decrease characters remaining count.
;KPL0001                        07   19   0710  .37         BLSS    90$                     ;Branch if no more characters remaining.
;KPL0001                  81    53   90   0712  .38         MOVB    R3, (R1)+               ;Copy character to output buffer
;KPL0001                    0C A7      D6   0715  .39         INCL    RESR1(R7)               ;Count characters stored
;KPL0001                               05   0718  .40         RSB                             ;Return
```

```
;KPL0001                                0719   .41
;KPL0001                0601 8F   3C   0719   .42 90$:    MOVZWL  #SS$_BUFFEROVF, -       ;Set buffer overflow status
                         08 A7         071D
;KPL0001                                071F   .43                 RESR0(R7)
;KPL0001                          05    071F   .44         RSB
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-14

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                        0720  1623          .SBTTL  BROADCAST TO A TERMINAL
                        0720  1624 ;++
                        0720  1625 ; IOC$BROADCAST
                        0720  1626 ;
                        0720  1627 ;       This routine will allow driver fork processes to broadcast a
                        0720  1628 ;       given message to given terminal.  The broadcast request is
                        0720  1629 ;       dispatched to the proper terminal and control returns immediately
                        0720  1630 ;       to the caller.  Some time later the broadcast will complete, and
                        0720  1631 ;       at that time all the necessary post-processing will be done.
                        0720  1632 ;
                        0720  1633 ;       This routine does not implement all the features of the $BRDCST system
                        0720  1634 ;       service, but only the bare minimum necessary to send a message to a
                        0720  1635 ;       single terminal.  For more information about the terminal broadcast
                        0720  1636 ;       mechanism, see the module SYSBRDCST.
                        0720  1637 ;
                        0720  1638 ; Input:
                        0720  1639 ;
                        0720  1640 ;       R1 = Message length
                        0720  1641 ;       R2 = Message address
                        0720  1642 ;       R5 = Address of target terminal's UCB
                        0720  1643 ;
                        0720  1644 ; Implicit input:
                        0720  1645 ;
                        0720  1646 ;       IPL$_ASTDEL  <=  CURRENT_IPL  <=  UCB$B_FIPL(R5)
                        0720  1647 ;
                        0720  1648 ; Output:
                        0720  1649 ;
                        0720  1650 ;       None.  The contents of R1 .. R5 are preserved across the call.
                        0720  1651 ;
                        0720  1652 ; Routine value:
                        0720  1653 ;
                        0720  1654 ;       SS$_NORMAL      - The broadcast completed successfully.
                        0720  1655 ;       SS$_INSFMEM     - Insufficient dynamic nonpaged pool for the request.
                        0720  1656 ;       SS$_DEVOFFLINE  - The target terminal has rejected the request.
                        0720  1657 ;       SS$_ILLIOFUNC   - The specified UCB does not belong to a terminal.
                        0720  1658 ;                         (Therefore a BROADCAST is an illegal I/O function.)
                        0720  1659 ;--
                        0720  1660
              00000000  0720  1661 SAVED_R0 = 0                                ;.
              00000004  0720  1662 SAVED_R1 = 4                                ; .
              00000008  0720  1663 SAVED_R2 = 8                                ; .
              0000000C  0720  1664 SAVED_R3 = 12                               ; . Symbolic offsets to saved registers
              00000010  0720  1665 SAVED_R4 = 16                               ; .
              00000014  0720  1666 SAVED_R5 = 20                               ;.
                        0720  1667
                        0720  1668 IOC$BROADCAST::                             ; Broadcast to a terminal
     50   00F4 8F   3C  0720  1669          MOVZWL  #SS$_ILLIOFUNC,R0           ; Assume device not a terminal
          02   E1      0725  1670          BBC     #DEV$V_TRM,-                ; Branch if not a terminal
       56 38 A5         0727  1671                  UCB$L_DEVCHAR(R5),14$       ;
          3F   BB      072A  1672          PUSHR   #^M<R0,R1,R2,R3,R4,R5>      ; Save R0 .. R5
;TCM0003   51   30      072C    .1        ADDL2   #TTY$K_WB_LENGTH,R1         ; Calculate the total pool required
-1   6E   0124 8F   3C  072F  1674          MOVZWL  #SS$_INSFMEM,SAVED_R0(SP); Assume allocation failure
            F8C9'  30  0734  1675          BSBW    EXE$ALONONPAGED             ; Allocate the pool
          44 50    E9  0737  1676          BLBC    R0,13$                      ; Exit if error
                        073A  1677          ;
                        073A  1678          ; Fill in the Terminal Write Packet (TWP).
                        073A  1679          ; Note that EXE$ALONONPAGED the pool size
```

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                        073A  1680          ; in R1 and the pool address in R2.
                        073A  1681          ;
08 A2    51    B0       073A  1682          MOVW    R1,TTY$W_WB_SIZE(R2)    ; Set TWP size
         30    90       073E  1683          MOVB    #DYN$C_TWP,-            ; Set TWP structure type
      0A A2             0740  1684                  TTY$B_WB_TYPE(R2)       ;
         06    90       0742  1685          MOVB    #IPL$_QUEUEAST,-        ; Set the TWP fork IPL (for later use)
      0B A2             0744  1686                  TTY$B_WB_FIPL(R2)       ;
10 A2    01    D0       0746  1687          MOVL    #1,TTY$L_WB_FR3(R2)     ; Request refresh of read prompt
      30 A2    9E       074A  1688          MOVAB   TTY$L_WB_DATA(R2),-     ; Set address of message start
      1C A2             074D  1689                  TTY$L_WB_NEXT(R2)       ;
      04 AE    C1       074F  1690          ADDL3   SAVED_R1(SP),-          ; Set address of message end
      1C A2             0752  1691                  TTY$L_WB_NEXT(R2),-     ;
      20 A2             0754  1692                  TTY$L_WB_END(R2)        ;
      8B'AF    9E       0756  1693          MOVAB   B^END_BROADCAST,-       ; Set callback address
      2C A2             0759  1694                  TTY$L_WB_RETADDR(R2)    ;
      24 A2    D4       075B  1695          CLRL    TTY$L_WB_IRP(R2)        ; Clear pointer to associated IRP
         52    DD       075E  1696          PUSHL   R2                      ; Save TWP address
      08 AE    28       0760  1697          MOVC3   4+SAVED_R1(SP),-        ; Copy the message text to the TWP
      0C BE             0763  1698                  @4+SAVED_R2(SP),-       ; (note the stack depth changed)
      30 A2             0765  1699                  TTY$L_WB_DATA(R2)       ;
                        0767  1700          ;
                        0767  1701          ; Queue the broadcast request to the terminal.
                        0767  1702          ; The disposition of the broadcast request will be determined
                        0767  1703          ; by the contents of TTY$L_WB_END.  Note that if the request is
                        0767  1704          ; accepted by a remote terminal, or is rejected outright, the
                        0767  1705          ; TWP is no longer needed, and may be deallocated.  The TTY$L_WB_END
                        0767  1706          ; field of the TWP will contain one of the following values:
                        0767  1707          ;
                        0767  1708          ;       System address: request accepted by TTDRIVER
                        0767  1709          ;       1:              request accepted by RTTDRIVER
                        0767  1710          ;       2:              request rejected
                        0767  1711          ;
   53    6E    D0       0767  1712          MOVL    (SP),R3                 ; Put TWP address in R3
55    18 AE    D0       076A  1713          MOVL    4+SAVED_R5(SP),R5       ; Restore UCB address
      F88F'    30       076E  1714          BSBW    EXE$ALTQUEPKT           ; Queue the request to the terminal
         50 8ED0        0771  1715          POPL    R0                      ; Remove TWP address from the stack
   6E    01    3C       0774  1716          MOVZWL  #SS$_NORMAL,SAVED_R0(SP); Assume success
      20 A0    D5       0777  1717          TSTL    TTY$L_WB_END(R0)        ; Check for rejection
         05    13       077A  1718          BEQL    69$                     ; Branch if request rejected
         08    14       077C  1719          BGTR    80$                     ; Branch if remote terminal accepted
         3F    BA       077E  1720 13$:     POPR    #^M<R0,R1,R2,R3,R4,R5>  ; Restore the registers
               05       0780  1721 14$:     RSB                             ; Return
   0084 8F    3C       0781  1722 69$:     MOVZWL  #SS$_DEVOFFLINE,-       ; Set broadcast rejection status
         6E             0785  1723                  SAVED_R0(SP)            ;
      F877'    30       0786  1724 80$:     BSBW    COM$DRVDEALMEM          ; Deallocate the TWP
         F3    11       0789  1725          BRB     13$                     ; Take common exit path
                        078B  1726
                        078B  1727 ;
                        078B  1728 ; The following code performs all of the necessary broadcast post-processing.
                        078B  1729 ; This entry point is FORKed to at IPL IPL$_QUEUEAST from the terminal driver.
                        078B  1730 ; The fork block is the TWP.
                        078B  1731 ;
                        078B  1732 END_BROADCAST:                           ; Post-processor for broadcast requests
   50    55    D0       078B  1733          MOVL    R5,R0                   ; Copy TWP address
      F86F'    31       078E  1734          BRW     EXE$DEANONPAGED         ; Deallocate the TWP and return
```

```
;ACG0399                                0791     .2          .SBTTL  SCAN THE I/O DATA BASE
;ACG0399                                0791     .3 ;+
;ACG0399                                0791     .4 ; IOC$SCAN_IODB - Scan the I/O data base and return next block.
;ACG0399                                0791     .5 ;
;ACG0399                                0791     .6 ; This routine is called to scan the device lists in the IO data base and
;ACG0399                                0791     .7 ; return a pointer to the next block in the list.  Context is kept in R11
;ACG0399                                0791     .8 ; and by using back pointers.
;ACG0399                                0791     .9 ;
;ACG0399                                0791    .10 ; Inputs:
;ACG0399                                0791    .11 ;
;ACG0399                                0791    .12 ;       The I/O data base is locked for read access.  This means that the caller
;ACG0399                                0791    .13 ;       owns the I/O data base mutex and/or is at IPL SYNCH or higher.
;ACG0399                                0791    .14 ;
;ACG0399                                0791    .15 ;               R11 =  0 implies first call
;ACG0399                                0791    .16 ;               R11 <> 0 indicates that R11 is pointer to current DDB
;ACG0399                                0791    .17 ;               R10 =  0 implies end of UCB chain
;ACG0399                                0791    .18 ;               R10 <> 0 indicates that R10 is pointer to current UCB
;ACG0399                                0791    .19 ;
;ACG0399                                0791    .20 ; Outputs:
;ACG0399                                0791    .21 ;
;ACG0399                                0791    .22 ;               R0  = Success status.
;ACG0399                                0791    .23 ;               R10 = Pointer to UCB
;ACG0399                                0791    .24 ;               R11 = Pointer to DDB
;ACG0399                                0791    .25 ;
;ACG0399                                0791    .26 ;       All other registers preserved.
;ACG0399                                0791    .27 ;
;ACG0399                                0791    .28 ;-
;ACG0399                                0791    .29
;ACG0399                                0791    .30 IOC$SCAN_IODB::
;ACG0399                                0791    .31
;ACG0399          50    01    D0  0791    .32         MOVL    #1,R0                   ; Success
;ACG0399                5B    D5  0794    .33         TSTL    R11                     ; Initial condition?
;ACG0399                2C    13  0796    .34         BEQL    50$                     ; Yes
;ACG0399                5A    D5  0798    .35         TSTL    R10                     ; End of chain?
;ACG0399                07    13  079A    .36         BEQL    10$                     ; Yes
;ACG0399       5A    30 AA    D0  079C    .37         MOVL    UCB$L_LINK(R10),R10     ; Get next UCB
;ACG0399                01    13  07A0    .38         BEQL    10$                     ; None
;ACG0399                      05  07A2    .39         RSB
;ACG0399                          07A3    .40
;ACG0399                6B    D5  07A3    .41 10$:    TSTL    DDB$L_LINK(R11)         ; At end of DDB chain?
;ACG0399                0A    13  07A5    .42         BEQL    30$                     ; Yes
;ACG0399          5B    6B    D0  07A7    .43         MOVL    DDB$L_LINK(R11),R11     ; No, get next one
;ACG0399       5A    04 AB    D0  07AA    .44 20$:    MOVL    DDB$L_UCB(R11),R10      ; Pick up first UCB
;ACG0399                F3    13  07AE    .45         BEQL    10$                     ; None, get next DDB
;ACG0399                      05  07B0    .46         RSB
;ACG0399                          07B1    .47
;ACG0399       5B    34 AB    D0  07B1    .48 30$:    MOVL    DDB$L_SB(R11),R11       ; Get back to parent system block
;ACG0399          5B    6B    D0  07B5    .49 40$:    MOVL    SB$L_FLINK(R11),R11     ; Get next system block
;ACG0399                5B    D1  07B8    .50         CMPL    R11,#SCS$GQ_CONFIG      ; End of chain?
                  00000000'8F          07BA
;ACG0399                0A    12  07BF    .51         BNEQ    60$                     ; No
;ACG0399                50    D7  07C1    .52         DECL    R0
;ACG0399                      05  07C3    .53         RSB
;ACG0399                          07C4    .54
;ACG0399        00000000'9F    D0  07C4    .55 50$:    MOVL    @#SCS$GQ_CONFIG,R11     ; Pick up first system block
                        5B          07CA
;ACG0399              54 AB    D5  07CB    .56 60$:    TSTL    SB$L_DDB(R11)           ; Is there a DDB chain?
```

```
;ACG0399                E5   13  07CE   .57         BEQL    40$                     ; No, go try next SB
;ACG0399          5B 54 AB   D0  07D0   .58         MOVL    SB$L_DDB(R11),R11       ; Yes, get the first DDB
;ACG0399                D4   11  07D4   .59         BRB     20$
;ACG0399                         07D6   .60
```

```
;ACG0399                                07D6   .62          .SBTTL  SCAN THE I/O DATA BASE BOTH PRIMARY & SECONDARY PATHS
;ACG0399                                07D6   .63 ;++
;ACG0399                                07D6   .64 ; IOC$SCAN_IODB_2P
;ACG0399                                07D6   .65 ;
;ACG0399                                07D6   .66 ; This routine is called to scan the device lists in the IO data base and
;ACG0399                                07D6   .67 ; return a pointer to the next block in the list.  Context is kept in R10
;ACG0399                                07D6   .68 ; and R11 and by using back pointers.
;ACG0399                                07D6   .69 ;
;ACG0399                                07D6   .70 ; SCAN_IODB_2P differs from SCAN_IODB in that it will scan both the primary
;ACG0399                                07D6   .71 ; and secondary UCB chain for each DDB.  This means that if a device is
;ACG0399                                07D6   .72 ; dual-pathed, SCAN_IODB_2P will return the address of its UCB twice, once in
;ACG0399                                07D6   .73 ; the context of the primary controller and once in the context of the
;ACG0399                                07D6   .74 ; secondary.
;ACG0399                                07D6   .75 ;
;ACG0399                                07D6   .76 ; Inputs and Outputs are identical to IOC$SCAN_IODB.
;ACG0399                                07D6   .77 ;--
;ACG0399                                07D6   .78
;ACG0399                                07D6   .79 IOC$SCAN_IODB_2P::
;ACG0399                                07D6   .80
;ACG0399          50    01    D0  07D6   .81          MOVL    #1,R0                   ; Success
;ACG0399                5B    D5  07D9   .82          TSTL    R11                     ; Initial condition?
;ACG0399                41    13  07DB   .83          BEQL    60$                     ; Yes
;ACG0399                5A    D5  07DD   .84          TSTL    R10                     ; Caller signalled end of chain?
;ACG0399                1C    13  07DF   .85          BEQL    30$                     ; Yes, done with this DDB
;ACG0399                           07E1   .86 ;
;ACG0399                           07E1   .87 ; At this point we must decide if we're following the primary or secondary
;ACG0399                           07E1   .88 ; chain of UCBs on this DDB.
;ACG0399                           07E1   .89 ;
;ACG0399       5B    28    AA    D1  07E1   .90          CMPL    UCB$L_DDB(R10),R11      ; Are we traversing the primary chain?
;ACG0399                07    12  07E5   .91          BNEQ    10$                     ; Branch if we're following secondary
;ACG0399       5A    30    AA    D0  07E7   .92          MOVL    UCB$L_LINK(R10),R10     ; Get next UCB on primary chain
;ACG0399                09    13  07EB   .93          BEQL    20$                     ; Branch if none to try secondary chain
;ACG0399                      05  07ED   .94          RSB                             ; Else return UCB address to caller
;ACG0399                           07EE   .95 ;
;ACG0399                           07EE   .96 ; Get next UCB on secondary chain.
;ACG0399                           07EE   .97 ;
;ACG0399       5A    00A4  CA    D0  07EE   .98 10$:     MOVL    UCB$L_DP_LINK(R10),R10  ; Get next UCB on secondary chain
;ACG0399                08    13  07F3   .99          BEQL    30$                     ; Branch if none left
;ACG0399                      05  07F5  .100          RSB                             ; Else return UCB address to caller
;ACG0399                           07F6  .101 ;
;ACG0399                           07F6  .102 ; No UCBs left on primary chain; traverse secondary chain if present.
;ACG0399                           07F6  .103 ;
;ACG0399          5A    40    AB  D0  07F6  .104 20$:     MOVL    DDB$L_DP_UCB(R11),R10   ; Get first UCB on secondary chain
;ACG0399                01    13  07FA  .105          BEQL    30$                     ; Branch if none to try next DDB
;ACG0399                      05  07FC  .106          RSB                             ; Else return UCB address to caller
;ACG0399                           07FD  .107 ;
;ACG0399                           07FD  .108 ; Step to next DDB.
;ACG0399                           07FD  .109 ;
;ACG0399                6B    D5  07FD  .110 30$:     TSTL    DDB$L_LINK(R11)         ; At end of DDB chain?
;ACG0399                0A    13  07FF  .111          BEQL    40$                     ; Yes, try next system block
;ACG0399             5B    6B    D0  0801  .112          MOVL    DDB$L_LINK(R11),R11     ; No, get next one
;ACG0399          5A    04    AB  D0  0804  .113 35$:     MOVL    DDB$L_UCB(R11),R10      ; Pick up first UCB on primary chain
;ACG0399                EC    13  0808  .114          BEQL    20$                     ; None, try for UCB on secondary chain
;ACG0399                      05  080A  .115          RSB                             ; Else return UCB address to caller
;ACG0399                           080B  .116
;ACG0399                           080B  .117 ;
;ACG0399                           080B  .118 ; Step to next system block.
```

```
;ACG0399                                 080B  .119 ;
;ACG0399                5B   34 AB   D0  080B  .120 40$:    MOVL    DDB$L_SB(R11),R11       ; Get back to parent system block
;ACG0399                   5B   6B   D0  080F  .121 50$:    MOVL    SB$L_FLINK(R11),R11     ; Get next system block
;ACG0399                        5B   D1  0812  .122         CMPL    R11,#SCS$GQ_CONFIG      ; End of chain?
                      00000000'8F       0814
;ACG0399                        0A   12  0819  .123         BNEQ    70$                     ; No
;ACG0399                        50   D7  081B  .124         DECL    R0                      ; Signal end of IO scan
;ACG0399                             05  081D  .125         RSB
;ACG0399                                 081E  .126
;ACG0399                00000000'9F   D0  081E  .127 60$:    MOVL    @#SCS$GQ_CONFIG,R11     ; Pick up first system block
                               5B        0824
;ACG0399                      54 AB   D5  0825  .128 70$:    TSTL    SB$L_DDB(R11)           ; Is there a DDB chain?
;ACG0399                         E5   13  0828  .129         BEQL    50$                     ; No, go try next SB
;ACG0399                5B    54 AB   D0  082A  .130         MOVL    SB$L_DDB(R11),R11       ; Yes, get the first DDB
;ACG0399                         D4   11  082E  .131         BRB     35$                     ; Try for UCB on primary chain
```

```
;ACG0399                                0830  .133          .SBTTL  IOC$CTRLINIT - Call driver controller init. routine
;ACG0399                                0830  .134 ;++
;ACG0399                                0830  .135 ;  FUNCTIONAL DESCRIPTION:
;ACG0399                                0830  .136 ;
;ACG0399                                0830  .137 ;       For UNIBUS devices, the device CSR is tested for existance.  If this
;ACG0399                                0830  .138 ;       test fails, a no routine call occurs and failure status is returned in
;ACG0399                                0830  .139 ;       R0.  Input values for a device driver's controller initialization
;ACG0399                                0830  .140 ;       routine are loaded into the proper registers, the routine starting
;ACG0399                                0830  .141 ;       address is located, and if a routine exists, it is called.
;ACG0399                                0830  .142 ;
;ACG0399                                0830  .143 ;  INPUTS:
;ACG0399                                0830  .144 ;       R1      CSR address to use if IDB contains zero
;ACG0399                                0830  .145 ;       R8      CRB address (primary)
;ACG0399                                0830  .146 ;       R11     DDB address
;ACG0399                                0830  .147 ;
;ACG0399                                0830  .148 ;  OUTPUTS:
;ACG0399                                0830  .149 ;       R0      Status (success, or failure ==> UNIBUS CSR non-existant)
;ACG0399                                0830  .150 ;       R1-R6   Destroyed
;ACG0399                                0830  .151 ;--
;ACG0399                                0830  .152
;ACG0399                                0830  .153 ;++
;ACG0399                                0830  .154 ;  Controller initialization routine parameters:
;ACG0399                                0830  .155 ;
;ACG0399                                0830  .156 ;  INPUTS:
;ACG0399                                0830  .157 ;       R4      CSR address (for UNIBUS and MASSBUS devices)
;ACG0399                                0830  .158 ;               SCSSYSTEMID address (for class drivers during SYSGEN driver
;ACG0399                                0830  .159 ;                       loading)
;ACG0399                                0830  .160 ;               zero for all others, including class drivers during power
;ACG0399                                0830  .161 ;                       failure recovery
;ACG0399                                0830  .162 ;       R5      IDB address (or zero if none exists)
;ACG0399                                0830  .163 ;       R6      DDB address
;ACG0399                                0830  .164 ;       R8      CRB address
;ACG0399                                0830  .165 ;
;ACG0399                                0830  .166 ;  OUTPUTS:
;ACG0399                                0830  .167 ;       Must preserve all registers except R0 through R4.
;ACG0399                                0830  .168 ;
;ACG0399                                0830  .169 ;--
;ACG0399                                0830  .170
;ACG0399                                0830  .171
;ACG0399                                0830  .172 IOC$CTRLINIT::
;ACG0399                                0830  .173
;ACG0399  55   2C A8   D0  0830  .174          MOVL    CRB$L_INTD+VEC$L_IDB(R8), R5    ; Get IDB address.
;ACG0399         05   18  0834  .175          BGEQ    10$                             ; Branch if none.
;ACG0399     54  65   D0  0836  .176          MOVL    IDB$L_CSR(R5), R4               ; Get CSR address.
;ACG0399         05   19  0839  .177          BLSS    20$                             ; Branch if really a CSR.
;ACG0399     54  51   D0  083B  .178 10$:     MOVL    R1, R4                          ; Else, use supplied value,
;ACG0399         1B   11  083E  .179          BRB     40$                             ; and skip CSR testing.
;ACG0399                  0840  .180
;ACG0399  56   14 A5   D0  0840  .181 20$:     MOVL    IDB$L_ADP(R5), R6               ; Get ADP address.
;ACG0399         15   18  0844  .182          BGEQ    40$                             ; If none, skip CSR test.
;ACG0399  0E A6   01   B1  0846  .183          CMPW    #AT$_UBA, ADP$W_ADPTYPE(R6)     ; Is this a UBA?
;ACG0399         0F   12  084A  .184          BNEQ    40$                             ; If not a UBA, skip CSR test.
;ACG0399     56  66   D0  084C  .185          MOVL    ADP$L_CSR(R6), R6               ; Get adapter config reg addr.
;ACG0399     50  54   D0  084F  .186          MOVL    R4, R0                          ; Setup CSR for test.
;ACG0399  00000000'GF 16  0852  .187          JSB     G^EXE$TEST_CSR                  ; Test UNIBUS CSR.
;ACG0399        0E 50 E9  0858  .188          BLBC    R0, 90$                         ; Branch if no CSR present.
;ACG0399                  085B  .189
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;ACG0399        50    30 A8    D0   085B  .190 40$:    MOVL    CRB$L_INTD+VEC$L_INITIAL(R8), R0 ; Get ctrl init rout addr.
;ACG0399              05    18   085F  .191          BGEQ    80$                              ; Branch if none.
;ACG0399           56 5B    D0   0861  .192          MOVL    R11, R6                          ; Get DDB address.
;ACG0399              60    16   0864  .193          JSB     (R0)                             ; Call ctrl init routine.
;ACG0399                          0866  .194
;ACG0399           50 01    D0   0866  .195 80$:     MOVL    #1, R0                           ; Set success status.
;ACG0399                       05   0869  .196 90$:     RSB                                      ; Return w/ status.
```

```
;ACG0399                                086A  .198          .SBTTL  IOC$UNITINIT - Call driver unit init. routine
;ACG0399                                086A  .199 ;++
;ACG0399                                086A  .200 ;  FUNCTIONAL DESCRIPTION:
;ACG0399                                086A  .201 ;
;ACG0399                                086A  .202 ;       Input values for a device driver's unit initialization routine are
;ACG0399                                086A  .203 ;       loaded into the proper registers, the routine starting address is
;ACG0399                                086A  .204 ;       located, and if a routine exists, it is called.
;ACG0399                                086A  .205 ;
;ACG0399                                086A  .206 ;  INPUTS:
;ACG0399                                086A  .207 ;       R5      UCB address
;ACG0399                                086A  .208 ;       R8      CRB address (primary)
;ACG0399                                086A  .209 ;
;ACG0399                                086A  .210 ;  OUTPUTS:
;ACG0399                                086A  .211 ;       R0-R4   Destroyed
;ROW0221                                086A  .212 ;
;ROW0221                                086A  .213 ;  NOTES:
;ROW0221                                086A  .214 ;
;ROW0221                                086A  .215 ;       There are two unit initialization routine addresses in the I/O data
;ROW0221                                086A  .216 ;       base; CRB$L_INTD_VEC$L_UNITINIT and DDT$L_UNITINIT.  Normally, only
;ROW0221                                086A  .217 ;       one of these two places should contain a unit initialization routine
;ROW0221                                086A  .218 ;       address.  However, for the console block storage device, the both
;ROW0221                                086A  .219 ;       locations contain an address, and the DDT contains the address which
;ROW0221                                086A  .220 ;       must be used.
;ROW0221                                086A  .221 ;
;ROW0221                                086A  .222 ;       In this case, the CRB is shared by the console terminal and console
;ROW0221                                086A  .223 ;       block storage devices.  The CRB contains the address of the unit
;ROW0221                                086A  .224 ;       initialization routine for the console terminal, and the console
;ROW0221                                086A  .225 ;       terminal DDT contains no unit initialization routine address.  Thus
;ROW0221                                086A  .226 ;       the console terminal device "fits" the "normal" case.  However, the
;ROW0221                                086A  .227 ;       console block storage device DDT contains a unit initialization
;ROW0221                                086A  .228 ;       routine which differs from the console terminal unit initialization
;ROW0221                                086A  .229 ;       routine and whose address is stored in the DDT.
;ROW0221                                086A  .230 ;
;ROW0221                                086A  .231 ;       Since the CRB is shared and contains the wrong unit initialization
;ROW0221                                086A  .232 ;       routine address for the console block storage device, the DDT must be
;ROW0221                                086A  .233 ;       inspected first.  Initialization for the console terminal will be
;ROW0221                                086A  .234 ;       accomplished correctly regardless of which address is checked first.
;ROW0203                                086A  .235 ;
;ROW0203                                086A  .236 ;--
;ROW0203                                086A  .237
;ROW0203                                086A  .238 ;++
;ROW0203                                086A  .239 ;  Unit initialization routine parameters:
;ROW0203                                086A  .240 ;
;ROW0203                                086A  .241 ;  INPUTS:
;ROW0203                                086A  .242 ;       R3      CSR address (primary)
;ROW0203                                086A  .243 ;       R4      CSR address (secondary, same as primary if no secondary exists)
;ROW0203                                086A  .244 ;       R5      UCB address
;ROW0203                                086A  .245 ;
;ROW0203                                086A  .246 ;  OUTPUTS:
;ROW0203                                086A  .247 ;       Must preserve all registers except R0 through R4.
;ROW0203                                086A  .248 ;
;ROW0203                                086A  .249 ;--
;ROW0203                                086A  .250
;ROW0203                                086A  .251
;ROW0203                                086A  .252 IOC$UNITINIT::
;ROW0203                                086A  .253
;ROW0221          50    0088 C5    D0  086A  .254          MOVL    UCB$L_DDT(R5), R0               ; Get DDT address.
```

```
;ROW0221        50    18 A0    D0  086F  .255          MOVL    DDT$L_UNITINIT(R0), R0          ; Get DDT unit init rout addr.
;ROW0221              50       D1  0873  .256          CMPL    R0, #IOC$RETURN                 ; Null unit init routine?
                000005D9'8F          0875
;ROW0221              06       12  087A  .257          BNEQ    10$                             ; Branch if real unit init rout.
;ROW0221        50    3C A8    D0  087C  .258          MOVL    CRB$L_INTD+VEC$L_UNITINIT(R8), R0 ; Get CRB unit init rout addr.
;ROW0221              1A       18  0880  .259          BGEQ    90$                             ; Branch if no unit init rout.
;ROW0203                       0882  .260
;ROW0203              54       D4  0882  .261 10$:     CLRL    R4                              ; Assume no IDB exists.
;ROW0203        53    2C A8    D0  0884  .262          MOVL    CRB$L_INTD+VEC$L_IDB(R8), R3    ; Get IDB address.
;ROW0203              10       18  0888  .263          BGEQ    50$                             ; Branch if none.
;ROW0203           53    63    D0  088A  .264          MOVL    IDB$L_CSR(R3), R3               ; Get primary CSR.
;ROW0203           54    53    D0  088D  .265          MOVL    R3, R4                          ; Assume no sec. CRB exists.
;ROW0203        51    20 A8    D0  0890  .266          MOVL    CRB$L_LINK(R8), R1              ; Get secondary CRB addr.
;ROW0203              04       18  0894  .267          BGEQ    50$                             ; Branch if none.
;ROW0203                       0896  .268          ASSUME  IDB$L_CSR EQ 0
;ROW0203        54    2C B1    D0  0896  .269          MOVL    @CRB$L_INTD+VEC$L_IDB(R1), R4   ; Get secondary CSR addr.
;ROW0203                       089A  .270
;ROW0203              60       17  089A  .271 50$:     JMP     (R0)                            ; Call unit init routine, and
;ROW0203                       089C  .272                                                       ; return to caller.
;ROW0221                       089C  .273
;ROW0221                    05 089C  .274 90$:     RSB                                         ; No unit init routine to call:
;ROW0221                       089D  .275                                                       ; return to caller.
```

```
;ACG0414                                089D  .277          .SBTTL  Parse Device Name String
;ACG0414                                089D  .278
;ACG0414                                089D  .279 ;+
;ACG0414                                089D  .280 ;
;ACG0414                                089D  .281 ; IOC$PARSDEVNAM - parse device name string
;ACG0414                                089D  .282 ;
;ACG0414                                089D  .283 ; This routine parses a device name string, checking syntax and
;ACG0414                                089D  .284 ; extracting node name, allocation class number, and unit number.
;ACG0414                                089D  .285 ; If device type format is specified, it is converted into the internal
;ACG0414                                089D  .286 ; compressed format.
;ACG0414                                089D  .287 ;
;ACG0414                                089D  .288 ; INPUTS:
;ACG0414                                089D  .289 ;
;ACG0414                                089D  .290 ;       R8 = size of name string
;ACG0414                                089D  .291 ;       R9 = address of name string
;ACG0414                                089D  .292 ;       R10 = flags
;ACG0414                                089D  .293 ;
;ACG0414                                089D  .294 ; OUTPUTS:
;ACG0414                                089D  .295 ;
;ACG0414                                089D  .296 ;       R0 = SS$_NORMAL - valid name string
;ACG0414                                089D  .297 ;          = SS$_IVDEVNAM - invalid device name string
;ACG0414                                089D  .298 ;       R2 = unit number
;ACG0414                                089D  .299 ;       R3 = length of SCS node name at head of name string
;ACG0414                                089D  .300 ;            or allocation class number
;ACG0414                                089D  .301 ;            or device type code
;ACG0414                                089D  .302 ;       R8 = size of name string
;ACG0414                                089D  .303 ;       R9 = address of name string
;ACG0414                                089D  .304 ;       R10 = flags
;ACG0414                                089D  .305 ;       R4 - R7, R11 preserved
;ACG0414                                089D  .306 ;
;ACG0414                                089D  .307 ;-
;ACG0414                                089D  .308
;ACG0414                                089D  .309          .ENABLE LSB
;ACG0414                                089D  .310
;ACG0414                                089D  .311 IOC$PARSDEVNAM::
;ACG0414        0070 8F    BB   089D  .312          PUSHR   #^M<R4,R5,R6>           ; save working registers
;ACG0414             58    D5   08A1  .313          TSTL    R8                      ; check name string length
;ACG0414             28    13   08A3  .314          BEQL    30$                     ; branch if null - error
;ACG0414          54 58    7D   08A5  .315          MOVQ    R8,R4                   ; copy name string descriptor
;ACG0414       56 59 01    C3   08A8  .316          SUBL3   #1,R9,R6                ; default is no node no allocation
;ACG0414                           08AC  .317                                      ; class, set pointer before beginning
;ACG0414                           08AC  .318                                      ; of the string
;ACG0414       69 58 24    3A   08AC  .319          LOCC    #^A'$',R8,(R9)          ; scan name for a "$"
;ACG0414             03    13   08B0  .320          BEQL    10$                     ; failed to find one - no nodename
;ACG0414          56 51    D0   08B2  .321          MOVL    R1,R6                   ; found it, save pointer
;ACG0414             52    7C   08B5  .322 10$:     CLRQ    R2                      ; init unit number and node name
;ACG0414          50 65    9A   08B7  .323 20$:     MOVZBL  (R5),R0                 ; get next character
;ACG0414       11 50 06    E1   08BA  .324          BBC     #6,R0,40$               ; br if code 0-^X3F - numeric or $
;ACG0414          50 20    8A   08BE  .325          BICB    #^X20,R0                ; collapse lower case to upper case
;ACG0414       5A 8F 50    91   08C1  .326          CMPB    R0,#^A'Z'               ; possible alphabetic?
;ACG0414             77    1A   08C5  .327          BGTRU   150$                    ; br if not
;ACG0414       41 8F 50    91   08C7  .328          CMPB    R0,#^A'A'               ; possible alphabetic?
;ACG0414             37    1E   08CB  .329          BGEQU   70$                     ; branch if OK - store it
;ACG0414             6F    11   08CD  .330 30$:     BRB     150$                    ; no - error
;ACG0414                           08CF  .331 ;
;ACG0414                           08CF  .332 ; Non alphabetic - may be numeric or "$"
;ACG0414                           08CF  .333 ;
```

```
;ACG0414                56   55   D1   08CF  .334 40$:    CMPL    R5,R6                   ; hit the "$" yet?
;ACG0414                     0E   13   08D2  .335          BEQL    50$                     ; yes, deal with it
;ACG0414                     34   1A   08D4  .336          BGTRU   80$                     ; past it, digits are unit number
;ACG0414                39   50   91   08D6  .337          CMPB    R0,#^A'9                ; legal?
;ACG0414                     63   1A   08D9  .338          BGTRU   150$                    ; no, error
;ACG0414                30   50   91   08DB  .339          CMPB    R0,#^A'0'               ; legal?
;ACG0414                     24   1E   08DE  .340          BGEQU   70$                     ; yes, accept it as alpha
;ACG0414                     5C   11   08E0  .341          BRB     150$                    ; no, error
;ACG0414                               08E2  .342 ;
;ACG0414                               08E2  .343 ; $ in device name - either node name or allocation class.
;ACG0414                               08E2  .344 ;
;ACG0414          53    55   59   C3   08E2  .345 50$:     SUBL3   R9,R5,R3                ; compute length of node name
;ACG0414                     1C   12   08E6  .346          BNEQ    70$                     ; branch if non-null - process the $
;ACG0414                               08E8  .347 ;
;ACG0414                               08E8  .348 ; Process allocation class number.
;ACG0414                               08E8  .349 ;
;ACG0414                     55   D6   08E8  .350 60$:     INCL    R5                      ; move over "$" to allocation
;ACG0414                     54   D7   08EA  .351          DECL    R4                      ; class digits.
;ACG0414                     6A   10   08EC  .352          BSBB    GETNUMBER               ; convert allocation class.
;ACG0414                53   52   D0   08EE  .353          MOVL    R2,R3                   ; store requested allocation class.
;ACG0414                     4B   15   08F1  .354          BLEQ    150$                    ; leq zero is not legal.
;ACG0414                5A   04   88   08F3  .355          BISB    #IOC$M_CLASS,R10        ; set allocation class flag
;ACG0414                50   24   91   08F6  .356          CMPB    #^A'$',R0               ; was terminator a "$"?
;ACG0414                     43   12   08F9  .357          BNEQ    150$                    ; if not, invalid device name.
;ACG0414                58   54   7D   08FB  .358          MOVQ    R4,R8                   ; reset device name - unit size.
;ACG0414                     54   D5   08FE  .359          TSTL    R4                      ; check remaining string count
;ACG0414                     B5   14   0900  .360          BGTR    20$                     ; if characters remain, process them.
;ACG0414                     3A   11   0902  .361          BRB     150$                    ; else, invalid device name.
;ACG0414                               0904  .362
;ACG0414                85   50   90   0904  .363 70$:     MOVB    R0,(R5)+                ; store potentially upcased character
;ACG0414                  AD 54   F5   0907  .364          SOBGTR  R4,20$                  ; any more characters to scan?
;ACG0414                               090A  .365 ;
;ACG0414                               090A  .366 ; End of alpha scan. Make sure we actually got a non-null device name.
;ACG0414                               090A  .367 ;
;ACG0414                58   54   C2   090A  .368 80$:     SUBL    R4,R8                   ; subtract unit number from string
;ACG0414                     2F   13   090D  .369          BEQL    150$                    ; if eql no device name specified
;ACG0414                     56   D6   090F  .370          INCL    R6                      ; point past $ in node name
;ACG0414                55   56   D1   0911  .371          CMPL    R6,R5                   ; see if we've processed any more chars
;ACG0414                     09   1F   0914  .372          BLSSU   90$                     ; branch if yes
;ACG0414                  25 5A   E8   0916  .373          BLBS    R10,150$                ; branch if physical - not valid
;ACG0414          21 5A         06   E1   0919  .374          BBC     #IOC$V_ANY,R10,150$     ; or if not generic search for any
;ACG0414                     0D   11   091D  .375          BRB     100$                    ; node name only - verify end of string
;ACG0414                               091F  .376 ;
;ACG0414                               091F  .377 ; Process unit number and make sure there's no trailing junk.
;ACG0414                               091F  .378 ;
;ACG0414                     52   D4   091F  .379 90$:     CLRL    R2                      ; init unit number to 0
;ACG0414                     54   D5   0921  .380          TSTL    R4                      ; see if there's anything left
;ACG0414                     0B   15   0923  .381          BLEQ    110$                    ; branch if not
;ACG0414                5A   01   88   0925  .382          BISB    #IOC$M_PHY,R10          ; set physical flag
;ACG0414                     2E   10   0928  .383          BSBB    GETNUMBER               ; convert unit number
;ACG0414                     54   D6   092A  .384          INCL    R4                      ; return terminator to string count
;ACG0414                     54   D5   092C  .385 100$:     TSTL    R4                      ; reached end of string?
;ACG0414                     0E   14   092E  .386          BGTR    150$                    ; branch if not - error
;ACG0414          37 5A         01   E0   0930  .387 110$:     BBS     #IOC$V_TYPE,R10,190$    ; branch if name is a device type
;ACG0414                50    01   D0   0934  .388 120$:     MOVL    #SS$_NORMAL,R0          ; successful parse
;ACG0414                0070  8F   BA   0937  .389 130$:     POPR    #^M<R4,R5,R6>           ; restore registers
;ACG0414                               093B  .390          RSB                             ; and return
```

```
;ACG0414                                    093C  .391 ;
;ACG0414                                    093C  .392 ; Invalid device name
;ACG0414                                    093C  .393 ;
;ACG0414                          8E   D5   093C  .394 140$:   TSTL    (SP)+                   ; pop GETNUMBER return address from stack
;ACG0414                    50    0144 8F   3C   093E  .395 150$:   MOVZWL  #SS$_IVDEVNAM,R0        ; set invalid device name
;ACG0414                          F2   11   0943  .396         BRB     130$
;ACG0414                                    0945  .397
;ACG0414                                    0945  .398 ;+
;ACG0414                                    0945  .399 ; Routine to convert ASCII to integer
;ACG0414                                    0945  .400 ;
;ACG0414                                    0945  .401 ; Inputs:
;ACG0414                                    0945  .402 ;
;ACG0414                                    0945  .403 ;       R2      assumed zero
;ACG0414                                    0945  .404 ;       R4      size of string
;ACG0414                                    0945  .405 ;       R5      starting address of string
;ACG0414                                    0945  .406 ;
;ACG0414                                    0945  .407 ; Outputs:
;ACG0414                                    0945  .408 ;
;ACG0414                                    0945  .409 ;       R0      terminator character
;ACG0414                                    0945  .410 ;       R2      converted number
;ACG0414                                    0945  .411 ;       R4      size of string with number and terminator character removed
;ACG0414                                    0945  .412 ;       R5      address of first character after number terminator character
;ACG0414                                    0945  .413 ;-
;ACG0414                                    0945  .414
;ACG0414                    50    85   9A   0945  .415 160$:   MOVZBL  (R5)+,R0                  ; get next character.
;ACG0414                    50    30   82   0948  .416         SUBB    #^A'0',R0               ; base it at decimal digits.
;ACG0414                          10   1F   094B  .417         BLSSU   170$                    ; branch if not a decimal digit.
;ACG0414                    09    50   91   094D  .418         CMPB    R0,#9                   ; is it a digit?
;ACG0414                          0B   1A   0950  .419         BGTRU   170$                    ; branch if not a decimal digit.
;ACG0414                    52    0A   C4   0952  .420         MULL    #10,R2                  ; scale current unit number by 10
;ACG0414                    52    50   C0   0955  .421         ADDL    R0,R2                   ; add new digit to accumulation.
;ACG0414                                    0958  .422 GETNUMBER:
;ACG0414                       EA 54   F4   0958  .423         SOBGEQ  R4,160$                 ; count off a character
;ACG0414                          04   11   095B  .424         BRB     180$                    ; branch if no more characters
;ACG0414                                    095D  .425
;ACG0414                 50    FF A5   9A   095D  .426 170$:   MOVZBL  -1(R5),R0               ; restore terminator character.
;ACG0414                          52   D1   0961  .427 180$:   CMPL    R2,#32768               ; check number value
;ACG0414                       00008000 8F        0963
;ACG0414                          D2   1E   0968  .428         BGEQU   140$                    ; branch if not valid
;ACG0414                          05   096A  .429         RSB                             ; return to caller.
;ACG0414                                    096B  .430
;ACG0414                                    096B  .431 ;
;ACG0414                                    096B  .432 ; Parse device type name. We do this last because all the regular device
;ACG0414                                    096B  .433 ; name validation is necessary anyway. Now we just have to do the
;ACG0414                                    096B  .434 ; additional checks and pack the characters.
;ACG0414                                    096B  .435 ;
;ACG0414                          53   D5   096B  .436 190$:   TSTL    R3                      ; check if we saw node or alloc class
;ACG0414                          CF   12   096D  .437         BNEQ    150$                    ; branch if so - not valid
;ACG0414                    50    55   59   C3   096F  .438         SUBL3   R9,R5,R0                ; compute total length of string
;ACG0414                          50   58   C2   0973  .439         SUBL    R8,R0                   ; compute length of unit number string
;ACG0414                          02   50   D1   0976  .440         CMPL    R0,#2                   ; must be two digits
;ACG0414                               C3   12   0979  .441         BNEQ    150$                    ; branch if not - not valid
;ACG0414                          55   59   D0   097B  .442         MOVL    R9,R5                   ; copy name address again
;ACG0414                          02   58   D1   097E  .443         CMPL    R8,#2                   ; check minimum name length
;ACG0414                               BB   1F   0981  .444         BLSSU   150$                    ; too short - out
;ACG0414                    85    40 8F   83   0983  .445         SUBB3   #^A'A'-1,(R5)+,R0       ; get char and convert to compressed
                                     50        0987
```

```
;ACG0414        05   11   50   F0  0988  .446          INSV    R0,#17,#5,R3            ; store compressed code
                                53  098C
;ACG0414          85   40 8F   83  098D  .447          SUBB3   #^A'A'-1,(R5)+,R0       ; get char and convert to compressed
                             50      0991
;ACG0414        05   0C   50   F0  0992  .448          INSV    R0,#12,#5,R3            ; store compressed code
                             53      0996
;ACG0414             03   58   D1  0997  .449          CMPL    R8,#3                   ; check how many chars left
;ACG0414                  A2   1A  099A  .450          BGTRU   150$                    ; string was longer than 5 - error
;ACG0414                  0A   1F  099C  .451          BLSSU   200$                    ; short - don't take 3rd alpha
;ACG0414          85   40 8F   83  099E  .452          SUBB3   #^A'A'-1,(R5)+,R0       ; get char and convert to compressed
                             50      09A2
;ACG0414        05   07   50   F0  09A3  .453          INSV    R0,#7,#5,R3             ; store compressed code
                             53      09A7
;ACG0414             53   52   C0  09A8  .454 200$:    ADDL    R2,R3                   ; add in unit number
;ACG0414             5A   01   8A  09AB  .455          BICB    #IOC$M_PHY,R10          ; clear physical flag
;ACG0414                  FF83 31  09AE  .456          BRW     120$                    ; done
```

```
;ACG0414                                09B1   .458          .SBTTL  Search I/O Database for Device
;ACG0414                                09B1   .459
;ACG0414                                09B1   .460 ;+
;ACG0414                                09B1   .461 ;
;ACG0414                                09B1   .462 ; IOC$SEARCHINT - internal I/O database search
;ACG0414                                09B1   .463 ;
;ACG0414                                09B1   .464 ; This routine searches the I/O database for the specified device, using
;ACG0414                                09B1   .465 ; the specified search rules. Depending on the search, a lock may or may
;ACG0414                                09B1   .466 ; not be taken out on the device when it is found.
;ACG0414                                09B1   .467 ;
;ACG0414                                09B1   .468 ; Note! While this routine is non-paged and therefore may be called at
;ACG0414                                09B1   .469 ; elevated IPL, the device locking code it calls is not. Therefore, only
;ACG0414                                09B1   .470 ; searches with IOC$V_ANY may be called from elevated IPL.
;ACG0414                                09B1   .471 ;
;ACG0414                                09B1   .472 ; INPUTS:
;ACG0414                                09B1   .473 ;
;ACG0414                                09B1   .474 ;       R2 = unit number
;ACG0414                                09B1   .475 ;       R3 = length of SCS node name at head of name string
;ACG0414                                09B1   .476 ;            or allocation class number
;ACG0414                                09B1   .477 ;            or device type code
;ACG0414                                09B1   .478 ;       R8 = size of name string
;ACG0414                                09B1   .479 ;       R9 = address of name string
;ACG0414                                09B1   .480 ;       R10 = flags
;ACG0414                                09B1   .481 ;       R11 = address to store lock value block
;ACG0414                                09B1   .482 ;       I/O database mutex held, IPL 2
;ACG0414                                09B1   .483 ;
;ACG0414                                09B1   .484 ; OUTPUTS:
;ACG0414                                09B1   .485 ;
;ACG0414                                09B1   .486 ;       R0 = SS$_NORMAL - device found
;ACG0414                                09B1   .487 ;          = SS$_NOSUCHDEV - device not found
;ACG0414                                09B1   .488 ;          = SS$_NODEVAVL - device exists but not available according to rules
;ACG0414                                09B1   .489 ;          = SS$_DEVALLOC - device allocated to other user
;ACG0414                                09B1   .490 ;          = SS$_NOPRIV - failed device protection
;ACG0414                                09B1   .491 ;          = SS$_TEMPLATEDEV - can't allocate template device
;ACG0414                                09B1   .492 ;          = SS$_DEVMOUNT - device already mounted
;ACG0414                                09B1   .493 ;          = SS$_DEVOFFLINE - device marked offline
;ACG0414                                09B1   .494 ;       R5 = UCB
;ACG0414                                09B1   .495 ;       R6 = DDB
;ACG0414                                09B1   .496 ;       R7 = system block
;ACG0414                                09B1   .497 ;       R10 - R4, R8 - R11 preserved
;ACG0414                                09B1   .498 ;
;ACG0414                                09B1   .499 ;       Note: If failure, R5 - R7 point to the last structures looked at.
;ACG0414                                09B1   .500 ;
;ACG0414                                09B1   .501 ;-
;ACG0414                                09B1   .502
;ACG0414                                09B1   .503 ;
;ACG0414                                09B1   .504 ; Stack use:
;ACG0414                                09B1   .505 ;
;ACG0414                  00000000      09B1   .506 SAVR2   = 0
;ACG0414                  00000004      09B1   .507 SAVR3   = 4
;ACG0414                  00000008      09B1   .508 SAVR4   = 8
;ACG0414                  0000000C      09B1   .509 SAVR8   = 12
;ACG0414                  00000010      09B1   .510 SAVR9   = 16
;ACG0414                                09B1   .511
;ACG0414                                09B1   .512
;ACG0414                                09B1   .513          .ENABLE LSB
;ACG0414                                09B1   .514
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```
;ACG0414                                09B1  .515 IOC$SEARCHINT::
;ACG0414                031C 8F    BB   09B1  .516          PUSHR   #^M<R2,R3,R4,R8,R9>      ; save registers
;ACG0414                                09B5  .517 ;
;ACG0414                                09B5  .518 ; Search the system blocks for a suitable node. If we are doing a search
;ACG0414                                09B5  .519 ; by allocation class, generic device type, or no node name is given,
;ACG0414                                09B5  .520 ; all system blocks qualify.
;ACG0414                                09B5  .521 ;
;ACG0414          00000000'EF    DE   09B5  .522          MOVAL   SCS$GQ_CONFIG,R7         ; get head of SCS SB list
                              57        09BB
;ACG0414               50   67    D0   09BC  .523 10$:     MOVL    SB$L_FLINK(R7),R0        ; get next system block
;ACG0414                    50    D1   09BF  .524          CMPL    R0,#SCS$GQ_CONFIG        ; are we back at list head?
                    00000000'8F         09C1
;ACG0414                    78    13   09C6  .525          BEQL    50$                      ; branch if yes - all done
;ACG0414                                09C8  .526
;ACG0414               57   50    D0   09C8  .527          MOVL    R0,R7
;ACG0414          56   54 A7    DE   09CB  .528          MOVAL   SB$L_DDB-DDB$L_LINK(R7),R6 ; pick up DDB listhead
;ACG0414               55   56    D0   09CF  .529          MOVL    R6,R5                    ; make sure UCB is non-zero
;ACG0414                                09D2  .530                                           ; if allocation class or generic dev,
;ACG0414               5A   06    93   09D2  .531          BITB    #IOC$M_CLASS!IOC$M_TYPE,R10
;ACG0414                    27    12   09D5  .532          BNEQ    30$                      ; check every system block
;ACG0414          58   0C AE    7D   09D7  .533          MOVQ    SAVR8(SP),R8             ; get orig dev name descriptor
;ACG0414          53   04 AE    D0   09DB  .534          MOVL    SAVR3(SP),R3             ; get node name length
;ACG0414                    1D    13   09DF  .535          BEQL    30$                      ; branch if none - go ahead
;ACG0414          44 A7    53    91   09E1  .536          CMPB    R3,SB$T_NODENAME(R7)     ; check node name length
;ACG0414                    D5    12   09E5  .537          BNEQ    10$                      ; branch if not
;ACG0414          45 A7    53    29   09E7  .538          CMPC3   R3,SB$T_NODENAME+1(R7),(R9) ; node names match?
                              69        09EB
;ACG0414                    CE    12   09EC  .539          BNEQ    10$                      ; branch if not
;ACG0414                                09EE  .540 ;
;ACG0414                                09EE  .541 ; Found a suitable system block. Search its DDB list.
;ACG0414                                09EE  .542 ;
;ACG0414               50   01    3C   09EE  .543 20$:     MOVZWL  #SS$_NORMAL,R0
;ACG0414          04 AE    01    C1   09F1  .544          ADDL3   #1,SAVR3(SP),R3          ; include the "$"
                              53        09F5
;ACG0414               59   53    C0   09F6  .545          ADDL    R3,R9                    ; skip over the nodename
;ACG0414               58   53    C2   09F9  .546          SUBL    R3,R8                    ; adjust the length
;ACG0414                    52    15   09FC  .547          BLEQ    60$                      ; if no device name, just return SB
;ACG0414                                09FE  .548
;ACG0414               50   66    D0   09FE  .549 30$:     MOVL    DDB$L_LINK(R6),R0        ; get address of next DDB
;ACG0414                    5A    13   0A01  .550          BEQL    80$                      ; if eql end of list
;ACG0414               56   50    D0   0A03  .551          MOVL    R0,R6
;ACG0414          55   D4 A6    DE   0A06  .552          MOVAL   <DDB$L_UCB-UCB$L_LINK>(R6),R5 ; initialize primary UCB address
;ACG0414               5A   20    8A   0A0A  .553          BICB    #IOC$M_2P,R10            ; new DDB - clear secondary flag
;ACG0414          5E 5A    01    E0   0A0D  .554          BBS     #IOC$V_TYPE,R10,100$     ; branch if generic type search
;ACG0414          07 5A    02    E1   0A11  .555          BBC     #IOC$V_CLASS,R10,40$     ; branch if no class to check
;ACG0414     3C A6   04 AE    D1   0A15  .556          CMPL    SAVR3(SP),DDB$L_ALLOCLS(R6) ; else, is allo. class right?
;ACG0414                    E2    12   0A1A  .557          BNEQ    30$                      ; branch if not, try next DDB
;ACG0414               69   58    29   0A1C  .558 40$:     CMPC3   R8,(R9),DDB$T_NAME+1(R6) ; check device name
                         15 A6         0A1F
;ACG0414                    DB    12   0A21  .559          BNEQ    30$                      ; if no match, try next DDB
;ACG0414          50   14 A6    9A   0A23  .560          MOVZBL  DDB$T_NAME(R6),R0        ; get length of name in DDB
;ACG0414               50   58    D1   0A27  .561          CMPL    R8,R0                    ; check name lengths
;ACG0414                    43    13   0A2A  .562          BEQL    100$                     ; if they match - OK
;ACG0414                    50    D7   0A2C  .563          DECL    R0                       ; try subtracting out controller letter
;ACG0414               50   58    D1   0A2E  .564          CMPL    R8,R0                    ; and see if this matches
;ACG0414                    CB    12   0A31  .565          BNEQ    30$                      ; if not, keep trying
;ACG0414                 39 5A    E9   0A33  .566          BLBC    R10,100$                         ; branch if not physical search - OK
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;ACG0414                15 A640   91   0A36  .567          CMPB    DDB$T_NAME+1(R6)[R0],#^A'A' ; is this controller A?
                          41 8F        0A3A
;ACG0414                    31   13   0A3C  .568          BEQL    100$                        ; if so, search it
;ACG0414                    BE   F1   0A3E  .569          BRB     30$                         ; if not, keep looking
;ACG0414                             0A40  .570 ;
;ACG0414                             0A40  .571 ; End of search - no suitable device has been found
;ACG0414                             0A40  .572 ;
;ACG0414          50   0908 8F   3C   0A40  .573 50$:     MOVZWL  #SS$_NOSUCHDEV,R0           ; no device found
;ACG0414            4D 5A    04   E1   0A45  .574          BBC     #IOC$V_EXISTS,R10,140$      ; branch if not seen
;ACG0414          50   09B0 8F   3C   0A49  .575          MOVZWL  #SS$_NODEVAVL,R0            ; otherwise status is not available
;ACG0414                    46   11   0A4E  .576          BRB     140$
;ACG0414                             0A50  .577 ;
;ACG0414                             0A50  .578 ; To here if we're just returning a system block, with no device specified.
;ACG0414                             0A50  .579 ;
;ACG0414              56    66   D0   0A50  .580 60$:     MOVL    (R6),R6                     ; get first DDB
;ACG0414           55    04 A6   D0   0A53  .581          MOVL    DDB$L_UCB(R6),R5            ; and first UCB
;ACG0414                    3D   11   0A57  .582          BRB     140$                        ; and return
;ACG0414                             0A59  .583 ;
;ACG0414                             0A59  .584 ; To here when all UCB's on a DDB have been searched.
;ACG0414                             0A59  .585 ;
;ACG0414           A1 5A    01   E0   0A59  .586 70$:     BBS     #IOC$V_TYPE,R10,30$         ; if generic type search, try next DDB
;ACG0414                             0A5D  .587 ;
;ACG0414                             0A5D  .588 ; To here when all DDB's on a system block have been searched.
;ACG0414                             0A5D  .589 ;
;ACG0414              5A    06   93   0A5D  .590 80$:     BITB    #IOC$M_CLASS!IOC$M_TYPE,R10 ; if generic type or alloc class
;ACG0414                    0A   12   0A60  .591          BNEQ    90$                         ; keep searching system blocks
;ACG0414              5A    09   93   0A62  .592          BITB    #IOC$M_PHY!IOC$M_LOCAL,R10 ; if physical or local only
;ACG0414                    D9   12   0A65  .593          BNEQ    50$                         ; we're done
;ACG0414                 04 AE   D5   0A67  .594          TSTL    SAVR3(SP)                   ; if there was an explicit node
;ACG0414                    D4   12   0A6A  .595          BNEQ    50$                         ; we're done
;ACG0414                  FF4D   31   0A6C  .596 90$:     BRW     10$                         ; else go try next system block
;ACG0414                             0A6F  .597 ;
;ACG0414                             0A6F  .598 ; Found a suitable DDB. Search both its UCB lists for the right UCB.
;ACG0414                             0A6F  .599 ;
;ACG0414              52    6E   7D   0A6F  .600 100$:     MOVQ    SAVR2(SP),R2                ; get unit number and device type
;ACG0414          00000000'EF   D0   0A72  .601          MOVL    SCH$GL_CURPCB,R4            ; get PCB address
                            54        0A78
;ACG0414                             0A79  .602 NEXTUCB:                                     ; re-entry for next UCB
;ACG0414            07 5A    05   E1   0A79  .603 110$:     BBC     #IOC$V_2P,R10,120$          ; branch if on primary path
;ACG0414          55    00A4 C5   D0   0A7D  .604          MOVL    UCB$L_2P_LINK(R5),R5        ; link to next secondary unit.
;ACG0414                    04   11   0A82  .605          BRB     130$
;ACG0414           55    30 A5   D0   0A84  .606 120$:     MOVL    UCB$L_LINK(R5),R5           ; link to next primary unit.
;ACG0414                    11   13   0A88  .607 130$:     BEQL    150$                        ; branch if no more units.
;ACG0414                    28   10   0A8A  .608          BSBB    IOC$TESTUNIT                ; is this unit ok?
;ACG0414                 07 50   E8   0A8C  .609          BLBS    R0,140$                     ; branch if successful
;ACG0414            E6 5A    04   E1   0A8F  .610          BBC     #IOC$V_EXISTS,R10,110$      ; keep going if we haven't seen it yet
;ACG0414                E3 5A    E9   0A93  .611          BLBC    R10,110$                    ; or if not physical search
;ACG0414               031C 8F   BA   0A96  .612 140$:     POPR    #^M<R2,R3,R4,R8,R9>         ; restore registers
;ACG0414                    05   05   0A9A  .613          RSB                                 ; and return
;ACG0414                             0A9B  .614
;ACG0414            BA 5A    05   E2   0A9B  .615 150$:     BBSS    #IOC$V_2P,R10,70$           ; branch if secondary path already searched
;ACG0414            55    9C A6   DE   0A9F  .616          MOVAL   <DDB$L_2P_UCB -             ; initialize secondary UCB address.
;ACG0414                             0AA3  .617                  -UCB$L_2P_LINK>(R6),R5
;ACG0414                    D4   11   0AA3  .618          BRB     110$                        ; go search secondary path
;ACG0414                             0AA5  .619
;ACG0414                             0AA5  .620          .DISABLE LSB
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;ACG0414                                0AA5  .622          .SBTTL  Continue I/O Database Search
;ACG0414                                0AA5  .623
;ACG0414                                0AA5  .624 ;+
;ACG0414                                0AA5  .625 ;
;ACG0414                                0AA5  .626 ; IOC$SEARCHCONT - internal I/O database search
;ACG0414                                0AA5  .627 ;
;ACG0414                                0AA5  .628 ; This routine continues a search started with a call to IOC$SEARCHINT.
;ACG0414                                0AA5  .629 ; It uses IOC$SEARCHINT's outputs as the starting point at which to
;ACG0414                                0AA5  .630 ; resume.
;ACG0414                                0AA5  .631 ;
;ACG0414                                0AA5  .632 ; INPUTS:
;ACG0414                                0AA5  .633 ;
;ACG0414                                0AA5  .634 ;       R2 = unit number
;ACG0414                                0AA5  .635 ;       R3 = length of SCS node name at head of name string
;ACG0414                                0AA5  .636 ;            or allocation class number
;ACG0414                                0AA5  .637 ;            or device type code
;ACG0414                                0AA5  .638 ;       R5 = last UCB
;ACG0414                                0AA5  .639 ;       R6 = last DDB
;ACG0414                                0AA5  .640 ;       R7 = last system block
;ACG0414                                0AA5  .641 ;       R8 = size of name string
;ACG0414                                0AA5  .642 ;       R9 = address of name string
;ACG0414                                0AA5  .643 ;       R10 = flags
;ACG0414                                0AA5  .644 ;       R11 = address to store lock value block
;ACG0414                                0AA5  .645 ;       I/O database mutex held, IPL 2
;ACG0414                                0AA5  .646 ;
;ACG0414                                0AA5  .647 ; OUTPUTS:
;ACG0414                                0AA5  .648 ;
;ACG0414                                0AA5  .649 ;       R0 = SS$_NORMAL - device found
;ACG0414                                0AA5  .650 ;          = SS$_NOSUCHDEV - device not found
;ACG0414                                0AA5  .651 ;          = SS$_NODEVAVL - device exists but not available according to rules
;ACG0414                                0AA5  .652 ;          = SS$_DEVALLOC - device allocated to other user
;ACG0414                                0AA5  .653 ;          = SS$_NOPRIV - failed device protection
;ACG0414                                0AA5  .654 ;          = SS$_TEMPLATEDEV - can't allocate template device
;ACG0414                                0AA5  .655 ;          = SS$_DEVMOUNT - device already mounted
;ACG0414                                0AA5  .656 ;          = SS$_DEVOFFLINE - device marked offline
;ACG0414                                0AA5  .657 ;       R5 = UCB
;ACG0414                                0AA5  .658 ;       R6 = DDB
;ACG0414                                0AA5  .659 ;       R7 = system block
;ACG0414                                0AA5  .660 ;       R10 - R4, R8 - R11 preserved
;ACG0414                                0AA5  .661 ;
;ACG0414                                0AA5  .662 ;       Note: If failure, R5 - R7 point to the last structures looked at.
;ACG0414                                0AA5  .663 ;
;ACG0414                                0AA5  .664 ;-
;ACG0414                                0AA5  .665
;ACG0414                                0AA5  .666 IOC$SEARCHCONT::
;ACG0414          031C 8F    BB  0AA5  .667          PUSHR   #^M<R2,R3,R4,R8,R9>     ; save registers
;ACG0414       05 5A    08    E5  0AA9  .668          BBCC    #IOC$V_ALT,R10,10$      ; check if alternate UCB in use
;ACG0414    55 00A8 C5    D0  0AAD  .669          MOVL    UCB$L_DP_ALTUCB(R5),R5  ; link back to other to continue
;ACG0414             C5    11  0AB2  .670 10$:     BRB     NEXTUCB                 ; continue search
;ACG0414
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;ACG0414                                 0AB4  .672          .SBTTL  Check UCB Against Search Rules
;ACG0414                                 0AB4  .673
;ACG0414                                 0AB4  .674 ;+
;ACG0414                                 0AB4  .675 ;
;ACG0414                                 0AB4  .676 ; IOC$TESTUNIT - Check UCB Against Search Rules
;ACG0414                                 0AB4  .677 ;
;ACG0414                                 0AB4  .678 ; INPUTS:
;ACG0414                                 0AB4  .679 ;
;ACG0414                                 0AB4  .680 ;        R2 = unit number
;ACG0414                                 0AB4  .681 ;        R3 = device type code
;ACG0414                                 0AB4  .682 ;        R4 = PCB address
;ACG0414                                 0AB4  .683 ;        R5 = UCB address
;ACG0414                                 0AB4  .684 ;        R10 = flags
;ACG0414                                 0AB4  .685 ;        R11= address of lock value block
;ACG0414                                 0AB4  .686 ;
;ACG0414                                 0AB4  .687 ; OUTPUTS:
;ACG0414                                 0AB4  .688 ;
;ACG0414                                 0AB4  .689 ;        R0 = SS$_NORMAL - eligible for use according to flags
;ACG0414                                 0AB4  .690 ;           = SS$_NOSUCHDEV - wrong unit number
;ACG0414                                 0AB4  .691 ;           = SS$_DEVALLOC - device allocated to other user
;ACG0414                                 0AB4  .692 ;           = SS$_NOPRIV - failed device protection
;ACG0414                                 0AB4  .693 ;           = SS$_TEMPLATEDEV - can't allocate template device
;ACG0414                                 0AB4  .694 ;           = SS$_DEVMOUNT - device already mounted
;ACG0414                                 0AB4  .695 ;           = SS$_DEVOFFLINE - device marked offline
;ACG0414                                 0AB4  .696 ;
;ACG0414                                 0AB4  .697 ;-
;ACG0414                                 0AB4  .698
;ACG0414                                 0AB4  .699 IOC$TESTUNIT::
;ACG0414          50    0908 8F    3C    0AB4  .700          MOVZWL  #SS$_NOSUCHDEV,R0       ; assume wrong device
;ACG0414                06 5A     E9    0AB9  .701          BLBC    R10,10$                 ; branch if not physical search
;ACG0414            54 A5    52    B1    0ABC  .702          CMPW    R2,UCB$W_UNIT(R5)       ; is the unit number exactly right?
;ACG0414                     5B    12    0AC0  .703          BNEQ    80$                     ; branch to error if not right.
;ACG0414                                 0AC2  .704
;ACG0414             09 5A    01    E1    0AC2  .705 10$:     BBC     #IOC$V_TYPE,R10,20$     ; branch if not searching for dev type
;ACG0414                      00    ED    0AC6  .706          CMPZV   #MSCP$V_MTYP_N,-
;ACG0414                      16          0AC8  .707                  #MSCP$V_MTYP_D1,-
;ACG0414          53    008C C5          0AC9  .708                  UCB$L_MEDIA_ID(R5),R3   ; is this the requested type?
;ACG0414                      4E    12    0ACD  .709          BNEQ    80$                     ; branch if not
;ACG0414                5A    10    88    0ACF  .710 20$:     BISB    #IOC$M_EXISTS,R10       ; note eligible device seen
;ACG0414         0A 3C A5     03    E1    0AD2  .711          BBC     #DEV$V_CDP,UCB$L_DEVCHAR2(R5),30$ ; is this served path to a local d
;ACG0414          55    00A8 C5    D0    0AD7  .712          MOVL    UCB$L_DP_ALTUCB(R5),R5  ; yes, get local path UCB address.
;ACG0414          5A    0100 8F    A8    0ADC  .713          BISW    #IOC$M_ALT,R10          ; note alternate UCB in use
;ACG0414            03 5A     06    E1    0AE1  .714 30$:     BBC     #IOC$V_ANY,R10,40$      ; if SEARCHALL, finish with success.
;ACG0414                    0085    31    0AE5  .715          BRW     120$
;ACG0414                                 0AE8  .716 ;
;ACG0414                                 0AE8  .717 ; Check the device reference count and allocation status.
;ACG0414                                 0AE8  .718 ;
;ACG0414          50    006C 8F    3C    0AE8  .719 40$:     MOVZWL  #SS$_DEVMOUNT,R0        ; check if device is already mounted
;ACG0414        7F 38 A5     13    E0    0AED  .720          BBS     #DEV$V_MNT,UCB$L_DEVCHAR(R5),130$
;ACG0414          50    0840 8F    3C    0AF2  .721          MOVZWL  #SS$_DEVALLOC,R0
;ACG0414        75 64 A5     09    E0    0AF7  .722          BBS     #UCB$V_MOUNTING,UCB$W_STS(R5),130$ ; branch if mount in progress
;ACG0414                5C A5     B5    0AFC  .723          TSTW    UCB$W_REFC(R5)          ; is reference count zero?
;ACG0414                      1E    13    0AFF  .724          BEQL    90$                     ; branch if reference count is zero.
;ACG0414             0B 5A    07    E1    0B01  .725          BBC     #IOC$V_MOUNT,R10,50$    ; if mounting...
;ACG0414             0A 5A    0A    E0    0B05  .726          BBS     #IOC$V_ALLOC,R10,60$    ; if shared mount
;ACG0414        11 38 A5     17    E1    0B09  .727          BBC     #DEV$V_ALL,UCB$L_DEVCHAR(R5),90$ ; OK if not allocated
;ACG0414                      08    11    0B0E  .728          BRB     70$                     ; otherwise check allocation
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;ACG0414                                0B10  .729
;ACG0414                          5E 5A  E9  0B10  .730 50$:    BLBC    R10,130$                ; allocate: error if not phy
;ACG0414                    59 38 A5   17  E1  0B13  .731 60$:    BBC     #DEV$V_ALL,UCB$L_DEVCHAR(R5),130$ ; err if dev. not allocated.
;ACG0414                    60 A4   2C A5  D1  0B18  .732 70$:    CMPL    UCB$L_PID(R5),PCB$L_PID(R4) ; does this process own the device?
;ACG0414                        52  12  0B1D  .733 80$:    BNEQ    130$                    ; branch to error if not our device.
;ACG0414                                0B1F  .734 ;
;ACG0414                                0B1F  .735 ; Check all the other miscellaneous junk that can make a device not
;ACG0414                                0B1F  .736 ; available.
;ACG0414                                0B1F  .737 ;
;ACG0414                     50   24   3C  0B1F  .738 90$:    MOVZWL  #SS$_NOPRIV,R0          ; check if device is spooled
;ACG0414                 06 38 A5   06  E1  0B22  .739         BBC     #DEV$V_SPL,UCB$L_DEVCHAR(R5),100$ ; branch if not
;ACG0414                                0B27  .740         IFNPRIV ALLSPOOL,130$,R4        ; else, process must have ALLSPOOL priv.
;ACG0414                  50    0084 8F   3C  0B2D  .741 100$:   MOVZWL  #SS$_DEVOFFLINE,R0      ; check if device is available
;ACG0414                3A 38 A5   12  E1  0B32  .742         BBC     #DEV$V_AVL,UCB$L_DEVCHAR(R5),130$
;ACG0414                35 64 A5   04  E1  0B37  .743         BBC     #UCB$V_ONLINE,UCB$W_STS(R5),130$
;ACG0414                 50    21DC 8F   3C  0B3C  .744         MOVZWL  #SS$_TEMPLATEDEV,R0     ; check if device is a template
;ACG0414                2B 64 A5   0D  E0  0B41  .745         BBS     #UCB$V_TEMPLATE,UCB$W_STS(R5),130$
;ACG0414                      F4B7'    30  0B46  .746         BSBW    EXE$CHKRDACCES          ; check device protection
;ACG0414                   25 50   E9  0B49  .747         BLBC    R0,130$                 ; out if not accessible
;ACG0414                                0B4C  .748 ;
;ACG0414                                0B4C  .749 ; We've passed all the local tests. Now try to take out the appropriate
;ACG0414                                0B4C  .750 ; lock on the device.
;ACG0414                                0B4C  .751 ;
;ACG0414                1C 3C A5   00  E1  0B4C  .752         BBC     #DEV$V_CLU,UCB$L_DEVCHAR2(R5),120$ ; br. if not cluster visible
;ACG0414                17 38 A5   17  E0  0B51  .753         BBS     #DEV$V_ALL,UCB$L_DEVCHAR(R5),120$ ; br. if allocated
;ACG0414                     51    5B  D0  0B56  .754         MOVL    R11,R1                  ; value block address
;ACG0414                     50    05  D0  0B59  .755         MOVL    #LCK$K_EXMODE,R0        ; assume exclusive lock
;ACG0414                   07 5A   0A  E0  0B5C  .756         BBS     #IOC$V_ALLOC,R10,110$   ; branch if allocation requested
;ACG0414                   03 5A   07  E1  0B60  .757         BBC     #IOC$V_MOUNT,R10,110$   ; branch if not mount mode
;ACG0414                     50    04  D0  0B64  .758         MOVL    #LCK$K_PWMODE,R0        ; which uses PW
;ACG0414                      F496'    30  0B67  .759 110$:   BSBW    IOC$LOCK_DEV            ; and try to take device lock
;ACG0414                   04 50   E9  0B6A  .760         BLBC    R0,130$
;ACG0414                     50    01  D0  0B6D  .761 120$:   MOVL    #SS$_NORMAL,R0          ; indicate success
;ACG0414                           05  0B70  .762         RSB
;ACG0414                                0B71  .763 ;
;ACG0414                                0B71  .764 ; To here on any error.
;ACG0414                                0B71  .765 ;
;ACG0414                05 5A   08  E5  0B71  .766 130$:   BBCC    #IOC$V_ALT,R10,140$     ; check if alternate UCB in use
;ACG0414                55    00A8 C5   D0  0B75  .767         MOVL    UCB$L_DP_ALTUCB(R5),R5  ; link back to other to continue
;ACG0414                           05  0B7A  .768 140$:   RSB                             ; return
;ACG0414                                0B7B  .769
;ACG0414                                0B7B  .770
;ACG0414                                0B7B  .771
                                       0B7B 1735         .END
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```
$$BASE                  = 00000001
$$DISPL                 = 00000008
$$GENSW                 = 00000001
$$HIGH                  = 00000007
$$LIMIT                 = 00000006
$$LOW                   = 00000001
$$MNSW                  = 00000001
$$MXSW                  = 00000001
ADD_DOLLAR                000006BF R      02
ADD_NODE                  000006B5 R      02
ADP$C_NUMDATAP          = 00000010
ADP$L_CSR               = 00000000
ADP$L_DPQBL             = 00000018
ADP$L_DPQFL             = 00000014
ADP$L_MRACTMDRS         = 0000005C
ADP$L_MRQBL             = 00000034
ADP$L_MRQFL             = 00000030
ADP$W_ADPTYPE           = 0000000E
ADP$W_DPBITMAP          = 00000060
ADP$W_MRFREGARY         = 0000015E
ADP$W_MRNREGARY         = 00000064
ALLOC_DESCRIP             000004D8 R      02
ALLOC_NAME                00000682 R      02
AT$_UBA                 = 00000001
BINNUM                    00000000
BOO$GL_SPTFREH            ********    X   02
BOO$GL_SPTFREL            ********    X   02
BUG$_INCONSTATE           ********    X   02
BUG$_IVBYTEALGN           ********    X   02
BUG$_UNSUPRTCPU           ********    X   02
CAN$C_AMBXDGN           = 00000002
CAN$C_DASSGN            = 00000001
CDRP$L_BCNT             = FFFFFFD2
CDRP$L_FPC              = 0000000C
CDRP$L_FQFL             = 00000000
CDRP$L_FR3              = 00000010
CDRP$L_IOQFL            = FFFFFFA0
CDRP$L_RWCPTR           = 00000028
CDRP$L_UBARSRCE         = 0000003C
CDRP$W_BOFF             = FFFFFFD0
CLU$GL_CLUB               ********    X   02
COM$DRVDEALMEM            ********    X   02
COMMON_ALOUBAMAP          00000366 R      02
CRB$B_MASK              = 0000000E
CRB$L_INTD              = 00000024
CRB$L_LINK              = 00000020
CRB$L_WQBL              = 00000004
CRB$L_WQFL              = 00000000
CRB$M_BSY               = 00000001
CRB$V_BSY               = 00000000
DC$_DISK                = 00000001
DDB$L_2P_UCB            = 00000040
DDB$L_ALLOCLS           = 0000003C
DDB$L_DP_UCB            = 00000040
DDB$L_LINK              = 00000000
DDB$L_SB                = 00000034
DDB$L_UCB               = 00000004
DDB$T_NAME              = 00000014
DDT$L_CANCEL            = 0000000C
DDT$L_REGDUMP           = 00000010
DDT$L_START             = 00000000
DDT$L_UNITINIT          = 00000018
DEALLOC_DESCRIP           000004BF R      02
DEV$M_MBX               = 00100000
DEV$M_TRM               = 00000004
DEV$V_2P                = 00000004
DEV$V_ALL               = 00000017
DEV$V_AVL               = 00000012
DEV$V_CDP               = 00000003
DEV$V_CLU               = 00000000
DEV$V_FOD               = 0000000E
DEV$V_MNT               = 00000013
DEV$V_NNM               = 00000009
DEV$V_OPR               = 00000007
DEV$V_SPL               = 00000006
DEV$V_TRM               = 00000002
DIR...                  = 00000001
DISKCHK                   00000191 R      02
DISPLAY_NAME              0000069F R      02
DO_PMS                    000001A9 R      02
DYN$C_TWP               = 00000030
DYN$C_UCB               = 00000010
EMB$B_DV_ERTCNT         = 00000010
EMB$Q_DV_IOSB           = 00000012
EMB$W_DV_STS            = 0000001A
END_BROADCAST             0000078B R      02
ERL$RELEASEMB             ********    X   02
EXDVNM                    000006D8 R      02
EXE$ALONONPAGED           ********    X   02
EXE$ALTQUEPKT             ********    X   02
EXE$CHKRDACCES            ********    X   02
EXE$DEANONPAGED           ********    X   02
EXE$GB_CPUTYPE            ********    X   02
EXE$GL_ABSTIM             ********    X   02
EXE$GQ_SYSTIME            ********    X   02
EXE$MOUNTVER              ********    X   02
EXE$TEST_CSR              ********    X   02
FULL_NAME                 0000067D R      02
GETNUMBER                 00000958 R      02
IDB$L_ADP               = 00000014
IDB$L_CSR               = 00000000
IDB$L_OWNER             = 00000004
IOC$ALLOSPT               00000620 RG     02
IOC$ALODATAP              00000261 R      02
IOC$ALOMAPUDA             00000314 R      02
IOC$ALOUBAMAP             0000033E RG     02
IOC$ALOUBAMAPN            00000337 RG     02
IOC$ALOUBAMAPSP           000003A8 RG     02
IOC$ALOUBMAPRM            0000044E RG     02
IOC$ALOUBMAPRMN           00000447 RG     02
IOC$ALTREQCOM             00000111 RG     02
IOC$BROADCAST             00000720 RG     02
IOC$CANCELIO              00000000 RG     02
IOC$CREDIT_UCB            ********    X   02
```

```
IOC$CTRLINIT                    00000830 RG     02
IOC$CVT_DEVNAM                  00000647 RG     02
IOC$DALOCUBAMAP                 00000568 R      02
IOC$DELETE_UCB                  ********   X    02
IOC$DIAGBUFILL                  00000054 RG     02
IOC$GL_PSBL                     ********   X    02
IOC$INITIATE                    000001D4 RG     02
IOC$LAST_CHAN                   0000001E RG     02
IOC$LAST_CHAN_AMBX              00000017 RG     02
IOC$LOCK_DEV                    ********   X    02
IOC$MNTVER                      000001CB RG     02
IOC$M_2P                      = 00000020
IOC$M_ALT                     = 00000100
IOC$M_CLASS                   = 00000004
IOC$M_EXISTS                  = 00000010
IOC$M_LOCAL                   = 00000008
IOC$M_PHY                     = 00000001
IOC$M_TYPE                    = 00000002
IOC$PARSDEVNAM                  0000089D RG     02
IOC$RELCHAN                     00000083 RG     02
IOC$RELDATAP                    0000028C RG     02
IOC$RELDATAPUDA                 00000281 RG     02
IOC$RELMAPREG                   00000513 RG     02
IOC$RELMAPUDA                   000004F8 RG     02
IOC$RELSCHAN                    00000079 RG     02
IOC$REQCOM                      0000013C RG     02
IOC$REQDATAP                    00000201 RG     02
IOC$REQDATAPNW                  00000213 RG     02
IOC$REQDATAPUDA                 00000221 RG     02
IOC$REQMAPREG                   00000302 RG     02
IOC$REQMAPUDA                   000002ED RG     02
IOC$REQPCHANH                   000000DA RG     02
IOC$REQPCHANL                   000000E3 RG     02
IOC$REQSCHANH                   000000C6 RG     02
IOC$REQSCHANL                   000000D0 RG     02
IOC$RETURN                      000005D9 RG     02
IOC$SCAN_IODB                   00000791 RG     02
IOC$SCAN_IODB_2P                000007D6 RG     02
IOC$SEARCHCONT                  00000AA5 RG     02
IOC$SEARCHINT                   000009B1 RG     02
IOC$TESTUNIT                    00000AB4 RG     02
IOC$UNITINIT                    0000086A RG     02
IOC$V_2P                      = 00000005
IOC$V_ALLOC                   = 0000000A
IOC$V_ALT                     = 00000008
IOC$V_ANY                     = 00000006
IOC$V_CLASS                   = 00000002
IOC$V_EXISTS                  = 00000004
IOC$V_MOUNT                   = 00000007
IOC$V_TYPE                    = 00000001
IOC$WFIKPCH                     000005DA RG     02
IOC$WFIRLCH                     000005FC RG     02
IPL$_ASTDEL                   = 00000002
IPL$_IOPOST                   = 00000004
IPL$_QUEUEAST                 = 00000006
IRP$L_DIAGBUF                 = 0000004C
IRP$L_IOQFL                   = 00000000
IRP$L_MEDIA                   = 00000038
IRP$L_PID                     = 0000000C
IRP$L_SVAPTE                  = 0000002C
IRP$L_UCB                     = 0000001C
IRP$V_DIAGBUF                 = 00000007
IRP$W_CHAN                    = 00000028
IRP$W_STS                     = 0000002A
LCK$K_EXMODE                  = 00000005
LCK$K_PWMODE                  = 00000004
LOCAL_NAME                      000006C1 R      02
MMG$GL_SPTBASE                  ********   X    02
MNTVERPNDCHK                    000001B1 R      02
MSCP$V_MTYP_D1                = 00000016
MSCP$V_MTYP_N                 = 00000000
NEXTUCB                         00000A79 R      02
NO_SECONDARY                    000006E0 R      02
NXTIRP                          00000182 R      02
PCB$L_PID                     = 00000060
PCB$Q_PRIV                    = 00000084
PDT$L_ADP                     = 000000E0
PMS$END_IO                      ********   X    02
PMS$GL_IOPFMPDB                 ********   X    02
PMS$START_IO                    ********   X    02
PMSEND                          00000173 R      02
PR$_IPL                       = 00000012
PR$_SID_TYP730                = 00000003
PR$_SID_TYP750                = 00000002
PR$_SID_TYP780                = 00000001
PR$_SID_TYP790                = 00000004
PR$_SID_TYP8NN                = 00000006
PR$_SID_TYP8SS                = 00000005
PR$_SID_TYPUV1                = 00000007
PR$_SIRR                      = 00000014
PRV$V_ALLSPOOL                = 00000004
PUTASCIC                        000006FD R      02
PUTCHAR                         0000070E R      02
PUTDOLLAR                       0000070B R      02
PUTNUM                          000006E5 R      02
REALLOC_CD_MAPREGS              0000055A R      02
RELDATAP_COMMON                 00000298 R      02
RELEASE                         0000018E R      02
RESR0                           00000008
RESR1                           0000000C
RESR2                           00000010
RESR3                           00000014
RESR4                           00000018
SAVABS...                     = 0000001C
SAVED_R0                      = 00000000
SAVED_R1                      = 00000004
SAVED_R2                      = 00000008
SAVED_R3                      = 0000000C
SAVED_R4                      = 00000010
SAVED_R5                      = 00000014
SAVR2                         = 00000000
SAVR3                         = 00000004
SAVR4                         = 00000008
SAVR8                         = 0000000C
```

```
SAVR9                   = 00000010
SB$L_DDB                = 00000054
SB$L_FLINK              = 00000000
SB$T_NODENAME           = 00000044
SCH$GL_CURPCB             ********    X   02
SCRLEN                    00000010
SCS$GA_LOCALSB            ********    X   02
SCS$GQ_CONFIG             ********    X   02
SCS$RESUMEWAITR           ********    X   02
SECONDARY_NAME            0000068F R      02
SS$_BUFFEROVF           = 00000601
SS$_DEVALLOC            = 00000840
SS$_DEVMOUNT            = 0000006C
SS$_DEVOFFLINE          = 00000084
SS$_ILLIOFUNC           = 000000F4
SS$_INSFMEM             = 00000124
SS$_IVDEVNAM            = 00000144
SS$_NODEVAVL            = 000009B0
SS$_NOPRIV              = 00000024
SS$_NORMAL              = 00000001
SS$_NOSUCHDEV           = 00000908
SS$_TEMPLATEDEV         = 000021DC
TTY$B_WB_FIPL           = 0000000B
TTY$B_WB_TYPE           = 0000000A
TTY$K_WB_LENGTH         = 00000030
TTY$L_WB_DATA           = 00000030
TTY$L_WB_END            = 00000020
TTY$L_WB_FR3            = 00000010
TTY$L_WB_IRP            = 00000024
TTY$L_WB_NEXT           = 0000001C
TTY$L_WB_RETADDR        = 0000002C
TTY$W_WB_SIZE           = 00000008
UBMD$B_DATAPATH         = 00000003
UBMD$B_NUMREG           = 00000002
UBMD$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$L_EMB               = 00000094
UCB$L_FPC               = 0000000C
UCB$L_FQFL              = 00000000
UCB$L_FR3               = 00000010
UCB$L_IOQFL             = 0000004C
UCB$L_IRP               = 00000058
UCB$L_LINK              = 00000030
UCB$L_MEDIA_ID          = 0000008C
UCB$L_OPCNT             = 00000070
UCB$L_PID               = 0000002C
UCB$L_STS               = 00000064
UCB$L_SVAPTE            = 00000078
UCB$M_BSY               = 00000100
UCB$M_CANCEL            = 00000008
UCB$M_INT               = 00000002
UCB$M_TIM               = 00000001
UCB$M_TIMOUT            = 00000040
UCB$V_BSY               = 00000008
UCB$V_DELETEUCB         = 00000010
UCB$V_ERLOGIP           = 00000002
UCB$V_MNTVERIP          = 0000000E
UCB$V_MNTVERPND         = 00000013
UCB$V_MOUNTING          = 00000009
UCB$V_ONLINE            = 00000004
UCB$V_TEMPLATE          = 0000000D
UCB$W_BCNT              = 0000007E
UCB$W_BOFF              = 0000007C
UCB$W_REFC              = 0000005C
UCB$W_STS               = 00000064
UCB$W_UNIT              = 00000054
VEC$B_DATAPATH          = 00000013
VEC$B_NUMREG            = 00000012
VEC$L_ADP               = 00000014
VEC$L_IDB               = 00000008
VEC$L_INITIAL           = 0000000C
VEC$L_UNITINIT          = 00000018
VEC$M_MAPLOCK           = 00008000
VEC$S_DATAPATH          = 00000005
VEC$V_DATAPATH          = 00000000
VEC$V_MAPLOCK           = 0000000F
VEC$V_PATHLOCK          = 00000007
VEC$W_MAPREG            = 00000010
```

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	00000B7B (2939.)	02 (2.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC BYTE

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	9	00:00:00.05	00:00:03.03
Command processing	73	00:00:00.67	00:00:05.51
Pass 1	676	00:00:36.81	00:02:30.72
Symbol table sort	0	00:00:04.17	00:00:16.52
Pass 2	408	00:00:12.25	00:00:52.03
Symbol table output	0	00:00:00.24	00:00:00.47
Psect synopsis output	1	00:00:00.02	00:00:00.02
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	1170	00:00:54.21	00:03:48.30

The working set limit was 2250 pages.
176206 bytes (345 pages) of virtual memory were used to buffer the intermediate code.
There were 150 pages of symbol table space allocated to hold 2680 non-local and 162 local symbols.
2794 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
_255DUA28:[SYS.OBJ]LIB.MLB;1	35
_255DUA28:[SYSLIB]STARLET.MLB;2	12
TOTALS (all libraries)	47

2923 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

FORKCNTRL

Table of contents

(1)	66.1	CREATE FORK-AND-WAIT PROCESS
(1)	67	CREATE I/O DRIVER FORK PROCESS
(2)	90	CREATE FORK PROCESS
(3)	117	SOFTWARE INTERRUPT ENTRY POINTS
(4)	165	SOFTWARE INTERRUPT FORK DISPATCHER

```
                        0000     1          .TITLE  FORKCNTRL - FORK PROCESS CONTROL
;DWT0158                0000    .1          .IDENT  'V03-002'
-1                      0000     3
                        0000     4 ;
                        0000     5 ;******************************************************************************
                        0000     6 ;*                                                                            *
                        0000     7 ;*  COPYRIGHT (c) 1978, 1980, 1982 BY                                         *
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                        0000    23 ;*  SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.                   *
                        0000    24 ;*                                                                            *
                        0000    25 ;*                                                                            *
                        0000    26 ;******************************************************************************
                        0000    27 ;
                        0000    28 ; D. N. CUTLER 9-AUG-76
                        0000    29 ;
;ROW0176                0000    .1 ; MODIFIED BY:
;ROW0176                0000    .2 ;
;DWT0158                0000    .3 ;       V03-002 DWT0158         David W. Thiel          27-DEC-1983
;DWT0158                0000    .4 ;               Speed up fork processing a bit by doing fewer interrupts
;DWT0158                0000    .5 ;               and REMQUE's.
;DWT0158                0000    .6 ;
;ROW0176                0000    .7 ;       V03-001 ROW0176         Ralph O. Weber          4-APR-1983
;ROW0176                0000    .8 ;               Add EXE$FORK_WAIT, the entry fork-and-wait routine which is
;ROW0176                0000    .9 ;               the object of the FORK_WAIT macro.
;ROW0176                0000   .10 ;
-29                     0000    59 ;
                        0000    60 ; MACRO LIBRARY CALLS
                        0000    61 ;
                        0000    62
                        0000    63          $FKBDEF                         ;DEFINE FKB OFFSETS
                        0000    64          $PRDEF                          ;DEFINE PROCESSOR REGISTERS
                        0000    65          $UCBDEF                         ;DEFINE UCB OFFSETS
```

```
;DWT0158                                0000     .1          .SBTTL  CREATE FORK-AND-WAIT PROCESS
;DWT0158                                0000     .2 ;+
;DWT0158                                0000     .3 ; EXE$FORK_WAIT - CREATE FORK-AND-WAIT PROCESS
;DWT0158                                0000     .4 ;
;DWT0158                                0000     .5 ; FUNCTIONAL DESCRIPTION:
;DWT0158                                0000     .6 ;
;DWT0158                                0000     .7 ;       This routine is called to fold a fork context into a fork block and
;DWT0158                                0000     .8 ;       place that block on the fork-and-wait work queue, EXE$GL_FKWAITFL.
;DWT0158                                0000     .9 ;       From zero to one seconds later, EXE$TIMEOUT will remove all entries in
;DWT0158                                0000    .10 ;       the fork-and-wait work queue and restart the fork thread saved here.
;DWT0158                                0000    .11 ;
;DWT0158                                0000    .12 ; INPUTS:
;DWT0158                                0000    .13 ;
;DWT0158                                0000    .14 ;       00(SP)  = Return address of the caller
;DWT0158                                0000    .15 ;       04(SP)  = Return address of the caller's caller
;DWT0158                                0000    .16 ;
;DWT0158                                0000    .17 ;       R5      = Address of a fork block
;DWT0158                                0000    .18 ;       R3 & R4 = Saved fork context registers
;DWT0158                                0000    .19 ;
;DWT0158                                0000    .20 ;       IPL >= IPL$_SYNCH
;DWT0158                                0000    .21 ;
;DWT0158                                0000    .22 ;
;DWT0158                                0000    .23 ; OUTPUTS (to caller's caller):
;DWT0158                                0000    .24 ;
;DWT0158                                0000    .25 ;       All registers and IPL are returned as they were when this routine was
;DWT0158                                0000    .26 ;       called.  Depending upon actions taken by the caller this may be
;DWT0158                                0000    .27 ;       equivalent to destroying R0 through R5 and altering IPL.
;DWT0158                                0000    .28 ;
;DWT0158                                0000    .29 ; OUTPUTS (to caller after fork-and-wait completed):
;DWT0158                                0000    .30 ;
;DWT0158                                0000    .31 ;       R3 through R5 preserved.
;DWT0158                                0000    .32 ;       All other registers destroyed.
;DWT0158                                0000    .33 ;       IPL = FKB$B_FIPL(R5)
;DWT0158                                0000    .34 ;-
;DWT0158                                0000    .35
;DWT0158                                0000    .36 EXE$FORK_WAIT::
;DWT0158                                0000    .37
;DWT0158                                0000    .38         ASSUME  FKB$L_FR4 EQ <FKB$L_FR3 + 4>
;DWT0158                  10 A5   53 7D 0000    .39         MOVQ    R3, FKB$L_FR3(R5)           ; Save fork context registers.
;DWT0158                     0C A5 8ED0 0004    .40         POPL    FKB$L_FPC(R5)               ; Save fork context PC.
;DWT0158               0000'DF   65 0E 0008    .41         INSQUE  (R5), @W^EXE$GL_FKWAITBL    ; Put fork block on work queue.
;DWT0158                         05    000D    .42         RSB                                 ; Return to caller's caller.
```

```
                        .TITLE  FORKCNTRL - FORK PROCESS CONTROL
;DWT0158                .IDENT  'V03-002'
-1
                ;
                ;*****************************************************************************
                ;*                                                                           *
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                ;*                                                                           *
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                ;*  SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.                  *
                ;*                                                                           *
                ;*                                                                           *
                ;*****************************************************************************
                ;
                ; D. N. CUTLER 9-AUG-76
                ;
;ROW0176        ; MODIFIED BY:
;ROW0176        ;
;DWT0158        ;       V03-002 DWT0158         David W. Thiel          27-DEC-1983
;DWT0158        ;               Speed up fork processing a bit by doing fewer interrupts
;DWT0158        ;               and REMQUE's.
;DWT0158        ;
;ROW0176        ;       V03-001 ROW0176         Ralph O. Weber          4-APR-1983
;ROW0176        ;               Add EXE$FORK_WAIT, the entry fork-and-wait routine which is
;ROW0176        ;               the object of the FORK_WAIT macro.
;ROW0176        ;
-29
                ;
                ; MACRO LIBRARY CALLS
                ;

                        $FKBDEF                         ;DEFINE FKB OFFSETS
                        $PRDEF                          ;DEFINE PROCESSOR REGISTERS
                        $UCBDEF                         ;DEFINE UCB OFFSETS
```

```
;DWT0158                                0000     .1          .SBTTL  CREATE FORK-AND-WAIT PROCESS
;DWT0158                                0000     .2 ;+
;DWT0158                                0000     .3 ; EXE$FORK_WAIT - CREATE FORK-AND-WAIT PROCESS
;DWT0158                                0000     .4 ;
;DWT0158                                0000     .5 ; FUNCTIONAL DESCRIPTION:
;DWT0158                                0000     .6 ;
;DWT0158                                0000     .7 ;       This routine is called to fold a fork context into a fork block and
;DWT0158                                0000     .8 ;       place that block on the fork-and-wait work queue, EXE$GL_FKWAITFL.
;DWT0158                                0000     .9 ;       From zero to one seconds later, EXE$TIMEOUT will remove all entries in
;DWT0158                                0000    .10 ;       the fork-and-wait work queue and restart the fork thread saved here.
;DWT0158                                0000    .11 ;
;DWT0158                                0000    .12 ; INPUTS:
;DWT0158                                0000    .13 ;
;DWT0158                                0000    .14 ;       00(SP)  = Return address of the caller
;DWT0158                                0000    .15 ;       04(SP)  = Return address of the caller's caller
;DWT0158                                0000    .16 ;
;DWT0158                                0000    .17 ;       R5      = Address of a fork block
;DWT0158                                0000    .18 ;       R3 & R4 = Saved fork context registers
;DWT0158                                0000    .19 ;
;DWT0158                                0000    .20 ;       IPL >= IPL$_SYNCH
;DWT0158                                0000    .21 ;
;DWT0158                                0000    .22 ;
;DWT0158                                0000    .23 ; OUTPUTS (to caller's caller):
;DWT0158                                0000    .24 ;
;DWT0158                                0000    .25 ;       All registers and IPL are returned as they were when this routine was
;DWT0158                                0000    .26 ;       called.  Depending upon actions taken by the caller this may be
;DWT0158                                0000    .27 ;       equivalent to destroying R0 through R5 and altering IPL.
;DWT0158                                0000    .28 ;
;DWT0158                                0000    .29 ; OUTPUTS (to caller after fork-and-wait completed):
;DWT0158                                0000    .30 ;
;DWT0158                                0000    .31 ;       R3 through R5 preserved.
;DWT0158                                0000    .32 ;       All other registers destroyed.
;DWT0158                                0000    .33 ;       IPL = FKB$B_FIPL(R5)
;DWT0158                                0000    .34 ;-
;DWT0158                                0000    .35
;DWT0158                                0000    .36 EXE$FORK_WAIT::
;DWT0158                                0000    .37
;DWT0158                                0000    .38         ASSUME  FKB$L_FR4 EQ <FKB$L_FR3 + 4>
;DWT0158          10 A5    53    7D     0000    .39         MOVQ    R3, FKB$L_FR3(R5)               ; Save fork context registers.
;DWT0158             0C A5 8ED0          0004    .40         POPL    FKB$L_FPC(R5)                   ; Save fork context PC.
;DWT0158    0000'DF    65    0E          0008    .41         INSQUE  (R5), @W^EXE$GL_FKWAITBL        ; Put fork block on work queue.
;DWT0158                  05            000D    .42         RSB                                     ; Return to caller's caller.
```

```
                     000E     67          .SBTTL  CREATE I/O DRIVER FORK PROCESS
                     000E     68 ;+
                     000E     69 ; EXE$IOFORK - CREATE I/O DRIVER FORK PROCESS
                     000E     70 ;
                     000E     71 ; THIS ROUTINE IS CALLED BY AN I/O DRIVER TO CREATE A FORK PROCESS.
                     000E     72 ;
                     000E     73 ; INPUTS:
                     000E     74 ;
                     000E     75 ;       00(SP) = RETURN ADDRESS OF CALLER.
                     000E     76 ;       04(SP) = RETURN ADDRESS OF CALLER'S CALLER.
                     000E     77 ;
                     000E     78 ;       R5 = UCB ADDRESS OF DEVICE UNIT.
                     000E     79 ;
                     000E     80 ; OUTPUTS:
                     000E     81 ;
                     000E     82 ;       ***TBS***
                     000E     83 ;-
                     000E     84
                  00000000    85          .PSECT  A$EXENONPAGED,LONG
                     0000     86 EXE$IOFORK::                             ;CREATE I/O DRIVER FORK PROCESS
64 A5    01    AA  0000     87          BICW    #UCB$M_TIM,UCB$W_STS(R5);DISABLE TIMEOUT AND FALL THROUGH
                     0004     88                                          ;TO EXE$FORK
```

```
                                0004     90          .SBTTL  CREATE FORK PROCESS
                                0004     91 ;+
                                0004     92 ; EXE$FORK - CREATE FORK PROCESS
                                0004     93 ;
                                0004     94 ; THIS ROUTINE IS CALLED TO CREATE A FORK PROCESS.
                                0004     95 ;
                                0004     96 ; INPUTS:
                                0004     97 ;
                                0004     98 ;       00(SP) = RETURN ADDRESS OF CALLER.
                                0004     99 ;       04(SP) = RETURN ADDRESS OF CALLER'S CALLER.
                                0004    100 ;
                                0004    101 ;       R5 = ADDRESS OF FORK BLOCK.
                                0004    102 ;
                                0004    103 ; OUTPUTS:
                                0004    104 ;
                                0004    105 ;       ***TBS***
                                0004    106 ;-
                                0004    107
                                0004    108 EXE$FORK::                                  ;CREATE FORK PROCESS
                          10 A5   53  7D 0004    109          MOVQ    R3,FKB$L_FR3(R5)   ;SAVE REGISTERS R3 AND R4
                               0C A5 8ED0 0008    110          POPL    FKB$L_FPC(R5)      ;SET FORK PROCESS PC
                          54   0B A5  9A 000C    111          MOVZBL  FKB$B_FIPL(R5),R4  ;GET FORK IPL
                    53   FFD0'CF44  7E 0010    112          MOVAQ   W^SWI$GL_FQFL-<6*8>[R4],R3 ;GET ADDRESS OF FORK QUEUE LISTHEAD
                          04 B3   65  0E 0016    113          INSQUE  (R5),@4(R3)        ;INSERT FORK BLOCK IN FORK QUEUE
;DWT0158                        03  12 001A     .1          BNEQ    10$                ;IF QUEUE ALREADY POPULATED AVOID EXTRA INTE
;DWT0158                            001C     .2          SOFTINT R4                 ;INITIATE SOFTWARE INTERRUPT
;DWT0158                        05  001F     .3 10$:     RSB                        ; AND RETURN
```

```
                        0020   117          .SBTTL  SOFTWARE INTERRUPT ENTRY POINTS
                        0020   118 ;+
                        0020   119 ; THE APPROPRIATE ENTRY POINT IS AUTOMATICALLY VECTORED TO WHEN THE SOFTWARE
                        0020   120 ; INTERRUPT PRIORITY ARBITRATION LOGIC IN THE CENTRAL PROCESSOR DETECTS A
                        0020   121 ; PENDING INTERRUPT AT LEVEL 6, 8, 9, 10, OR 11 AND THE CURRENT PRIORITY LEVEL
                        0020   122 ; IS LOWER THAN THE PENDING LEVEL. THE STATE OF THE STACK ON ENTRY IS:
                        0020   123 ;
                        0020   124 ;       00(SP) = INTERRUPT PC.
                        0020   125 ;       04(SP) = INTERRUPT PSL.
                        0020   126 ;
                        0020   127 ; THERE IS AN ENTRY POINT FOR EACH FORK LEVEL SO THAT THE HARDWARE IPL REGISTER
                        0020   128 ; WILL NOT HAVE TO BE READ TO DETERMINE THE CURRENT PROCESSOR IPL.  READING THE
                        0020   129 ; IPL REGISTER IS SLOW ENOUGH TO WARRANT THE ADDITIONAL CODE.
                        0020   130 ;-
                        0020   131
                        0020   132          .ALIGN  LONG                    ;ENTRY POINT MUST BE LONGWORD ALIGNED
                        0020   133 EXE$FRKIPL6DSP::                         ;FORK IPL 6 ENTRY POINT
              56    DD  0020   134          PUSHL   R6                      ;SAVE R6.
56    0000'CF   7E  11  0022   135          MOVAQ   W^SWI$GL_FQFL,R6        ;GET ADDRESS OF FORK QUEUE LISTHEAD
                  2F  11  0027   136          BRB     EXE$FORKDSPTH           ;BRANCH TO COMMON CODE
                        0029   137
                        0029   138          .ALIGN  LONG                    ;ENTRY POINT MUST BE LONGWORD ALIGNED
                        002C   139 EXE$FRKIPL9DSP::                         ;FORK IPL 9 ENTRY POINT
              56    DD  002C   140          PUSHL   R6                      ;SAVE R6.
56    0018'CF   7E  11  002E   141          MOVAQ   W^SWI$GL_FQFL+24,R6     ;GET ADDRESS OF FORK QUEUE LISTHEAD
                  23  11  0033   142          BRB     EXE$FORKDSPTH           ;BRANCH TO COMMON CODE
                        0035   143
                        0035   144          .ALIGN  LONG                    ;ENTRY POINT MUST BE LONGWORD ALIGNED
                        0038   145 EXE$FRKIPL10DSP::                        ;FORK IPL 10 ENTRY POINT
              56    DD  0038   146          PUSHL   R6                      ;SAVE R6.
56    0020'CF   7E  11  003A   147          MOVAQ   W^SWI$GL_FQFL+32,R6     ;GET ADDRESS OF FORK QUEUE LISTHEAD
                  17  11  003F   148          BRB     EXE$FORKDSPTH           ;BRANCH TO COMMON CODE
                        0041   149
                        0041   150          .ALIGN  LONG                    ;ENTRY POINT MUST BE LONGWORD ALIGNED
                        0044   151 EXE$FRKIPL11DSP::                        ;FORK IPL 11 ENTRY POINT
              56    DD  0044   152          PUSHL   R6                      ;SAVE R6.
56    0028'CF   7E  11  0046   153          MOVAQ   W^SWI$GL_FQFL+40,R6     ;GET ADDRESS OF FORK QUEUE LISTHEAD
                  0B  11  004B   154          BRB     EXE$FORKDSPTH           ;BRANCH TO COMMON CODE
                        004D   155
                        004D   156          .ALIGN  LONG                    ;ENTRY POINT MUST BE LONGWORD ALIGNED
                        0050   157 EXE$FRKIPL8DSP::                         ;FORK IPL 8 ENTRY POINT
              56    DD  0050   158          PUSHL   R6                      ;SAVE R6.
56    0010'CF   7E  11  0052   159          MOVAQ   W^SWI$GL_FQFL+16,R6     ;GET ADDRESS OF FORK QUEUE LISTHEAD
                  01  11  0057   160          NOP                             ;PAD OUT TO LONGWORD BOUNDARY
                        0058   161          ;
                        0058   162          ; DROP THROUGH TO COMMON CODE
                        0058   163          ;
```

```
                                0058   165          .SBTTL  SOFTWARE INTERRUPT FORK DISPATCHER
                                0058   166 ;+
                                0058   167 ; EXE$FORKDSPTH - SOFTWARE INTERRUPT FORK DISPATCHER
                                0058   168 ;
                                0058   169 ; FOR EACH OF THE LEVELS 6, 8, 9, 10, AND 11, THERE EXISTS A QUEUE OF FORK
                                0058   170 ; BLOCKS WAITING TO BE PROCESSED. WHEN A FORK BLOCK IS ENTERED IN ITS
                                0058   171 ; CORRESPONDING QUEUE AND IT IS THE FIRST TO BE ENTERED (I. E. THE QUEUE
                                0058   172 ; WAS PREVIOUSLY EMPTY), A SOFTWARE INTERRUPT IS REQUESTED FOR THAT LEVEL.
                                0058   173 ; THE FORK DISPATCHER GAINS CONTROL AND EMPTIES THE QUEUE ONE ENTRY AT A
                                0058   174 ; TIME. AS EACH FORK IS DISPATCHED, REGISTERS R3 AND R4 ARE RESTORED FROM
                                0058   175 ; THE FORK BLOCK AND THE FORK PROCESS IS CALLED VIA A JSB INSTRUCTION.
                                0058   176 ; ON RETURN, THE FORK DISPATCHER RETRIEVES THE NEXT ENTRY FROM THE QUEUE
                                0058   177 ; AND REPEATS THE DISPATCHING OPERATION. THIS PROCESS CONTINUES UNTIL
                                0058   178 ; THERE ARE NO MORE FORKS TO DISPATCH AT WHICH TIME THE INTERRUPT IS
                                0058   179 ; DISMISSED.
                                0058   180 ;
                                0058   181 ;
                                0058   182 ;-
                                0058   183          .ALIGN  LONG
                                0058   184 EXE$FORKDSPTH::                             ;SOFTWARE INTERRUPT FORK DISPATCHER
                      55    DD  0058   185          PUSHL   R5                          ;SAVE R5 .
                      54    DD  005A   186          PUSHL   R4                          ;SAVE R4  .
                      53    DD  005C   187          PUSHL   R3                          ;SAVE R3   . PUSHLS ARE FASTEST!
                      52    DD  005E   188          PUSHL   R2                          ;SAVE R2  .
                      51    DD  0060   189          PUSHL   R1                          ;SAVE R1 .
                      50    DD  0062   190          PUSHL   R0                          ;SAVE R0.
;DWT0158               07    11  0064    .1         BRB     20$                         ;BRANCH TO BODY OF DISPATCHER
;DWT0158                           0066    .2 ;
;DWT0158                           0066    .3 ; DISPATCH FORK PROCESS WHEN QUEUE IS NOT YET EMPTY
-3                                 0066   194 ; DISPATCH FORK PROCESS WITH:
                                   0066   195 ;
                                   0066   196 ;       R0 THRU R2 = SCRATCH REGISTERS.
                                   0066   197 ;       R3 AND R4 = RESTORED FROM FORK BLOCK.
                                   0066   198 ;       R5 = ADDRESS OF FORK BLOCK.
                                   0066   199 ;
                53    10 A5    7D  0066   200 10$:    MOVQ    FKB$L_FR3(R5),R3            ;RESTORE REGISTERS R3 AND R4
                      0C B5    16  006A   201         JSB     @FKB$L_FPC(R5)              ;DISPATCH FORK
;DWT0158         55    00 B6    0F  006D    .1 20$:    REMQUE  @(R6),R5                    ;REMOVE NEXT ENTRY FROM FORK QUEUE
;DWT0158                  F3    12  0071    .2         BNEQ    10$                         ;BRANCH IF QUEUE NOT YET EMPTY
;DWT0158                  07    1D  0073    .3         BVS     30$                         ;IF VS NO ENTRY REMOVED
;DWT0158                           0075    .4                                             ;HERE WHEN LAST ENTRY DEQUEUED
;DWT0158                           0075    .5 ;
;DWT0158                           0075    .6 ; DISPATCH LAST ENTRY IN THE QUEUE
;DWT0158                           0075    .7 ; DISPATCH FORK PROCESS WITH:
;DWT0158                           0075    .8 ;
;DWT0158                           0075    .9 ;       R0 THRU R2 = SCRATCH REGISTERS.
;DWT0158                           0075   .10 ;       R3 AND R4 = RESTORED FROM FORK BLOCK.
;DWT0158                           0075   .11 ;       R5 = ADDRESS OF FORK BLOCK.
;DWT0158                           0075   .12 ;
;DWT0158         53    10 A5    7D  0075   .13         MOVQ    FKB$L_FR3(R5),R3            ;RESTORE REGISTERS R3 AND R4
;DWT0158               0C B5    16  0079   .14         JSB     @FKB$L_FPC(R5)              ;DISPATCH FORK
;DWT0158            007F 8F     BA  007C   .15 30$:    POPR    #^M<R0,R1,R2,R3,R4,R5,R6>   ;RESTORE FORK PROCESS REGISTER SET
-3                                 0080   205         REI                                 ;DISMISS INTERRUPT
                                   0081   206
                                   0081   207          .END
```

```
EXE$FORK                        00000004 RG     03
EXE$FORKDSPTH                   00000058 RG     03
EXE$FORK_WAIT                   00000000 RG     01
EXE$FRKIPL10DSP                 00000038 RG     03
EXE$FRKIPL11DSP                 00000044 RG     03
EXE$FRKIPL6DSP                  00000020 RG     03
EXE$FRKIPL8DSP                  00000050 RG     03
EXE$FRKIPL9DSP                  0000002C RG     03
EXE$GL_FKWAITBL                 ********    X   01
EXE$IOFORK                      00000000 RG     03
FKB$B_FIPL                    = 0000000B
FKB$L_FPC                     = 0000000C
FKB$L_FR3                     = 00000010
FKB$L_FR4                     = 00000014
PR$_SIRR                      = 00000014
SWI$GL_FQFL                     ********    X   03
UCB$M_TIM                     = 00000001
UCB$W_STS                     = 00000064
```

Psect synopsis

PSECT name	Allocation		PSECT No.	Attributes								
. ABS .	00000000	(0.)	00 (0.)	NOPIC	USR	CON	ABS	LCL	NOSHR	NOEXE	NORD	NOWRT NOVEC BYTE
. BLANK .	0000000E	(14.)	01 (1.)	NOPIC	USR	CON	REL	LCL	NOSHR	EXE	RD	WRT NOVEC BYTE
ABS	00000000	(0.)	02 (2.)	NOPIC	USR	CON	ABS	LCL	NOSHR	EXE	RD	WRT NOVEC BYTE
A$EXENONPAGED	00000081	(129.)	03 (3.)	NOPIC	USR	CON	REL	LCL	NOSHR	EXE	RD	WRT NOVEC LONG

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	9	00:00:00.07	00:00:00.47
Command processing	73	00:00:00.58	00:00:06.58
Pass 1	200	00:00:04.79	00:00:24.27
Symbol table sort	0	00:00:00.68	00:00:02.39
Pass 2	51	00:00:01.32	00:00:07.47
Symbol table output	3	00:00:00.04	00:00:00.03
Psect synopsis output	2	00:00:00.02	00:00:00.10
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	341	00:00:07.50	00:00:41.34

The working set limit was 900 pages.
22659 bytes (45 pages) of virtual memory were used to buffer the intermediate code.
There were 30 pages of symbol table space allocated to hold 426 non-local and 4 local symbols.
244 source lines were read in Pass 1, producing 14 object records in Pass 2.
12 pages of virtual memory were used to define 11 macros.

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

Macro library name                       Macros defined
------------------                       --------------
_$255$DUA28:[SYS.OBJ]LIB.MLB;1                      3
_$255$DUA28:[SYSLIB]STARLET.MLB;2                   5
TOTALS (all libraries)                              8

491 GETS were required to define 8 macros.

There were no errors, warnings or information messages.

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

INITADP

Table of contents

(3)	168	Macros to describe nexus configurations
(4)	220.1	Adapter-specific data structures
(5)	378	CPU-specific data structures
(6)	528	Message strings
(7)	539	INI$IOMAP, Initialize and map nexuses
(8)	691	INITADP_780, _750, _730, and _UV1
(9)	708	CONFIG_IOSPACE
(10)	832	CREATE_ARRAYS
(11)	867	MAP_PAGES
(13)	1016	INI$UBSPACE
(14)	1072	INI$UBADP - BUILD ADP AND INITIALIZE UBA
(14)	1503	INI$MBADP - BUILD ADP AND INITIALIZE MBA
(14)	1504	INI$DRADP - BUILD ADP AND INITIALIZE DR32
(14)	1505	INI$CIADP - BUILD ADP AND INITIALIZE CI
(14)	1649.36	INI$KDZ11
(14)	1650	INI$CONSOLE, init data structures for console
(15)	1762	EXE$INI_TIMWAIT - COMPUTE CORRECT TIMEWAIT LOOP VALUES
(16)	1905	EXE$INIT_TODR - SET SYSTEM TIME TO CORRECT VALUE AT STARTUP

```
                        0000     1          .NLIST  CND
                        0000     3          .TITLE  INIADP780 - ADAPTER INITIALIZATION FOR VAX 11/780
                        0000     5
                        0000     9
                        0000    13
                        0000    17
                        0000    21
;RLRSCORPIO              0000    .4
;RLRSCORPIO              0000    .5          .IDENT  'V03-021'
-1                      0000    23 ;
                        0000    24 ;*****************************************************************************
                        0000    25 ;*                                                                           *
                        0000    26 ;*  COPYRIGHT (c) 1978, 1980, 1982, 1983 BY                                  *
                        0000    27 ;*  DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASSACHUSETTS.                    *
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                        0000    36 ;*                                                                           *
                        0000    37 ;*  THE INFORMATION IN THIS SOFTWARE IS SUBJECT TO CHANGE WITHOUT NOTICE      *
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                        0000    40 ;*                                                                           *
                        0000    41 ;*  DIGITAL ASSUMES NO RESPONSIBILITY FOR THE USE OR RELIABILITY OF ITS      *
                        0000    42 ;*  SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.                  *
                        0000    43 ;*                                                                           *
                        0000    44 ;*                                                                           *
                        0000    45 ;*****************************************************************************
                        0000    46 ;
                        0000    47 ; Facility: System bootstrapping and initialization
                        0000    48 ;
                        0000    49 ; Abstract: This module contains initialization routines that are loaded
                        0000    50 ;            during system initialization (rather than linked into the system).
                        0000    51 ;
                        0000    52 ; Environment: Mode = KERNEL, Executing on INTERRUPT stack, IPL=31
                        0000    53 ;
                        0000    54 ; Author:  Trudy C. Matthews            Creation date: 22-Jan-1981
                        0000    55 ;
                        0000    56 ; Modification history:
                        0000    57 ;
;KDM0100                 0000    .1 ;       V03-021 KDM0100         Kathleen D. Morse       01-May-1984
;KDM0100                 0000    .2 ;               Correct address of memory CSRs to be past the 8 missing
;KDM0100                 0000    .3 ;               Qbus adapter pages that do not exist.
;KDM0100                 0000    .4 ;
;KDM0099                 0000    .5 ;       V03-020 KDM0099         Kathleen D. Morse       27-Apr-1984
;KDM0099                 0000    .6 ;               On a MicroVAX I, if the sysgen parameter TIMEDWAIT is set
;KDM0099                 0000    .7 ;               to request no time-prompting, then use the last recorded
;KDM0099                 0000    .8 ;               system time instead.  This is found in EXE$GQ_TODCBASE
;KDM0099                 0000    .9 ;               which can be updated with a SET TIME command.
;KDM0099                 0000   .10 ;
;RLRSCORPIO              0000   .11 ;       V03-019 RLRSCORPIO      Robert L. Rappaport     16-Mar-1984
;RLRSCORPIO              0000   .12 ;               Begin additions (to INI$IOMAP) for Scorpio support.
;RLRSCORPIO              0000   .13 ;               Also move ADAPDESC to SYSMAR.MAR, changing it to remove
```

```
;RLRSCORPIO                0000    .14 ;                   the ADAP_GENERAL array.
;RLRSCORPIO                0000    .15 ;
;RLRSCORPIO                0000    .16 ;       V03-018 RLRINIADP       Robert Rappaport        28-Feb-1984
;RLRSCORPIO                0000    .17 ;                   Add refinements to previous update that introduces
;RLRSCORPIO                0000    .18 ;                   longword array CONFREG.  Mainly add logic to allow for
;RLRSCORPIO                0000    .19 ;                   independently assembled invocations of ADAPDESC macro
;RLRSCORPIO                0000    .20 ;                   to be linked into this code.  This provides possible
;RLRSCORPIO                0000    .21 ;                   support of BI as a public bus, with user defined nodes.
;RLRSCORPIO                0000    .22 ;
;KPL0100                   0000    .23 ;       V03-017 KPL0100         Peter Lieberwirth       30-Jan-1984
;KPL0100                   0000    .24 ;                   Implement first step towards a longword-array CONFREG to
;KPL0100                   0000    .25 ;                   replace current byte array CONFREG.  INIADP will construct
;KPL0100                   0000    .26 ;                   two confregs, CONFREG and CONFREGL.  CONFREGL will be
;KPL0100                   0000    .27 ;                   a longword array.  The high byte will be a VMS-bus
;KPL0100                   0000    .28 ;                   designation, and the low word will contain the 16-bit
;KPL0100                   0000    .29 ;                   device type.  The BI introduces 16 bit device types.
;KPL0100                   0000    .30 ;
;KPL0100                   0000    .31 ;                   When all references to CONFREG have been modified to touch
;KPL0100                   0000    .32 ;                   CONFREGL, INIADP will be modified again to stop creating
;KPL0100                   0000    .33 ;                   the byte array.
;KPL0100                   0000    .34 ;
;KPL0100                   0000    .35 ;                   While here, map 9 pages of CI register space, up from 8.
;KPL0100                   0000    .36 ;
;KPL0001                   0000    .37 ;       V03-016 KPL0001         Peter Lieberwirth       17-Jan-1984
;KPL0001                   0000    .38 ;                   Fix bug in V03-015 that caused a failure to boot on 750s.
;KPL0001                   0000    .39 ;                   Specifically, add NDT$_MEM1664NI to ADAPDESC macro.
;KPL0001                   0000    .40 ;
;TCM0009                   0000    .41 ;       V03-015 TCM0009         Trudy C. Matthews       12-Dec-1983
;TCM0009                   0000    .42 ;                   Add support for booting from VENUS console device to
;TCM0009                   0000    .43 ;                   INI$CONSOLE.  When mapping I/O space on VENUS, use the
;TCM0009                   0000    .44 ;                   PAMM to determine if any adaptors are present on the
;TCM0009                   0000    .45 ;                   ABUS.
;TCM0009                   0000    .46 ;
                          0000     58 ;       V03-014 KDM0081         Kathleen D. Morse       13-Sep-1983
                          0000     59 ;                   Create version for Micro-VAX I.
                          0000     60 ;
                          0000     61 ;       V03-013 DWT0126         David W. Thiel          30-Aug-1983
                          0000     62 ;                   Modify EXE$INIT_TODR to set internal time without
                          0000     63 ;                   modifying the contents of the system disk.
                          0000     64 ;
                          0000     65 ;       V03-012 KDM0062         Kathleen D. Morse       18-Jul-1983
                          0000     66 ;                   Add loadable, cpu-dependent routine for initializing
                          0000     67 ;                   the time-wait loop data cells, EXE$INI_TIMWAIT.
                          0000     68 ;
                          0000     69 ;       V03-011 KDM0057         Kathleen D. Morse       15-Jul-1983
                          0000     70 ;                   Added loadable, cpu-dependent routine for initializing
                          0000     71 ;                   the system time, EXE$INIT_TODR.
                          0000     72 ;
                          0000     73 ;       V03-010 KTA3071         Kerbey T. Altmann       12-Jul-1983
                          0000     74 ;                   Include CPU-specific console init code.
                          0000     75 ;
                          0000     76 ;       V03-009 TCM0008         Trudy C. Matthews       10-Jan-1983
                          0000     77 ;                   Change PSECT of 11/790 data that must stick around after
                          0000     78 ;                   INIADP is deleted.  Build arrays ABUS_VA, ABUS_TYPE, and
                          0000     79 ;                   ABUS_INDEX that describe the 11/790 ABUS configuration.
                          0000     80 ;
                          0000     81 ;       V03-008 MSH0002         Maryann Hinden          08-Dec-1982
```

```
0000     82 ;                  Add powerfail support for DW750.
0000     83 ;
0000     84 ;        V03-007 ROW0142         Ralph O. Weber          24-NOV-1982
0000     85 ;                Change UBA interrupt services routines prototype so that
0000     86 ;                UBAERRADR is correctly computed as an offset from UBAINTBASE.
0000     87 ;
0000     88 ;        V03-006 TCM0007         Trudy C. Matthews       10-Nov-1982
0000     89 ;                Add 11/790-specific initialization of SCB.
0000     90 ;
0000     91 ;        V03-005 TCM0006         Trudy C. Matthews       8-Nov-1982
0000     92 ;                Initialize field ADP$L_AVECTOR with the address of
0000     93 ;                each adapter's first SCB vector.
0000     94 ;
0000     95 ;        V03-004 KTA3018         Kerbey T. Altmann       30-Oct-1982
0000     96 ;                Move from INILOA facility, rename from INITADP,
0000     97 ;                put in conditional assembly, rewrite some routines.
0000     98 ;
0000     99 ;        V03-003 MSH0001         Maryann Hinden          24-Sep-1982
0000    100 ;                Change EXE$DW780_INT to EXE$UBAERR_INT.
0000    101 ;
0000    102 ;        V03-002 TCM0005         Trudy C. Matthews       10-Aug-1982
0000    103 ;                Added support for 11/790 processor.
0000    104 ;
0000    105 ;        V03-001 KDM0002         Kathleen D. Morse       28-Jun-1982
0000    106 ;                Added $DCDEF.
0000    107 ;
0000    108 ;--
```

```
                        0000    110 ;
                        0000    111 ; MACRO LIBRARY CALLS
                        0000    112 ;
                        0000    113         $ADPDEF                         ; Define ADP offsets.
;RLRSCORPIO             0000     .1         $BIICDEF                        ; Define BIIC offsets.
;RLRSCORPIO             0000     .2         $BTDDEF                         ; Define boot devices
;RLRSCORPIO             0000     .3         $BUADEF                         ; Define BUA Register offsets.
-1                      0000    115         $CRBDEF                         ; Define CRB offsets.
                        0000    116         $DCDEF                          ; Define adapter types
                        0000    117         $DDBDEF                         ; Define DDB offsets
                        0000    118         $DYNDEF                         ; Define data structure type codes.
                        0000    119         $IDBDEF                         ; Define interrupt dispatcher offsets.
                        0000    125         $IO780DEF                       ; Define 11/780 I/O space.
                        0000    137         $MCHKDEF                        ; Define machine check masks.
                        0000    138         $NDTDEF                         ; Define nexus device types.
                        0000    139         $PRDEF                          ; Define IPR numbers.
                        0000    140
                        0000    142         $PR780DEF                       ; Define 11/780 specific IPR numbers.
                        0000    144
                        0000    148
                        0000    152
                        0000    156
                        0000    160
;RLRSCORPIO             0000     .4
                        0000    161         $PTEDEF                         ; Define Page Table Entry bits.
                        0000    162         $RPBDEF                         ; Define Restart Parameter Block fields.
                        0000    163         $UBADEF                         ; Define UBA register offsets.
                        0000    164         $UCBDEF                         ; Define UCB offsets.
                        0000    165         $VADEF                          ; Define virtual address fields.
                        0000    166         $VECDEF                         ; Define vec offsets.
```

```
                     0000   168          .SBTTL  Macros to describe nexus configurations
                     0000   169 ;
                     0000   170 ;       The macros FLOAT_NEXUS and FIXED_NEXUS add one or more entries to a
                     0000   171 ;       nexus descriptor table.  Each entry is of the form:
                     0000   172 ;               +-------------------------------+
                     0000   173 ;               |   PFN of nexus I/O space      |
;KPL0100              0000    .1 ;               +-------+-------+---------------+
;KPL0100              0000    .2 ;               |  bus  |   0   |     type      |
;KPL0100              0000    .3 ;               +-------+-------+---------------+
;KPL0100              0000    .4 ;       type = 0 -> floating nexus
;KPL0100              0000    .5 ;       type = non-zero -> fixed nexus; type = fixed adapter type
;KPL0100              0000    .6 ;       bus  = 0, if SBI; %x80 if BI  (this is a VMS-only designation)
;KPL0100              0000    .7 ;
;KPL0100              0000    .8 ;
;KPL0100              0000    .9 ;       device_type:    SBI adapters have 8-bit device type codes.  These
;KPL0100              0000   .10 ;                       device types are simple integers.
;KPL0100              0000   .11 ;
;KPL0100              0000   .12 ;                       BI adapters have 16-bit device type codes, that are
;KPL0100              0000   .13 ;                       subject to the following interpretation:
;KPL0100              0000   .14 ;
;KPL0100              0000   .15 ;                       - the MSB of the device-type field will be 0 for DEC
;KPL0100              0000   .16 ;                       devices and 1 for non-DEC devices,
;KPL0100              0000   .17 ;
;KPL0100              0000   .18 ;                       - DEC memory devices will have 0s in the high-order
;KPL0100              0000   .19 ;                       byte of the device type,
;KPL0100              0000   .20 ;
;KPL0100              0000   .21 ;                       - non-DEC supplied memory devices will have a 1 in the
;KPL0100              0000   .22 ;                       MSB of the high-order byte, and the rest of the high
;KPL0100              0000   .23 ;                       order byte will contain 0s.
;KPL0100              0000   .24 ;
;KPL0100              0000   .25 ;                       - The "all 0s" and "all 1s" device-type codes are
;KPL0100              0000   .26 ;                       reserved for DEC.
;KPL0100              0000   .27 ;
;KPL0100              0000   .28 ; If SBI type codes were simply expanded to a word for purposes of the routines
;KPL0100              0000   .29 ; in this module, there would be possible conflicts between SBI devices and
;KPL0100              0000   .30 ; BI memory adapters supplied by DEC.  Voila:  the bus type.
-5                   0000   179 ;
                     0000   180 ; Macro FLOAT_NEXUS.
                     0000   181 ; INPUTS:
                     0000   182 ;       PHYSADR -- physical address of 1 or more contiguous floating nexus
                     0000   183 ;                  slots
                     0000   184 ;       NUMNEX -- number of contiguous floating nexuses, default = 1
                     0000   185 ;       PERNEX -- amount of address space per nexus (does not have to be
                     0000   186 ;                 specified if NUMNEX = 1)
                     0000   187 ;
                     0000   188          .MACRO  FLOAT_NEXUS     PHYSADR,NUMNEX=1,PERNEX=0
                     0000   189          PA = PHYSADR
                     0000   190          .REPEAT NUMNEX          ; For each nexus...
                     0000   191          .LONG   <PA/^X200>      ; Store PFN.
;KPL0100              0000    .1          .LONG   0               ; Store floating nexus type.
-1                   0000   193          PA = PA + PERNEX        ; Increment to physical address of next nexus.
                     0000   194          .ENDR
                     0000   195          .ENDM   FLOAT_NEXUS
                     0000   196
                     0000   197 ;
                     0000   198 ; Macro FIXED_NEXUS.
                     0000   199 ;
```

```
                     0000   200 ; INPUTS:
                     0000   201 ;       PHYSADR - physical address of 1 or more contiguous fixed nexus slots
                     0000   202 ;       PERNEX - amount of address space per nexus
                     0000   203 ;       NEXUSTYPES - a list of fixed nexus types, enclosed in <>
                     0000   204 ;
                     0000   205         .MACRO  FIXED_NEXUS     PHYSADR,PERNEX=0,NEXUSTYPES
                     0000   206         PA = PHYSADR
                     0000   207         .IRP    TYPECODE,NEXUSTYPES     ; For each fixed nexus type...
                     0000   208         .LONG   <PA/^X200>              ; Store PFN.
;RLRSCORPIO           0000    .1         .LONG   TYPECODE                ; Store fixed nexus type.
;RLRSCORPIO           0000    .2         PA = PA + PERNEX                ; Increment to address of next nexus.
;RLRSCORPIO           0000    .3         .ENDR
;RLRSCORPIO           0000    .4         .ENDM   FIXED_NEXUS
;RLRSCORPIO           0000    .5
;RLRSCORPIO           0000    .6 ;
;RLRSCORPIO           0000    .7 ; Macro NEXUSDESC_TABLE - declare the beginning of a NEXUS descriptor table
;RLRSCORPIO           0000    .8 ;
;RLRSCORPIO           0000    .9 ;       1st byte in table (at offset -5 from label) contains length of
;RLRSCORPIO           0000   .10 ;       adapter type code field in CSR's on this bus. [Note for SBI like
;RLRSCORPIO           0000   .11 ;       busses, this is 1.]  The next longword (at offset -4) in the
;RLRSCORPIO           0000   .12 ;       table contains the Software defined bus type byte defined in the
;RLRSCORPIO           0000   .13 ;       high order byte of the longword.  [Note for SBI like busses, this
;RLRSCORPIO           0000   .14 ;       value is 0, for the BI it is ^x80.]
;RLRSCORPIO           0000   .15 ;
;RLRSCORPIO           0000   .16
;RLRSCORPIO           0000   .17 ; Define parameters that may be specified or used in macro invocation.
;RLRSCORPIO           0000   .18
;RLRSCORPIO 00000000  0000   .19 BI_LIKE  = 0                    ; BI like bus.
;RLRSCORPIO 00000001  0000   .20 SBI_LIKE = 1                    ; SBI like bus.
;RLRSCORPIO           0000   .21
;RLRSCORPIO 00000001  0000   .22 SBI_CSR_LEN = 1                 ; Length of type code field in adapter CSR's
;RLRSCORPIO           0000   .23                                 ;  on SBI, CMI, etc.
;RLRSCORPIO 00000002  0000   .24 BI_CSR_LEN  = 2                 ; Length of type code field in adapter CSR's
;RLRSCORPIO           0000   .25                                 ;  on BI.
;RLRSCORPIO           0000   .26
;RLRSCORPIO 00000000  0000   .27 SBI_BUS_CODE = 0                ; Software defined bus code for SBI like busses.
;RLRSCORPIO 80000000  0000   .28 BI_BUS_CODE  = ^x80000000       ; Software defined bus code for the BI.
;RLRSCORPIO           0000   .29
;RLRSCORPIO           0000   .30         .MACRO  NEXUSDESC_TABLE LABEL,BUS_TYPE=SBI_LIKE
;RLRSCORPIO           0000   .31         .IF     EQ,BUS_TYPE-SBI_LIKE
;RLRSCORPIO           0000   .32                                 .BYTE   SBI_CSR_LEN
;RLRSCORPIO           0000   .33                                 .LONG   SBI_BUS_CODE
;RLRSCORPIO           0000   .34         .IFF
;RLRSCORPIO           0000   .35                 .IF     EQ,BUS_TYPE-BI_LIKE
;RLRSCORPIO           0000   .36                                 .BYTE   BI_CSR_LEN
;RLRSCORPIO           0000   .37                                 .LONG   BI_BUS_CODE
;RLRSCORPIO           0000   .38                 .IFF
;RLRSCORPIO           0000   .39                                 .ERROR  ; UNRECOGNIZED BUS TYPE, NEXUSDESC_TABLE;
;RLRSCORPIO           0000   .40                 .ENDC
;RLRSCORPIO           0000   .41         .ENDC
;RLRSCORPIO           0000   .42
;RLRSCORPIO           0000   .43 LABEL:
;RLRSCORPIO           0000   .44         .ENDM   NEXUSDESC_TABLE
;RLRSCORPIO           0000   .45
;RLRSCORPIO FFFFFFFB  0000   .46 CSR_LEN_OFFSET  = -5                ; Offset before nexus descriptor of
;RLRSCORPIO           0000   .47                                     ;  byte containing length of adapter
;RLRSCORPIO           0000   .48                                     ;  type field in adapter CSR.
```

```
;RLRSCORPIO              FFFFFFFC  0000    .49 BUS_CODE_OFFSET = -4                    ; Offset before nexus descriptor table
;RLRSCORPIO                        0000    .50                                         ;  of longword containing software
;RLRSCORPIO                        0000    .51                                         ;  defined bus type to be or'ed with
;RLRSCORPIO                        0000    .52                                         ;  adapter type to produce NDT$_ value.
-5                                 0000    214 ;
                                   0000    215 ; Macro END_NEXUSDESC.
                                   0000    216 ;
                                   0000    217         .MACRO  END_NEXUSDESC
                                   0000    218         .LONG   0                       ; PFN=0 -> end of nexus descriptors.
                                   0000    219         .ENDM   END_NEXUSDESC
```

```
;RLRSCORPIO                              .1          .SBTTL  Adapter-specific data structures
;RLRSCORPIO                              .2 ;
;RLRSCORPIO                              .3 ; Put a symbol for arrays built by macros in the correct psects.
;RLRSCORPIO                              .4 ;
;RLRSCORPIO                              .5 ;***************** ADAPTERS array *************
;RLRSCORPIO                    00000000  .6          .PSECT  $$$INIT$DATA0
;RLRSCORPIO                              .7 ADAPTERS:                                    ; Build adapter type code arrays here.
;RLRSCORPIO                              .8
;RLRSCORPIO                    00000000  .9          .PSECT  $$$INIT$DATA1             ; User contributions in this .PSECT.
;RLRSCORPIO                              .10                                           ; End of ADAPTERS array.
;RLRSCORPIO                              .11 ;***************** End of ADAPTERS array *************
;RLRSCORPIO                              .12
;RLRSCORPIO                              .13 ;***************** NUM_PAGES array *************
;RLRSCORPIO                    00000000  .14          .PSECT  $$$INIT$DATA2
;RLRSCORPIO                              .15 NUM_PAGES:                                  ; Build "number of pages to map" array.
;RLRSCORPIO                    00000000  .16          .PSECT  $$$INIT$DATA3            ; User contributions in this .PSECT.
;RLRSCORPIO                              .17 ;***************** End of NUM_PAGESarray *************
;RLRSCORPIO                              .18
;RLRSCORPIO                              .19 ;***************** INIT_ROUTINES array *************
;RLRSCORPIO                    00000000  .20          .PSECT  $$$INIT$DATA4
;RLRSCORPIO                              .21 INIT_ROUTINES:                              ; Build "address of init routine" array.
;RLRSCORPIO                    00000000  .22          .PSECT  $$$INIT$DATA5            ; User contributions in this .PSECT.
;RLRSCORPIO                              .23 ;***************** End of INIT_ROUTINES array *************
-65                                     286
                                        287 ;
                                        288 ; To add a new adapter type:
                                        289 ;       1) Add a new ADAPDESC macro invocation to the end of this list.
                                        290 ;
                                        291          .PSECT  $$$INIT$DATA,LONG
                                        292
                                        293 ;
                                        294 ; Default interupt vectors for UNIBUS system devices
                                        295 ; (This array is indexed by the RPB field RPB$B_DEVTYP, if the RPB field
                                        296 ; RPB$W_ROUBVEC is zero.  If RPB$W_ROUBVEC is not zero, then RPB$W_ROUBVEC
                                        297 ; is used and this array is not referenced at all.  RPB$W_ROUBVEC is set up
                                        298 ; by PQDRIVER.  RPB$L_BOOTRO is set by VMB to contain the device name in
                                        299 ; ASCII, not the vector number and device type, as it does on full
                                        300 ; architecture VAX machines.
                                        301 ;
                                        302 BOOTVECTOR:
                              0088      303          .WORD   ^X88                     ; RK06/7 Interrupt vector
                              0070      304          .WORD   ^X70                     ; RL01/2 Interrupt vector
                                        305
;RLRSCORPIO                              .1 BUS_CSR_LEN:                                 ; Static byte containing the length (in bytes)
;RLRSCORPIO                      00      .2          BYTE    0                       ;  of the adapter type field in the CSR's of
;RLRSCORPIO                              .3                                          ;  the bus currently being configured.  The
;RLRSCORPIO                              .4                                          ;  proper value for the bus of interest is
;RLRSCORPIO                              .5                                          ;  copied here, from the current nexus
;RLRSCORPIO                              .6                                          ;  descriptor table, when we enter subroutine
;RLRSCORPIO                              .7                                          ;  CONFIG_IOSPACE.
;RLRSCORPIO                              .8
;RLRSCORPIO                              .9 SW_BUS_CODE:                             ; Static longword containing the software
;RLRSCORPIO                    00000000  .10          LONG    0                       ;  defined bus type, of the bus currently being
;RLRSCORPIO                              .11                                         ;  configured, in the high order byte.  The
;RLRSCORPIO                              .12                                         ;  proper value for the bus of current interest
;RLRSCORPIO                              .13                                         ;  is copied here, from the nexus descriptor
;RLRSCORPIO                              .14                                         ;  table, when we enter subroutine
```

```
;RLRSCORPIO                      0009    .15                             ;  CONFIG_IOSPACE.
;RLRSCORPIO                      0009    .16
;RLRSCORPIO                      0009    .17 DIRECT_VEC_NODE_CNT:        ; Static longword that counts the number of
;RLRSCORPIO                      0009    .18                             ;  direct vectoring adpater nodes that we have
;RLRSCORPIO              00000000 0009    .19         .LONG   0           ;  run across so far.
;RLRSCORPIO                      000D    .20
;RLRSCORPIO              00000001 000D    .21 $$$VMSDEFINED = 1           ; Define symbol that means VMS system software.
;RLRSCORPIO              00000080 000D    .22 NUMUBAVEC = 128             ; ALLOW FOR 128 UNIBUS VECTORS
;RLRSCORPIO                      000D    .23
;RLRSCORPIO                      000D    .24         ADAPDESC -          ; Memory. ** MUST BE 1ST IN DESCRIPTOR LIST **
;RLRSCORPIO                      000D    .25         ADPTYPES=<NDT$_MEM1664NI,NDT$_MEM4NI,NDT$_MEM4I,NDT$_MEM16NI, -
;RLRSCORPIO                      000D    .26                 NDT$_MEM16I,NDT$_MEM64NIL,NDT$_MEM64EIL,NDT$_MEM64NIU, -
;RLRSCORPIO                      000D    .27                 NDT$_MEM64EIU, NDT$_MEM64I, NDT$_SCORMEM> -
-8                               000D    314                 NUMPAGES=1
                                 000D    315
                                 000D    316         ADAPDESC -          ; MASSbus.
                                 000D    317                 ADPTYPES=NDT$_MB, -
                                 000D    318                 NUMPAGES=8, -
                                 000D    319                 INITRTN=INI$MBADP
                                 000D    320
                                 000D    321         ADAPDESC -          ; UNIbus.
;RLRSCORPIO                      000D     .1                 ADPTYPES=<NDT$_UB0,NDT$_UB1,NDT$_UB2,NDT$_UB3,NDT$_BUA>, -
-1                               000D    323                 NUMPAGES=8, -
                                 000D    324                 INITRTN=INI$UBSPACE
                                 000D    325
                                 000D    326         ADAPDESC -          ; Multi-port memory.
                                 000D    327                 ADPTYPES=<NDT$_MPM0,NDT$_MPM1,NDT$_MPM2,NDT$_MPM3>, -
                                 000D    328                 NUMPAGES=1, -
                                 000D    329                 INITRTN=INI$MPMADP
                                 000D    330
                                 000D    331         ADAPDESC -          ; DR32.
                                 000D    332                 ADPTYPES=NDT$_DR32, -
                                 000D    333                 NUMPAGES=4, -
                                 000D    334                 INITRTN=INI$DRADP
                                 000D    335
                                 000D    336         ADAPDESC -          ; CI780
                                 000D    337                 ADPTYPES=NDT$_CI, -
;KPL0100                         000D     .1                 NUMPAGES=9, -
;RLRSCORPIO                      000D     .2                 INITRTN=INI$CIADP
;RLRSCORPIO                      000D     .3
;RLRSCORPIO                      000D     .4         ADAPDESC -          ; KDZ11 Processor
;RLRSCORPIO                      000D     .5                 ADPTYPES=NDT$_KDZ11, -
;RLRSCORPIO                      000D     .6                 NUMPAGES=1, -
;RLRSCORPIO                      000D     .7                 INITRTN=INI$KDZ11
;RLRSCORPIO                      000D     .8
```

```
                 000D   343 ;
                 000D   344 ; TABLES OF ADAPTER-DEPENDENT INFORMATION
                 000D   345 ;
                 000D   346 ; THE TABLE OFFSETS ARE:
                 000D   347 ;
                 000D   348         $DEFINI ADPTAB
                 0000   349
00000001         0000   350 ADPTAB_IDBUNITS:.BLKB   1              ; # UNITS TO SET IN IDB
00000003         0001   351 ADPTAB_ADPLEN:  .BLKW   1              ; LENGTH OF ADP
00000004         0003   352 ADPTAB_ATYPE:   .BLKB   1              ; ADP TYPE
                 0004   353
                 0004   354         $DEFEND ADPTAB
                 000D   355
                 000D   356 ;
                 000D   357 ; TABLES THEMSELVES:
                 000D   358 ;
                 000D   359
                 000D   360 MBATAB:                               ; TABLE OF MBA CONSTANTS
      08         000D   361         .BYTE   8                     ; # UNITS IN MBA IDB
    0030         000E   362         .WORD   ADP$C_MBAADPLEN       ; # BYTES IN MBA ADP
      00         0010   363         .BYTE   AT$_MBA               ; MBA ADAPTER TYPE
                 0011   364
                 0011   365 DRTAB:                                ; TABLE OF DR32 CONSTANTS
      01         0011   366         .BYTE   1                     ; # UNITS IN DR IDB
    0030         0012   367         .WORD   ADP$C_DRADPLEN        ; # BYTES IN DR ADP
      02         0014   368         .BYTE   AT$_DR                ; DR ADAPTER TYPE
                 0015   369
                 0015   370 CITAB:                                ; TABLE OF CI CONSTANTS
      01         0015   371         .BYTE   1                     ; # UNITS IN CI IDB
    0030         0016   372         .WORD   ADP$C_CIADPLEN        ; # BYTES IN CI ADP
      04         0018   373         .BYTE   AT$_CI                ; CI ADAPTER TYPE
                 0019   374
```

```
                        0019   378          .SBTTL  CPU-specific data structures
                        0019   379 ;
                        0019   380 ; To add a new CPU type:
                        0019   381 ;       1) Create a new nexus descriptor table, using FLOAT_NEXUS and
                        0019   382 ;          FIXED_NEXUS macros.  Put an END_NEXUSDESC macro at the end.
                        0019   383 ;
                        0019   384
                        0019   386
                        0019   387 CPU_ADPSIZE:
                 04EC'  0019   388          .WORD   ADP$C_UBAADPLEN+UBINTSZ+<NUMUBAVEC*4>
                        001B   389
;KPL0100                 001B    .1
;KPL0100                 001B    .2 ;
;KPL0100                 001B    .3 ; Declare the beginning of a nexus-descriptor table.
;KPL0100                 001B    .4 ;
;KPL0100                 001B    .5          NEXUSDESC_TABLE LABEL=NEXUSDESC
;RLRSCORPIO              0020    .6
;RLRSCORPIO              0020    .7 ;
;RLRSCORPIO              0020    .8 ; Describe all possible nexuses on an 11/780.
;RLRSCORPIO              0020    .9 ;
;RLRSCORPIO       00000001   0020   .10          SBI_CPU = 1
;RLRSCORPIO       00000000   0020   .11          BI_CPU  = 0
-7                          0020   397          FLOAT_NEXUS -
                            0020   398                  PHYSADR=IO780$AL_IOBASE, -
                            0020   399                  NUMNEX=IO780$AL_NNEX, -
                            0020   400                  PERNEX=IO780$AL_PERNEX
                            00A0   401          END_NEXUSDESC
                            00A4   403
                            00A4   436
                            00A4   458
                            00A4   495
                            00A4   496
                            00A4   513
;RLRSCORPIO                 00A4    .24
;RLRSCORPIO                 00A4    .25 ;
;RLRSCORPIO                 00A4    .26 ; Nexus "descriptor" arrays -- these arrays hold the nexus-device type and
;RLRSCORPIO                 00A4    .27 ; virtual address of every adapter on the system.  The arrays, CONFREGL and
;RLRSCORPIO                 00A4    .28 ; SBICONF, are allocated enough space to hold the maximum number of adapters
;RLRSCORPIO                 00A4    .29 ; that can be attached to any CPU.  When the code discovers how many adapters
;RLRSCORPIO                 00A4    .30 ; actually exist on the system, it will allocate space from non-paged pool
;RLRSCORPIO                 00A4    .31 ; and move a permanent copy of these arrays into that space.
;RLRSCORPIO                 00A4    .32 ;
;KPL0100          00000040  00A4    .33 MAXNEXUS = 64
;KPL0100                    00A4    .34 CONFREG:                                    ; Byte array of nexus-device type codes..
;KPL0100          000000E4  00A4    .35          .BLKB   MAXNEXUS
;KPL0100                    00E4    .36 SBICONF:
;KPL0100          000001E4  00E4    .37          .BLKL   MAXNEXUS                   ; Longword array of VAs of adapter space.
;KPL0100                    01E4    .38 CONFREGL:
;KPL0100          000002E4  01E4    .39          .BLKL   MAXNEXUS                   ; Longword array of nexus-device type codes
```

```
                                02E4    528          .SBTTL  Message strings
                                02E4    529
                    0000000D    02E4    530 CR = 13
                    0000000A    02E4    531 LF = 10
                                02E4    532 NOSPT:
45 58 45 25 0A 0D               02E4    533          .ASCIZ  <CR><LF>/%EXECINIT-F-Insufficient SPT entries/<CR><LF>
2D 54 49 4E 49 43               02EA
75 73 6E 49 2D 46               02F0
65 69 63 69 66 66               02F6
54 50 53 20 74 6E               02FC
69 72 74 6E 65 20               0302
   00 0A 0D 73 65               0308
                                030D    535 BADUMR:
45 58 45 25 0A 0D               030D    536          .ASCIZ  <CR><LF>/%EXECINIT-F-UNIBUS memory does not start at 0/<CR><LF>
2D 54 49 4E 49 43               0313
42 49 4E 55 2D 46               0319
6D 65 6D 20 53 55               031F
6F 64 20 79 72 6F               0325
74 6F 6E 20 73 65               032B
74 72 61 74 73 20               0331
0D 30 20 74 61 20               0337
            00 0A               033D
```

```
                                033F   539          .SBTTL  INI$IOMAP, Initialize and map nexuses
                                033F   540 ;++
                                033F   541 ; FUNCTIONAL DESCRIPTION:
                                033F   542 ;       This routine is executed only once, during system initialization.
                                033F   543 ;       It loops through all nexuses on the system, testing for
                                033F   544 ;       adapters.  When it finds an adapter, it maps its I/O space and
                                033F   545 ;       initializes it.
                                033F   546 ;
                                033F   547 ; INPUTS:
                                033F   548 ;       BOO$GL_SPTFREL  - next free VPN
                                033F   549 ;       MMG$GL_SPTVASE  - base of system page table
                                033F   550 ;       EXE$GL_RPB      - address of reboot parameter block
                                033F   552 ;       RPB$L_ADPPHY(RPB) - PFN of boot adapter space
                                033F   554 ;
                                033F   555 ; OUTPUTS:
                                033F   556 ;       R0 - SS$_NORMAL
                                033F   557 ;
                                033F   558 ;       For each adapter found, its accessible I/O space is mapped to virtual
                                033F   559 ;       addresses.  An ADP (Adapter Control Block) is built, and the hardware
                                033F   560 ;       adapter is initialized.
                                033F   561 ;
                                033F   562 ;       The arrays CONFREG (a byte array of nexus-device type codes, defined
;RLRSCORPIO                     033F    .1 ;       by NDT$_ symbols) and SBICONF (a longword array of
;RLRSCORPIO                     033F    .2 ;       virtual addresses that map adapter space) are initialized.  Pointers
;RLRSCORPIO                     033F    .3 ;       to these arrays are stored in EXE$GL_CONFREG  and
;RLRSCORPIO                     033F    .4 ;       MMG$GL_SBICONF.  The number of entries in these two parallel arrays is
;RLRSCORPIO                     033F    .5 ;       stored in EXE$GL_NUMNEXUS.
;RLRSCORPIO                     033F    .6 ;
;RLRSCORPIO                     033F    .7 ;       Since BI devices have a 16-bit device type code, a new CONFREG array is
;RLRSCORPIO                     033F    .8 ;       constructed.  This is a longword array called CONFREGL.
-4
                                033F   567 ;
                                033F   568 ;       Several locations in the RPB that describe the boot device are init'ed:
                                033F   569 ;       RPB$L_BOOTR1    - holds index into CONFREG and SBICONF for the boot
                                033F   570 ;                         adapter
                                033F   571 ;       RPB$L_ADPVIR    - holds VA of boot device adapter's register space
                                033F   572 ;       RPB$L_CSRVIR    - holds VA of boot device's register space
                                033F   573 ;--
                                033F   574
                           00000000   575          .PSECT  $$$INIT$CODE,QUAD
                                0000   576 INI$IOMAP::
                                0000   577
                    0FFF 8F     BB 0000   578          PUSHR   #^M<R0,R1,R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                                0004   579 ;
                                0004   580 ; Set up common inputs to CONFIG_IOSPACE subroutine for the CPU-specific code.
                                0004   581 ;
         00000000'GF            D0 0004   582          MOVL    G^BOO$GL_SPTFREL,R2     ; Get next available VPN.
                       52       000A
         00000000'GF            D0 000B   583          MOVL    G^MMG$GL_SPTBASE,R3     ; Get base of System Page Table.
                       53       0011
            53    6342          DE 0012   584          MOVAL   (R3)[R2],R3             ; Compute SVASPT.
       52   52      09          78 0016   585          ASHL    #9,R2,R2                ; Convert VPN to VA.
        80000000 8F              C8 001A   586          BISL    #VA$M_SYSTEM,R2         ; Set system bit.
                       52        0020
                       54       D4 0021   587          CLRL    R4                      ; Clear index into CONFREG and SBICONF.
         00000000'GF            D0 0023   588          MOVL    G^EXE$GL_RPB,R9         ; Get address of RPB.
                       59        0029
    5C A9    F7 8F              78 002A   590          ASHL    #-9,RPB$L_ADPPHY(R9),R10; Get PFN of boot adapter space.
```

```
                      5A      002F
                00E4'CF   DE  0030   592          MOVAL   W^SBICONF,G^MMG$GL_SBICONF  ; Set pointers to local copies
            00000000'GF       0034
                00A4'CF   DE  0039   593          MOVAL   W^CONFREG,G^EXE$GL_CONFREG  ; of these arrays for init routines.
            00000000'GF       003D
;KPL0100        01E4'CF   DE  0042    .1          MOVAL   W^CONFREGL,G^EXE$GL_CONFREGL ; ...
            00000000'GF       0046
```

```
                                004B   691          .SBTTL  INITADP_780, _750, _730, and _UV1
                                004B   692 ;
                                004B   693 ; I/O address space for the 11/780, 11/750, 11/730, and Micro-VAX I cpus
                                004B   694 ; is statically defined in their respective nexus descriptor tables.
                                004B   695 ;
56    0020'CF    DE             004B   696          MOVAL   W^NEXUSDESC,R6          ; Get address of nexus table.
           5B    D4             0050   697          CLRL    R11                     ; Signal use 1st page of SCB.
           0B    10             0052   698          BSBB    CONFIG_IOSPACE          ; Configure processor I/O space.
                                0054   699
                                0054   701
         00C3    30             0054   702          BSBW    CREATE_ARRAYS           ; Create CONFREG and SBICONF arrays.
       0FFF 8F   BA             0057   703          POPR    #^M<R0,R1,R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
       50   01   D0             005B   704          MOVL    #1,R0                   ; Set success status
                 05             005E   705          RSB                             ; Return.
```

```
                                005F   708          .SBTTL  CONFIG_IOSPACE
                                005F   709 ;
                                005F   710 ; CONFIG_IOSPACE
                                005F   711 ;       Given a nexus descriptor table, which describes what "nexuses" or
                                005F   712 ;       "slots" are available on a system to hold I/O adapters, find and
                                005F   713 ;       initialize all adapters on the system.
                                005F   714 ;
                                005F   715 ; Inputs:
                                005F   716 ;       R2 - next available virtual address, to be used for mapping I/O space
                                005F   717 ;       R3 - address of PTE associated with VA in R2
                                005F   718 ;       R4 - Current index into CONFREG and SBICONF arrays (should be 0 the
                                005F   719 ;            first time CONFIG_IOSPACE is called)
                                005F   720 ;       R6 - address of nexus descriptor table
                                005F   721 ;       R9 - address of Restart Parameter Block (RPB)
                                005F   722 ;       R10 - PFN of boot adapter space
                                005F   723 ;       R11- page offset from beginning of SCB; tells which page of the SCB
                                005F   724 ;            to use for this set of nexuses (passed to routines that init ADP)
                                005F   725 ;
                                005F   726 ; Outputs:
                                005F   727 ;       R2,R3,R4 - updated
                                005F   728 ;       R9,R10,R11 - preserved; all other registers potentially modified
                                005F   729 ;       CONFREG - initialized with adapter NDT$ code for each nexus
                                005F   730 ;       SBICONF - initialized with adapter space VA for each nexus
                                005F   731 ;
                                005F   732 CONFIG_IOSPACE:
                                005F   734 ;
                                005F   735 ; Main loop.  Map and initialize all adapters on system.
                                005F   736 ;
;RLRSCORPIO                      005F    .1
;RLRSCORPIO          FB A6   90  005F    .2          MOVB    CSR_LEN_OFFSET(R6),-    ; Move length of adapter type field
;RLRSCORPIO      0004'CF         0062    .3                  W^BUS_CSR_LEN           ;  in CSR's to static location.
;RLRSCORPIO          FC A6   D0  0065    .4          MOVL    BUS_CODE_OFFSET(R6),-   ; Move software defined bus type code
;RLRSCORPIO      0005'CF         0068    .5                  W^SW_BUS_CODE           ;  to static longword.
;RLRSCORPIO                      006B    .6
                                006B   742 NXT_NEXUS:                               ; For each nexus...
                    58   86   D0  006B   743          MOVL    (R6)+,R8                ; Get PFN of nexus.
                         01   12  006E   745          BNEQ    TEST_NEXUS              ; If PFN non-zero, go test the slot.
                              05  0070   746          RSB                             ; If 0, we've found all nexuses.
                                  0071   747 ;
                                  0071   748 ; Read configuration register to determine if anything is present at this
                                  0071   749 ; nexus.
                                  0071   750 ;
                                  0071   751 TEST_NEXUS:
                90000000 8F   C9  0071   752          BISL3   #PTE$M_VALID!PTE$C_KW,- ; Temporarily associate VA in R2 with
                    63   58       0077   753                  R8,(R3)                 ; PFN in R8 via SPTE in R3.
                                  0079   754          $PRTCTINI B^10$, -              ; Protect following code from non-
                                  0079   755                  #<MCHK$M_NEXM!MCHK$M_LOG>; existent memory machine checks.
                    51   62   D0  0085   756          MOVL    (R2),R1                 ; Read adapter configuration register.
                                  0088   757          $PRTCTEND 10$                   ; End of protected code.
                                  0089   758          INVALID R2                      ; Clear TB of temporary mapping.
                      11 50   E8  008C   759          BLBS    R0,GET_TYPE             ; Branch if no machine check occurred.
                                  008F   760 ;
                                  008F   761 ; No adapter present at this nexus.
                                  008F   762 ;
;KPL0100         00A4'CF44   94   008F    .1          CLRB    W^CONFREG[R4]           ; Store "unknown" type in CONFREG
;KPL0100         01E4'CF44   D4   0094    .2          CLRL    W^CONFREGL[R4]          ; and in CONFREGL also.
;KPL0100               55    D4  0099    .3          CLRL    R5                      ; Use general memory type to map
```

```
;KPL0100                                009B    .4                                      ; one page of I/O space.
;KPL0100                 56   04   C0  009B    .5          ADDL2   #4,R6               ; Step past type code in nexus table.
-4                       59   11   009E  767          BRB     MAP_NEXUS               ; Go map I/O space for this nexus.
                                   00A0  769 ;
                                   00A0  770 ; Execution continues here if adapter was present.
                                   00A0  771 ;
                                   00A0  772 GET_TYPE:
;RLRSCORPIO              57   86   D0  00A0    .1          MOVL    (R6)+,R7                ; Get nexus-device type from nexus table.
;RLRSCORPIO                   14   12  00A3    .3          BNEQ    GET_GEN_TYPE            ; Branch if fixed slot.
;RLRSCORPIO                           00A5    .4 ;
;RLRSCORPIO                           00A5    .5 ; Floating-type slot.  Use type from configuration register.
;RLRSCORPIO                           00A5    .6 ; Determine if type in configuration register is 8-bits or 16-bits.
;RLRSCORPIO                           00A5    .7 ;
;RLRSCORPIO                           00A5    .8
;RLRSCORPIO        0004'CF    01   91  00A5    .9          CMPB    #1,W^BUS_CSR_LEN        ; Determine length of adapter type
;RLRSCORPIO                           00AA   .10                                          ;  field in CSR contained in R7.
;RLRSCORPIO                   05   13  00AA   .11          BEQL    10$                     ; EQL implies 1 byte (8-bit) field.
;RLRSCORPIO              57   51   3C  00AC   .12          MOVZWL  R1,R7                   ; BI_LIKE, so use word instruction.
;RLRSCORPIO                   03   11  00AF   .13          BRB     20$                     ; Skip byte instruction.
;RLRSCORPIO              57   51   9A  00B1   .14 10$:     MOVZBL  R1,R7                   ; Use byte instruction to get type.
;RLRSCORPIO                           00B4   .15 20$:                                     ;
;RLRSCORPIO         57   0005'CF    C8  00B4   .16          BISL    W^SW_BUS_CODE,R7        ; Or in software bus code.
;RLRSCORPIO                           00B9   .18 ;
;RLRSCORPIO                           00B9   .19 ; Here R7 has hardware adapter code or'ed with software bus code.
;RLRSCORPIO                           00B9   .20 ; Translate specific nexus device type code into general adapter type code.
;RLRSCORPIO                           00B9   .21 ;
;RLRSCORPIO                           00B9   .22 GET_GEN_TYPE:
;RLRSCORPIO      00A4'CF44    57   90  00B9   .23          MOVB    R7,W^CONFREG[R4]        ; Save nexus-device type in CONFREG.
;RLRSCORPIO      01E4'CF44    57   D0  00BF   .24          MOVL    R7,W^CONFREGL[R4]       ; CONFREGL also filled in.
;RLRSCORPIO                   55   D4  00C5   .25          CLRL    R5                      ; Clear loop index.
;RLRSCORPIO                           00C7   .26 30$:                                     ;
;RLRSCORPIO      50   0000'CF45   DE  00C7   .27          MOVAL   W^ADAPTERS[R5],R0       ; Get address of adapter type code.
;RLRSCORPIO             0000'CF   9F  00CD   .28          PUSHAB  W^NUM_PAGES             ; Push addr of end of ADAPTERS array.
;RLRSCORPIO              8E   50   D1  00D1   .29          CMPL    R0,(SP)+                ; See if we went beyond array.
;RLRSCORPIO                   3F   1E  00D4   .30          BGEQU   END_NEXUS               ; unrecognized adapter, do not map.
;RLRSCORPIO              60   57   D1  00D6   .31          CMPL    R7,(R0)                 ; Adapter type match?
;RLRSCORPIO                   04   13  00D9   .32          BEQL    40$                     ; If EQL yes, adapter type match.
;RLRSCORPIO                   55   D6  00DB   .33          INCL    R5                      ; Increment loop index.
;RLRSCORPIO                   E8   11  00DD   .34          BRB     30$                     ; Look at next adapter.
;RLRSCORPIO                           00DF   .35 40$:
-16                                  00DF   789
                                     00DF   790 ;
                                     00DF   791 ; Store boot parameters.
                                     00DF   792 ;
                         5A   58   D1  00DF   794          CMPL    R8,R10                  ; Does PFN match boot adapter's PFN?
                                15   12  00E2   795          BNEQ    MAP_NEXUS               ; No; continue.
                      60 A9    52   D0  00E4   797          MOVL    R2,RPB$L_ADPVIR(R9)     ; Store VA of boot adapter space.
                      20 A9    54   D0  00E8   798          MOVL    R4,RPB$L_BOOTR1(R9)     ; Store boot adapter nexus number.
                         0D    00   EF  00EC   799          EXTZV   #0,#13, -               ; Get offset into UNIBUS/QBUS I/O page.
                   51    54 A9        00EF
                                      00F2   800                  RPB$L_CSRPHY(R9),R1     ;
                    1000 C241    9E   00F2   801          MOVAB   <8*512>(R2)[R1], -      ; Set VA of UNIBUS/QBUS registers.
                         58 A9        00F7
                                      00F9   802                  RPB$L_CSRVIR(R9)        ;
                                      00F9   803
                                      00F9   804
                                      00F9   805
```

```
                        00F9    806 ; R5/ general adapter type; index into "general" adapter arrays.
                        00F9    807 ; For each adapter -
                        00F9    808 ;       Map the # of pages specified in ADAPDESC macro
                        00F9    809 ;       JSB to initialization routine specified in ADAPDESC macro
                        00F9    810 ;
                        00F9    811 MAP_NEXUS:
00E4'CF44    52   D0    00F9    816         MOVL    R2,W^SBICONF[R4]        ; Save VA of adapter space in SBICONF.
51   0000'CF45   3C    00FF    817         MOVZWL  W^NUM_PAGES[R5],R1      ; Get number of pages to map.
          6C     10    0105    818         BSBB    MAP_PAGES               ; Map the I/O pages.
51   0000'CF45   DE    0107    819         MOVAL   W^INIT_ROUTINES[R5],R1  ; Get address of initialization routine.
          61     D5    010D    820         TSTL    (R1)                    ; Initialization routine specified?
          04     13    010F    821         BEQL    END_NEXUS               ; Branch if none.
       00 B141   16    0111    822         JSB     @(R1)[R1]               ; Call initialization routine.
                        0115    823 END_NEXUS:
          54     D6    0115    824         INCL    R4                      ; Increment CONFREG and SBICONF index.
        FF51     31    0117    826         BRW     NXT_NEXUS               ; Go do next nexus.
                        011A    830
```

```
                                011A   832          .SBTTL  CREATE_ARRAYS
                                011A   833 ;
                                011A   834 ; CREATE_ARRAYS
                                011A   835 ;
                                011A   836 ;       Move the local CONFREG and SBICONF arrays into non-paged pool.
                                011A   837 ;
                                011A   838 ; Inputs:
                                011A   839 ;       R4 - Number of nexuses on the system.
                                011A   840 ;       CONFREG and SBICONF have been initialized.
                                011A   841 ;
                                011A   842 ; Outputs:
                                011A   843 ;       R0 - R5 destroyed
                                011A   844 ;       EXE$GL_CONFREG points to a copy of the CONFREG array in non-paged pool
                                011A   845 ;       MMG$GL_SBICONF points to a copy of the SBICONF array in non-paged pool
                                011A   846 ;       EXE$GL_NUMNEXUS contains the number of nexuses on the system
                                011A   847 ;
                                011A   848 ;
                                011A   849 CREATE_ARRAYS:
                          54    D0    011A   850          MOVL    R4,G^EXE$GL_NUMNEXUS     ; Store number of nexuses on system.
                00000000'GF           011C
              51    0C A444   DE    0121   851          MOVAL   12(R4)[R4],R1            ; Allocate n bytes for CONFREG plus
                                    0126   852                                           ; 4n bytes for SBICONF + header
;KPL0100         51    6144   DE    0126    .1          MOVAL   (R1)[R4],R1              ; Another 4n bytes for CONFREGL.
;KPL0100               02A7   30    012A    .2          BSBW    ALONPAGD                 ; Get pool for CONFREG and SBICONF.
;KPL0100                 82   7C    012D    .3          CLRQ    (R2)+                    ; Clear out unused
;KPL0100            82   51   B0    012F    .4          MOVW    R1,(R2)+                 ; Set in size
;KPL0100      82    0763 8F   B0    0132    .5          MOVW    #<DYN$C_CONF@8>!DYN$C_INIT,(R2)+ ; Set type and subtype
;KPL0100                 62   9E    0137    .6          MOVAB   (R2),G^EXE$GL_CONFREG    ; Store address of system CONFREG.
                00000000'GF           0139
;KPL0100         51    6244   9E    013E    .7          MOVAB   (R2)[R4],R1              ; Two steps to CONFREGL, 1st, SBICONF,
;KPL0100               51     D0    0142    .8          MOVL    R1,G^MMG$GL_SBICONF      ; Store address of system SBICONF.
                00000000'GF           0144
;KPL0100               6144   DE    0149    .9          MOVAL   (R1)[R4],G^EXE$GL_CONFREGL ; And address of system CONFREGL.
                00000000'GF           014C
;KPL0100                 14   BB    0151   .10          PUSHR   #^M<R2,R4>               ; Save pool address and nexus count.
;KPL0100      00A4'CF    54   28    0153   .11          MOVC3   R4,W^CONFREG,(R2)        ; Copy CONFREG to pool.
                           62         0158
;KPL0100                 14   BA    0159   .12          POPR    #^M<R2,R4>               ; Retrieve pool address and nexus count.
;KPL0100      51    54    04   C5    015B   .13          MULL3   #4,R4,R1                 ; Number of bytes in SBICONF.
;KPL0100            7E    51   D0    015F   .14          MOVL    R1,-(SP)                 ; Save, SBICONF size = CONFREGL size
;KPL0100      00E4'CF    51   28    0162   .15          MOVC3   R1,W^SBICONF,(R2)[R4]    ; Copy SBICONF to pool.
                         6244         0167
;KPL0100           51    8E   D0    0169   .16          MOVL    (SP)+,R1                 ; Restore size of SBICONF and CONFREGL.
;KPL0100      01E4'CF    51   28    016C   .17          MOVC3   R1,W^CONFREGL,(R3)       ; Copy CONFREGL to pool.  R3 is output
                           63         0171
;KPL0100                               0172   .18                                       ; from SBICONF MOVC3, so SBICONF and
;KPL0100                               0172   .19                                       ; CONFREGL must be adjacent.
-11                                    0172   864
                                05     0172   865          RSB
```

```
                     0173   867          .SBTTL  MAP_PAGES
                     0173   868 ;++
                     0173   869 ; INPUTS:
                     0173   870 ;        R1/ Number of pages to map.
                     0173   871 ;        R2/ VA of page to map.
                     0173   872 ;        R3/ VA of system page table entry to be used.
                     0173   873 ;        R8/ PFN of page(s) to map.
                     0173   874 ;
                     0173   875 ; OUTPUTS:
                     0173   876 ;        R2,R3 updated; R1,R8 destroyed; all other registers preserved
                     0173   877 ;
                     0173   878 ;--
                     0173   879
                     0173   880 MAP_PAGES:
                     0173   881
 90000000 8F   C9    0173   882          BISL3   #<PTE$M_VALID!PTE$C_KW>,R8,(R3)+
      83   58        0179
                     017B   883                                          ; Map a page.
          58   D6    017B   884          INCL    R8                      ; Next PFN.
52   0200 C2   9E    017D   885          MOVAB   512(R2),R2              ; Next VA.
 00000000'GF   D6    0182   886          INCL    G^BOO$GL_SPTFREL        ; Next free entry.
 00000000'GF   D1    0188   887          CMPL    G^BOO$GL_SPTFREH, -     ; Check for no more system page
 00000000'GF         018E
                     0193   888                  G^BOO$GL_SPTFREL        ; table entries.
          04   15    0193   889          BLEQ    ERROR_HALT              ; Branch if out of SPTEs.
        DB 51   F5    0195   890          SOBGTR  R1,MAP_PAGES            ; Map another page.
               05    0198   891          RSB                             ; All done.
                     0199   892
                     0199   893 ERROR_HALT:
51   02E4'CF   9E    0199   894          MOVAB   W^NOSPT,R1              ; Set error message.
                     019E   895 ERROR_HALT_1:
          5B   D4    019E   896          CLRL    R11                     ; Indicate console terminal.
 00000000'GF   16    01A0   897          JSB     G^EXE$OUTZSTRING        ; Output error message.
               00    01A6   898          HALT                            ; ***** FATAL ERROR *******
```

```
                                01A7  1016          .SBTTL  INI$UBSPACE
                                01A7  1017 ;++
                                01A7  1018 ;        Map UNIBUS space; initialize UNIBUS ADP.
                                01A7  1019 ;
                                01A7  1020 ; INPUTS:
                                01A7  1021 ;        R2 - VA of next free system page
                                01A7  1022 ;        R3 - VA of system page table entry to be used to map VA in R2
                                01A7  1023 ;        R4 - nexus identification number of this adapter
;KPL0100                        01A7    .1 ;    -8(R6) - PFN of this UNIBUS adapter's register space
-1                              01A7  1025 ;
                                01A7  1026 ; OUTPUTS:
                                01A7  1027 ;        UNIBUS space is mapped.
                                01A7  1028 ;        INI$UBADP is called to build an ADP block and initialize UNIBUS
                                01A7  1029 ;        adapter hardware.
                                01A7  1030 ;
                                01A7  1031 ;--
                                01A7  1032
                                01A7  1033 INI$UBSPACE:
                                01A7  1034
;RLRSCORPIO      58   01E4'CF44   DE  01A7    .3          MOVAL   W^CONFREGL[R4],R8               ; R8 => CONFREGL slot.
;RLRSCORPIO        68   02   00   EF  01AD    .4          EXTZV   #0,#2,(R8),R8                   ; Get UBA number.
                             58       01B1
;RLRSCORPIO        58   58   09   78  01B2    .5          ASHL    #9,R8,R8                        ; Position UB number.
;RLRSCORPIO                           01B6    .8
-2                              01B6  1037
                  001009F0 8F   C0  01B6  1039          ADDL    #<IO780$AL_UBOSP+^O760000/^X200>,R8
                           58       01BC
                                01BD  1040                                          ; Get PFN of Ub I/O page.
                                01BD  1042
                                01BD  1047
                                01BD  1052
                                01BD  1058
                                01BD  1063
                        51   10  DO  01BD  1064          MOVL    #16,R1                          ; Number of pages to map (UB/Qbus space).
                           FFB0  30  01C0  1065          BSBW    MAP_PAGES                       ; Map I/O pages.
                                01C3  1066 ;
                                01C3  1067 ; Call adapter initialization routine.
                                01C3  1068 ;
                                01C3  1069 ;        BSBW    INI$UBADP                       ; Init ADP block.
                                01C3  1070 ;        RSB
```

```
                                01C3  1072          .SBTTL  INI$UBADP - BUILD ADP AND INITIALIZE UBA
                                01C3  1073 ;+
                                01C3  1074 ; INI$UBADP ALLOCATES AND FILLS IN AN ADAPTER CONTROL BLOCK, INTERRUPT
                                01C3  1075 ; DISPATCHER AND CONNECTS THEM TO THE PROPER SCB VECTORS.  A CALL IS
                                01C3  1076 ; THEN MADE TO UBA$INITIAL TO INITIALIZE THE ADAPTER HARDWARE.
                                01C3  1077 ;
                                01C3  1078 ; INPUT:
                                01C3  1079 ;       R4 - nexus identification number of this adapter
                                01C3  1080 ;       R11- offset from beginning of SCB to correct SCB page for this adapter
                                01C3  1081 ;-
                                01C3  1082
                                01C3  1083 INI$UBADP:
                                01C3  1084
          01FF 8F       BB    01C3  1085          PUSHR   #^M<R0,R1,R2,R3,R4,R5,R6,R7,R8> ; SAVE R0-R8
                                01C7  1086 ;
                                01C7  1087 ; Allocate and initialize Adapter Control Block (ADP).
                                01C7  1088 ;
    51    0019'CF       3C    01C7  1089          MOVZWL  W^CPU_ADPSIZE,R1        ; PICK UP LENGTH OF ADP
             0205       30    01CC  1090          BSBW    ALONPAGD                ; ALLOCATE SPACE FOR ADP
       08 A2    51       B0    01CF  1091          MOVW    R1,ADP$W_SIZE(R2)       ; SET SIZE INTO ADP BLOCK
       0A A2    01       90    01D3  1092          MOVB    #DYN$C_ADP, -           ; AND SET TYPE OF BLOCK
                                01D7  1093                  ADP$B_TYPE(R2)
       0E A2    01       B0    01D7  1094          MOVW    #AT$_UBA, -             ; SET TYPE OF ADAPTER
                                01DB  1095                  ADP$W_ADPTYPE(R2)
    62    00E4'CF44       D0    01DB  1096          MOVL    W^SBICONF[R4], -        ; SET VA OF CONFIGURATION REG
                                01E1  1097                  ADP$L_CSR(R2)
       0C A2    54       B0    01E1  1098          MOVW    R4,ADP$W_TR(R2)         ; SET TR NUMBER FOR ADAPTER
                                01E5  1099
       50    14 A2       DE    01E5  1100          MOVAL   ADP$L_DPQFL(R2),R0      ; ADDRESS OF DATA PATH WAIT QUEUE
          60    50       D0    01E9  1101          MOVL    R0,(R0)                 ; INIT QUEUE HEADER
       04 A0    50       D0    01EC  1102          MOVL    R0,4(R0)                ;
                                01F0  1103
       50    30 A2       DE    01F0  1104          MOVAL   ADP$L_MRQFL(R2),R0      ; ADDRESS OF MAP WAIT QUEUE
          60    50       D0    01F4  1105          MOVL    R0,(R0)                 ; INIT QUEUE HEADER
       04 A0    50       D0    01F7  1106          MOVL    R0,4(R0)                ;
             04 A2       D4    01FB  1107          CLRL    ADP$L_LINK(R2)          ; ZAP ADAPTER CHAIN LINK
              FDFF'      30    01FE  1108          BSBW    ADPLINK                 ; LINK ADP TO END OF LIST
                                0201  1109 ;
                                0201  1110 ; Initialize adapter interrupt vectors in System Control Block.
                                0201  1111 ;
 00000000'GF          D0    0201  1112          MOVL    G^EXE$GL_SCB,R8         ; GET SCB ADDRESS
             58               0207
                                0208  1113
                                0208  1120
                                0208  1122
                                0208  1123 ;
                                0208  1124 ; Following ASSUME breaks if the ADP length is not a multiple of 4, thereby
                                0208  1125 ;       causing the vectors to NOT be long word aligned.
                                0208  1126
                                0208  1127          ASSUME  ADP$C_UBAADPLEN/4*4     EQ      ADP$C_UBAADPLEN
                                0208  1128
    53    02EC'C2       9E    0208  1129          MOVAB   ADP$C_UBAADPLEN+UBINTSZ(R2),R3  ; LOCATE VECTORS
       10 A2    53       D0    020D  1130          MOVL    R3,ADP$L_VECTOR(R2)     ; AND RECORD IN ADP
          FFFE 8F       B0    0211  1131          MOVW    #^XFFFE,ADP$W_DPBITMAP(R2) ; MARK DATAPATHS 1-15 AVAILABLE
             60 A2            0215
    53    FF6C'C3       9E    0217  1132          MOVAB   -UBINTSZ(R3),R3         ; BASE OF INTERRUPT CODE
             3F       BB    021C  1133          PUSHR   #^M<R0,R1,R2,R3,R4,R5>  ; SAVE MOVC REGISTERS
```

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                0094'8F    28  021E  1134          MOVC3   #UBINTSZ,W^UBAINTBASE,(R3)      ; COPY INTERRUPT CODE
          63    0340'CF        0222
                     3F    BA  0226  1135          POPR    #^M<R0,R1,R2,R3,R4,R5>  ; RESTORE MOVC REGISTERS
          54    04    00    EF  0228  1136          EXTZV   #0,#4,R4,R4             ; Use low 4 bits of nexus number.
                     54        022C
        50    0100 C844    DE  022D  1137          MOVAL   ^X100(R8)[R4],R0        ; COMPUTE 1ST VECTOR ADDRESS
            1C A2    50    D0  0233  1138          MOVL    R0,ADP$L_AVECTOR(R2)    ; SAVE ADDR OF ADAPTER SCB VECTORS
            60    01'A3    9E  0237  1139          MOVAB   B^UBAINT4+1(R3),(R0)    ; STORE VECTOR FOR BR4
         40 A0    21'A3    9E  023B  1140          MOVAB   B^UBAINT5+1(R3),64(R0)  ; STORE VECTOR FOR BR5
                  41'A3    9E  0240  1141          MOVAB   B^UBAINT6+1(R3),128(R0) ; STORE VECTOR FOR BR6
                0080 C0        0243
                  61'A3    9E  0246  1142          MOVAB   B^UBAINT7+1(R3),192(R0) ; STORE VECTOR FOR BR7
                00C0 C0        0249
                50    62    D0  024C  1143          MOVL    ADP$L_CSR(R2),R0        ; GET UBACSR ADDRESS
             0A'A3    50    C0  024F  1144          ADDL    R0,B^UBAINT4REL(R3)     ; ADD CSR VA
             2A'A3    50    C0  0253  1145          ADDL    R0,B^UBAINT5REL(R3)     ; TO EACH OF THE
             4A'A3    50    C0  0257  1146          ADDL    R0,B^UBAINT6REL(R3)     ; BICL INSTRUCTIONS
             6A'A3    50    C0  025B  1147          ADDL    R0,B^UBAINT7REL(R3)     ; IN THE INTERRUPT DISPATCHERS
          0089'C3    52    D0  025F  1148          MOVL    R2,UBAINTADP(R3)        ;SET ADDRESS OF ADAPTOR CONTROL BLOCK
                0000'CF    9E  0264  1149          MOVAB   W^EXE$UBAERR_INT,-
                0090'C3        0268  1150                   UBAERRADR(R3)          ; SET ADDRESS OF ERROR HANDLER
                  01'A3    9E  026B  1151          MOVAB   B^UBAINT4+1(R3),-
                  44 A2        026E  1152                   ADP$L_UBASCB(R2)       ; SAVE 4 SCB VECTOR CONTENTS
                  21'A3    9E  0270  1153          MOVAB   B^UBAINT5+1(R3),-
                  48 A2        0273  1154                   ADP$L_UBASCB+4(R2)     ; DITTO
                  41'A3    9E  0275  1155          MOVAB   B^UBAINT6+1(R3),-
                  4C A2        0278  1156                   ADP$L_UBASCB+8(R2)     ; DITTO
                  61'A3    9E  027A  1157          MOVAB   B^UBAINT7+1(R3),-
                  50 A2        027D  1158                   ADP$L_UBASCB+12(R2)    ; DITTO
                54    52    D0  027F  1159          MOVL    R2,R4                   ; COPY ADP ADDRESS
                52    62    D0  0282  1160          MOVL    ADP$L_CSR(R2),R2        ; VIRTUAL ADDRESS OF ADAPTER
           7C000000 8F    D0  0285  1161          MOVL    #^X7C000000,UBA$L_CR(R2); DISABLE ALL UMR'S
                  04 A2        028B
          00000000'GF    16  028D  1162          JSB     G^MMG$SVAPTECHK         ; ADDRESS OF SPTE THAT MAPS ADAPTER
            54 A4    63    D0  0293  1163          MOVL    (R3),ADP$L_UBASPTE(R4)  ; SAVE CONTENTS OF SPTE MAPPING ADAPTER
        58 A4    20 A3    D0  0297  1164          MOVL    <8*4>(R3),-             ; CONTENTS OF SPTE MAPPING I/O SPACE
                          029C  1165                   ADP$L_UBASPTE+4(R4)
                52    54    D0  029C  1166          MOVL    R4,R2                   ; COPY ADP ADDRESS BACK TO R2
          00000000'GF    DE  029F  1167          MOVAL   G^UBA$UNEXINT,R3        ; GET ADDR OF UNEXP INT SERVICE(IN EXEC)
                     53        02A5
         54    0000'CF    DE  02A6  1168          MOVAL   W^UBA$INTO,R4           ; GET ADDR OF SPECIAL VECTOR 0 ROUTINE
                          02AB  1169
                          02AB  1170 ;
                          02AB  1171 ; INIT UB VECTORS TO UNEXPECTED INTERRUPT SERVICE
                          02AB  1172 ;
            50    10 A2    D0  02AB  1173          MOVL    ADP$L_VECTOR(R2),R0     ; GET ADDRESS OF VECTORS
               80    54    D0  02AF  1174          MOVL    R4,(R0)+                ; SPECIAL CASE FOR VECTOR 0
            51    7F 8F    9A  02B2  1175          MOVZBL  #<NUMUBAVEC-1>,R1       ; REST OF VECTORS
               80    53    D0  02B6  1176 10$:     MOVL    R3,(R0)+                ; FILL VECTOR WITH UNEXP INT
                 FA 51    F5  02B9  1177          SOBGTR  R1,10$                  ; FILL ALL VECTORS
                          02BC  1178
                          02BC  1180
                          02BC  1240
                          02BC  1241
                          02BC  1269
                          02BC  1270
                          02BC  1291
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```
;RLRSCORPIO                              02BC     .1
;RLRSCORPIO                              02BC    .43
;RLRSCORPIO                              02BC    .44
                                        02BC  1340 ;
                                        02BC  1341 ; Now check for any UNIBUS memory that may be on the adapter. First we must
                                        02BC  1342 ; disable all the UNIBUS Map Registers so that there is no conflict in
                                        02BC  1343 ; which memory will respond.  Then we check all 248Kb of potential memory in
                                        02BC  1344 ; 8Kb chunks, since each disable bit on the 780 UBA represents 16 UMR's or
                                        02BC  1345 ; 8Kb of memory.  The number of registers is stored in the ADP and the
                                        02BC  1346 ; corresponding number withdrawn from the UMR map in the ADP.
                                        02BC  1347 ;
                                        02BC  1348
        56    62    D0                  02BC  1350          MOVL    ADP$L_CSR(R2),R6        ; Pick up adapter pointer
              51    D4                  02BF  1351          CLRL    R1                      ; Zero out number of UMR to disable
 00000200     8F    C3                  02C1  1353          SUBL3   #512,8(SP),R7           ; R7 = VA of last page of UNIBUS
     57    08    AE                     02C7
     0C    AE    04    C3              02CA  1354          SUBL3   #4,12(SP),R8            ; R8 = VA of SPTE mapping (R7)
              58                        02CE
 00000200     8F    C3                  02CF  1355          SUBL3   #512,32(SP),R4          ; R4 = PFN of first page of UNIBUS
     54    20    AE                     02D5
              68    DD                  02D8  1356          PUSHL   (R8)                    ; Save contents of SPTE
        53    54    D0                  02DA  1357          MOVL    R4,R3                   ; Copy starting PFN
        55    1F    D0                  02DD  1358          MOVL    #31,R5                  ; 31 8Kb chunks to test
                                        02E0  1359 50$:     INVALID R7                      ; Invalidate TB
 90000000     8F    C9                  02E3  1360          BISL3   #<PTE$M_VALID!PTE$C_KW>,-
        68    54                        02E9  1361                   R4,(R8)                ; Map each page of UNIBUS
        50    57    D0                  02EB  1362          MOVL    R7,R0                   ; Address to check
           FD0F     30                  02EE  1363          BSBW    EXE$TEST_CSR            ; Validate it
           0D    50    E9              02F1  1364          BLBC    R0,70$                  ; Not there
        54    53    D1                  02F4  1365          CMPL    R3,R4                   ; First time in?
              04    13                  02F7  1366          BEQL    60$                     ; Yes, skip next test
              51    D5                  02F9  1367          TSTL    R1                      ; Any registers already?
              3A    13                  02FB  1368          BEQL    80$                     ; No, memory not start at 0
     51    10    A1    9E              02FD  1369 60$:     MOVAB   16(R1),R1               ; Yes, up the count
     54    10    A4    9E              0301  1370 70$:     MOVAB   16(R4),R4               ; Map Next 8Kb (16*512)
           D8    55    F5              0305  1371          SOBGTR  R5,50$                  ; Loop until done
              68 8ED0                   0308  1372          POPL    (R8)                    ; Restore old contents of SPTE
                                        030B  1373          INVALID R7                      ; Invalidate TB
   0256    C2    51    B0              030E  1375          MOVW    R1,ADP$W_UMR_DIS(R2)    ; Record number disabled
                                        0313  1377 ;
                                        0313  1378 ; Initialize fields for new UBA map register allocation.  Make it appear
                                        0313  1379 ;       that we have one contiguous array of 496 available map registers.
                                        0313  1380 ;       To do this we set ADP$L_MRACTMDRS to one (the number of active
                                        0313  1381 ;       map register descriptors for distinct contiguous areas),
                                        0313  1382 ;       ADP$W_MRNREGARY(0) to 496 (i.e the number of registers in this
                                        0313  1383 ;       contiguous range) and ADP$FREGARY(0) to 0 (i.e. the first register
                                        0313  1384 ;       in the range is register 0).
                                        0313  1385 ;
     5C    A2    01    D0              0313  1386          MOVL    #1,ADP$L_MRACTMDRS(R2)  ; 1 active map descriptor
   01F0    8F    51    A3              0317  1387          SUBW3   R1,#496,ADP$W_MRNREGARY(R2);  for a range of 496 registers
           64    A2                    031C
   015E    C2    51    B0              031E  1399          MOVW    R1,ADP$W_MRFREGARY(R2)  ;  starting at register zero.
     62    A2    01    AE              0323  1400          MNEGW   #1,ADP$W_MRNFENCE(R2)   ; Also init "fences" which preceed
   015C    C2    01    AE              0327  1401          MNEGW   #1,ADP$W_MRFFENCE(R2)   ;  the two descriptor arrays.
                                        032C  1402 ;
                                        032C  1403 ; Initialize adapter hardware.
                                        032C  1404 ;
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                54   62    D0  032C  1405          MOVL    ADP$L_CSR(R2),R4        ; Get CSR address to init
                   FCCE'   30  032F  1406          BSBW    UBA$INITIAL             ; And initialize adapter
                01FF 8F    BA  0332  1407          POPR    #^M<R0,R1,R2,R3,R4,R5,R6,R7,R8> ; Restore registers
                           05  0336  1408          RSB                             ; Return
                               0337  1409
                               0337  1411 ;
                               0337  1412 ; Error if UNIBUS memory not start at location 0
                               0337  1413 ;
          51   030D'CF    9E  0337  1414 80$:     MOVAB   W^BADUMR,R1             ; Set error message
                  FE5F    31  033C  1415          BRW     ERROR_HALT_1            ; Put it out
                               033F  1417
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                                033F  1420 ;
                                033F  1421 ; UBA INTERRUPT SERVICE ROUTINES.  ONE COPY OF THESE ROUTINES IS
                                033F  1422 ; MOVED INTO NONPAGED POOL AND RELOCATED FOR EACH UBA.
                                033F  1423 ;
                                033F  1424 ; **** NOTE ****  THE CODING SEQUENCE FOR DISPATCHING ON UBA INTTERUPTS
                                033F  1425 ; IS ASSUMED IN THE MODULE MCHECK780.MAR.  THE ASSUMPTIONS ARE MADE SO
                                033F  1426 ; THE MACHINE CHECK HANDLER CAN IDENTIFY A CPU TIMEOUT WHEN THE
                                033F  1427 ; BICL3 INSTRUCTION IS READING THE  UBA'S BRRVR REGISTER.
                                033F  1428 ; THE ASSUMPTIONS MADE ARE THAT THE VALUE OF THE VIRTUAL ADDRESS OF THE BRRVR
;RLRSCORPIO                     033F    .1 ; REGISTER IS AT AN OFFSET OF 10. BYTES PAST THE INTERRUPT VECTOR ENTRY POINT,
;RLRSCORPIO                     033F    .2 ; THAT THE PC OF THE INSTRUCTION ACCESSING BRRVR IS 3 BYTES PAST THE INTERRUPT
;RLRSCORPIO                     033F    .3 ; VECTOR ENTRY, AND THAT R4 AND R5 ARE SAVED ON THE STACK AT THAT POINT.
-2                              033F  1431 ;
                                033F  1432
                                033F  1433          .ENABL  LSB
                                033F  1434          .ALIGN  QUAD
                                0340  1435 UBAINTBASE:                                  ; BASE OF UBA INTERRUPT DISPATCHERS
                    00000000    0340  1436 UBAINT4=.-UBAINTBASE                         ; UBA 0 INTERRUPT DISPATCH LEVEL 4
                7E    54    7D  0340  1437          MOVQ    R4,-(SP)                    ; SAVE REGISTERS
             7FFFFE03 8F    CB  0343  1438          BICL3   #^X7FFFFE03,@#UBA$L_BRRVR,R4 ; READ VECTOR  REGISTER AND CLEAR BITS
             00000030 9F        0349
                      54        034E
                    0000000A    034F  1439 UBAINT4REL=.-UBAINTBASE-5                   ; OFFSET TO ADD UBACSR VALUE
                7E    52    7D  034F  1440          MOVQ    R2,-(SP)                    ; SAVE REGISTERS
             55    D4'AF44    9E  0352  1441          MOVAB   B^VECTAB[R4],R5             ; GET ADDRESS OF INTERRUPT VECTOR
                      65    18  0357  1442          BGEQ    10$                         ; IF GEQ UBA INTERRUPTS
                7E    50    7D  0359  1443          MOVQ    R0,-(SP)                    ; SAVE REGISTERS
                      95    17  035C  1444          JMP     @(R5)+                      ; DISPATCH INTERRUPT
                                035E  1445          .ALIGN  QUAD
                    00000020    0360  1446 UBAINT5=.-UBAINTBASE                         ; UBA 0 INTERRUPT DISPATCH LEVEL 5
                7E    54    7D  0360  1447          MOVQ    R4,-(SP)                    ; SAVE REGISTERS
             7FFFFE03 8F    CB  0363  1448          BICL3   #^X7FFFFE03,@#UBA$L_BRRVR+4,R4 ; READ VECTOR REGISTER AND CLEAR BITS
             00000034 9F        0369
                      54        036E
                    0000002A    036F  1449 UBAINT5REL=.-UBAINTBASE-5                   ; OFFSET TO ADD UBACSR VALUE
                7E    52    7D  036F  1450          MOVQ    R2,-(SP)                    ; SAVE REGISTERS
             55    D4'AF44    9E  0372  1451          MOVAB   B^VECTAB[R4],R5             ; GET ADDRESS OF INTERRUPT VECTOR
                      45    18  0377  1452          BGEQ    10$                         ; IF GEQ UBA INTERRUPTS
                7E    50    7D  0379  1453          MOVQ    R0,-(SP)                    ; SAVE REGISTERS
                      95    17  037C  1454          JMP     @(R5)+                      ; DISPATCH INTERRUPT
                                037E  1455          .ALIGN  QUAD
                    00000040    0380  1456 UBAINT6=.-UBAINTBASE                         ; UBA 0 INTERRUPT DISPATCH LEVEL 6
                7E    54    7D  0380  1457          MOVQ    R4,-(SP)                    ; SAVE REGISTERS
             7FFFFE03 8F    CB  0383  1458          BICL3   #^X7FFFFE03,@#UBA$L_BRRVR+8,R4 ; READ VECTOR REGISTER AND CLEAR BITS
             00000038 9F        0389
                      54        038E
                    0000004A    038F  1459 UBAINT6REL=.-UBAINTBASE-5                   ; OFFSET TO ADD UBACSR VALUE
                7E    52    7D  038F  1460          MOVQ    R2,-(SP)                    ; SAVE REGISTERS
             55    D4'AF44    9E  0392  1461          MOVAB   B^VECTAB[R4],R5             ; GET ADDRESS OF INTERRUPT VECTOR
                      25    18  0397  1462          BGEQ    10$                         ; IF GEQ UBA INTERRUPTS
                7E    50    7D  0399  1463          MOVQ    R0,-(SP)                    ; SAVE REGISTERS
                      95    17  039C  1464          JMP     @(R5)+                      ; DISPATCH INTERRUPT
                                039E  1465          .ALIGN  QUAD
                    00000060    03A0  1466 UBAINT7=.-UBAINTBASE                         ; UBA 0 INTERRUPT DISPATCH LEVEL 7
                7E    54    7D  03A0  1467          MOVQ    R4,-(SP)                    ; SAVE REGISTERS
             7FFFFE03 8F    CB  03A3  1468          BICL3   #^X7FFFFE03,@#UBA$L_BRRVR+12,R4 ; READ VECTOR AND CLEAR BITS
             0000003C 9F        03A9
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                54        03AE
          0000006A        03AF  1469 UBAINT7REL=.-UBAINTBASE-5                ; OFFSET TO ADD UBACSR VALUE
      7E        52    7D  03AF  1470          MOVQ    R2,-(SP)               ; SAVE REGISTERS
55    D4'AF44         9E  03B2  1471          MOVAB   B^VECTAB[R4],R5        ; GET ADDRESS OF INTERRUPT VECTOR
          05          18  03B7  1472          BGEQ    10$                    ; IF GEQ UBA INTERRUPTS
      7E        50    7D  03B9  1473          MOVQ    R0,-(SP)               ; SAVE REGISTERS
          95          17  03BC  1474          JMP     @(R5)+                 ; DISPATCH INTERRUPT
   00 54          1F    E5  03BE  1475 10$:     BBCC    #31,R4,20$             ;CLEAR ADAPTER ERROR INTERRUPT FLAG (MSB)
55    D4'AF44         9E  03C2  1476 20$:     MOVAB   B^VECTAB[R4],R5        ;GET ADDRESS OF INTERRUPT VECTOR
 00000000'8F          D0  03C7  1477          MOVL    I^#0,R4                ;GET ADDRESS OF ADAPTOR CONTROL BLOCK
                54        03CD
          00000089        03CE  1478 UBAINTADP=.-UBAINTBASE-5                ;OFFSET TO START OF LOADED CODE
 00000000 9F          17  03CE  1479          JMP     @#0                    ;ERROR ROUTINE IN ADPERR780
          00000090        03D4  1480 UBAERRADR=.-UBAINTBASE-4
                          03D4  1481          .DSABL  LSB
                          03D4  1482
                          03D4  1483          .ALIGN  LONG                   ; LONGWORD ALIGN VECTORS
                          03D4  1484 VECTAB:                                 ; END OF INTERRUPT CODE, START OF VECTORS
          00000094        03D4  1485 UBINTSZ=.-UBAINTBASE                    ; SIZE OF UBA INTERRUPT CODE
                          03D4  1486
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                        03D4  1503          .SBTTL  INI$MBADP - BUILD ADP AND INITIALIZE MBA
                        03D4  1504          .SBTTL  INI$DRADP - BUILD ADP AND INITIALIZE DR32
                        03D4  1505          .SBTTL  INI$CIADP - BUILD ADP AND INITIALIZE CI
                        03D4  1506 ;+
                        03D4  1507 ; INI$MBADP IS CALLED AFTER MAPPING THE REGISTERS FOR A MASSBUS ADAPTER.
                        03D4  1508 ; AN ADAPTER CONTROL BLOCK IS ALLOCATED AND FILLED.  A CRB AND IDB ARE
                        03D4  1509 ; ALSO ALLOCATED AND INITIALIZED. THE ADAPTER HARDWARE IS THEN INITIALIZED
                        03D4  1510 ; BY CALLING MBA$INITIAL.
                        03D4  1511 ;
                        03D4  1512 ; INI$DRADP IS CALLED AFTER MAPPING THE REGISTERS FOR THE DR32
                        03D4  1513 ; ADAPTER.  THE ADAPTER CONTROL BLOCK, CRB, AND IDB ARE ALLOCATED
                        03D4  1514 ; AND INITIALIZED.  THE ADAPTER HARDWARE IS THEN INITIALIZED BY
                        03D4  1515 ; CALLING DR$INITIAL.
                        03D4  1516 ;
                        03D4  1517 ; INI$MBADP AND INI$DRADP SHARE COMMON CODE AFTER THE TABLE OF ADAPTER
                        03D4  1518 ; SPECIFIC CONSTANTS IS SELECTED AND STORED IN R8.
                        03D4  1519 ;
                        03D4  1520 ; INPUT:
                        03D4  1521 ;       R4 - nexus identification number of this adapter
                        03D4  1522 ;       R11- offset from beginning of SCB to correct SCB page for this adapter
                        03D4  1523 ;
                        03D4  1524 ; OUTPUTS:
                        03D4  1525 ;       ALL REGISTERS PRESERVED
                        03D4  1526 ;-
                        03D4  1527
  00000000'GF    17     03D4  1528 ALONPAGD:JMP    G^INI$ALONONPAGED
                        03DA  1529
                        03DA  1530          .ENABL  LSB
                        03DA  1531
                        03DA  1532 INI$DRADP:                                   ; INITIALIZE DR32 DATA STRUCTURES
                        03DA  1533
      07FF 8F    BB     03DA  1536          PUSHR   #^M<R0,R1,R2,R3,R4,R5,R6,R7,R8,R9,R10> ; SAVE REGISTERS
58    0011'CF    DE     03DE  1537          MOVAL   W^DRTAB,R8                  ; GET DR32 TABLE OF CONSTANTS
59    0000'CF    9E     03E3  1538          MOVAB   W^DR$INT,R9                 ; ADDRESS OF INITERRUPT SERVICE ROUTINE
5A    0000'CF    9E     03E8  1539          MOVAB   W^DR$INITIAL,R10            ; ADDRESS OF DEVICE INITIALIZATION
            28    11     03ED  1540          BRB     10$                         ; JOIN COMMON CODE
                        03EF  1543
                        03EF  1544 INI$CIADP:                                   ; INITIALIZE CI DATA STRUCTURES
                        03EF  1545
      07FF 8F    BB     03EF  1548          PUSHR   #^M<R0,R1,R2,R3,R4,R5,R6,R7,R8,R9,R10> ; SAVE REGISTERS
58    0015'CF    DE     03F3  1549          MOVAL   W^CITAB,R8                  ; GET CI TABLE OF CONSTANTS
59    0000'CF    9E     03F8  1550          MOVAB   W^CI$INT,R9                 ; ADDRESS OF INITERRUPT SERVICE ROUTINE
5A    0000'CF    9E     03FD  1551          MOVAB   W^CI$INITIAL,R10            ; ADDRESS OF DEVICE INITIALIZATION
            13    11     0402  1552          BRB     10$                         ; JOIN COMMON CODE
                        0404  1555
                        0404  1556 INI$MBADP:                                   ; INIT MBA DATA STRUCTURES
                        0404  1557
      07FF 8F    BB     0404  1560          PUSHR   #^M<R0,R1,R2,R3,R4,R5,R6,R7,R8,R9,R10> ;
58    000D'CF    DE     0408  1561          MOVAL   W^MBATAB,R8                 ; GET MBA TABLE OF CONSTANTS
59    0000'CF    9E     040D  1562          MOVAB   W^MBA$INT,R9                ; ADDRESS OF INITERRUPT SERVICE ROUTINE
5A    0000'CF    9E     0412  1563          MOVAB   W^MBA$INITIAL,R10           ; ADDRESS OF DEVICE INITIALIZATION
                        0417  1564 10$:                                         ;
                        0417  1565 ;
                        0417  1566 ; Allocate and initialize Channel Request Block.
                        0417  1567 ;
51    0048 8F    3C     0417  1568          MOVZWL  #CRB$C_LENGTH,R1            ; SET SIZE OF CRB
            B6    10     041C  1569          BSBB    ALONPAGD                    ; ALLOCATE SPACE FOR CRB
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                08 A2    51    B0  041E  1570          MOVW    R1,CRB$W_SIZE(R2)          ; SET CORRECT SIZE
                0A A2    05    90  0422  1571          MOVB    #DYN$C_CRB,CRB$B_TYPE(R2) ; SET CORRECT TYPE
                   62    62    DE  0426  1572          MOVAL   CRB$L_WQFL(R2),CRB$L_WQFL(R2)    ; INITIALIZE WAIT QUEUE HEADER
                04 A2    62    DE  0429  1573          MOVAL   CRB$L_WQFL(R2),CRB$L_WQBL(R2)    ; FLINK AND BLINK
                50    24 A2    9E  042D  1574          MOVAB   CRB$L_INTD(R2),R0          ; SET ADDRESS OF INTD AREAD
              9F163CBB 8F    D0  0431  1575          MOVL    #^X9F163CBB,(R0)+          ; "PUSHR ^M<R2,R3,R4,R5>,JSB @#"
                      80          0437
                   80    59    D0  0438  1576          MOVL    R9,(R0)+                   ; ADDR OF XXX$INT ROUTINE
                         80    D4  043B  1577          CLRL    (R0)+                      ; CLEAR OUT UNNEEDED AREA
                   60    5A    D0  043D  1578          MOVL    R10,(R0)                   ; ADDR OF XXX$INITIAL ROUTINE
                   5A    52    D0  0440  1579          MOVL    R2,R10                     ; SAVE CRB ADDRESS
                               0443  1580 ;
                               0443  1581 ; Allocate and initialize Interrupt Dispatch Block.
                               0443  1582 ;
                   51    68    9A  0443  1583          MOVZBL  ADPTAB_IDBUNITS(R8),R1     ; GET # OF IDB UNITS
             00000038 9F41    DE  0446  1584          MOVAL   @#IDB$C_LENGTH[R1],R1      ; GET TOTAL SIZE OF IDB
                      51          044D
                      84    10  044E  1585          BSBB    ALONPAGD                   ; ALLOCATE SPACE FOR CRB
                08 A2    51    B0  0450  1586          MOVW    R1,IDB$W_SIZE(R2)          ; SET STRUCTURE SIZE
                0A A2    09    90  0454  1587          MOVB    #DYN$C_IDB, -              ; AND TYPE CODE
                               0458  1588                  IDB$B_TYPE(R2)
                      68    9B  0458  1589          MOVZBW  ADPTAB_IDBUNITS(R8),-      ; SET COUNT OF UNITS
                         0C A2        045A  1590                  IDB$W_UNITS(R2)
             62    00E4'CF44    D0  045C  1591          MOVL    W^SBICONF[R4], -           ; SET CSR ADDRESS TO
                               0462  1592                  IDB$L_CSR(R2)              ;  START OF ADAPTER REG SPACE
                2C AA    52    D0  0462  1593          MOVL    R2, -                      ; SET ADDRESS OF IDB INTO CRB
                               0466  1594                  CRB$L_INTD+VEC$L_IDB(R10)
                   59    52    D0  0466  1595          MOVL    R2,R9                      ; SAVE ADDRESS OF IDB
                               0469  1596 ;
                               0469  1597 ; Allocate and initialize Adapter Control Block (ADP).
                               0469  1598 ;
                51    01 A8    3C  0469  1599          MOVZWL  ADPTAB_ADPLEN(R8),R1       ; GET SIZE OF ADAPTER
                      FF64    30  046D  1600          BSBW    ALONPAGD                   ; ALLOCATE SPACE FOR CRB
                08 A2    51    B0  0470  1601          MOVW    R1,ADP$W_SIZE(R2)          ; SET SIZE OF STRUCTURE
                0A A2    01    90  0474  1602          MOVB    #DYN$C_ADP,ADP$B_TYPE(R2); AND TYPE CODE
                   62    69    D0  0478  1603          MOVL    IDB$L_CSR(R9),ADP$L_CSR(R2); SET ADDRESS OF CONFIGURATION REGISTER
                0C A2    54    B0  047B  1604          MOVW    R4,ADP$W_TR(R2)            ; SET TR/SLOT-16 NUMBER OF ADAPTER
                      03 A8    9B  047F  1605          MOVZBW  ADPTAB_ATYPE(R8),-         ; SET THE ADAPTER TYPE
                         0E A2        0482  1606                  ADP$W_ADPTYPE(R2)
                10 A2    5A    D0  0484  1607          MOVL    R10,ADP$L_CRB(R2)          ; POINT ADP TO CRB
                               0488  1608 ;       CMPW    ADP$W_ADPTYPE(R2),#AT$_CI ; CI?
                               0488  1609 ;       BEQL    20$                        ; YES, DO NOT CONNECT UP VECTORS
                               0488  1610 ;
                               0488  1611 ; Initialize adapter interrupt vectors in System Control Block.
                               0488  1612 ;
             00000000'GF    D0  0488  1613          MOVL    G^EXE$GL_SCB,R0            ; GET ADDRESS OF SCB
                      50          048E
                55    5B    09  78  048F  1614          ASHL    #9,R11,R5                  ; Turn SCB page offset into byte offset.
                   50    55    C0  0493  1615          ADDL    R5,R0                      ; set to beginning of correct SCB page.
                54    04    00  EF  0496  1616          EXTZV   #0,#4,R4,R4                ; Use low 4 bits of nexus number.
                      54          049A
             50    0100 C044    DE  049B  1617          MOVAL   ^X100(R0)[R4],R0           ; COMPUTE ADDR OF 1ST VECTOR
                1C A2    50    D0  04A1  1618          MOVL    R0,ADP$L_AVECTOR(R2)       ; SAVE ADDR OF ADAPTER'S SCB VECTORS
                60    25 AA    DE  04A5  1619          MOVAL   CRB$L_INTD+1(R10),(R0)     ; CONNECT VECTOR TO CRB CODE
             40 A0    25 AA    DE  04A9  1620          MOVAL   CRB$L_INTD+1(R10),64(R0); SAME FOR
                      25 AA    DE  04AE  1621          MOVAL   CRB$L_INTD+1(R10),128(R0); ALL FOUR
                   0080 C0        04B1
```

```
                25 AA    DE   04B4  1622          MOVAL   CRB$L_INTD+1(R10),192(R0); VECTORS
              00C0 CC          04B7
                               04BA  1623 ;
                               04BA  1624 ; Continue with ADP initialization.
                               04BA  1625 ;
    14 A2       25 AA    DE   04BA  1626 20$:      MOVAL   CRB$L_INTD+1(R10), -      ; SAVE SCB VECTOR CONTENTS IN ADP
                               04BF  1627                ADP$L_MBASCB(R2)
                    0C    BB   04BF  1628          PUSHR   #^M<R2,R3>                ; SAVE SOME REGISTERS
                55  52    D0   04C1  1629          MOVL    R2,R5                     ; COPY ADP ADDRESS
                52  62    D0   04C4  1630          MOVL    ADP$L_CSR(R2),R2          ; VIRTUAL ADDRESS OF ADAPTER
          00000000'GF    16   04C7  1631          JSB     G^MMG$SVAPTECHK           ; ADDRESS OF SPTE THAT MAPS ADAPTER
           18 A5  63    D0   04CD  1632          MOVL    (R3),ADP$L_MBASPTE(R5)    ; SAVE CONTENTS OF SPTE
                    0C    BA   04D1  1633          POPR    #^M<R2,R3>                ; RESTORE REGISTERS
           38 AA  52    D0   04D3  1634          MOVL    R2,CRB$L_INTD+VEC$L_ADP(R10)     ; SET CRB POINTER TO ADP
           14 A9  52    D0   04D7  1635          MOVL    R2,IDB$L_ADP(R9)          ; AND INTO IDB
                FB22'   30   04DB  1636          BSBW    ADPLINK                   ; LINK ADP TO END OF CHAIN
                               04DE  1637 ;
                               04DE  1638 ; Initialize adapter hardware.
                               04DE  1639 ;
                55  59    D0   04DE  1640          MOVL    R9,R5                     ; ADDRESS OF IDB
                54  65    D0   04E1  1641          MOVL    IDB$L_CSR(R5),R4          ; ADDRESS OF CONFIGURATION REGISTER 0
                  30 BA    16   04E4  1642          JSB     @CRB$L_INTD+VEC$L_INITIAL(R10) ; INIT ADAPTER
                07FF 8F    BA   04E7  1643          POPR    #^M<R0,R1,R2,R3,R4,R5,R6,R7,R8,R9,R10>; RESTORE ALL REGISTERS
                           05   04EB  1644          RSB                               ; RETURN
                               04EC  1645
                               04EC  1646          .DSABL  LSB
```

```
;RLRSCORPIO                      04EC    .36          .SBTTL  INI$KDZ11
;RLRSCORPIO                      04EC    .37 ;++
;RLRSCORPIO                      04EC    .38 ;
;RLRSCORPIO                      04EC    .39 ; INPUTS:
;RLRSCORPIO                      04EC    .40 ;        R2 - VA of next free system page
;RLRSCORPIO                      04EC    .41 ;        R3 - VA of system page table entry to be used to map VA in R2
;RLRSCORPIO                      04EC    .42 ;        R4 - nexus identification number of this adapter
;RLRSCORPIO                      04EC    .43 ;
;RLRSCORPIO                      04EC    .44 ; OUTPUTS:
;RLRSCORPIO                      04EC    .45 ;
;RLRSCORPIO                      04EC    .46 ;--
;RLRSCORPIO                      04EC    .47
;RLRSCORPIO                      04EC    .48 INI$KDZ11:
;RLRSCORPIO                      04EC    .49
;RLRSCORPIO                05    04EC    .68          RSB                             ; Return to caller.
```

```
                                04ED  1650          .SBTTL  INI$CONSOLE, init data structures for console
                                04ED  1651 ;++
                                04ED  1652 ; FUNCTIONAL DESCRIPTION:
                                04ED  1653 ;
                                04ED  1654 ;       This routine is executed only once, during system initialization.
                                04ED  1655 ;       It initializes the CRB and IDB for boot/console device.
                                04ED  1656 ;
                                04ED  1657 ;       This routine is called from INIT.
                                04ED  1658 ;
                                04ED  1659 ; INPUTS:
                                04ED  1660 ;
                                04ED  1661 ;       R3 -->  DISK [CLASS] DRIVER DDB
                                04ED  1662 ;       R4 -->  DISK [CLASS] DRIVER DPT
                                04ED  1663 ;       R5 -->  DISK [CLASS] DRIVER UCB
                                04ED  1664 ;       R6 -->  RPB
                                04ED  1665 ;       R7 -->  ADP FOR EITHER A REAL DISK OR A PORT
                                04ED  1666 ;       R9 -->  PORT DRIVER DPT (IF PRESENT)
                                04ED  1667 ;       R10-->  PORT DIRVER UCB (IF PRESENT)
                                04ED  1668 ;
                                04ED  1669 ;--
                                04ED  1670
                                04ED  1671 INI$CONSOLE::
                                04ED  1672          .ENABL  LSB
                                04ED  1673
                      66 A6   91 04ED  1675          CMPB    RPB$B_DEVTYP(R6),-      ; BOOTING FROM CONSOLE BLOCK
                      40 8F      04F0  1676                  #BTD$K_CONSOLE          ; STORAGE DEVICE?
                         12   12 04F2  1677          BNEQ    BLD_CRB                 ; NO
                41534303 8F   D0 04F4  1678          MOVL    #^A/CSA/@8+3,-          ; YES, SET DEVICE NAME
                      14 A3      04FA  1679                  DDB$T_NAME(R3)          ; COUNTED STRING
                                 04FC  1681
;RLRSCORPIO      00000000'9F   DE 04FC    .2         MOVAL   @#OPA$CRB,R8            ; SET ADDRESS OF CRB
                         58      0502
;RLRSCORPIO            0068   31 0503    .3         BRW     100$
;RLRSCORPIO                     0506    .5
-12                             0506  1694
                                0506  1695 ;
                                0506  1696 ; NOW BUILD THE AUXILIARY DATA BLOCKS (CRB,IDB)
                                0506  1697 ;
                                0506  1698 BLD_CRB:
                58   10 A7   D0 0506  1699          MOVL    ADP$L_CRB(R7),R8        ; GET ADDRESS OF CRB IF IT EXISTS
                0E A7   01   B1 050A  1700          CMPW    #AT$_UBA,ADP$W_ADPTYPE(R7); IS THIS A UNIBUS ADAPTER?
                      03   13 050E  1701          BEQL    FILL_CRB                ; YES, ALLOCATE CRB
                   005B   31 0510  1702          BRW     100$                    ; NO, CRB/IDB ALREADY ALLOCATED
                                0513  1703
                                0513  1704 FILL_CRB:
             00000000'9F   16 0513  1705          JSB     @#INI$ALLOC_CRB         ; GO ALLOCATE AND SETUP CRB
             9F163FBB 8F   D0 0519  1706          MOVL    #^X9F163FBB,CRB$L_INTD(R2) ; SET PUSHR #^M<R0,...R5>
                   24 A2      051F
                                0521  1707                                      ;  JSB @#0 INTO INTERRUPT DISPATCH
                38 A2   57   D0 0521  1708          MOVL    R7,CRB$L_INTD+VEC$L_ADP(R2)     ; SET POINTER TO ADP
                   58   52   D0 0525  1709          MOVL    R2,R8                   ; SAVE CRB POINTER
             51    0058 8F   3C 0528  1710          MOVZWL  #<IDB$C_LENGTH+<8*4>>,R1; SIZE TO ALLOCATE FOR IDB
              00000000'9F   16 052D  1711          JSB     @#INI$ALONONPAGED       ; ALLOCATE IDB
                08 A2   51   B0 0533  1712          MOVW    R1,IDB$W_SIZE(R2)       ; SET SIZE OF IDB
                0A A2   09   90 0537  1713          MOVB    #DYN$C_IDB,IDB$B_TYPE(R2); AND STRUCTURE TYPE CODE
                2C A8   52   D0 053B  1714          MOVL    R2,CRB$L_INTD+VEC$L_IDB(R8) ; SET IDB INTO CRB
;TCM0009                         053F    .1
```

```
-1
                                053F  1736
      62    58 A6    D0   053F  1737 10$:    MOVL    RPB$L_CSRVIR(R6), -     ; SAVE BOOT DEVICE CSR ADDRESS
                              0543  1738             IDB$L_CSR(R2)           ; IN INTERRUPT DISPATCH BLOCK
                 11    91   0543  1739             CMPB    #BTD$K_UDA,-            ; LOW ORDER BYTE OF ORIGINAL R0 TELLS
               66 A6         0545  1740             RPB$B_DEVTYP(R6)        ;  BOOT DEVICE TYPE.
                  08    12   0547  1741             BNEQ    20$             ; IF NOT BOOTING FROM A UDA BRANCH
                              0549  1742                                     ;  AROUND.
               58 A6    D0   0549  1743             MOVL    RPB$L_CSRVIR(R6), -     ; COPY VIRTUAL ADDRESS OF UDA PORT CSR
        00000000'9F          054C
                              0551  1744             @#BOO$GB_SYSTEMID       ;  TO LOW ORDER LONGWORD OF SYSTEMID
                              0551  1745 20$:
        14 A2    57    D0   0551  1746             MOVL    R7,IDB$L_ADP(R2)        ; POINT IDB TO ADP
        50    1E A6    3C   0555  1747             MOVZWL  RPB$W_ROUBVEC(R6),R0    ; GET USER SPECIFIED VECTOR
                  0A    12   0559  1748             BNEQ    30$             ; BRANCH IF VECTOR SPECIFIED
        50    66 A6    9A   055B  1749             MOVZBL  RPB$B_DEVTYP(R6),R0     ; ELSE GET DEVICE TYPE CODE
   50    FFFE'CF40    3C   055F  1750             MOVZWL  W^BOOTVECTOR-2[R0],R0   ; GET DEFAULT INTERRUPT VECTOR
     50    10 B740    9E   0565  1751 30$:    MOVAB   @ADP$L_VECTOR(R7)[R0],R0; COMPUTE ADDRESS OF VECTOR
        60    26 A8    9E   056A  1752             MOVAB   CRB$L_INTD+2(R8),(R0)   ; SET ADDR OF INTERRUPT VECTOR
                              056E  1753
                              056E  1757                                     ;
                              056E  1758 100$:
                        05    056E  1759             RSB                     ; RETURN
                              056F  1760             .DISABLE LSB
```

```
                        056F  1762          .SBTTL  EXE$INI_TIMWAIT - COMPUTE CORRECT TIMEWAIT LOOP VALUES
                        056F  1763 ;++
                        056F  1764 ; FUNCTIONAL DESCRIPTION:
                        056F  1765 ;
                        056F  1766 ; EXE$INI_TIMWAIT initializes EXE$GL_TENUSEC and EXE$GL_UBDELAY, cells used
                        056F  1767 ; in the time-wait macros.  The first data cell, EXE$GL_TENUSEC, is the number
                        056F  1768 ; of times the following loop will be executed in ten u-seconds.  This is
                        056F  1769 ; done once here to calibrate the loop instead of reading the processor clock.
                        056F  1770 ; The resulting number is used in the system macros TIMEWAIT and TIMEDWAIT.
                        056F  1771 ;
                        056F  1772 ; The first step is to initialize EXE$GL_UBDELAY.  If the bit test instruction
                        056F  1773 ; in the TIMEWAIT macro is executed too rapidly in a loop, it can saturate the
                        056F  1774 ; Unibus.  EXE$GL_UBDELAY is used to introduce a 3 microsecond delay loop into
                        056F  1775 ; the TIMEWAIT bit test loop.
                        056F  1776 ;
                        056F  1777 ; This routine is called only once, from INIT.
                        056F  1778 ;
                        056F  1779 ; INPUT PARAMETERS:
                        056F  1780 ;
                        056F  1781 ;       NONE
                        056F  1782 ;
                        056F  1783 ; IMPLICIT INPUTS:
                        056F  1784 ;
                        056F  1785 ;       Time-of-day processor clock.
                        056F  1786 ;       Interval timers.
                        056F  1787 ;
                        056F  1788 ; OUTPUT PARAMETERS:
                        056F  1789 ;
                        056F  1790 ;       R0 - Destroyed.
                        056F  1791 ;
                        056F  1792 ; IMPLICIT OUTPUTS:
                        056F  1793 ;
                        056F  1794 ;       EXE$GL_TENUSEC - set to appropriate value to make TIMEWAIT and TIMEDWAIT
                        056F  1795 ;                        macros loop for 10 micro-seconds.
                        056F  1796 ;
                        056F  1797 ;       EXE$GL_UBDELAY - set to appropriate value to make TIMEWAIT and TIMEDWAIT
                        056F  1798 ;                        macros loop for 3 micro-seconds in the unibus delay
                        056F  1799 ;                        loop.
                        056F  1800 ;
                        056F  1801 ;--
                        056F  1802
                        056F  1803 EXE$INI_TIMWAIT::                    ; Initialize time-wait data cells
                        056F  1805          .ENABLE LSB
                        056F  1806
          19    00   DA  056F  1808          MTPR    #0,#PR780$_NICR     ; Initialize next interval count register.
                        0572  1810
                        0572  1814
                        0572  1818
                        0572  1822
00004E20  8F    D0      0572  1823          MOVL    #20000,-(SP)        ; # of times to execute timed loop.
          7E            0578
          18    11   DA  0579  1824          MTPR    #^X11,#PR$_ICCS     ; Start clock, no interrupts.
                        057C  1825
                        057C  1826 ; * * * start of loop to time * * *
            FD  6E    F5  057C  1827 10$:     SOBGTR  (SP),10$            ; Delay loop.
                        057F  1828 ; * * * end of loop to time * * *
                        057F  1829
```

```
                50    1A    DB  057F  1831          MFPR    #PR780$_ICR,R0          ; Read total time to execute loop.
                                0582  1833
                                0582  1837
                                0582  1841
                                0582  1845
                18    00    DA  0582  1846          MTPR    #0,#PR$_ICCS            ; Shut off clock.
                      50    C7  0585  1847          DIVL3   R0,#60000,G^EXE$GL_UBDELAY; Calculate number of times through
          0000EA60  8F          0587
          00000000'GF           058C
          00000000'GF   D6    0591  1848          INCL    G^EXE$GL_UBDELAY        ; loop to delay 3 microseconds.
                                0597  1849
                19    00    DA  0597  1851          MTPR    #0,#PR780$_NICR         ; Initialize next interval count register.
                                059A  1853
                                059A  1857
                                059A  1861
                                059A  1865
          00004E20  8F    D0  059A  1866          MOVL    #20000,R0               ; Number of times to execute test loop
                      50        05A0
          00000000'GF   D0    05A1  1867          MOVL    G^EXE$GL_UBDELAY,(SP)   ; Get delay loop iteration count.
                      6E        05A7
                18    11    DA  05A8  1868          MTPR    #^X11,#PR$_ICCS         ; Start clock, no interrupts
                                05AB  1869
                                05AB  1870 ; **** Start of loop to time
                8000  8F    B3  05AB  1871 20$:     BITW    #^X8000,40$             ; Random BITx instruction to time
          00005B9'EF            05AF
                      03    12  05B4  1872          BNEQ    40$                     ; Random conditional branch instruction
                   FD 6E    F5  05B6  1873 30$:     SOBGTR  (SP),30$                ; Delay 3 microseconds.
                   EF 50    F5  05B9  1874 40$:     SOBGTR  R0,20$                  ; Loop
                                05BC  1875 ; **** End of loop to time
                                05BC  1876
                50    1A    DB  05BC  1878          MFPR    #PR780$_ICR,R0          ; Read total time to execute loop.
                                05BF  1880
                                05BF  1884
                                05BF  1888
                18    00    DA  05BF  1892          MTPR    #0,#PR$_ICCS            ; Shut clock off
                      8E    D5  05C2  1893          TSTL    (SP)+                   ; Pop delay loop index off stack.
                      50    C7  05C4  1894          DIVL3   R0,#200000,G^EXE$GL_TENUSEC ; Calculate number of times to
          00030D40  8F          05C6
          00000000'GF           05CB
          00000000'GF   D6    05D0  1895          INCL    G^EXE$GL_TENUSEC        ; execute the loop to kill 10 u-secs.
                        05    05D6  1896          RSB                             ; Return
                              05D7  1897          .DISABLE LSB
```

```
                        05D7  1905          .SBTTL  EXE$INIT_TODR  -  SET SYSTEM TIME TO CORRECT VALUE AT STARTUP
                        05D7  1906 ;++
                        05D7  1907 ; FUNCTIONAL DESCRIPTION:
                        05D7  1908 ;
                        05D7  1909 ;        EXE$INIT_TODR SOLICITS THE CORRECT TIME FROM THE OPERATOR IF NECESSARY,
                        05D7  1910 ;        CONVERTS THE ASCII RESPONSE TO BINARY FORMAT AND CALLS AN INTERNAL
                        05D7  1911 ;        ENTRY POINT OF THE $SETIME SYSTEM SERVICE TO SET THE NEW SYSTEM TIME
                        05D7  1912 ;        IN MEMORY WITHOUT MODIFYING THE CONTENTS OF THE SYSTEM DISK.
                        05D7  1913 ;
                        05D7  1914 ;        IF THE TIME WOULD NORMALLY BE SOLICITED FROM AN OPERATOR, BECAUSE
                        05D7  1915 ;        THE HARDWARE TIME OF YEAR CLOCK IS ZERO, THEN THE SYSGEN PARAMETER
                        05D7  1916 ;        "TPWAIT" IS CHECKED.  IF IT IS ZERO, THEN IT IS ASSUMED THAT NO
                        05D7  1917 ;        OPERATOR IS PRESENT AND THE SYSTEM IS BOOTED USING THE LAST TIME
                        05D7  1918 ;        RECORDED IN THE SYSTEM IMAGE.  IF THE PARAMETER IS NON ZERO THEN
                        05D7  1919 ;        THAT TIME IS USED AS THE MAXIMUM TIME TO WAIT BEFOR ASSUMING THAT
                        05D7  1920 ;        THERE IS NO OPERATOR AND BOOTING ANY WAY.  IF THE PARAMETER IS
                        05D7  1921 ;        NEGATIVE, THE SYSTEM WILL WAIT FOREVER.
                        05D7  1922 ;
                        05D7  1923 ;        THIS ROUTINE IS CALLED ONLY ONCE, FROM SYSINIT OR STASYSGEN.
                        05D7  1924 ;
                        05D7  1925 ; INPUT PARAMETERS:
                        05D7  1926 ;
                        05D7  1927 ;        NONE
                        05D7  1928 ;
                        05D7  1929 ; IMPLICIT INPUTS:
                        05D7  1930 ;
                        05D7  1931 ;        TIME-OF-DAY PROCESSOR CLOCK.
                        05D7  1932 ;
                        05D7  1933 ; OUTPUT PARAMETERS:
                        05D7  1934 ;
                        05D7  1935 ;        R0,R1 - DESTROYED
                        05D7  1936 ;
                        05D7  1937 ; IMPLICIT OUTPUTS:
                        05D7  1938 ;
                        05D7  1939 ;        EXE$GQ_SYSTIME - SET TO CURRENT TIME IN 100 NANOSECOND UNITS SINCE
                        05D7  1940 ;                         17-NOV-1858  00:00:00.
                        05D7  1941 ;
                        05D7  1942 ;--
                        05D7  1943
                        05D7  1944 ;
                        05D7  1945 ; Stack storage offsets:
                        05D7  1946 ;
                  00000000  05D7  1947 TTCHAN  = ^X00                          ; CHANNEL FOR TERMINAL (LONGWORD)
                  00000004  05D7  1948 TTNAME  = ^X04                          ; STRING DESCRIPTOR FOR OPERATOR'S TERM
                  0000000C  05D7  1949 TMPDESC = ^X0C                          ; TEMPORY STRING DESCRIPTOR (QUADWORD)
                  00000014  05D7  1950 INTIME  = ^X14                          ; INPUT TIME VALUE (QUADWORD)
                  0000001C  05D7  1951 LINBUF  = ^X1C                          ; INPUT LINE BUFFER (5 LONGWORDS)
                  00000014  05D7  1952 LINBUFSIZ = ^X14                        ;  (LENGTH OF LINE BUFFER IN BYTES)
                        05D7  1953
                        05D7  1954 ;
                        05D7  1955 ; PURE DATA
                        05D7  1956 ;
                        05D7  1957 TERM_NAMADR:
              30 41 50 4F  05D7  1958          .ASCII  \OPA0\                  ; DEVICE NAME FOR OPERATOR'S TERMINAL
                  00000004  05DB  1959 TERM_NAMSIZ = . - TERM_NAMADR
6C 61 76 6E 69 00  05DB  1960 TIMERR: .ASCIC  \invalid date/time\            ;
74 61 64 20 64 69  05E1
```

```
                65 6D 69 74 2F 65   05E7
                               11   05DB
                                    05ED   1961 TIMEPROMPT:
                               33'  05ED   1962          .BYTE   NPROMPT
                41 45 4C 50 0A 0D   05EE   1963          .ASCII  <13><10>/PLEASE ENTER DATE AND TIME (DD-MMM-YYYY  HH:MM)  /
                54 4E 45 20 45 53   05F4
                54 41 44 20 52 45   05FA
                20 44 4E 41 20 45   0600
                28 20 45 4D 49 54   0606
                4D 4D 4D 2D 44 44   060C
                20 59 59 59 59 2D   0612
                4D 4D 3A 48 48 20   0618
                      20 20 29      061E
                      00000033      0621   1964 NPROMPT=.-TIMEPROMPT-1
                                    0621   1965
                                    0621   1966
                                    0621   1967 EXE$INIT_TODR::                        ; SET CORRECT TIME
                                    0621   1968          .ENABLE LSB
                   077C 8F    BB    0621   1969          PUSHR   #^M<R2,R3,R4,R5,R6,R8,R9,R10> ; SAVE REGISTERS
                   5E   30    C2    0625   1970          SUBL    #4*12,SP                ; SCRATCH STORAGE
                   56   5E    D0    0628   1971          MOVL    SP,R6                   ; SAVE ADDRESS OF SCRATCH STORAGE
                04 A6   04    9A    062B   1972          MOVZBL  #TERM_NAMSIZ,TTNAME(R6) ; SET SIZE OF OPERATOR'S TERM NAME AND
                   FFA4 CF    9E    062F   1973          MOVAB   W^TERM_NAMADR,TTNAME+4(R6) ;  PIC ADDRESS INTO TERM NAME DESC
                     08 A6          0633
                      00'   E0    0635   1974          BBS     S^#EXE$V_SETTIME,G^EXE$GL_FLAGS,READTIME ; BR TO SOLICIT TIME
            1C 00000000'GF          0637
                                    063D   1975
                                    063D   1976
                   50   1B    DB    063D   1978          MFPR    #PR780$_TODR,R0         ; GET TIME OF DAY CLOCK VALUE
                                    0640   1980
                                    0640   1984
                                    0640   1988
                                    0640   1992
                      50    C3    0640   1994          SUBL3   R0,G^EXE$GL_TODR,R9     ; GET TOD DELTA TIME (10 MS UNITS)
                00000000'GF         0642
                      59            0647
                      09    1B    0648   1995          BLEQU   5$                      ; BRANCH IF TIME IS LATER
                      59    D1    064A   1996          CMPL    R9,#24*60*60*100        ; CHECK FOR SETBACK OF ONE DAY
                0083D600 8F         064C
                      06    1E    0651   1997          BGEQU   READTIME                ; MORE, MUST SOLICIT TIME
                   14 A6    7C    0653   2002 5$:      CLRQ    INTIME(R6)              ; NULL ARGUMENT FOR EXE$SETIME_INT
                    00C7    31    0656   2003          BRW     200$                    ; RETURN TO CALLER
                                    0659   2004
                                    0659   2005 READTIME:                             ; SOLICIT TIME
                      59    D4    0659   2006          CLRL    R9                      ; CLEAR A FLAG
                00000000'GF   32    065B   2007          CVTWL   G^SGN$GW_TPWAIT,R8      ; PICK UP TIMEOUT WAIT INTERVAL
                      58          0661
                      14    14    0662   2008          BGTR    8$                      ; POSITIVE, WAIT THAT PERIOD ONCE
                      0D    19    0664   2009          BLSS    7$                      ; NEGATIVE IS WAIT FOREVER
                                    0666   2010 6$:
                      01    C1    0666   2012          ADDL3   #1,G^EXE$GL_TODR,R0     ; ZERO, SET TIME-OF-DAY CLOCK TO
                00000000'GF         0668
                      50            066D
                                    066E   2014
                   1B   50    DA    066E   2016          MTPR    R0,#PR780$_TODR         ;   KNOWN VALUE + 10 MSEC AND FINISH UP
                                    0671   2018
                                    0671   2022
```

```
                                0671  2026
                                0671  2030
;KDM0099                   E0   11  0671    .2          BRB     5$                          ;
;KDM0099                            0673    .4
-1                                  0673  2032
                           58   14  D0  0673  2033 7$:    MOVL    #20,R8                      ; STARTING WAIT
                                59  D6  0676  2034        INCL    R9                          ; NEGATIVE - WAIT FOREVER
                                        0678  2035 8$:    $ASSIGN_S       TTNAME(R6),TTCHAN(R6) ; AND ASSIGN TO INPUT DEVICE
                             DD 50  E9  0686  2036        BLBC    R0,6$                       ; ERROR - FALL BACK TO STORED TIME
                        52   FF60 CF  9E  0689  2037 10$:   MOVAB   W^TIMEPROMPT,R2           ; GET ADDRESS OF PROMPT STRING
                             53   82  9A  068E  2038        MOVZBL  (R2)+,R3                    ; AND LENGTH
                                        0691  2039        $QIOW_S #0,W^TTCHAN(R6),-           ; PROMPT AND READ TIME
                                        0691  2040                #<IO$_READPROMPT!IO$M_PURGE!IO$M_TIMED!IO$M_CVTLOW>,-
                                        0691  2041                TMPDESC(R6),,,-             ;  I/O STATUS BLOCK , NO AST OR PARAM
                                        0691  2042                LINBUF(R6),#LINBUFSIZ,-     ;  BUFFER ADDRESS AND SIZE
                                        0691  2043                R8,#0,-                     ;  TIME OUT
                                        0691  2044                R2,R3                       ;  PROMPT ADDRESS AND SIZE
                             AD 50  E9  06B6  2045        BLBC    R0,6$                       ; ERROR - FALL BACK TO STORED TIME
                          54   0C A6  7D  06B9  2046        MOVQ    TMPDESC(R6),R4              ; GET COMPLETION STATUS
                             0D 54  E8  06BD  2047        BLBS    R4,20$                      ; CONTINUE IF SUCCESSFUL READ
                             A3 59  E9  06C0  2048        BLBC    R9,6$                       ; FAILED ON ONE-TIME READ, RETURN
                        58   01 A848 9E  06C3  2049        MOVAB   1(R8)[R8],R8                ; (2 * TIMEOUT) + 1
                             58   58  3C  06C8  2050        MOVZWL  R8,R8                       ; BOUND TIMEOUT
                                BC  11  06CB  2051        BRB     10$                         ; TRY AGAIN FOR TIME
                                        06CD  2052 20$:                                       ; SOMETHING WAS INPUT
                     0C A6   0E A6  3C  06CD  2053        MOVZWL  TMPDESC+2(R6),TMPDESC(R6)   ; FORM DESCRIPTOR FOR BUFFER
                     10 A6   1C A6  9E  06D2  2054        MOVAB   LINBUF(R6),TMPDESC+4(R6)    ; SET DESCRIPTOR ADDRESS
                                        06D7  2055        $BINTIM_S TMPDESC(R6),INTIME(R6)    ; CONVERT TO BINARY TIME
                             05 50  E9  06E4  2056        BLBC    R0,89$                      ; INVALID TIME
                             18 A6  D5  06E7  2057        TSTL    INTIME+4(R6)                ; CHECK FOR DELTA TIME
                                2A  14  06EA  2058        BGTR    100$                        ; BRANCH IF NOT - OK
                                        06EC  2059 89$:                                       ; INVALID TIME VALUE INPUT
                        52   FEEB CF  9E  06EC  2060        MOVAB   W^TIMERR,R2                 ; ADDRESS OF ERROR MESSAGE
                             53   82  9A  06F1  2061        MOVZBL  (R2)+,R3                    ; GET STRING LENGTH
                                        06F4  2062        $QIOW_S #0,TTCHAN(R6),-             ; GIVE ERROR MESSAGE
                                        06F4  2063                #IO$_WRITEVBLK,-            ;
                                        06F4  2064                ,,,-                        ;  NO I/O STATUS,AST OR AST PARAM
                                        06F4  2065                (R2),R3 ,-                  ;  BUFFER ADDRESS, LENGTH
                                        06F4  2066                #0,#32                      ;  SET CARRIAGE CONTROL TO CR/LF
                                FF73    31  0713  2067        BRW     10$                         ; AND TRY AGAIN
                                        0716  2068 100$:                                      ; EXIT
                                        0716  2069        $DASSGN_S TTCHAN(R6)                ; DE-ASSIGN TERMINAL CHANNEL
                             14 A6  7F  0720  2070 200$:   PUSHAQ  INTIME(R6)                  ; SET NEW SYSTEM TIME
                                01  FB  0723  2071        CALLS   #1,G^EXE$SETIME_INT         ; USE TODR CLOCK TO SET SYSTEM TIME
                  00000000'GF           0725
                  00000000'GF   7D  072A  2072        MOVQ    G^EXE$GQ_TODCBASE,G^EXE$GQ_BOOTTIME ; SAVE BOOT TIME
                  00000000'GF           0730
                     5E   30  C0  0735  2073        ADDL    #12*4,SP                    ; CLEAN OFF SCRATCH STORAGE
                     077C 8F  BA  0738  2074        POPR    #^M<R2,R3,R4,R5,R6,R8,R9,R10> ; RESTORE REGISTERS
                                        073C  2075
                                        073C  2076 ;
                                        073C  2077 ; Fall through into the deallocate logic.
                                        073C  2078 ;
                                        073C  2079 ;       RSB                                 ; *** This goes in if another piece of
                                        073C  2080                                          ; *** initialization code is added that
                                        073C  2081                                          ; *** is executed after EXE$INI_TIMWAIT.
                                        073C  2082        .DISABLE LSB
```

```
                073C  2083
```

```
                        073C  2085 DEAL_INIT_CODE:                          ; DEALLOCATE THE INITIALIZATION CODE
                        073C  2086 ;
                        073C  2087 ; It is the duty of the last-executed, loadable initialization
                        073C  2088 ; routine to make itself and all other such routines disappear, i.e.,
                        073C  2089 ; release the space they occupy to non-paged pool.  Each routine's vector
                        073C  2090 ; must be disconnected, e.g., be made to point to the symbol, EXE$LOAD_ERROR.
                        073C  2091 ;
                        073C  2092 ; NOTE:  This means that new initialization routines should be added
                        073C  2093 ;        to this module in a particular order, not necessarily at the
                        073C  2094 ;        end of the module!
                        073C  2095 ;
                        073C  2096         .ENABLE LSB
          7E   52   7D  073C  2097         MOVQ    R2,-(SP)                ; Save some registers
                        073F  2098
                        073F  2099 ;
                        073F  2100 ; First find the vectors that point to these initialization routines
                        073F  2101 ; and reset them to point to EXE$LOAD_ERROR.
                        073F  2102 ;
    50   0000'CF   9E  073F  2103         MOVAB   W^SYSL$BEGIN,R0         ; Compute bounds of releasable piece:
     00000000'8F   C1  0744  2104         ADDL3   #<STAY_HEADER-SYSL$BEGIN>,R0,R1 ; starting and ending addresses.
          51   50      074A
     00000000'GF   9E  074C  2105         MOVAB   G^EXE$AL_LOAVEC,R2      ; Get starting address of vectors.
               52      0752
     00000000'GF   9E  0753  2106         MOVAB   G^EXE$LOAD_ERROR,R3     ; Get end of vectors.
               53      0759
 9F17 8F       62   B1  075A  2107 10$:    CMPW    (R2),#^X9F17            ; Is this JMP @# ?
               1B   13  075F  2108         BEQL    30$                     ; Br if yes, skip past it.
80 8F    03   A2   91  0761  2109         CMPB    3(R2),#^X80             ; Is this a system space address
               16   12  0766  2110         BNEQ    40$                     ; Br if no, assume it's a HALT instr.
          50   62   D1  0768  2111         CMPL    (R2),R0                 ; Is address before the releasable
               0C   1F  076B  2112         BLSSU   20$                     ;  piece of memory?  Br on yes.
          51   62   D1  076D  2113         CMPL    (R2),R1                 ; Is address after the releasable
               07   1A  0770  2114         BGTRU   20$                     ;  piece of memory?  Br on yes.
     00000000'GF   9E  0772  2115         MOVAB   G^EXE$LOAD_ERROR,(R2)   ; Reset this vector.
               62      0778
          52   02   C0  0779  2116 20$:    ADDL    #2,R2                   ; Point past this vector.
               52   D6  077C  2117 30$:    INCL    R2                      ; Come here to point past JMP @#.
               52   D6  077E  2118 40$:    INCL    R2                      ; Come here to point past HALT.
          53   52   D1  0780  2119         CMPL    R2,R3                   ; Past the end of the vectors?
               D5   1F  0783  2120         BLSSU   10$                     ; Keep searching vectors.
                        0785  2121 ;
                        0785  2122 ; Now release the memory to non-paged pool.
                        0785  2123 ;
    50   0000'CF   9E  0785  2124         MOVAB   W^SYSL$BEGIN,R0         ; Point to start of module
    51   0000'8F   3C  078A  2125         MOVZWL  #<STAY_HEADER-SYSL$BEGIN>,R1 ; Length to vaporize
            F87A   31  078F  2126         BRW     50$                     ; Br to code that is not released.
                        0792  2127
                   00000000  2128          PSECT  $$$INIT__END,PAGE       ; 'PAGE' SINCE 16-BYTE ALIGN IS NOT
                        0000  2129
                        0000  2130 STAY_HEADER:
 00000000 00000000      0000  2131         .LONG   0,0
                  0000  0008  2132         .WORD   <SYSL$END-STAY_HEADER>
                    62  000A  2133         .BYTE   DYN$C_LOADCODE
                    00  000B  2134         .BYTE   0
                        000C  2135
     00000000'9F   16   000C  2136 50$:    JSB     @#EXE$DEANONPGDSIZ      ; Just the smile on the Chesire cat
          52   8E   7D  0012  2137         MOVQ    (SP)+,R2                ; Restore
```

```
 05  0015  2138          RSB                             ; Return.
     0016  2139
     0016  2140          .DISABLE LSB
     0016  2141          .END
```

```
$$$VMSDEFINED                   = 00000001
$$T1                            = 00000001
ADAPTERS                          00000000 R      02
ADP$B_TYPE                      = 0000000A
ADP$C_CIADPLEN                  = 00000030
ADP$C_DRADPLEN                  = 00000030
ADP$C_MBAADPLEN                 = 00000030
ADP$C_UBAADPLEN                 = 00000258
ADP$L_AVECTOR                   = 0000001C
ADP$L_CRB                       = 00000010
ADP$L_CSR                       = 00000000
ADP$L_DPQFL                     = 00000014
ADP$L_LINK                      = 00000004
ADP$L_MBASCB                    = 00000014
ADP$L_MBASPTE                   = 00000018
ADP$L_MRACTMDRS                 = 0000005C
ADP$L_MRQFL                     = 00000030
ADP$L_UBASCB                    = 00000044
ADP$L_UBASPTE                   = 00000054
ADP$L_VECTOR                    = 00000010
ADP$W_ADPTYPE                   = 0000000E
ADP$W_DPBITMAP                  = 00000060
ADP$W_MRFFENCE                  = 0000015C
ADP$W_MRFREGARY                 = 0000015E
ADP$W_MRNFENCE                  = 00000062
ADP$W_MRNREGARY                 = 00000064
ADP$W_SIZE                      = 00000008
ADP$W_TR                        = 0000000C
ADP$W_UMR_DIS                   = 00000256
ADPLINK                           ********    X   09
ADPTAB_ADPLEN                     00000001
ADPTAB_ATYPE                      00000003
ADPTAB_IDBUNITS                   00000000
ALONPAGD                          000003D4 R      09
AT$_CI                          = 00000004
AT$_DR                          = 00000002
AT$_MBA                         = 00000000
AT$_UBA                         = 00000001
BADUMR                            0000030D R      08
BI_BUS_CODE                     = 80000000
BI_CPU                          = 00000000
BI_CSR_LEN                      = 00000002
BI_LIKE                         = 00000000
BLD_CRB                           00000506 R      09
BOO$GB_SYSTEMID                   ********    X   09
BOO$GL_SPTFREH                    ********    X   09
BOO$GL_SPTFREL                    ********    X   09
BOOTVECTOR                        00000000 R      08
BTD$K_CONSOLE                   = 00000040
BTD$K_UDA                       = 00000011
BUS_CODE_OFFSET                 = FFFFFFFC
BUS_CSR_LEN                       00000004 R      08
CI$INITIAL                        ********    X   09
CI$INT                            ********    X   09
CITAB                             00000015 R      08
CONFIG_IOSPACE                    0000005F R      09
CONFREG                           000000A4 R      08
CONFREGL                          000001E4 R      08
CPU_ADPSIZE                       00000019 R      08
CPU_TYPE                        = 00000001
CR                              = 0000000D
CRB$B_TYPE                      = 0000000A
CRB$C_LENGTH                    = 00000048
CRB$L_INTD                      = 00000024
CRB$L_WQBL                      = 00000004
CRB$L_WQFL                      = 00000000
CRB$W_SIZE                      = 00000008
CREATE_ARRAYS                     0000011A R      09
CSR_LEN_OFFSET                  = FFFFFFFB
DDB$T_NAME                      = 00000014
DEAL_INIT_CODE                    0000073C R      09
DIRECT_VEC_NODE_CNT               00000009 R      08
DR$INITIAL                        ********    X   09
DR$INT                            ********    X   09
DRTAB                             00000011 R      08
DYN$C_ADP                       = 00000001
DYN$C_CONF                      = 00000007
DYN$C_CRB                       = 00000005
DYN$C_IDB                       = 00000009
DYN$C_INIT                      = 00000063
DYN$C_LOADCODE                  = 00000062
END_NEXUS                         00000115 R      09
ERROR_HALT                        00000199 R      09
ERROR_HALT_1                      0000019E R      09
EXE$AL_LOAVEC                     ********    X   09
EXE$DEANONPGDSIZ                  ********    X   0A
EXE$GL_CONFREG                    ********    X   09
EXE$GL_CONFREGL                   ********    X   09
EXE$GL_FLAGS                      ********    X   09
EXE$GL_NUMNEXUS                   ********    X   09
EXE$GL_RPB                        ********    X   09
EXE$GL_SCB                        ********    X   09
EXE$GL_TENUSEC                    ********    X   09
EXE$GL_TODR                       ********    X   09
EXE$GL_UBDELAY                    ********    X   09
EXE$GQ_BOOTTIME                   ********    X   09
EXE$GQ_TODCBASE                   ********    X   09
EXE$INIT_TODR                     00000621 RG     09
EXE$INI_TIMWAIT                   0000056F RG     09
EXE$LOAD_ERROR                    ********    X   09
EXE$MCHK_PRTCT                    ********    X   09
EXE$OUTZSTRING                    ********    X   09
EXE$SETIME_INT                    ********    X   09
EXE$TEST_CSR                      ********    X   09
EXE$UBAERR_INT                    ********    X   09
EXE$V_SETTIME                     ********    X   09
FILL_CRB                          00000513 R      09
GET_GEN_TYPE                      000000B9 R      09
GET_TYPE                          000000A0 R      09
IDB$B_TYPE                      = 0000000A
IDB$C_LENGTH                    = 00000038
IDB$L_ADP                       = 00000014
IDB$L_CSR                       = 00000000
IDB$W_SIZE                      = 00000008
```

```
IDB$W_UNITS                     = 0000000C
INI$ALLOC_CRB                     ********    X   09
INI$ALONONPAGED                   ********    X   09
INI$CIADP                         000003EF R      09
INI$CONSOLE                       000004ED RG     09
INI$DRADP                         000003DA R      09
INI$IOMAP                         00000000 RG     09
INI$KDZ11                         000004EC R      09
INI$MBADP                         00000404 R      09
INI$MPMADP                        ********    X   06
INI$UBADP                         000001C3 R      09
INI$UBSPACE                       000001A7 R      09
INIT_ROUTINES                     00000000 R      06
INTIME                          = 00000014
IO$M_CVTLOW                       ********    X   09
IO$M_PURGE                        ********    X   09
IO$M_TIMED                        ********    X   09
IO$_READPROMPT                    ********    X   09
IO$_WRITEVBLK                     ********    X   09
IO780$AL_IOBASE                 = 20000000
IO780$AL_NNEX                   = 00000010
IO780$AL_PERNEX                 = 00002000
IO780$AL_UBOSP                  = 20100000
LF                              = 0000000A
LINBUF                          = 0000001C
LINBUFSIZ                       = 00000014
MAP_NEXUS                         000000F9 R      09
MAP_PAGES                         00000173 R      09
MAXNEXUS                        = 00000040
MBA$INITIAL                       ********    X   09
MBA$INT                           ********    X   09
MBATAB                            0000000D R      08
MCHK$M_LOG                      = 00000001
MCHK$M_NEXM                     = 00000004
MMG$GL_SBICONF                    ********    X   09
MMG$GL_SPTBASE                    ********    X   09
MMG$SVAPTECHK                     ********    X   09
NDT$_BUA                        = 80000102
NDT$_CI                         = 00000038
NDT$_DR32                       = 00000030
NDT$_KDZ11                      = 80000105
NDT$_MB                         = 00000020
NDT$_MEM1664NI                  = 00000012
NDT$_MEM16I                     = 00000011
NDT$_MEM16NI                    = 00000010
NDT$_MEM4I                      = 00000009
NDT$_MEM4NI                     = 00000008
NDT$_MEM64EIL                   = 00000069
NDT$_MEM64EIU                   = 0000006B
NDT$_MEM64I                     = 0000006C
NDT$_MEM64NIL                   = 00000068
NDT$_MEM64NIU                   = 0000006A
NDT$_MPM0                       = 00000040
NDT$_MPM1                       = 00000041
NDT$_MPM2                       = 00000042
NDT$_MPM3                       = 00000043
NDT$_SCORMEM                    = 80000001
NDT$_UB0                        = 00000028
NDT$_UB1                        = 00000029
NDT$_UB2                        = 0000002A
NDT$_UB3                        = 0000002B
NEXUSDESC                         00000020 R      08
NOSPT                             000002E4 R      08
NPROMPT                         = 00000033
NUMUBAVEC                       = 00000080
NUM_PAGES                         00000000 R      04
NXT_NEXUS                         0000006B R      09
OPA$CRB                           ********    X   09
PA                              = 20020000
PR$_ICCS                        = 00000018
PR$_SID_TYP730                  = 00000003
PR$_SID_TYP750                  = 00000002
PR$_SID_TYP780                  = 00000001
PR$_SID_TYP790                  = 00000004
PR$_SID_TYP8NN                  = 00000006
PR$_SID_TYP8SS                  = 00000005
PR$_SID_TYPUV1                  = 00000007
PR$_TBIS                        = 0000003A
PR780$_ICR                      = 0000001A
PR780$_NICR                     = 00000019
PR780$_TODR                     = 0000001B
PTE$C_KW                        = 10000000
PTE$M_VALID                     = 80000000
READTIME                          00000659 R      09
RPB$B_DEVTYP                    = 00000066
RPB$L_ADPPHY                    = 0000005C
RPB$L_ADPVIR                    = 00000060
RPB$L_BOOTR1                    = 00000020
RPB$L_CSRPHY                    = 00000054
RPB$L_CSRVIR                    = 00000058
RPB$W_ROUBVEC                   = 0000001E
SBICONF                           000000E4 R      08
SBI_BUS_CODE                    = 00000000
SBI_CPU                         = 00000001
SBI_CSR_LEN                     = 00000001
SBI_LIKE                        = 00000001
SGN$GW_TPWAIT                     ********    X   09
STAY_HEADER                       00000000 R      0A
SW_BUS_CODE                       00000005 R      08
SYS$ASSIGN                        ********   GX   09
SYS$BINTIM                        ********   GX   09
SYS$DASSGN                        ********   GX   09
SYS$QIOW                          ********   GX   09
SYSL$BEGIN                        ********    X   09
SYSL$END                          ********    X   0A
TERM_NAMADR                       000005D7 R      09
TERM_NAMSIZ                     = 00000004
TEST_NEXUS                        00000071 R      09
TIMEPROMPT                        000005ED R      09
TIMERR                            000005DB R      09
TMPDESC                         = 0000000C
TTCHAN                          = 00000000
TTNAME                          = 00000004
UBA$INITIAL                       ********    X   09
```

```
UBA$INTO                        ********    X   09
UBA$L_BRRVR                   = 00000030
UBA$L_CR                      = 00000004
UBA$UNEXINT                     ********    X   09
UBAERRADR                     = 00000090
UBAINT4                       = 00000000
UBAINT4REL                    = 0000000A
UBAINT5                       = 00000020
UBAINT5REL                    = 0000002A
UBAINT6                       = 00000040
UBAINT6REL                    = 0000004A
UBAINT7                       = 00000060
UBAINT7REL                    = 0000006A
UBAINTADP                     = 00000089
UBAINTBASE                      00000340 R      09
UBINTSZ                       = 00000094
VA$M_SYSTEM                   = 80000000
VEC$L_ADP                     = 00000014
VEC$L_IDB                     = 00000008
VEC$L_INITIAL                 = 0000000C
VECTAB                          000003D4 R      09
```

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	00000004	(4.)	01 (1.)	NOPIC	USR	CON	ABS	LCL	NOSHR	EXE	RD WRT NOVEC BYTE
$$$INIT$DATA0	00000060	(96.)	02 (2.)	NOPIC	USR	CON	REL	LCL	NOSHR	EXE	RD WRT NOVEC BYTE
$$$INIT$DATA1	00000000	(0.)	03 (3.)	NOPIC	USR	CON	REL	LCL	NOSHR	EXE	RD WRT NOVEC BYTE
$$$INIT$DATA2	00000030	(48.)	04 (4.)	NOPIC	USR	CON	REL	LCL	NOSHR	EXE	RD WRT NOVEC BYTE
$$$INIT$DATA3	00000000	(0.)	05 (5.)	NOPIC	USR	CON	REL	LCL	NOSHR	EXE	RD WRT NOVEC BYTE
$$$INIT$DATA4	00000060	(96.)	06 (6.)	NOPIC	USR	CON	REL	LCL	NOSHR	EXE	RD WRT NOVEC BYTE
$$$INIT$DATA5	00000000	(0.)	07 (7.)	NOPIC	USR	CON	REL	LCL	NOSHR	EXE	RD WRT NOVEC BYTE
$$$INIT$DATA	0000033F	(831.)	08 (8.)	NOPIC	USR	CON	REL	LCL	NOSHR	EXE	RD WRT NOVEC LONG
$$$INIT$CODE	00000792	(1938.)	09 (9.)	NOPIC	USR	CON	REL	LCL	NOSHR	EXE	RD WRT NOVEC QUAD
$$$INIT__END	00000016	(22.)	0A (10.)	NOPIC	USR	CON	REL	LCL	NOSHR	EXE	RD WRT NOVEC PAGE

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	31	00:00:00.07	00:00:00.34
Command processing	124	00:00:00.50	00:00:01.88
Pass 1	530	00:00:16.59	00:01:02.39
Symbol table sort	0	00:00:01.67	00:00:04.91
Pass 2	313	00:00:06.56	00:00:33.79
Symbol table output	32	00:00:00.16	00:00:00.66
Psect synopsis output	7	00:00:00.06	00:00:00.21
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	1040	00:00:25.63	00:01:44.18

The working set limit was 1950 pages.

134197 bytes (263 pages) of virtual memory were used to buffer the intermediate code.
There were 90 pages of symbol table space allocated to hold 1618 non-local and 36 local symbols.
2489 source lines were read in Pass 1, producing 39 object records in Pass 2.
46 pages of virtual memory were used to define 44 macros.

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

Macro library name	Macros defined
_255DUA28:[SYS.OBJ]LIB.MLB;1	21
_255DUA28:[SYSLIB]STARLET.MLB;2	15
TOTALS (all libraries)	36

1755 GETS were required to define 36 macros.

There were no errors, warnings or information messages.

MACRO/LIS=LIS$:INIADP780/OBJ=OBJ$:INIADP780 MSRC$:CPUSW780/UPDATE=(ENH$:CPUSW780)+MSRC$:INIADP/UPDATE=(ENH$:INIADP)+EXECML$/LIB

LIOSUB780

Table of contents

(3) 137 PURGE DATAPATH

```
0000     1          .NOSHOW CONDITIONALS
0000     3          .TITLE  LIOSUB780 - LOADABLE I/O SUBROUTINES
0000     5
0000     9
0000    13
0000    17
0000    21
0000    22          .IDENT  'V03-012'
0000    23
0000    24 ;
0000    25 ;*****************************************************************************
0000    26 ;*                                                                           *
0000    27 ;*  COPYRIGHT (c) 1978, 1980, 1982, 1983, 1984 BY                           *
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0000    44 ;*                                                                           *
0000    45 ;*                                                                           *
0000    46 ;*****************************************************************************
0000    47 ;
0000    48 ;++
0000    49 ;
0000    50 ; FACILITY:
0000    51 ;
0000    52 ;       EXECUTIVE, I/O CONTROL ROUTINES
0000    53 ;
0000    54 ; ABSTRACT:
0000    55 ;
0000    56 ; I/O SUBROUTINES WHICH CONTAIN PROCESSOR DEPENDENCIES.
0000    57 ;
0000    58 ; AUTHOR:
0000    59 ;
0000    60 ;       N. KRONENBERG, JANUARY 12, 1979.
0000    61 ;
0000    62 ; MODIFIED BY:
0000    63 ;
0000    64 ;       V03-012 KDM0096         Kathleen D. Morse       27-Mar-1984
0000    65 ;               Add memory CSR scanning to IOC$PURGDATAP for MicroVAX I.
0000    66 ;               (All DMA MicroVAX I drivers should call this routine, just
0000    67 ;               before calling IOC$REQCOM.)
0000    68 ;
0000    69 ;       V03-011 KDM0081         Kathleen D. Morse       13-Sep-1983
0000    70 ;               Create a version for Micro-VAX I.
0000    71 ;
```

```
0000     72 ;       V03-010 TCM0004         Trudy C. Matthews       4-Jan-1982
0000     73 ;               Added 11/790-specific path to IOC$PURGDATAP.
0000     74 ;
0000     75 ;       V09     TCM0003         Trudy C. Matthews       9-Nov-1982
0000     76 ;               Added a .TITLE statement for LIOSUB790.
0000     77 ;
0000     78 ;       V08     TCM0002         Trudy C. Mathews        29-Jul-1981
0000     79 ;               Changed all "7ZZ"s to "730"s.
0000     80 ;
0000     81 ;       V07     TCM0001         Trudy C Matthews        28-Feb-1980
0000     82 ;               Changed IOC$PURGDATAP for NEBULA so that it logs
0000     83 ;               the Unibus Error Summary register itself when there
0000     84 ;               are Unibus errors reported.
0000     85 ;
0000     86 ;       V06     NPK0002         N. KRONENBERG           4-DEC-1979
0000     87 ;               REPLACED IOC$PURGDATAP FOR NEBULA
0000     88 ;
0000     89 ;       V05     NPK0001         N. KRONENBERG           23-AUG-1979
0000     90 ;               CORRECTED 11/750 CHECK FOR PURGE DONE.
0000     91 ;
0000     92 ;       V04     TCM0001         Trudy C. Matthews       3-Jul-1979
0000     93 ;       Modified IOC$PURGDATAP for NEBULA.
0000     94 ;
0000     95 ;--
```

```
                     0000     97 ;
                     0000     98 ; MACRO LIBRARY CALLS:
                     0000     99 ;
                     0000    100          $ADPDEF                         ; Define ADP offsets
                     0000    101          $CRBDEF                         ; Define CRB offsets
                     0000    102          $EMBETDEF                       ; Define error types.
                     0000    103          $EMBUEDEF                       ; Define Unibus Error buffer.
                     0000    104          $IDBDEF                         ; Define IDB offsets
                     0000    105          $PRDEF                          ; Define IPR'S
                     0000    106          $UBADEF                         ; Define UBA offsets
                     0000    107          $UBIDEF                         ; Define UBI offsets
                     0000    108          $UCBDEF                         ; Define UCB offsets
                     0000    109          $VECDEF                         ; Define CRB/VEC offsets
                     0000    110
00000001             0000    112          C780_LIKE = 1
00000000             0000    113          C750_LIKE = 0
                     0000    115
                     0000    120
                     0000    125
                     0000    130
                     0000    135
```

```
                        0000   137          .SBTTL  PURGE DATAPATH
                        0000   138 ;+
                        0000   139 ; IOC$PURGDATAP - PURGE DATAPATH
                        0000   140 ;
                        0000   141 ; This routine purges the caller's buffered datapath, and clears any
                        0000   142 ; datapath errors.  if there was a datapath error, this fact is
                        0000   143 ; returned to the caller.
                        0000   144 ;
                        0000   145 ; INPUTS:
                        0000   146 ;
                        0000   147 ;       R5 = UCB address
                        0000   148 ;
                        0000   149 ; OUTPUTS:
                        0000   150 ;
                        0000   151 ;       R0-R3 altered
                        0000   152 ;       Other registers preserved
                        0000   153 ;       R0 = low bit clear/set if transmission error/success
                        0000   154 ;       R1 = DPR contents after purge (for register dump by caller)
                        0000   155 ;       R2 = address of start of adapter map registers (for reg dump by caller)
                        0000   156 ;       R3 = CRB address
                        0000   157 ;-
                        0000   158
                00000000   159          .PSECT  WIONONPAGED
                        0000   160
                        0000   161          .ENABL  LSB
                        0000   162
                        0000   163 IOC$PURGDATAP::                              ;
                10      BB  0000   165          PUSHR   #^M<R4>                 ; Save register
          53    24 A5   D0  0002   166          MOVL    UCB$L_CRB(R5),R3        ; Get CRB address
          52    38 B3   D0  0006   167          MOVL    @CRB$L_INTD+VEC$L_ADP(R3),R2 ; Get start of adapter register space
                        000A   168
                00      EF  000A   169          EXTZV   #VEC$V_DATAPATH,-       ; Extract datapath #
                05          000C   170                  #VEC$S_DATAPATH,-       ;  from CRB
          51    37 A3       000D   171                  CRB$L_INTD+VEC$B_DATAPATH(R3),R1
     54   40 A241   DE  0010   172          MOVAL   UBA$L_DPR(R2)[R1],R4    ; Get address of DPR
     64   01    1F  78  0015   173          ASHL    #UBA$V_DPR_BNE,#1,(R4)  ; Purge datapath
          51    64  D0  0019   174          MOVL    (R4),R1                 ; Get DPR contents
       08 51    1E  E1  001C   175          BBC     #UBA$V_DPR_XMTER,R1,20$ ; Branch if no error
     64   01    1E  78  0020   176          ASHL    #UBA$V_DPR_XMTER,#1,(R4) ; Clear error in DPR
                50  D4  0024   177          CLRL    R0                      ; Set to return transfer error
                03  11  0026   178          BRB     30$                     ; Join common code
          50    01  9A  0028   179 20$:     MOVZBL  #1,R0                   ; Set to return transfer success
     52   0800 C2  DE  002B   180 30$:     MOVAL   UBA$L_MAP(R2),R2        ; Return addr of 1st map register
                        0030   181
                10      BA  0030   182          POPR    #^M<R4>                 ; Restore register
                05          0032   183          RSB                             ; Return
                        0033   185
                        0033   186
                        0033   214
                        0033   263
                        0033   297
                        0033   298          .DSABL  LSB
                        0033   299
                        0033   300          .END
```

```
C750_LIKE                       = 00000000
C780_LIKE                       = 00000001
CPU_TYPE                        = 00000001
CRB$L_INTD                      = 00000024
IOC$PURGDATAP                     00000000 RG    02
PR$_SID_TYP730                  = 00000003
PR$_SID_TYP750                  = 00000002
PR$_SID_TYP780                  = 00000001
PR$_SID_TYP790                  = 00000004
PR$_SID_TYPUV1                  = 00000007
UBA$L_DPR                       = 00000040
UBA$L_MAP                       = 00000800
UBA$V_DPR_BNE                   = 0000001F
UBA$V_DPR_XMTER                 = 0000001E
UCB$L_CRB                       = 00000024
VEC$B_DATAPATH                  = 00000013
VEC$L_ADP                       = 00000014
VEC$S_DATAPATH                  = 00000005
VEC$V_DATAPATH                  = 00000000
```

Psect synopsis

```
PSECT name                      Allocation          PSECT No.  Attributes
----------                      ----------          ---------  ----------
   ABS                          00000000  (     0.) 00 (  0.) NOPIC   USR   CON   ABS   LCL NOSHR NOEXE NORD  NOWRT NOVEC BYTE
$ABS$                           00000000  (     0.) 01 (  1.) NOPIC   USR   CON   ABS   LCL NOSHR   EXE   RD    WRT NOVEC BYTE
WIONONPAGED                     00000033  (    51.) 02 (  2.) NOPIC   USR   CON   REL   LCL NOSHR   EXE   RD    WRT NOVEC BYTE
```

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	25	00:00:00.04	00:00:00.24
Command processing	121	00:00:00.49	00:00:02.65
Pass 1	273	00:00:04.90	00:00:10.47
Symbol table sort	0	00:00:00.77	00:00:01.25
Pass 2	31	00:00:00.97	00:00:02.58
Symbol table output	3	00:00:00.03	00:00:00.03
Psect synopsis output	3	00:00:00.01	00:00:00.01
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	459	00:00:07.21	00:00:17.23

```
The working set limit was 1350 pages.
43453 bytes (85 pages) of virtual memory were used to buffer the intermediate code.
There were 40 pages of symbol table space allocated to hold 754 non-local and 2 local symbols.
304 source lines were read in Pass 1, producing 13 object records in Pass 2.
17 pages of virtual memory were used to define 16 macros.
```

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

Macro library name                       Macros defined
------------------                       --------------
_$255$DUA28:[SYS.OBJ]LIB.MLB;1                         9
_$255$DUA28:[SYSLIB]STARLET.MLB;2                      4
TOTALS (all libraries)                                13

845 GETS were required to define 13 macros.

There were no errors, warnings or information messages.

MACRO/LIS=LIS$:LIOSUB780/OBJ=OBJ$:LIOSUB780 MSRC$:CPUSW780/UPDATE=(ENH$:CPUSW780)+MSRC$:LIOSUB/UPDATE=(ENH$:LIOSUB)+EXECML$/LIB
```

LOADMREG

Table of contents

(1)	74	LOAD MASSBUS ADAPTER MAP REGISTERS
(1)	120	LOAD UNIBUS ADAPTER MAP REGISTERS
(1)	197	GET PFN FROM INVALID PTE
(1)	230	Load UBA map registers
(1)	276	LOAD UNIBUS ADAPTER MAP REGISTERS FOR UDA PORT

```
                        .TITLE  LOADMREG - LOAD MBA AND UBA MAP REGISTERS
                        .IDENT  'V03-002'
;RLRPDTADP
-1
                ;*****************************************************************************
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                ;*                                                                           *
                ;*****************************************************************************
                ;
                ; D. N. CUTLER 1-NOV-77
                ;
                ; LOAD MBA MAP REGISTERS
                ;
                ; MODIFIED BY:
                ;
;RLRPDTADP       .1 ;       V03-002 RLRPDTADP       Robert L. Rappaport     9-Apr-1984
;RLRPDTADP       .2 ;               Modify IOC$LUBAUDAMAP so as to pickup the pointer to the
;RLRPDTADP       .3 ;               ADP from PDT$L_ADP(R4).
;RLRPDTADP       .4 ;
;KDM0002         .5 ;       V03-001 KDM0002         Kathleen D. Morse       28-Jun-1982
;KDM0002         .6 ;               Add $VADEF.
-24             0000    58 ;
```

```
                        0000     60 ;
                        0000     61 ; MACRO LIBRARY CALLS
                        0000     62 ;
                        0000     63
                        0000     64          $ADPDEF                 ;DEFINE ADP OFFSETS
                        0000     65          $CDRPDEF                ;DEFINE CDRP OFFSETS
                        0000     66          $CRBDEF                 ;DEFINE CRB OFFSETS
                        0000     67          $MBADEF                 ;DEFINE MBA REGISTER OFFSET DEFINITIONS
;RLRPDTADP               0000     .1          $PDTDEF                 ;DEFINE PDT OFFSETS
;RLRPDTADP               0000     .2          $PTEDEF                 ;DEFINE PAGE TABLE ENTRY FIELDS
;RLRPDTADP               0000     .3          $UBADEF                 ;DEFINE UCB OFFSETS
;RLRPDTADP               0000     .4          $UBMDDEF                ;DEFINE UBMD OFFSETS
;RLRPDTADP               0000     .5          $UCBDEF                 ;DEFINE UCB OFFSETS
;KDM0002                 0000     .6          $VADEF                  ;DEFINE VIRTUAL ADDRESS FIELDS
-4                       0000     72          $VECDEF                 ;DEFINE CRB TRANSFER VECTOR OFFSETS
```

```
                                0000     74          .SBTTL  LOAD MASSBUS ADAPTER MAP REGISTERS
                                0000     75 ;+
                                0000     76 ; IOC$LOADMBAMAP - LOAD MASSBUS ADAPTER MAP REGISTERS
                                0000     77 ;
                                0000     78 ; THIS ROUTINE IS CALLED TO LOAD THE MASSBUS ADAPTER MAP REGISTERS, THE
                                0000     79 ; BYTE COUNT REGISTER, AND THE VIRTUAL ADDRESS REGISTER.
                                0000     80 ;
                                0000     81 ; INPUTS:
                                0000     82 ;
                                0000     83 ;       R4 = ADDRESS OF MBA CONFIGURATION STATUS REGISTER.
                                0000     84 ;       R5 = UCB ADDRESS OF UNIT TRANSFER IS TO OCCUR ON.
                                0000     85 ;
                                0000     86 ; OUTPUTS:
                                0000     87 ;
                                0000     88 ;       THE TRANSFER BYTE COUNT, STARTING PAGE OFFSET, AND ADDRESS OF THE
                                0000     89 ;       PAGE TABLE ENTIRES THAT DESCRIBE THE TRANSFER ARE RETRIEVED FROM
                                0000     90 ;       THE SPECIFED UCB AND USED TO LOAD THE MBA BYTE COUNT, VIRTUAL ADDRESS,
                                0000     91 ;       AND MAP REGISTERS. ONE ADDITIONAL MAP REGISTER IS LOADED AS INVALID
                                0000     92 ;       TO STOP THE TRANSFER IF A HARDWARE FAILURE SHOULD OCCUR.
                                0000     93 ;
                                0000     94 ;       R3 IS PRESERVED ACROSS CALL.
                                0000     95 ;-
                                0000     96
                            00000000     97          .PSECT  WIONONPAGED
                                0000     98 IOC$LOADMBAMAP::                             ;LOAD MASSBUS ADAPTER MAP REGISTERS
                     53         DD  0000     99          PUSHL   R3                      ;SAVE REGISTERS
          52    7E A5         3C  0002    100          MOVZWL  UCB$W_BCNT(R5),R2       ;GET TRANSFER BYTE COUNT
          10 A4    52         CE  0006    101          MNEGL   R2,MBA$L_BCR(R4)        ;LOAD BYTE COUNT REGISTER
          51    7C A5         3C  000A    102          MOVZWL  UCB$W_BOFF(R5),R1       ;GET BYTE OFFSET IN PAGE
          0C A4    51         D0  000E    103          MOVL    R1,MBA$L_VAR(R4)        ;LOAD STARTING VIRTUAL ADDRESS
          0C A4    51         D0  0012    104          MOVL    R1,MBA$L_VAR(R4)        ;*****TEMP UNTIL MBA ECO ******
    52    01FF C241         9E  0016    105          MOVAB   ^X1FF(R2)[R1],R2        ;CALCULATE HIGHEST RELATIVE BYTE AND ROUND
          52    F7 8F       78  001C    106          ASHL    #-9,R2,R2               ;CALCULATE NUMBER OF MAP REGISTERS TO LOAD
                52            0020
       51    0800 C4         DE  0021    107          MOVAL   MBA$L_MAP(R4),R1        ;GET ADDRESS OF MBA MAP REGISTERS
          50    78 A5         D0  0026    108          MOVL    UCB$L_SVAPTE(R5),R0     ;GET ADDRESS OF PAGE TABLE
             81    80         D0  002A    109 10$:     MOVL    (R0)+,(R1)+             ;LOAD MAP REGISTER
                   09         18  002D    110          BGEQ    30$                     ;IF GEQ PTE INVALID
                F8 52         F5  002F    111 20$:     SOBGTR  R2,10$                  ;ANY MORE TO LOAD?
                   61         D4  0032    112          CLRL    (R1)                    ;LOAD INVALID MAP ENTRY
             53    8E         D0  0034    113          MOVL    (SP)+,R3                ;RESTORE REGISTER
                   05         00  0037    114          RSB                             ;
          53    FC A0         D0  0038    115 30$:     MOVL    -4(R0),R3               ;GET THE PTE (NOT FROM MAP REGISTER!)
                0095            30  003C    116          BSBW    IOC$PTETOPFN            ;GET PFN FROM INVALID PTE
       80000000 8F         C9  003F    117          BISL3   #^X80000000,R3,-4(R1)   ;AND LOAD THE MAP REGISTER
          FC A1    53            0045
                   E5   11  0048    118          BRB     20$
```

```
                                004A   120          .SBTTL  LOAD UNIBUS ADAPTER MAP REGISTERS
                                004A   121 ;+
                                004A   122 ; IOC$LOADUBAMAP  - LOAD UNIBUS ADAPTER MAP REGISTERS
                                004A   123 ; IOC$LOADUBAMAPA - LOAD UNIBUS ADAPTER MAP REGISTERS ALTERNATE ENTRY FOR
                                004A   124 ;        BYTE ALIGNED UNIBUS DMA DEVICES WHICH NEVER WISH TO SET THE BYTE
                                004A   125 ;        OFFSET BIT IN MAP REGISTERS.  IN ALL OTHER RESPECTS THESE TWO
                                004A   126 ;        ENTRYPOINTS PRODUCE IDENTICAL RESULTS.
                                004A   127 ;
                                004A   128 ; THIS ROUTINE IS CALLED TO LOAD THE UNIBUS ADAPTER MAP REGISTERS.
                                004A   129 ;
                                004A   130 ; INPUTS:
                                004A   131 ;
                                004A   132 ;        R5 = UCB ADDRESS OF UNIT TRANSFER IS TO OCCUR ON.
                                004A   133 ;
                                004A   134 ;        IT IS ASSUMED THAT THE DATAPATH AND MAP REGISTERS HAVE BEEN PREVIOUSLY
                                004A   135 ;        ASSIGNED.
                                004A   136 ;
                                004A   137 ; OUTPUTS:
                                004A   138 ;
                                004A   139 ;        EACH MAP REGISTER IS LOADED WITH THE APPROPRIATE PAGE FRAME NUMBER
                                004A   140 ;        MERGED WITH THE DATAPATH DESIGNATOR AND BYTE OFFSET BIT. ONE ADDITIONAL
                                004A   141 ;        MAP REGISTER IS LOADED AS INVALID TO STOP THE TRANSFER IF A HARDWARE
                                004A   142 ;        FAILURE SHOULD OCCUR.
                                004A   143 ;
                                004A   144 ;        R3 IS PRESERVED ACROSS CALL.
                                004A   145 ;-
                                004A   146
                                004A   147          .ENABL  LSB
                                004A   148 IOC$LOADUBAMAPA::                 ;LOAD UNIBUS ADAPTER MAP REGISTERS - ALTERNATE
                                004A   149                                  ; HERE WE DUPLICATE THE CODE IN THE OTHER ENTRY
                                004A   150                                  ;  EXCEPT THAT WE DO NOT CHECK WHETHER THE BYTE
                                004A   151                                  ;  OFFSET IS ODD.  INSTEAD WE BRANCH DIRECTLY
                                004A   152                                  ;   PAST THE SETTING OF THE BYTE OFFSET BIT.
        7E    53    7D    004A   153          MOVQ    R3,-(SP)                ;SAVE REGISTERS
      51    7C A5    3C    004D   154          MOVZWL  UCB$W_BOFF(R5),R1       ;GET BYTE OFFSET IN PAGE
      52    7E A5    3C    0051   155          MOVZWL  UCB$W_BCNT(R5),R2       ;GET TRANSFER BYTE COUNT
      53    24 A5    D0    0055   156          MOVL    UCB$L_CRB(R5),R3        ;GET ADDRESS OF CRB
              00     EF    0059   157          EXTZV   #VEC$V_DATAPATH,-       ;GET DATAPATH
              05           005B   158                  #VEC$S_DATAPATH,-       ; NUMBER
      54    37 A3          005C   159                  CRB$L_INTD+VEC$B_DATAPATH(R3),R4
              1B    11     005F   160          BRB     10$                     ; BRANCH AROUND TO JOIN COMMON CODE
                           0061   161 IOC$LOADUBAMAP::                        ;LOAD UNIBUS ADAPTER MAP REGISTERS
        7E    53    7D    0061   162          MOVQ    R3,-(SP)                ;SAVE REGISTERS
      51    7C A5    3C    0064   163          MOVZWL  UCB$W_BOFF(R5),R1       ;GET BYTE OFFSET IN PAGE
      52    7E A5    3C    0068   164          MOVZWL  UCB$W_BCNT(R5),R2       ;GET TRANSFER BYTE COUNT
      53    24 A5    D0    006C   165          MOVL    UCB$L_CRB(R5),R3        ;GET ADDRESS OF CRB
              00     EF    0070   166          EXTZV   #VEC$V_DATAPATH,-       ;GET DATAPATH
              05           0072   167                  #VEC$S_DATAPATH,-       ; NUMBER
      54    37 A3          0073   168                  CRB$L_INTD+VEC$B_DATAPATH(R3),R4
           03 51    E9    0076   169          BLBC    R1,10$                  ;IF LBC WORD ALIGNED TRANSFER
         54    10    88    0079   170          BISB    #^X10,R4                ;SET BYTE OFFSET BIT
  54    0400 8F    A8    007C   171 10$:      BISW    #^X400,R4               ;MERGE VALID WITH BYTE OFFSET AND DATAPATH
              05    E1    0081   172          BBC     #VEC$V_LWAE,-           ;BRANCH IF LONGWORD ACCESS NOT ENABLED
        03 37 A3          0083   173                  CRB$L_INTD+VEC$B_DATAPATH(R3),15$
         54    20    88    0086   174          BISB    #^X20,R4                ;ELSE SET LWAE FOR MAP REG
52    01FF C241    9E    0089   175 15$:      MOVAB   ^X1FF(R2)[R1],R2        ;CALCULATE HIGHEST RELATIVE BYTE AND ROUND
    52    F7 8F    78    008F   176          ASHL    #-9,R2,R2               ;CALCULATE NUMBER OF MAP REGISTERS TO LOAD
```

```
                52        0093
        36 A3   52    91  0094   177          CMPB    R2,CRB$L_INTD+VEC$B_NUMREG(R3) ;ENOUGH MAP REGISTERS ASSIGNED?
                2C    1E  0098   178          BGEQU   40$                            ;IF GEQU NO
        51   38 B3    D0  009A   179          MOVL    @CRB$L_INTD+VEC$L_ADP(R3),R1 ;GET ADDRESS OF CONFIGURATION REGISTER
                00    EF  009E   180          EXTZV   #VEC$V_MAPREG,-                ;GET STARTING REGISTER
                0F        00A0   181                  #VEC$S_MAPREG,-
        50   34 A3        00A1   182                  CRB$L_INTD+VEC$W_MAPREG(R3),R0
51    0800 C140    DE  00A4   183          MOVAL   UBA$L_MAP(R1)[R0],R1           ;GET ADDRESS OF FIRST MAP REGISTER TO LOAD
        50   78 A5    D0  00AA   184          MOVL    UCB$L_SVAPTE(R5),R0            ;GET ADDRESS OF PAGE TABLE
           53   80    D0  00AE   185 20$:     MOVL    (R0)+,R3                       ;GET NEXT PAGE TABLE ENTRY
                02    19  00B1   186          BLSS    30$                            ;IF LSS VALID PAGE TABLE ENTRY
                1F    10  00B3   187          BSBB    IOC$PTETOPFN                   ;GET PFN FROM INVALID PTE
  0B    15    54    F0  00B5   188 30$:     INSV    R4,#21,#11,R3                  ;INSERT VALID, BYTE OFFSET, AND DATAPATH
                53        00B9
           81   53    D0  00BA   189          MOVL    R3,(R1)+                       ;LOAD UBA MAP REGISTER
              EE 52    F5  00BD   190          SOBGTR  R2,20$                         ;ANY MORE TO LOAD?
                61    D4  00C0   191          CLRL    (R1)                           ;LOAD INVALID MAP ENTRY
           53   8E    7D  00C2   192          MOVQ    (SP)+,R3                       ;RESTORE REGISTERS
                      05  00C5   193          RSB                                    ;
                          00C6   194 40$:     BUG_CHECK UBMAPEXCED,FATAL             ;UNIBUS MAP REGISTER ALLOCATION EXCEEDED
                          00CA   195          .DSABL  LSB
```

```
                        00CA    197          .SBTTL  GET PFN FROM INVALID PTE
                        00CA    198 ;+
                        00CA    199 ; IOC$PTETOPFN - GET PFN FROM INVALID PTE
                        00CA    200 ;
                        00CA    201 ; THIS ROUTINE IS CALLED TO RETURN THE PAGE FRAME NUMBER FROM A
                        00CA    202 ; PAGE TABLE ENTRY WHICH HAS ALREADY BEEN DETERMINED TO BE NOT VALID.
                        00CA    203 ;
                        00CA    204 ; INPUTS:
                        00CA    205 ;
                        00CA    206 ;        R3 = PAGE TABLE ENTRY
                        00CA    207 ;
                        00CA    208 ; OUTPUTS:
                        00CA    209 ;
                        00CA    210 ;        R3 = PAGE FRAME NUMBER AND MAY INCLUDE THE FOLLOWING FIELDS
                        00CA    211 ;                VALID BIT, MODIFY BIT, PROTECTION FIELD, OWNER FIELD
                        00CA    212 ;
                        00CA    213 ;        ALL OTHER REGISTERS PRESERVED
                        00CA    214 ;-
                        00CA    215
                        00CA    216          .ENABL  LSB
                        00CA    217 GLOBAL:
00000000'FF43   DO      00CA    218          MOVL    @MMG$GL_GPTBASE[R3],R3  ;GLOBAL PAGE TABLE ENTRY
          53            00D1
          0F    19      00D2    219          BLSS    10$                     ;BRANCH IF VALID
                        00D4    220 IOC$PTETOPFN::
  FB800000 8F   CA      00D4    221          BICL    #^C<PTE$M_TYP1 ! PTE$M_TYP0 !- ;PTE TYPE BITS
          53            00DA
                        00DB    222                  PTE$M_GPTX>,R3          ;AND GPTX/PFN
    05 53   1A    E0    00DB    223          BBS     #PTE$V_TYP1,R3,20$      ;BRANCH IF BAD PTE FOR I/O
    E7 53   16    E4    00DF    224          BBSC    #PTE$V_TYP0,R3,GLOBAL   ;BRANCH IF GLOBAL PAGE
                  05    00E3    225 10$:     RSB
                        00E4    226 20$:     BUG_CHECK INVPTEFMT,FATAL       ;INVALID PAGE TABLE ENTRY FORMAT
                        00E8    227          .DSABL  LSB
                        00E8    228
```

```
                                00E8   230          .SBTTL  Load UBA map registers
                                00E8   231 ;++
                                00E8   232 ; IOC$LOADUBAMAPN - Load UBA map registers
                                00E8   233 ;
                                00E8   234 ;  Functional description:
                                00E8   235 ;
                                00E8   236 ;       This routine is called to load the UNIBUS adapter map registers.
                                00E8   237 ;       It differs from IOC$LOADUBAMAPN in that it does not obtain its
                                00E8   238 ;       variant inputs from the UCB and CRB (which are normally synchronized
                                00E8   239 ;       at fork IPL).  Also, the byte offset and longword aligned
                                00E8   240 ;       capabilities are not supported.
                                00E8   241 ;
                                00E8   242 ; Inputs:
                                00E8   243 ;
                                00E8   244 ;       R1 = buffer address
                                00E8   245 ;       R2 = number of map registers allocated
                                00E8   246 ;            (last one should be extra one for wild transfer stopper)
                                00E8   247 ;       R3 = starting map register allocated
                                00E8   248 ;       R4 = datapath number
                                00E8   249 ;       R5 = UCB address
                                00E8   250 ;
                                00E8   251 ; Outputs:
                                00E8   252 ;
                                00E8   253 ;       R0-R4 destroyed.  R5 preserved.
                                00E8   254 ;--
                                00E8   255 IOC$LOADUBAMAPN::                            ;
                      54    DD  00E8   256          PUSHL   R4                        ; Save datapath number
              51   15    09    EF  00EA   257          EXTZV   S^#VA$V_VPN,S^#VA$S_VPN,R1,R1 ; Get buffer virtual page number
                            51      00EE
           00000000'GF      D0  00EF   258          MOVL    G^MMG$GL_SPTBASE,R4       ; Get system page table addres
                            54      00F5
              50    6441    DE  00F6   259          MOVAL   (R4)[R1],R0               ; Get first PTE address
              54    24 A5   D0  00FA   260          MOVL    UCB$L_CRB(R5),R4          ; Get CRB address
              54    38 B4   D0  00FE   261          MOVL    @CRB$L_INTD+VEC$L_ADP(R4),R4 ; Get first UBA register address
        51    0800 C443     DE  0102   262          MOVAL   UBA$L_MAP(R4)[R3],R1      ; Get address of first map register
           00000400 8F      C9  0108   263          BISL3   #1@<UBA$V_MAP_VALID-UBA$V_MAP_DPD>,- ; Get datapath number
              54    8E          010E   264                  (SP)+,R4                  ; and set map register valid bit
                    52    D7  0110   265          DECL    R2                        ; Subtract last register from count
              53    80    D0  0112   266 20$:     MOVL    (R0)+,R3                  ; Get next page table entry
                    02    19  0115   267          BLSS    30$                       ; Br if valid page
                    BB    10  0117   268          BSBB    IOC$PTETOPFN              ; Get PFN from invalid (global) page
              15    54    F0  0119   269 30$:     INSV    R4,#UBA$V_MAP_DPD,-       ; Insert datapath and valid bit,
              53    0B          011C   270                  #32-UBA$V_MAP_DPD,R3      ; clearing other PTE flags
              81    53    D0  011E   271          MOVL    R3,(R1)+                  ; Load the map register
                EE  52    F5  0121   272          SOBGTR  R2,20$                    ; Loop through all registers
                    61    D4  0124   273          CLRL    (R1)                      ; Invalidate last one to stop wild xfer
                          05  0126   274          RSB                               ;
```

```
                                0127   276          .SBTTL  LOAD UNIBUS ADAPTER MAP REGISTERS FOR UDA PORT
                                0127   277 ;+
                                0127   278 ; IOC$LUBAUDAMAP - LOAD UNIBUS ADAPTER MAP REGISTERS FOR UDA PORT
                                0127   279 ;
                                0127   280 ; INPUTS:
                                0127   281 ;
;RLRPDTADP                       0127    .1 ;       R4 => PDT.
                                0127   282 ;       R5 => CDRP OF I/O REQUEST.
                                0127   283 ;
                                0127   284 ;       IT IS ASSUMED THAT THE DATAPATH AND MAP REGISTERS HAVE BEEN PREVIOUSLY
                                0127   285 ;       ASSIGNED.
                                0127   286 ;
                                0127   287 ; OUTPUTS:
                                0127   288 ;
                                0127   289 ;       EACH MAP REGISTER IS LOADED WITH THE APPROPRIATE PAGE FRAME NUMBER
                                0127   290 ;       MERGED WITH THE DATAPATH DESIGNATOR AND BYTE OFFSET BIT. ONE ADDITIONAL
                                0127   291 ;       MAP REGISTER IS LOADED AS INVALID TO STOP THE TRANSFER IF A HARDWARE
                                0127   292 ;       FAILURE SHOULD OCCUR.
                                0127   293 ;
                                0127   294 ;       R3 IS PRESERVED ACROSS CALL.
                                0127   295 ;-
                                0127   296
                                0127   297 IOC$LUBAUDAMAP::                ;LOAD UNIBUS ADAPTER MAP REGISTERS
                                0127   298
                      7E   53   7D  0127   299          MOVQ    R3,-(SP)                ;SAVE REGISTERS
;RLRPDTADP                       012A    .1
;RLRPDTADP                       012A    .2          ASSUME  ADP$L_CSR       EQ      0
;RLRPDTADP                 00E0  D4  012A    .3          PUSHL   @PDT$L_ADP(R4)          ; Push UBA CSR address on stack.
;RLRPDTADP                       012E    .4
                  51    D0  A5   3C  012E   300          MOVZWL  CDRP$W_BOFF(R5),R1      ; R1=BYTE OFFSET IN PAGE
                  52    D2  A5   3C  0132   301          MOVZWL  CDRP$W_BCNT(R5),R2      ; R2=TRANSFER BYTE COUNT
                  50    3C  A5   9E  0136   302          MOVAB   CDRP$L_UBARSRCE(R5),R0  ; R0 => MAPPING RESOURCE DESCRIPTOR
                              00   EF  013A   303          EXTZV   #VEC$V_DATAPATH,-       ; GET DATAPATH
                              05       013C   304                  #VEC$S_DATAPATH,-       ; NUMBER
                  54    03  A0       013D   305                  UBMD$B_DATAPATH(R0),R4
                                       0140   306
                        03  51   E9   0140   307          BLBC    R1,10$                  ;IF LBC WORD ALIGNED TRANSFER
                      54    10   88   0143   308          BISB    #^X10,R4                ;SET BYTE OFFSET BIT
                54    0400  8F   A8   0146   309 10$:     BISW    #^X400,R4               ;MERGE VALID WITH BYTE OFFSET AND DATAPATH
              52    01FF  C241   9E   014B   310          MOVAB   ^X1FF(R2)[R1],R2        ;CALCULATE HIGHEST RELATIVE BYTE AND ROUND
                  52    F7  8F   78  0151   311          ASHL    #-9,R2,R2               ;CALCULATE NUMBER OF MAP REGISTERS TO LOAD
                              52       0155
                                       0156   312
;RLRPDTADP                         51  8ED0  0156    .1          POPL    R1                      ; R1 => UBA CSR.
;RLRPDTADP                 02  A0   52   91   0159    .2          CMPB    R2,UBMD$B_NUMREG(R0)    ;ENOUGH MAP REGISTERS ASSIGNED?
;RLRPDTADP                         28   1E   015D    .3          BGEQU   40$                     ;IF GEQU NO
;RLRPDTADP                                   015F    .4
;RLRPDTADP                         00   EF   015F    .5          EXTZV   #VEC$V_MAPREG,-         ; GET STARTING REGISTER
-9                                0F         0161   322                  #VEC$S_MAPREG,-
                      50   60         0162   323                  UBMD$W_MAPREG(R0),R0
                                       0164   324
              51    0800  C140   DE   0164   325          MOVAL   UBA$L_MAP(R1)[R0],R1    ;GET ADDRESS OF FIRST MAP REGISTER TO LOAD
                  50    CC  A5   D0  016A   326          MOVL    CDRP$L_SVAPTE(R5),R0    ;GET ADDRESS OF PAGE TABLE
                      53    80   D0  016E   327 20$:     MOVL    (R0)+,R3                ;GET NEXT PAGE TABLE ENTRY
                              03   19  0171   328          BLSS    30$                     ;IF LSS VALID PAGE TABLE ENTRY
                          FF5E     30  0173   329          BSBW    IOC$PTETOPFN            ;GET PFN FROM INVALID PTE
            0B    15    54   F0   0176   330 30$:     INSV    R4,#21,#11,R3           ;INSERT VALID, BYTE OFFSET, AND DATAPATH
```

```
                53          017A
81              53    DO    017B    331          MOVL    R3,(R1)+                ;LOAD UBA MAP REGISTER
                ED 52 F5    017E    332          SOBGTR  R2,20$                  ;ANY MORE TO LOAD?
                   61 D4    0181    333          CLRL    (R1)                    ;LOAD INVALID MAP ENTRY
53              8E    7D    0183    334          MOVQ    (SP)+,R3                ;RESTORE REGISTERS
                      05    0186    335          RSB                             ;
                            0187    336 40$:     BUG_CHECK UBMAPEXCED,FATAL      ;UNIBUS MAP REGISTER ALLOCATION EXCEEDED
                            018B    337          .END
```

```
ADP$L_CSR                       = 00000000
BUG$_INVPTEFMT                    ********    X   02
BUG$_UBMAPEXCED                   ********    X   02
CDRP$L_SVAPTE                   = FFFFFFCC
CDRP$L_UBARSRCE                 = 0000003C
CDRP$W_BCNT                     = FFFFFFD2
CDRP$W_BOFF                     = FFFFFFD0
CRB$L_INTD                      = 00000024
GLOBAL                            000000CA R      02
IOC$LOADMBAMAP                    00000000 RG     02
IOC$LOADUBAMAP                    00000061 RG     02
IOC$LOADUBAMAPA                   0000004A RG     02
IOC$LOADUBAMAPN                   000000E8 RG     02
IOC$LUBAUDAMAP                    00000127 RG     02
IOC$PTETOPFN                      000000D4 RG     02
MBA$L_BCR                       = 00000010
MBA$L_MAP                       = 00000800
MBA$L_VAR                       = 0000000C
MMG$GL_GPTBASE                    ********    X   02
MMG$GL_SPTBASE                    ********    X   02
PDT$L_ADP                       = 000000E0
PTE$M_GPTX                      = 003FFFFF
PTE$M_TYP0                      = 00400000
PTE$M_TYP1                      = 04000000
PTE$V_TYP0                      = 00000016
PTE$V_TYP1                      = 0000001A
UBA$L_MAP                       = 00000800
UBA$V_MAP_DPD                   = 00000015
UBA$V_MAP_VALID                 = 0000001F
UBMD$B_DATAPATH                 = 00000003
UBMD$B_NUMREG                   = 00000002
UBMD$W_MAPREG                   = 00000000
UCB$L_CRB                       = 00000024
UCB$L_SVAPTE                    = 00000078
UCB$W_BCNT                      = 0000007E
UCB$W_BOFF                      = 0000007C
VA$S_VPN                        = 00000015
VA$V_VPN                        = 00000009
VEC$B_DATAPATH                  = 00000013
VEC$B_NUMREG                    = 00000012
VEC$L_ADP                       = 00000014
VEC$S_DATAPATH                  = 00000005
VEC$S_MAPREG                    = 0000000F
VEC$V_DATAPATH                  = 00000000
VEC$V_LWAE                      = 00000005
VEC$V_MAPREG                    = 00000000
VEC$W_MAPREG                    = 00000010
```

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

PSECT name	Allocation	PSECT No.	Attributes
ABS	00000000 (0.)	00 (0.)	NOPIC USR CON ABS LCL NOSHR NOEXE NORD NOWRT NOVEC BYTE
ABS	00000000 (0.)	01 (1.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE
WIONONPAGED	0000018B (395.)	02 (2.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC BYTE

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	9	00:00:00.08	00:00:00.77
Command processing	75	00:00:00.61	00:00:06.93
Pass 1	285	00:00:09.21	00:00:38.62
Symbol table sort	0	00:00:01.35	00:00:06.01
Pass 2	67	00:00:01.95	00:00:07.61
Symbol table output	5	00:00:00.06	00:00:00.06
Psect synopsis output	2	00:00:00.02	00:00:00.02
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	446	00:00:13.29	00:01:00.03

The working set limit was 1050 pages.
48842 bytes (96 pages) of virtual memory were used to buffer the intermediate code.
There were 50 pages of symbol table space allocated to hold 892 non-local and 16 local symbols.
322 source lines were read in Pass 1, producing 14 object records in Pass 2.
20 pages of virtual memory were used to define 19 macros.

Macro library statistics

Macro library name	Macros defined
_255DUA28:[SYS.OBJ]LIB.MLB;1	12
_255DUA28:[SYSLIB]STARLET.MLB;2	4
TOTALS (all libraries)	16

991 GETS were required to define 16 macros.

There were no errors, warnings or information messages.

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

IOCIOPOST

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(6)	734	QUEUE NEXT SEGMENT
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(9)	1036.1	ERASE I/O HELPER ROUTINES
(10)	1037	MOVE DATA TO USER BUFFER
(11)	1054	UNLOCK AREAS IN IRPE'S

```
                        .TITLE  IOCIOPOST - I/O COMPLETION POSTING
;ACG0422                .IDENT  'V03-024'
-1
                        ;
                        ;*****************************************************************************
                        ;*                                                                           *
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                        ;*                                                                           *
                        ;*                                                                           *
                        ;*****************************************************************************
                        ;
                        ;++
                        ; FACILITY: EXECUTIVE, I/O SYSTEM
                        ;
                        ; ABSTRACT:
                        ;       IOCIOPOST IMPLEMENTS THE DEVICE INDEPENDENT COMPLETION PROCESSING FOR
                        ;       I/O PACKETS.  IT IS INVOKED BY QUEUEING THE PACKET ON THE I/O POST QUEUE
                        ;       AND TRIGGERING THE IPL$_IOPOST SOFTWARE INTERRUPT.  SOME OF THE IOPOST
                        ;       OPERATIONS SUCH AS SETTING EVENT FLAGS, UNLOCKING BUFFER PAGES,
                        ;       RELEASING BUFFERS AND PAGING I/O COMPLETION ARE PERFORMED IN THE IOPOST
                        ;       INTERRUPT SERVICE ROUTINE, WHILE OTHER OPERATIONS THAT REQUIRE ACCESS
                        ;       TO PROCESS ADDRESS SPACE ARE PERFORMED BY SENDING A SPECIAL KERNEL AST.
                        ;
                        ; ENVIRONMENT:  MODE = KERNEL, RESIDENT
                        ;
                        ;--
                        .SBTTL  HISTORY                 ; DETAILED
                        ;
                        ; AUTHOR: R. HUSTVEDT, CREATION DATE: 26-AUG-76
                        ;
                        ; MODIFIED BY:
                        ;
;ACG0422                ;       V03-024 ACG0422         Andrew C. Goldstein,    1-May-1984  19:35
;ACG0422                ;               Fix use of R0 in ACG0421
;ACG0422                ;
;ACG0421                ;       V03-023 ACG0421         Andrew C. Goldstein,    20-Apr-1984  14:19
;ACG0421                ;               Fix segment byte count limiting in erase QIO's
;ACG0421                ;
;EMD0076                ;       V03-022 EMD0076         Ellen M. Dusseault      05-Apr-1984
;EMD0076                ;               Modify IOPOST to check for a valid status bit for
;EMD0076                ;               encryption.  If valid, deallocate nonpaged pool buffer
```

```
;EMD0076                0000    .10 ;                   which contains the encryption key.
;EMD0076                0000    .11 ;
;SSA0021                0000    .12 ;           V03-021 SSA0021         Stan Amway              22-Mar-1984
;SSA0021                0000    .13 ;                   Decrement device queue length in UCB.
;SSA0021                0000    .14 ;
;WMC0020                0000    .15 ;           V03-020 WMC0020         Wayne Cardoza           07-Mar-1984
;WMC0020                0000    .16 ;                   Move POSTEF to fork context to regain optimization which
;WMC0020                0000    .17 ;                   avoids reexecution of WAITFR.
;WMC0020                0000    .18 ;
;WMC0019                0000    .19 ;           V03-019 WMC0019         Wayne Cardoza           28-Dec-1983
;WMC0019                0000    .20 ;                   Erase QIOs can be physical, logical, or virtual.
;WMC0019                0000    .21 ;
;CDS0003                0000    .22 ;           V03-018 CDS0003         Christian D. Saether    14-Dec-1983
;CDS0003                0000    .23 ;                   Add IOC$BUFPOST entry point.  This is used to perform
;CDS0003                0000    .24 ;                   the iopost level part of i/o posting to be executed as
;CDS0003                0000    .25 ;                   a subroutine call directly and avoid the iopost software
;CDS0003                0000    .26 ;                   interrupt entirely.  The F11BXQP is the initial user
;CDS0003                0000    .27 ;                   of this feature.
;CDS0003                0000    .28 ;
;ROW49597C              0000    .29 ;           V03-017 ROW49597C       Ralph O. Weber          21-SEP-1983
;ROW49597C              0000    .30 ;                   Change PAGEIO_OR_SWAPIO patch (from ROW49597B and ROW49597) to
;ROW49597C              0000    .31 ;                   zero bytes transfered count in the IOSB when status is not
;ROW49597C              0000    .32 ;                   successful and bytes transfered is greater than or equal to
;ROW49597C              0000    .33 ;                   bytes requested.
;ROW49597C              0000    .34 ;
;ROW0218                0000    .35 ;           V03-016 ROW0218         Ralph O. Weber           7-SEP-1983
;ROW0218                0000    .36 ;                   Change maximum byte count, UCB$L_MAXBCNT, tests to be
;ROW0218                0000    .37 ;                   unsigned.
;ROW0218                0000    .38 ;
;ADE9005                0000    .39 ;           V03-015 ADE9005         Alan D. Eldridge        30-May-1983
;ADE9005                0000    .40 ;                   Changed BSBW to JSB for calls to IOC$MAPVBLK and IOC$CVTLOGPHY.
;ADE9005                0000    .41 ;
;STJ3100                0000    .42 ;           V03-014 STJ3100         Steven T. Jeffreys,     03-May-1983
;STJ3100                0000    .43 ;                   -Added local subroutine CHECK_ERASE.
;STJ3100                0000    .44 ;                   -Do not update IRP$L_SVAPTE for ALL erase I/O's.  This
;STJ3100                0000    .45 ;                    is an extention of STJ3085.
;STJ3100                0000    .46 ;
;STJ3085                0000    .47 ;           V03-013 STJ3085         Steven T. Jeffreys,     13-Apr-1983
;STJ3085                0000    .48 ;                   -Do not update IRP$L_SVAPTE for erase I/O segmented
;STJ3085                0000    .49 ;                    requests if using the specail erase PPT.
;STJ3085                0000    .50 ;                   -After segmentation complete, resore original SVAPTE
;STJ3085                0000    .51 ;                    address to IRP$L_SVAPTE.
;STJ3085                0000    .52 ;
;ROW49597B              0000    .53 ;           V03-012 ROW49597B       Ralph O. Weber           9-APR-1983
;ROW49597B              0000    .54 ;                   Change PAGEIO_OR_SWAPIO from ROW49597 to zero bytes
;ROW49597B              0000    .55 ;                   transfered count when status is not successful and bytes
;ROW49597B              0000    .56 ;                   transfered is greater than or equal to bytes requested.
;ROW49597B              0000    .57 ;
;RLRMXBCNTC             0000    .58 ;           V03-011 RLRMXBCNTc      Robert L. Rappaport     28-Mar-1983
;RLRMXBCNTC             0000    .59 ;                   Verify IRP$L_DIAGBUF is non-zero before assuming that it
;RLRMXBCNTC             0000    .60 ;                   contains the original value of IRP$L_SVAPTE in VIRTUAL_LOGIO.
;RLRMXBCNTC             0000    .61 ;
;RLRMXBCNTC             0000    .62 ;           V03-010 RLRMXBCNTb      Robert L. Rappaport     22-Mar-1983
;RLRMXBCNTC             0000    .63 ;                   Check for file oriented device before going to VIRTUAL_LOGIO.
;RLRMXBCNTC             0000    .64 ;
;RLRMXBCNTA             0000    .65 ;           V03-009 RLRMXBCNTa      Robert L. Rappaport     22-Mar-1983
;RLRMXBCNTA             0000    .66 ;                   CLRL the byte count in the I/O status before queueing
```

```
;RLRMXBCNTA
;RLRMXBCNTA
;RLRMXBCNT
;RLRMXBCNT
;RLRMXBCNT
;RLRMXBCNT
;ROW49597
;ROW49597
;ROW49597
;ROW49597
;ROW49597
;ROW49597
;ROW49597
;ROW49597
;ROW49597
;ROW49597
;STJ3049
;STJ3049
;STJ3049
;CDS0002
;CDS0002
;CDS0002
;CDS0002
;CDS0001
;CDS0001
;CDS0001
;KDM0002
;KDM0002
;KDM0002
;LJK45299
;LJK45299
;LJK45299
-27
```

```
0000    .67 ;
0000    .68 ;
0000    .69 ;
0000    .70 ;
0000    .71 ;
0000    .72 ;
0000    .73 ;
0000    .74 ;
0000    .75 ;
0000    .76 ;
0000    .77 ;
0000    .78 ;
0000    .79 ;
0000    .80 ;
0000    .81 ;
0000    .82 ;
0000    .83 ;
0000    .84 ;
0000    .85 ;
0000    .86 ;
0000    .87 ;
0000    .88 ;
0000    .89 ;
0000    .90 ;
0000    .91 ;
0000    .92 ;
0000    .93 ;
0000    .94 ;
0000    .95 ;
0000    .96 ;
0000    .97 ;
0000    .98 ;
0000    .99 ;
0000     76 ;
0000     77 ;**
```

```
        an IRP back to the ACP in VIRTUAL_LOGIO.

V03-008 RLRMXBCNT       Robert L. Rappaport     11-Mar-1983
        Allow for segmentation of Logical I/O (and Virtual)
        based on the UCB$L_MAXBCNT field.

V03-007 ROW49597        Ralph O. Weber          26-JAN-1983
        Change both VIRTUAL and PAGEIO_OR_SWAPIO to guarantee an error
        status in IRP$L_IOST1 whenever the bytes transfered is less
        than the bytes requested.  For V3.x, the error will be
        SS$_CTRLERR.  After that, it will be SS$_INCSEGTRA.  The check
        and error status are required to detect and gracefully
        revcover from the instance where a driver returns success
        status but bytes transfered is less than bytes requested.
        The segmented transfer logic goes berserk when this happens
        and eventually crashes the system.

V03-006 STJ3049         Steven T. Jeffreys      06-Jan-1983
        Add support for the erase qio.

V03-005 CDS0002         C Saether               12-Oct-1982
        Fix bug where R5 was not preserved when queuing
        packet to xqp.

V03-004 CDS0001         C Saether               18-Jul-1982
        Changes to accomodate XQP mechanism.

V03-003 KDM0002         Kathleen D. Morse       28-Jun-1982
        Added $DEVDEF and $SSDEF.

V03-002 LJK45299        Lawrence J. Kenah       2-Jun-1982
        Fix deaccess-pending-on-spooled-device logic.
```

```
                        .SBTTL  DECLARATIONS
                ;
                ; INCLUDE FILES:
                ;
                        $ACBDEF                 ; AST CONTROL BLOCK DEFINITIONS
                        $AQBDEF                 ; DEFINE AQB OFFSETS
                        $CADEF                  ; CONDITIONAL ASSEMBLY PARAMETERS
                        $CCBDEF                 ; CCB DEFINITIONS
                        $CXBDEF                 ; DEFINE CXB OFFSETS
;STJ3049                .1                      $DCDEF                  ; DEVICE TYPE CODES
;KDM0002                .2                      $DEVDEF                 ; DEVICE TYPE DEFINITIONS
;STJ3049                .3                      $IODEF                  ; I/O REQUEST CODES
                        $IPLDEF                 ; IPL DEFINITIONS
                        $IRPDEF                 ; IRP DEFINITIONS
                        $IRPEDEF                ; IRPE DEFINITIONS
                        $JIBDEF                 ; JIB DEFINITIONS
                        $PCBDEF                 ; PCB DEFINITIONS
                        $PFNDEF                 ; PFN DATA BASE DEFINITIONS
                        $PHDDEF                 ; PROCESS HEADER DEFINITIONS
                        $PRDEF                  ; PROCESSOR REGISTER DEFINITIONS
                        $PRIDEF                 ; PRIORITY INCREMENT DEFS
                        $PTEDEF                 ; PAGE TABLE ENTRY DEFINITIONS
                        $RSNDEF                 ; DEFINE RESOURCE WAIT NUMBERS
;KDM0002                .1                      $SSDEF                  ; DEFINE SYSTEM STATUS CODES
                        $UCBDEF                 ; DEFINE UCB OFFSETS
                        $VADEF                  ; DEFINE VIRTUAL ADDRESS FIELDS
                        $VCBDEF                 ; DEFINE VCB OFFSETS
                        $WCBDEF                 ; DEFINE WCB OFFSETS
                        $WQHDEF                 ; WAIT QUEUE HEADER DEFINITIONS
                ;
                ; OWN STORAGE:
                ;
00000000                .PSECT  $AEXENONPAGED,LONG
                PRITBL:
01              .BYTE   PRI$_IOCOM              ; TABLE OF PRIORITY INCR CLASSES
03              .BYTE   PRI$_TOCOM              ; 0 => DIRECT WRITE
01              .BYTE   PRI$_IOCOM              ; 1 => BUFFERED WRITE
04              .BYTE   PRI$_TICOM              ; 2 => DIRECT READ
                                                ; 3 => BUFFERED READ
```

```
                                0004    115          .SBTTL  I/O COMPLETION POSTING
                                0004    116 ;++
                                0004    117 ; FUNCTIONAL DESCRIPTION:
                                0004    118 ;
                                0004    119 ;       IOC$IOPOST IS INITIATED BY TRIGGERING AN IPL$_IOPOST SOFTWARE
                                0004    120 ;       INTERRUPT AFTER PLACING A COMPLETED I/O PACKET IN THE IOPOST
                                0004    121 ;       QUEUE.  IOC$IOPOST PERFORMS ALL APPROPRIATE COMPLETION ACTIVITY
                                0004    122 ;       REQUIRED FOR THE PACKET EITHER DIRECTLY OR BY QUEUEING KERNEL
                                0004    123 ;       ASTS TO CONCLUDE PROCESSING IN THE CONTEXT OF THE PROCESS
                                0004    124 ;       WHEN REQUIRED.
                                0004    125 ;
                                0004    126 ; CALLING SEQUENCE:
                                0004    127 ;
                                0004    128 ;       SOFTINT #IPL$_IOPOST
                                0004    129 ;
                                0004    130 ; INPUT PARAMETERS:
                                0004    131 ;
                                0004    132 ;       NONE
                                0004    133 ;
                                0004    134 ; IMPLICIT INPUTS:
                                0004    135 ;
                                0004    136 ;       IOC$GL_PSFL - IOPOSTING QUEUE
                                0004    137 ;
                                0004    138 ; OUTPUT PARAMETERS:
                                0004    139 ;
                                0004    140 ;       NONE
                                0004    141 ;
                                0004    142 ;--
                                0004    143
                                0004    144          .ENABL  LSB
                                0004    145 IOC$IOPOST::                                ; I/O POSTING INTERRUPT
          7E    54    7D      0004    146          MOVQ    R4,-(SP)                    ; SAVE
          7E    52    7D      0007    147          MOVQ    R2,-(SP)                    ; NORMAL
          7E    50    7D      000A    148          MOVQ    R0,-(SP)                    ; REGISTERS
    55    0000'DF     0F      000D    149 IOPOST:  REMQUE  @W^IOC$GL_PSFL,R5           ; GET HEAD OF POST QUEUE
                16    1C      0012    150          BVC     10$                         ; QUEUE NOT YET EMPTY
          50    8E    7D      0014    151          MOVQ    (SP)+,R0                    ; RESTORE
          52    8E    7D      0017    152          MOVQ    (SP)+,R2                    ; REGISTERS
          54    8E    7D      001A    153          MOVQ    (SP)+,R4                    ; AND EXIT
                02    11      001D    154          REI                                 ; IF QUEUE EMPTY
                              001E    155
;RLRMXBCNT          038B    31      001E     .1 5$:      BRW     VIRTUAL_LOGIO       ; PROCESS VIRTUAL (OR LOGICAL) I/O COMPLETIO
;SSA0021                               0021     .2
;SSA0021              61    16      0021     .3 7$:      JSB     (R1)                ; CALL END ACTION ROUTINE
;SSA0021              E8    11      0023     .4          BRB     IOPOST              ;
;SSA0021                              0025     .5
;SSA0021           6A A0    B4      0025     .6 8$:      CLRW    UCB$W_QLEN(R0)      ; Device queue length went negative
;SSA0021              18    11      0028     .7          BRB     11$                 ; Reset queue length and continue
-4                                    002A    160
          51    0C A5    D0      002A    161 10$:    MOVL    IRP$L_PID(R5),R1        ; GET PID/END ACTION ADDRESS
                F1    19      002E    162          BLSS    7$                      ; BR IF END ACTION ADDRESS
                              0030    163                                          ; (SYSTEM SPACE ADDRESSES ARE NEGATIVE)
          51    51    3C      0030    164          MOVZWL  R1,R1                   ; GET PROCESS INDEX
    54    0000'DF41   D0      0033    165          MOVL    @W^SCH$GL_PCBVEC[R1],R4 ; AND TRANSLATE TO PCB ADDRESS
;EMD0076   50    1C A5    D0      0039     .1          MOVL    IRP$L_UCB(R5),R0    ; R0 => UCB. (Presets UCB for DIO path)
;EMD0076           6A A0    B7      003D     .2          DECW    UCB$W_QLEN(R0)      ; Decrement device queue length
;EMD0076              E3    19      0040     .3          BLSS    8$                  ; Length went negative, so go adjust
```

```
;EMD0076        07 2A A5   0F   E1  0042    .4 11$:    BBC     #IRP$V_KEY,IRP$W_STS(R5),12$ ; set, buffer alloc for encryption
;EMD0076           50   5C A5   D0  0047    .5         MOVL    IRP$L_KEYDESC(R5), R0    ; r0 contains address of alloc buffer
;EMD0076              FFB2   30  004B    .6         BSBW    EXE$DEANONPAGED          ; deallocate this buffer
;EMD0076        03 2A A5   00   E1  004E    .7 12$:    BBC     #IRP$V_BUFIO,IRP$W_STS(R5),13$  ; IF CLEAR, DIRECT I/O
;EMD0076              00C6   31  0053    .8         BRW     BUFIO                    ; BUFFERED I/O
;EMD0076              3E A4   B6  0056    .9 13$:    INCW    PCB$W_DIOCNT(R4)         ; UPDATE DIRECT I/O COUNT
-3                 53   2C A5   D0  0059   169         MOVL    IRP$L_SVAPTE(R5),R3      ; GET ADDRESS OF FIRST PTE
                                   005D   170
                                   005D   171         ASSUME  IRP$V_PAGIO LE 7
                                   005D   172         ASSUME  IRP$V_SWAPIO LE 7
                   2A A5   44 8F   93  005D   173         BITB    #<IRP$M_PAGIO ! IRP$M_SWAPIO>,IRP$W_STS(R5) ; PAGIO OR SWAPIO?
                              5D   12  0062   174         BNEQ    PAGIO_OR_SWAPIO
                                   0064   175
                                   0064   176 ;
                                   0064   177 ; DIRECT I/O COMPLETION
                                   0064   178 ;
                                   0064   179
                              53   D5  0064   180 DIRIO:  TSTL    R3                       ; PTE ADDRESS VALID?
                              42   13  0066   181         BEQL    18$                      ; IF EQL NO PAGES TO UNLOCK
                        51   32 A5   D0  0068   182         MOVL    IRP$L_BCNT(R5),R1        ; GET REQUESTED TRANSFER BYTE COUNT
                        52   30 A5   3C  006C   183         MOVZWL  IRP$W_BOFF(R5),R2        ; GET BYTE OFFSET IN PAGE
;SSA0021                      08   E0  0070    .1         BBS     #IRP$V_PHYSIO,-
;SSA0021                1C 2A A5        0072    .2                 IRP$W_STS(R5),UNLOCK     ; BRANCH IF PHYSICAL I/O
;SSA0021                      0E   E1  0075    .3         BBC     #DEV$V_FOD,-             ; If NOT file oriented, go to UNLOCK.
;SSA0021                17 38 A0        0077    .4                 UCB$L_DEVCHAR(R0),UNLOCK; (R0 preloaded in common DIO/BIO path)
;SSA0021                A0 38 A5   E9  007A    .5         BLBC    IRP$L_IOST1(R5),5$       ; BRANCH IF ERROR IN VIRT. OR LOG. REQUEST
-2                        46 A5   B5  007E   186         TSTW    IRP$L_OBCNT+2(R5)        ; WAS ORIGINAL COUNT > 64K?
                              07   13  0081   187         BEQL    14$                      ; EQL IMPLIES NO
                           3A A5   D1  0083   188         CMPL    IRP$L_IOST1+2(R5),-      ; LONGWORD COMPARE FOR > 64K OBCNT
                           44 A5        0086   189                 IRP$L_OBCNT(R5)          ; IF COMPLETED ORIGINAL BYTE COUNT
                                   0088   190                                              ; THEN NO SPECIAL VIRTUAL PROCESSING
                              05   11  0088   191         BRB     16$                      ; BRANCH AROUND TO COMMON 'BNEQ'
                                   008A   192 14$:
                           3A A5   B1  008A   193         CMPW    IRP$L_IOST1+2(R5),-      ; *NOTE 'CMPW' DUE TO CODE PATH FOR <64K BCN
                           44 A5        008D   194                 IRP$L_OBCNT(R5)          ; IF COMPLETED ORIGINAL BYTE COUNT
                                   008F   195                                              ; THEN NO SPECIAL VIRTUAL PROCESSING
                                   008F   196 16$:
                              8D   12  008F   197         BNEQ    5$                       ; OTHERWISE DO THE SEGMENTED COMPLETION
                  51   01FF C142   9E  0091   198 UNLOCK: MOVAB   511(R1)[R2],R1           ; COMBINE OFFSET AND COUNT AND ROUND
                     51   F7 8F   78  0097   199         ASHL    #-VA$S_BYTE,R1,R1        ; CONVERT TO NUMBER OF PAGES
                              51        009B
;STJ3100                      0A   E1  009C    .1         BBC     #IO$V_ERASE,-            ; BRANCH IF DEFINITELY NOT AN ERASE
;STJ3100                06 20 A5        009E    .2                 IRP$W_FUNC(R5),17$       ;
;STJ3100                   066C   30  00A1    .3         BSBW    CHECK_ERASE              ; IS THIS AN ERASE FUNCTION?
;STJ3100                   0B 50   E8  00A4    .4         BLBS    R0,19$                   ; BRANCH IF IT IS AN ERASE
-1                           FF56   30  00A7    .5 17$:    BSBW    MMG$UNLOCK               ; UNLOCK PAGES
                              0B   E1  00AA   201 18$:    BBC     #IRP$V_EXTEND,-
                        03 2A A5        00AC   202                 IRP$W_STS(R5),19$        ; BRANCH IF NO IRPE'S ATTACHED
                           06B3   30  00AF   203         BSBW    UNLOCK_MORE              ; UNLOCK AREAS DESCRIBED IN IRPE'S
                                   00B2   204 19$:                                         ; REFERENCE LABEL
                                   00B2   205
                                   00B2   206         .IF DF  CA$_MEASURE_IOT
                                   00B2   207
                        FF4B'      30  00B2   208         BSBW    PMS$END_RQ               ; INSERT END OF I/O REQUEST MESSAGE
                                   00B5   209
                                   00B5   210          ENDC
                                   00B5   211
```

```
;CDS0003                0648'CF   9E  00B5     .1          MOVAB   W^DIRPOST,ACB$L_KAST(R5) ; SET SPECIAL KERNEL AST ADDRESS
                          18 A5       00B9
;CDS0003                   009A   31  00BB     .2          BRW     40$                     ;
;CDS0003                           00BE     .3
;WMC0020                            00BE     .4 BRW_QNXTSEG:
;WMC0020                   034A   31  00BE     .5          BRW     QNXTSEG                 ; GO DO THE NEXT VIRTUAL SEGMENT
;WMC0020                           00C1     .6
-2                                 00C1   214 ;
                                   00C1   215 ;       PAGE I/O OR SWAP I/O COMPLETION
                                   00C1   216 ;
                                   00C1   217
                                   00C1   218 PAGIO_OR_SWAPIO:                             ; HERE WE ASSUME DISK I/O FOR PAGING
                                   00C1   219                                              ;  AND SWAPPING AND WE FURTHER RELY
                                   00C1   220                                              ;  ON THE FACT THAT ALL DISK DRIVERS
                                   00C1   221                                              ;  TRADITIONALLY RETURN ZERO IN THE 2ND
                                   00C1   222                                              ;  LONGWORD OF THE I/O STATUS BLOCK FOR
                                   00C1   223                                              ;  DATA TRANSFER OPERATIONS.  THEREFORE
                                   00C1   224                                              ;  THIS IS COMPATIBLE WITH DISK CLASS
                                   00C1   225                                              ;  DRIVER WHICH GROWS THE # OF BYTES
                                   00C1   226                                              ;  TRANSFERRED FIELD IN THE IOSB TO A
                                   00C1   227                                              ;  FULL LONGWORD.
;ROW49597              51   3A A5  D0  00C1     .1          MOVL    IRP$L_IOST1+2(R5), R1   ; Get bytes transfered.
;ROW49597B                12 38 A5  E9  00C5     .2          BLBC    IRP$L_IOST1(R5), 21$    ; Branch if transfer not successful.
;ROW49597B              44 A5   51  D1  00C9     .3          CMPL    R1, IRP$L_OBCNT(R5)     ; If completed whole transfer, skip
;ROW49597B                      3E  13  00CD     .4          BEQL    26$                     ; all this segmenting junk.
;ROW49597B              32 A5   51  D1  00CF     .5          CMPL    R1, IRP$L_BCNT(R5)      ; Bytes transfered = bytes requested?
;ROW49597B                      11  13  00D3     .6          BEQL    23$                     ; Branch if equal.
;ROW49597B                 2234 8F  B0  00D5     .7          MOVW    #SS$_INCSEGTRA, -       ; Else, change success status
                             38 A5       00D9
;ROW49597B                            00DB     .8                  IRP$L_IOST1(R5)         ; to error status.
;ROW49597B                            00DB     .9                                          ; For the error cases:
;ROW49597B              32 A5   51  D1  00DB     .10 21$:    CMPL    R1, IRP$L_BCNT(R5)      ; Bytes transfered < bytes requested?
;ROW49597B                      05  1F  00DF     .11         BLSSU   23$                     ; Branch if less than.
;ROW49597B                      51  D4  00E1     .12         CLRL    R1                      ; Else, assume no bytes transfered.
;ROW49597B                 3A A5    D4  00E3     .13         CLRL    IRP$L_IOST1+2(R5)       ; Clear bytes transfered in IRP too.
;ROW49597C              40 A5   51  C0  00E6     .14 23$:    ADDL    R1, IRP$L_ABCNT(R5)     ; Update accumulated byte count.
;ROW49597               51   17   09  EF  00EA     .15         EXTZV   #VA$V_VPN, -            ; Convert bytes transfered to
                                51       00EE
;ROW49597                            00EF     .16                 #<32-VA$V_VPN>, R1, R1  ; pages transfered.
-18                    48 A5   51  C0  00EF   246         ADDL    R1,IRP$L_SEGVBN(R5)     ; NEXT STARTING VBN (OR ERROR VBN)
                         09 38 A5  E9  00F3   247         BLBC    IRP$L_IOST1(R5),24$      ; BRANCH IF ERROR
                            40 A5  C3  00F7   248         SUBL3   IRP$L_ABCNT(R5),-
                            44 A5       00FA   249                 IRP$L_OBCNT(R5),-       ; CALCULATE REMAINING BYTE
                            32 A5       00FC   250                 IRP$L_BCNT(R5)          ; COUNT TO BE TRANSFERRED
                                BE  12  00FE   251         BNEQ    BRW_QNXTSEG             ; BRANCH IF ANOTHER SEGMENT TO DO
                                        0100   252 ;
                                        0100   253 ; LAST SEGMENT COMPLETED OR ERROR
                                        0100   254 ;
                                        0100   255 24$:
                               40 A5    D0  0100   256         MOVL    IRP$L_ABCNT(R5),-
                               3A A5       0103   257                 IRP$L_IOST1+2(R5)       ; SET BYTES TRANSFERRED
                         53    4C A5    D0  0105   258         MOVL    IRP$L_DIAGBUF(R5),R3    ; GET SAVED SVAPTE
                         2C A5    53    D0  0109   259         MOVL    R3,IRP$L_SVAPTE(R5)     ; AND PUT IT BACK
                                        010D   260 26$:
                                        010D   261          IF DF  CA$_MEASURE_IOT
                                        010D   262
                                FEF0'   30  010D   263         BSBW    PMS$END_RQ              ; INSERT END OF I/O REQUEST MESSAGE
```

```
                                0110   264
                                0110   265          .ENDC
                                0110   266
                76 2A A5   02   E0  0110   267          BBS     #IRP$V_PAGIO,IRP$W_STS(R5),PAGIO ; BRANCH IF PAGE I/O
                                0115   268
                                0115   269 ;
                                0115   270 ;        SWAP I/O COMPLETION
                                0115   271 ;
                                0115   272
                18 A5    14 A5  D0  0115   273          MOVL    IRP$L_ASTPRM(R5),ACB$L_KAST(R5) ; SET KERNEL AST ADDRESS
                           3C   11  011A   274          BRB     40$                     ; AND ENQUEUE AST
                                011C   275
                                011C   276 ;
                                011C   277 ; BUFFERED I/O COMPLETION
                                011C   278 ;
                                011C   279
;CDS0003          00000158'EF   9F  011C    .1 BUFIO:  PUSHAB  40$                     ; 'INLINE' SUBROUTINE CALL.
;CDS0003                         0122    .2
;CDS0003                         0122    .3 ;
;CDS0003                         0122    .4 ; THE FOLLOWING PIECE OF CODE MAY BE CALLED AS A SUBROUTINE DIRECTLY
;CDS0003                         0122    .5 ; TO DO THE PART OF BUFFERED I/O COMPLETION THAT NORMALLY EXECUTES
;CDS0003                         0122    .6 ; AS A RESULT OF AN IOPOST SOFTWARE INTERRUPT.
;CDS0003                         0122    .7 ;
;CDS0003                         0122    .8 ; THE F11BXQP, FOR EXAMPLE, EXECUTES VIRTUAL FILE SYSTEM FUNCTIONS
;CDS0003                         0122    .9 ; IN PROCESS CONTEXT.  THERE IS NO NEED FOR THE IOPOST INTERRUPT
;CDS0003                         0122   .10 ; AND SPECIAL KERNEL AST TO POST I/O COMPLETION.  AFTER RETURNING
;CDS0003                         0122   .11 ; FROM THIS SUBROUTINE, THE F11BXQP WILL DO A
;CDS0003                         0122   .12 ;
;CDS0003                         0122   .13 ;        JSB     @ACB$L_KAST (R5)
;CDS0003                         0122   .14 ;
;CDS0003                         0122   .15 ; TO COMPLETE POSTING THE I/O COMPLETION.
;CDS0003                         0122   .16 ; BOTH THE IOPOST SOFTWARE INTERRUPT AND THE SPECIAL KERNEL COMPLETION
;CDS0003                         0122   .17 ; AST ARE AVOIDED.
;CDS0003                         0122   .18 ;
;CDS0003                         0122   .19 ; THE CALLER SHOULD TEST IRP$L_PID AND POST A NORMAL IOPOST INTERRUPT
;CDS0003                         0122   .20 ; IF IT IS NEGATIVE, AS THAT CASE IS NOT HANDLED HERE.
;CDS0003                         0122   .21 ;
;CDS0003                         0122   .22 ; THE F11BXQP CODE THAT USES THIS ROUTINE IS IN [F11X.SRC]IODONE.MAR.
;CDS0003                         0122   .23 ;
;CDS0003                         0122   .24 ; IPL = IPL$_ASTDEL TO BLOCK PROCESS DELETION (PREVENT LOSS OF IRP).
;CDS0003                         0122   .25 ; R4 = PCB ADDRESS
;CDS0003                         0122   .26 ; R5 = IRP ADDRESS
;CDS0003                         0122   .27 ;
;CDS0003                         0122   .28
;CDS0003                         0122   .29 IOC$BUFPOST::
;CDS0003             3A A4   B6  0122   .30          INCW    PCB$W_BIOCNT(R4)        ; UPDATE BUFFERED I/O COUNT
-1               03 2A A5   0C  E1  0125   281          BBC     #IRP$V_FILACP,IRP$W_STS(R5),NOTACP ; BR IF NOT ACP I/O
                    3E A4   B6  012A   282          INCW    PCB$W_DIOCNT(R4)        ; RESTORE DIRECT I/O COUNT
                                012D   283 NOTACP:                                  ;
                                012D   284
                                012D   285          .IF DF  CA$_MEASURE_IOT
                                012D   286
                      FED0'  30 012D   287          BSBW    PMS$END_RQ              ; INSERT END OF I/O REQUEST MESSAGE
                                0130   288
                                0130   289          .ENDC
                                0130   290
                50   0080 C4   D0  0130   291          MOVL    PCB$L_JIB(R4),R0        ; GET JIB ADDRESS
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                51   30 A5   3C  0135   292          MOVZWL  IRP$W_BOFF(R5),R1        ; Convert I/O byte count to a longword.
                20 A0   51   C0  0139   293          ADDL    R1,JIB$L_BYTCNT(R0)      ; Update Byte Count Quota.
                50   2C A5   D0  013D   294          MOVL    IRP$L_SVAPTE(R5),R0      ; ANY BUFFER SPECIFIED?
                       0E   13  0141   295          BEQL    30$                      ; IF EQL NO
                  0566'CF   9E  0143   296          MOVAB   W^BUFPOST,ACB$L_KAST(R5) ; ASSUME READ FUNCTION
                    18 A5       0147
;CDS0003      09 2A A5   01   E0  0149    .1          BBS     #IRP$V_FUNC,IRP$W_STS(R5),35$  ; IF SET, READ FUNCTION
;CDS0003            FEAF'   30  014E    .2          BSBW    EXE$DEANONPAGED          ; DEALLOCATE WRITE BUFFER
;CDS0003         0648'CF   9E  0151    .3 30$:     MOVAB   W^DIRPOST,ACB$L_KAST(R5) ; SET SPECIAL KERNEL AST ADDRESS
                    18 A5       0155
;CDS0003                       05  0157    .4 35$:     RSB                              ; RETURN TO PROCESS CONTEXT IOPOSTING
;CDS0003                           0158    .5                                           ; PROCESS, OR CONTINUE INLINE IF THIS
;CDS0003                           0158    .6                                           ; IS NORMAL IOPOST SOFTWARE INTERRUPT.
-3              02   00   EF  0158   300 40$:     EXTZV   #IRP$V_BUFIO,#2,IRP$W_STS(R5),R0  ; GET PACKET TYPE
                50   2A A5       015B
             03 2A A5   09   E0  015E   301          BBS     #IRP$V_TERMIO,IRP$W_STS(R5),50$ ; BR IF TERMINAL I/O
                50   01   AA  0163   302          BICW    #1,R0                    ; ELSE TREAT AS NORMAL I/O COMPLETION
                           0166   303 50$:                                         ; FOR PRIORITY INCREMENT SELECTION
                51   0C A5   D0  0166   304          MOVL    IRP$L_PID(R5),R1         ; PROCESS IDENTIFICATION
             52   FE91 CF40   9A  016A   305          MOVZBL  PRITBL[R0],R2            ; SET PRIORITY INCREMENT CLASS
;WMC0020      53   22 A5   9A  0170    .1          MOVZBL  IRP$B_EFN(R5),R3         ; GET EVENT FLAG NUMBER
;WMC0020                    0174    .2          DSBINT  #IPL$_SYNCH              ; PREVENT INTERRUPT FROM MP SECONDARY
;WMC0020            FE83'   30  017A    .3          BSBW    SCH$POSTEF               ; AND POST IT
;WMC0020      0B A5   80 8F   88  017D    .4          BISB    #^X80,ACB$B_RMOD(R5)     ; SET INTERNAL AST FLAG
;WMC0020            FE7B'   30  0182    .5          BSBW    SCH$QAST                 ; NOW QUEUE THE KERNEL AST
;WMC0020                    0185    .6          ENBINT
;WMC0020            FE82    31  0188    .7          BRW     IOPOST                   ; GET NEXT PACKET TO POST
;WMC0020                    018B    .8          .DSABL  LSB
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                     018B    315          SBTTL  PAGIO - PAGE I/O COMPLETION
                     018B    316 ;
                     018B    317 ; PAGING I/O COMPLETION
                     018B    318 ;
                     018B    319 ; INPUTS:
                     018B    320 ;
                     018B    321 ;       R3 = SYSTEM VIRTUAL ADDRESS OF PAGE TABLE ENTRY
                     018B    322 ;       R4 = PROCESS CONTROL BLOCK ADDRESS
                     018B    323 ;       R5 = I/O REQUEST PACKET ADDRESS
                     018B    324 ;
                     018B    325 ;               FOR PAGE READ COMPLETION, THE FOLLOWING LOCATIONS IN THE
                     018B    326 ;       I/O REQUEST PACKET HAVE SPECIAL SIGNIFICANCE.
                     018B    327 ;
                     018B    328 ;       IRP$L_ASTPRM    = ORIGINAL PROCESS PAGE TABLE ENTRY BACKING STORE
                     018B    329 ;                         ADDRESS IF PAGE WAS A COPY ON REFERENCE PAGE.
                     018B    330 ;                         PFN$V_GBLBAK SET IF IT WAS GLOBAL CRF
                     018B    331 ;                       = 0 IF NOT A COPY ON REFERENCE PAGE
                     018B    332 ;       IRP$L_AST       = MASTER PTE CONTENTS IF GLOBAL CRF (>0)
                     018B    333 ;                       = SLAVE PTE ADDRESS IF GLOBAL NOT CRF (<0)
                     018B    334 ;                       = 0 IF NOT GLOBAL
                     018B    335 ;
                     018B    336 ;               FOR PAGE WRITE COMPLETION, THE FOLLOWING LOCATIONS IN
                     018B    337 ;       THE I/O REQUEST PACKET HAVE SIGNIFICANCE.
                     018B    338 ;
                     018B    339 ;       IRP$B_RMOD      = REQUEST MODE ! ACB$V_QUOTA.  IF ACB$V_QUOTA IS SET,
                     018B    340 ;                         PROCESS REQUESTED AN AST ON PAGE WRITE COMPLETION
                     018B    341 ;       IRP$L_AST       = AST ADDRESS IF REQUESTED
                     018B    342 ;       IRP$L_ASTPRM    = AST PARAMETER IF SPECIFIED
                     018B    343 ;       IRP$L_IOSB      = ADDRESS OF I/O STATUS BLOCK IF SPECIFIED.  IF
                     018B    344 ;                         NON-ZERO, THEN PROCESS EXPECTS I/O STATUS RETURNED.
                     018B    345 ;
        7E   56  7D  018B    346 PAGIO:  MOVQ    R6,-(SP)                ; SAVE SOME MORE REGISTERS
        56   55  D0  018E    347         MOVL    R5,R6                   ; USE R6 FOR IRP ADDRESS
                     0191    348
                     0191    349         SETIPL  #IPL$_SYNCH             ; SYNCHRONIZE ACCESS TO SYSTEM DATA BASE
     55   6C A4  D0  0194    350         MOVL    PCB$L_PHD(R4),R5        ; USE R5 FOR PROCESS HEADER ADR
             09  EF  0198    351         EXTZV   #VA$V_VPN,-
             17       019A    352                 #<32-VA$V_VPN>,-        ; FORM PAGE COUNT
     57   3A A6       019B    353                 IRP$L_IOST1+2(R6),R7    ; OF THE DATA TRANSFERRED
  33 2A A6   01  E0  019E    354         BBS     #IRP$V_FUNC,IRP$W_STS(R6),PAGRD_DONE ; BRANCH IF PAGE READ
                     01A3    355 ;
                     01A3    356 ; PAGE WRITE COMPLETE - R7 = NUMBER OF PAGES
                     01A3    357 ;       CONDITION CODES SET FROM LOAD OF R7
                     01A3    358 ;
             1F  13  01A3    359         BEQL    60$                     ; BRANCH IF NO PAGES SUCCESSFULLY TRANSFERRE
  63   15  00  EF  01A5    360         EXTZV   #PTE$V_PFN,#PTE$S_PFN,(R3),R0 ;GET PFN FROM PTE
             50       01A9
             50  D1  01AA    361         CMPL    R0,MMG$GL_MAXPFN        ;IS THIS PAGE IN SHARED MEMORY?
   00000000'EF       01AC
             11  1A  01B1    362         BGTRU   60$                     ;BR IF PAGE IN SH MEM, NO PFN DATABASE
             53  DD  01B3    363 20$:    PUSHL   R3                      ; SAVE SVAPTE
          01C3   30  01B5    364         BSBW    PFN_IO_DONE             ; SET PFN DATA BASE
                     01B8    365 ;
                     01B8    366 ; CONDITION CODES SET FROM DECREF
                     01B8    367 ;
             03  14  01B8    368         BGTR    40$                     ; BRANCH IF REFCNT NOT 0
          FE43'  30  01BA    369         BSBW    MMG$RELPFN              ; RELEASE THE PAGE
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                53    8E    04    C1  01BD    370 40$:    ADDL3   #4,(SP)+,R3                 ; GET NEXT PTE ADDRESS
                      EF 57       F5  01C1    371         SOBGTR  R7,20$                      ; DO THE NEXT PAGE IF ANY
                    00C4 8F       A3  01C4    372 60$:    SUBW3   #IRP$C_LENGTH,IRP$W_SIZE(R6),R7 ; IF EXTENDED I/O PACKET
                57    08 A6             01C8
                                        01CB    373                                         ; THEN COMPLETION IS DONE BY
                                        01CB    374                                         ; SPECIAL UPDATE SECTION KERNEL AST
                   04 38 A6       E9    01CB    375         BLBC    IRP$L_IOST1(R6),PAGWRT_ERR ; BRANCH IF PAGE WRITE ERROR
                                        01CF    376 ;
                                        01CF    377 ; CONDITION CODES SET FROM LOAD OF R7
                                        01CF    378 ;
                                        01CF    379 PAGWRT_ERR_DONE:
                         68    13       01CF    380         BEQL    PAGIO_DONE1                 ; BRANCH IF NOT, COMPLETE THE I/O HERE
                         6D    11       01D1    381         BRB     PAGIO_DONE2                 ; COMPLETE I/O IN PROCESS CONTEXT
                                        01D3    382 PAGWRT_ERR:
                       0150    31       01D3    383         BRW     PAGWRT_ERR1
                                        01D6    384 ;
                                        01D6    385 ; PAGE READ COMPLETE - R7 = NUMBER OF PAGES
                                        01D6    386 ;       CONDITION CODES SET FROM LOAD OF R7
                                        01D6    387 ;
                                        01D6    388 PAGRD_DONE:
                         3C    13       01D6    389         BEQL    100$                        ; BRANCH IF NO PAGES SUCCESSFULLY TRANSFERRE
                       01A0    30       01D8    390 20$:    BSBW    PFN_IO_DONE                 ; RECORD PAGE READ DONE
                                        01DB    391 ;
                                        01DB    392 ; CONDITION CODES SET FROM DECREF
                                        01DB    393 ;
                         11    14       01DB    394         BGTR    30$                         ; BRANCH IF REFCNT NOT ZERO
                                        01DD    395 ;
                                        01DD    396 ; NO MORE REFERENCES FOR THIS PAGE, DON'T MAKE IT VALID, RELEASE IT
                                        01DD    397 ;
                      04 A3    DF       01DD    398         PUSHAL  4(R3)                       ; SAVE PTE ADR FOR NEXT PTE
                       FE1D'   30       01E0    399         BSBW    MMG$RELPFN                  ; RELEASE THE PFN
                         08    BA       01E3    400         POPR    #^M<R3>                     ; RECOVER PTE FOR NEXT PAGE IN CLUSTER
                10 A6    04    C1       01E5    401         ADDL3   #4,IRP$L_AST(R6),R1         ; GLOBAL PAGE?
                         51             01E9
                         25    18       01EA    402         BGEQ    80$                         ; BRANCH IF IT ISN'T
                         1F    11       01EC    403         BRB     60$                         ; YES, SET CONTEXT FOR NEXT PAGE IN CLUSTER
            0000'DF40    07    88       01EE    404 30$:    BISB    #PFN$C_ACTIVE,@W^PFN$AB_STATE[R0] ; PAGE IS NOW ACTIVE
               00 50     1F    E2       01F4    405         BBSS    #PTE$V_VALID,R0,40$         ; TURN VALID ON WITH PFN
                  83     50    C8       01F8    406 40$:    BISL    R0,(R3)+                    ; SET VALID IN PTE
                                        01FB    407                                         ; NEXT PTE ADDRESS IN R3
                51    10 A6    D0       01FB    408         MOVL    IRP$L_AST(R6),R1            ; GLOBAL PAGE?
                         10    18       01FF    409         BGEQ    80$                         ; BRANCH IF NOT
                                        0201    410 ;
                                        0201    411 ; PAGE IS A GLOBAL PAGE, R1 = PROCESS PTE, MUST MAKE IT VALID TOO
                                        0201    412 ;
              867FFFFF 8F       CB      0201    413         BICL3   #^C<PTE$M_PROT ! PTE$M_OWN>,(R1),R2 ; PROTECTION AND OWNER FIELDS
                  52    61              0207
            81    52    50    C9      0209    414         BISL3   R0,R2,(R1)+                 ; MAKE PROCESS PTE VALID
              10 A6     51    D0      020D    415 60$:    MOVL    R1,IRP$L_AST(R6)            ; SET UP FOR NEXT PAGE IN CLUSTER
                    C4 57     F5      0211    416 80$:    SOBGTR  R7,20$                      ; DO THE NEXT PAGE IF ANY
                 7F 38 A6     E9      0214    417 100$:   BLBC    IRP$L_IOST1(R6),PAGRD_ERR ; BRANCH IF PAGE READ ERROR
                                        0218    418 ;
                                        0218    419 ; LAST PAGE IN CLUSTER HAS BEEN PROCESSED, COMPLETE THE PROCESSING
                                        0218    420 ; ASSOCIATED WITH THE TRANSFER AS A WHOLE.
                                        0218    421 ;
                                        0218    422 PAGIO_DONE:
                51    14 A6    D0       0218    423         MOVL    IRP$L_ASTPRM(R6),R1         ; COPY ON REFERENCE SECTION?
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                1B   13  021C   424          BEQL    20$                             ; BRANCH IF NOT
          0B 51   17   E1  021E   425          BBC     #PFN$V_GBLBAK,R1,10$            ; BRANCH IF NOT GBL CRF
       00000000'FF   DE  0222   426          MOVAL   @MMG$GL_SYSPHD,R5               ; SYSTEM HDR FOR GBL CRF PAGE
                55         0228
          51   10 A6   D0  0229   427          MOVL    IRP$L_AST(R6),R1                ; CONTENTS OF GBL PTE FOR GBL CRF
             51   51   32  022D   428 10$:     CVTWL   R1,R1                           ; SECTION INDEX
                09   EF  0230   429          EXTZV   #VA$V_VPN,-
                17       0232   430                  #<32-VA$V_VPN>,-                ; PAGE COUNT FROM
          50   3A A6       0233   431                  IRP$L_IOST1+2(R6),R0            ; BYTE COUNT TRANSFERRED
                FDC7'   30  0236   432          BSBW    MMG$SUBSECREF                   ; SUBTRACT R0 FROM SECTION REFERENC COUNT
                        0239   433 ;
                        0239   434 ; REPORT THAT PAGE I/O HAS COMPLETED.
                        0239   435 ;
                        0239   436 ; NORMALLY IT IS ONLY NECESSARY TO REPORT "PAGE FAULT COMPLETE"
                        0239   437 ; TO THE PROCESS THAT INITIATED THE I/O, BUT FOR SYSTEM PAGES
                        0239   438 ; AND FOR GLOBAL PAGES, MULTIPLE FAULTS CAN OCCUR FOR THE SAME
                        0239   439 ; PAGE WHILE IT IS ON ITS WAY INTO MEMORY.  ALL PROCESSES WHICH
                        0239   440 ; FAULT THE PAGE WHILE ITS STATE IS "READ IN PROGRESS" GET QUEUED
                        0239   441 ; ON THE COLLISION PAGE QUEUE, AND THE COLLISION BIT IS SET IN THE
                        0239   442 ; TYPE BYTE OF THE PFN DATA BASE.  THIS ROUTINE ALSO REPORTS THE
                        0239   443 ; COLLISION PAGE AVAILABLE EVENT TO ALL PROCESSES ON THE COLLISION
                        0239   444 ; QUEUE, IF THE COLLISION BIT IS SET.
                        0239   445 ;
                        0239   446 20$:
                        0239   447 PAGIO_DONE1:
          52   00   9A  0239   448          MOVZBL  #PRI$_NULL,R2                   ; SET FOR NULL PRIORITY INCREMENT
                       023C   449          RPTEVT  PFCOM                           ; REPORT PAGE FAULT COMPLETE
                        0240   450 ;
                        0240   451 ; IRP$W_BOFF WAS INCREMENTED IF ANY OF THE PAGES HAD THE COLLISION BIT SET
                        0240   452 ;
                        0240   453 ;       R7 = NON ZERO IF SUPPOSED TO ISSUE KERNEL AST
                        0240   454 ;            USED ONLY FOR PAGE WRITE COMPLETION
                        0240   455 ;            BUT MUST BE ZERO FOR PAGE READ COMPLETION
                        0240   456 ;
                        0240   457 PAGIO_DONE2:
          30 A6   B5  0240   458          TSTW    IRP$W_BOFF(R6)                  ; ANY PAGES WITH COLLISION BIT SET?
                15   13  0243   459          BEQL    60$                             ; BRANCH IF NOT
                54   DD  0245   460          PUSHL   R4                              ; SAVE PCB ADDRESS
          0008'CF   B5  0247   461 40$:     TSTW    W^SCH$GQ_COLPGWQ+WQH$W_WQCNT ; ANYONE WAITING?
                0B   15  024B   462          BLEQ    50$                             ; BRANCH IF NOT
    54    0000'CF   D0  024D   463          MOVL    W^SCH$GQ_COLPGWQ,R4             ; GET NEXT PCB
                       0252   464          RPTEVT  COLPGA                          ; REPORT "COLLISION PAGE AVAILABLE"
                EF   11  0256   465          BRB     40$                             ; REPEAT UNTIL QUEUE IS EMPTY
                10   BA  0258   466 50$:     POPR    #^M<R4>                         ; RESTORE SAVED PCB ADDRESS
                       025A   467 60$:     SETIPL  #IPL$_IOPOST                    ; LOWER TO I/O POST LEVEL
                57   D5  025D   468          TSTL    R7                              ; EXHAUSTED PAGE COUNT NON-ZERO?
                16   12  025F   469          BNEQ    PAGIO_KAST                      ; BRANCH IF YES, COMPLETE I/O IN PROCESS
       7E 38 A6   E9  0261   470          BLBC    IRP$L_IOST1(R6),PAGIO_ERR ; BRANCH IF MORE ERROR PROCESSING TO DO
          50   56  D0  0265   471          MOVL    R6,R0                           ; GET PACKET ADDRESS FOR RELEASE
          56   8E  7D  0268   472          MOVQ    (SP)+,R6                        ; RESTORE SAVED REGISTERS
                        026B   473 ;
                        026B   474 ; R0 = I/O REQUEST PACKET ADDRESS
                        026B   475 ;
                        026B   476 PAGIO_ERR_DONE:
             FD92'   30  026B   477          BSBW    EXE$DEANONPAGED                 ; AND RELEASE IT
          50   01   3C  026E   478          MOVZWL  #RSN$_ASTWAIT,R0                ; SET AST WAIT RESOURCE WAIT NUMBER
             FD8C'   30  0271   479          BSBW    SCH$RAVAIL                      ; SET RESOURCE AVAILABLE
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                FD96   31  0274   480          BRW     IOPOST                          ; CONTINUE TO PROCESS POST QUEUE
                           0277   481 ;
                           0277   482 ; COMPLETE THE PAGE WRITE IN THE PROCESS CONTEXT
                           0277   483 ;
                           0277   484 PAGIO_KAST:
                55   56    D0  0277   485          MOVL    R6,R5                           ; I/O PACKET ADDRESS BACK TO NORMAL REG
                56   8E    7D  027A   486          MOVQ    (SP)+,R6                        ; RESTORE SAVED REGISTERS
              51   0C A5    D0  027D   487          MOVL    IRP$L_PID(R5),R1                ; PROCESS ID FOR ISSUING KERNEL AST
          00000000'EF       9E  0281   488          MOVAB   MMG$UPDSECAST,ACB$L_KAST(R5) ; ADDRESS TO START KERNEL AST
                18 A5           0287
                52   01    9A  0289   489          MOVZBL  #PRI$_IOCOM,R2                  ; PRIORITY INCREMENT
;WMC0020   0B A5   80 8F    88  028C    .1          BISB    #^X80,ACB$B_RMOD(R5)            ; SET INTERNAL AST FLAG
;WMC0020         FD6C'      30  0291    .2          BSBW    SCH$QAST                        ; NOW QUEUE THE KERNEL AST
;WMC0020         FD76       31  0294    .3          BRW     IOPOST                          ; GET NEXT PACKET TO POST
-1                         0297   491 ;
                           0297   492 ; PAGE READ ERROR - CLEAN UP LOGIC
                           0297   493 ;
                           0297   494 ;       R3 = PTE ADDRESS OF BAD PAGE
                           0297   495 ;       R4 = PCB ADDRESS
                           0297   496 ;       R5 = PROCESS HEADER ADDRESS
                           0297   497 ;       R6 = I/O REQUEST PACKET ADDRESS
                           0297   498 ;       R7 = 0 AND MUST BE PRESERVED
                           0297   499 ;       IRP$L_AST(R6) = PROCESS PTE ADR OF BAD PAGE IF GLOBAL PAGE
                           0297   500 ;       IRP$L_ASTPRM(R6) = GPTX FOR START OF TRANSFER IF GLOBAL CRF
                           0297   501 ;
                           0297   502 PAGRD_ERR:
                 00E1   30 0297   503          BSBW    PFN_IO_DONE                     ; COMPLETE THE I/O FOR ERR PAGE
                   14   90 029A   504          MOVB    #<PFN$M_DELCON ! PFN$C_RDERR>,- ; SET PAGE TO
               0000'DF40      029C   505                  @W^PFN$AB_STATE[R0]         ; READ ERROR STATE
              51   14 A6    D0  02A0   506          MOVL    IRP$L_ASTPRM(R6),R1             ; GET BACKING STORE ADR IF CRF
                   18   13 02A4   507          BEQL    120$                            ; BRANCH IF NOT COPY ON REFERENCE
              0E 51    17   E1 02A6   508          BBC     #PFN$V_GBLBAK,R1,100$           ; BRANCH IF NOT GLOBAL CRF
                   09   EF 02AA   509          EXTZV   #VA$V_VPN,-
                   17      02AC   510                  #<32-VA$V_VPN>,-                ; ADJUST GPTX BY
                52   3A A6   02AD   511                  IRP$L_IOST1+2(R6),R2            ; TRANSFERRED PAGE COUNT
                   51   52   C0 02B0   512          ADDL    R2,R1                           ; TO GET CORRECT GPTX FOR BAD PAGE
                   51   01   C1 02B3   513          ADDL3   #1,R1,IRP$L_ASTPRM(R6)  ; SET GPTX FOR START OF NEXT TRANSFER
                   14 A6      02B6
          0000'DF40   51   D0 02B8   514 100$:    MOVL    R1,@W^PFN$AL_BAK[R0]    ; FIX BACKING STORE ADDRESS
                   10 A6   D5 02BE   515 120$:    TSTL    IRP$L_AST(R6)                   ; IF GLOBAL PAGE (NOT CRF)
                   04   18 02C1   516          BGEQ    140$
                10 A6   04   C0 02C3   517          ADDL    #4,IRP$L_AST(R6)                ; THEN SKIP OVER PROCESS PTE ADR
               0000'DF40   B5 02C7   518 140$:    TSTW    @W^PFN$AW_REFCNT[R0]    ; IS THIS THE LAST REFERENCE?
                   12   14 02CC   519          BGTR    160$                            ; BRANCH IF NOT
               0000'DF40   B5 02CE   520          TSTW    @W^PFN$AW_SWPVBN[R0]    ; IF THIS PROCESS HAS BEEN SWAPPED OUT
                   08   13 02D3   521          BEQL    150$
                52   02   9A 02D5   522          MOVZBL  #PFN$C_BADPAGLST,R2     ; THEN PUT THIS PAGE IN LIMBO
                   FD25'   30 02D8   523          BSBW    MMG$INSPFNT                     ; ON THE BAD PAGE LIST
                   03   11 02DB   524          BRB     160$
                   FD20'   30 02DD   525 150$:    BSBW    MMG$RELPFN                      ; OTHERWISE RELEASE THE PAGE
                   FF35   31 02E0   526 160$:    BRW     PAGIO_DONE                      ; COMPLETE THIS PORTION OF THE PAGE READ
                           02E3   527 ;
                           02E3   528 ; DO THE REMAINING SEGMENT OF THE I/O FOR A PAGE READ OR WRITE ERROR
                           02E3   529 ; SKIP OVER THE PORTION THAT WAS TRANSFERRED SUCCESSFULLY AND SKIP OVER
                           02E3   530 ; THE PAGE IN ERROR WHICH WAS DEALT WITH BY EITHER PAGRD_ERR OR
                           02E3   531 ; PAGWRT_ERR AND SET UP TO TRANSFER THE REMAINING PAGES IF ANY.
                           02E3   532 ; NOTE THAT FOR PAGE WRITE ERRORS THE REST OF THE TRANSFER IS NOT DONE
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                        02E3    533 ; IF I/O COMPLETION STATUS IS RETURNED TO THE PROCESS.
                        02E3    534 ;
                        02E3    535 PAGIO_ERR:
      55    56    D0    02E3    536          MOVL    R6,R5                       ; IRP ADDRESS
      56    8E    7D    02E6    537          MOVQ    (SP)+,R6                    ; RESTORE ADDITIONAL SAVED REGISTERS
            09    EF    02E9    538          EXTZV   #VA$V_VPN,-
                  17    02EB    539                  #<32-VA$V_VPN>,-            ; GET PAGE COUNT TRANSFERRED
   51    3A A5          02EC    540                  IRP$L_IOST1+2(R5),R1
            51    D6    02EF    541          INCL    R1                          ; COUNT THE ERROR PAGE AS DONE
50    51    09    9C    02F1    542          ROTL    #9,R1,R0                    ; BYTE COUNT COMPLETED
   44 A5    50    C2    02F5    543          SUBL    R0,IRP$L_OBCNT(R5)          ; BYTE COUNT REMAINING
            25    13    02F9    544          BEQL    40$                         ; BRANCH IF NOTHING LEFT TO DO
      40 A5    D4    02FB    545          CLRL    IRP$L_ABCNT(R5)             ; ZERO ACCUMULATED BYTE COUNT
                     02FE    546
      30 A5    B4    02FE    547          CLRW    IRP$W_BOFF(R5)              ; ZERO BOFF AND
      44 A5    D0    0301    548          MOVL    IRP$L_OBCNT(R5)
      32 A5          0304    549                  IRP$L_BCNT(R5)              ; SET NEW BYTE COUNT
      48 A5    D6    0306    550          INCL    IRP$L_SEGVBN(R5)            ; SEGMENT VBN WAS POINTING AT ERROR VBN
   53    4C A5    D0    0309    551          MOVL    IRP$L_DIAGBUF(R5),R3        ; STARTING SVAPTE OF ENTIRE TRANSFER
4C A5     6341    DE    030D    552          MOVAL   (R3)[R1],IRP$L_DIAGBUF(R5) ; STARTING PTE ADDRESS OF THIS SEGMENT
                     0312    553
                     0312    554          .IF     DF,CA$_MEASURE_IOT
            53    DD    0312    555          PUSHL   R3                          ;REMEMBER SVAPTE
      53    55    D0    0314    556          MOVL    R5,R3                       ;SET ADR OF IRP
         FCE6'    30    0317    557          BSBW    PMS$START_RQ                ; INSERT START OF I/O REQUEST MESSAGE
            53 8ED0    031A    558          POPL    R3                          ;RESTORE SVAPTE
                     031D    559          .ENDC
                     031D    560
         00EB    31    031D    561          BRW     QNXTSEG                     ; QUEUE THIS SEGMENT AND RETURN TO IOPOST
      50    55    D0    0320    562 40$:     MOVL    R5,R0                       ; I/O PACKET ADDRESS
         FF45    31    0323    563          BRW     PAGIO_ERR_DONE
                     0326    564 ;
                     0326    565 ; PAGE WRITE ERROR - CLEAN UP LOGIC
                     0326    566 ;
                     0326    567 ;       R3 = PTE ADDRESS FOR ERROR PAGE
                     0326    568 ;       R4 = PCB ADDRESS
                     0326    569 ;       R5 = PROCESS HEADER ADDRESS
                     0326    570 ;       R6 = I/O REQUEST PACKET ADDRESS
                     0326    571 ;       R7 = 0 IF ALL COMPLETION LOGIC IS DONE IN IOPOST
                     0326    572 ;          = NON-ZERO IF COMPLETION (AND ERROR REPORT) ARE TO BE
                     0326    573 ;            RETURNED TO THE PROCESS.
                     0326    574 ;
                     0326    575 PAGWRT_ERR1:
            57    DD    0326    576          PUSHL   R7                          ; SAVE KERNEL AST FLAG
            09    EF    0328    577          EXTZV   #VA$V_VPN,-
                  17    032A    578                  #<32-VA$V_VPN>,-            ; PAGE COUNT TRANSFERRED
   50    3A A6          032B    579                  IRP$L_IOST1+2(R6),R0
            09    EF    032E    580          EXTZV   #VA$V_VPN,-
                  17    0330    581                  #<32-VA$V_VPN>,-            ; ORIGINAL PAGE COUNT
   57    44 A6          0331    582                  IRP$L_OBCNT(R6),R7
      57    50    C2    0334    583          SUBL    R0,R7                       ; COUNT OF REMAINING PAGES
            6E    D5    0337    584          TSTL    (SP)                        ; IF NOT REPORTING ERROR TO PROCESS
            03    12    0339    585          BNEQ    20$
      57    01    D0    033B    586          MOVL    #1,R7                       ; ONLY CLEAN UP THE ERROR PAGE HERE
                     033E    587                                              ; REST OF TRANSFER WILL BE DONE BY PAGIO_ERR
            7E    D4    033E    588 20$:     CLRL    -(SP)                       ; INIT "ERROR PAGE" FLAG
63    15    00    EF    0340    589          EXTZV   #PTE$V_PFN,#PTE$S_PFN,(R3),R0 ;GET PFN FROM PTE
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                50          0344
                50    D1    0345    590          CMPL    R0,MMG$GL_MAXPFN        ;IS THIS PAGE IN SHARED MEMORY?
      00000000'EF         0347
                25    1A    034C    591          BGTRU   130$                    ;BR IF PAGE IN SH MEM, NO PFN DATABASE
                53    DD    034E    592 70$:     PUSHL   R3                      ; SAVE SVAPTE
              0028    30    0350    593          BSBW    PFN_IO_DONE             ; COMPLETE I/O FOR THIS PAGE
  0000'DF40     07    E2    0353    594          BBSS    #PFN$V_MODIFY,@W^PFN$AB_STATE[R0],80$ ; FORCE MODIFY BIT
                00    0359
                      035A    595 80$:
                      035A    596 ;
                      035A    597 ; CONDITION CODES STILL SET FROM DECREF AT END OF PFN_IO_DONE
                      035A    598 ;
                10    14    035A    599          BGTR    120$                    ; BRANCH IF NOT THE LAST REFERENCE
  08 04 AE      00    E2    035C    600          BBSS    #0,4(SP),100$           ; BRANCH IF NOT ERROR PAGE
                      0361    601 ;
                      0361    602 ; THIS IS THE PAGE THAT HAD THE WRITE ERROR
                      0361    603 ;
          52    02    D0    0361    604          MOVL    #PFN$C_BADPAGLST,R2     ; PUT IT ON THE BAD PAGE LIST
              FC99'   30    0364    605          BSBW    MMG$INSPFNT             ; WITH "MODIFY" SET AND "BAD" CLEAR
                03    11    0367    606          BRB     120$
              FC94'   30    0369    607 100$:    BSBW    MMG$RELPFN              ; NO MORE REFERENCES, RELEASE THE PAGE
    53    8E    04    C1    036C    608 120$:    ADDL3   #4,(SP)+,R3             ; NEXT PTE ADDRESS
            DB 57   F5    0370    609          SOBGTR  R7,70$
                03    BA    0373    610 130$:    POPR    #^M<R0,R1>              ;CLEAN OFF BAD PAGE FLAG
                      0375    611                                             ; R1 = SAVED KERNEL AST INDICATOR
          57    51    D0    0375    612          MOVL    R1,R7                   ; PUT IT IN R7, SET CONDITION CODES
              FE54    31    0378    613          BRW     PAGWRT_ERR_DONE
                      037B    614 ;
                      037B    615 ; PFN_IO_DONE
                      037B    616 ;
                      037B    617 ; INPUTS:
                      037B    618 ;
                      037B    619 ;       R3 = SVAPTE
                      037B    620 ;       R4 = PROCESS CONTROL BLOCK ADDRESS OF PROCESS THAT REQUESTED THE I/O
                      037B    621 ;       R5 = PROCESS HEADER OF THE PROCESS THAT REQUESTED THIS I/O
                      037B    622 ;       R6 = I/O REQUEST PACKET ADDRESS
                      037B    623 ;
                      037B    624 ; OUTPUTS:
                      037B    625 ;
                      037B    626 ;       R0 = PFN
                      037B    627 ;       R3 PRESERVED
                      037B    628 ;       IRP$W_BOFF(R6) INCREMENTED IF THIS WAS A COLLISION PAGE
                      037B    629 ;       CONDITION CODES SET FROM DECW @W^PFN$AW_REFCNT[R0]
                      037B    630 ;
                      037B    631 PFN_IO_DONE:
  63    15    00    EF    037B    632          EXTZV   #PTE$V_PFN,#PTE$S_PFN,(R3),R0 ; GET PAGE FRAME NUMBER
                50          037F
              E8 8F   8B    0380    633          BICB3   #^C<PFN$M_COLLISION ! PFN$M_PAGTYP>,- ; FETCH THESE
  51    0000'DF40           0383    634                  @W^PFN$AB_TYPE[R0],R1   ; BITS FROM PFN TYPE BYTE
      09 51     04    E5    0388    635          BBCC    #PFN$V_COLLISION,R1,20$ ; CLEAR COLLISION BIT, BRANCH IF WAS CLEAR
  0000'DF40     10    8A    038C    636          BICB    #PFN$M_COLLISION,@W^PFN$AB_TYPE[R0] ; CLEAR IT IN PFN DATA
            30  A6    B6    0392    637          INCW    IRP$W_BOFF(R6)          ; MUST EMPTY THE COLLISION QUEUE
          04    51    91    0395    638 20$:     CMPB    R1,#PFN$C_PPGTBL        ; IF PROCESS PAGE TABLE PAGE
                07    12    0398    639          BNEQ    40$
      51    42  A5    3C    039A    640          MOVZWL  PHD$W_PHVINDEX(R5),R1   ; MUST COUNT ONE LESS
              FC5F'   30    039E    641          BSBW    MMG$DECPHDREF1          ; PROCESS HEADER REFERENCE
                      03A1    642 40$:     DECREF                              ; ONE LESS REFERENCE FOR THE PAGE
```

```
 05  03AB   643          RSB                 ; RETURN WITH CONDITION CODES SET
     03AC   644                               ; TO NEW STATE OF THE REFCNT
```

```
;RLRMXBCNT                                03AC     .2          .SBTTL  VIRTUAL (OR LOGICAL) I/O COMPLETION
;RLRMXBCNT                                03AC     .3 ;
;RLRMXBCNT                                03AC     .4 ; VIRTUAL (OR LOGICAL) I/O COMPLETION
-6                                        03AC    651 ;
                                          03AC    652 ; CALLING SEQUENCE:
                                          03AC    653 ;
                                          03AC    654 ;       BRW     VIRTUAL
                                          03AC    655 ;
                                          03AC    656 ; INPUTS:
                                          03AC    657 ;
                                          03AC    658 ;       R1 = REQUESTED BYTE COUNT, POSSIBLY DIFFERENT FROM TRANSFERRED
                                          03AC    659 ;            BYTE COUNT FOR MAGTAPE
                                          03AC    660 ;       R2 = IRP$W_BOFF CONTENTS
                                          03AC    661 ;       R3 = SVAPTE OF START OF TRANSFER
;ROW49597                                 03AC     .1 ;       R4 = PCB ADDRESS ASSOCIATED WITH THE PID IN THE PACKET
;RLRMXBCNT                                03AC     .2 ;       R5 = IRP ADDRESS
                                          03AC    662 ;
                                          03AC    663 ; OUTPUTS:
                                          03AC    664 ;
                                          03AC    665 ;       BRANCHES TO UNLOCK, PRESERVING R1,R2,R3
                                          03AC    666 ;       OR BRANCHES TO IOPOST
                                          03AC    667 ;
                                          03AC    668
                                          03AC    669         .ENABL  LSB
                                          03AC    670
;RLRMXBCNT                                03AC     .1 VIRTUAL_LOGIO:                          ; VIRTUAL (OR LOGICAL) I/O FUNCTION
;RLRMXBCNT              46 A5    B5       03AC     .2         TSTW    IRP$L_OBCNT+2(R5)         ; SEE IF BYTE COUNT > 64K
;RLRMXBCNT                 0F    13       03AF     .3         BEQL    1$                        ; EQL IMPLIES NO, BRANCH TO OLD CODE
;RLRMXBCNT                                03B1     .4
;RLRMXBCNT           50    3A A5    D0    03B1     .5         MOVL    IRP$L_IOST1+2(R5), R0     ; Else pickup new, longer count.
;RLRMXBCNT           40 A5    50    C0    03B5     .6         ADDL    R0, IRP$L_ABCNT(R5)       ; Accumulate total bytes transfered.
;RLRMXBCNT        3A A5    40 A5    D0    03B9     .7         MOVL    IRP$L_ABCNT(R5), -        ; Set accumulated bytes transfered.
;RLRMXBCNT                                03BE     .8                 IRP$L_IOST1+2(R5)
;RLRMXBCNT                 0D    11       03BE     .9         BRB     3$                        ; Rejoin common code.
;RLRMXBCNT                                03C0    .10
;RLRMXBCNT           50    3A A5    3C    03C0    .11 1$:     MOVZWL  IRP$L_IOST1+2(R5), R0     ; Get old bytes transfered count.
;RLRMXBCNT           40 A5    50    C0    03C4    .12         ADDL    R0, IRP$L_ABCNT(R5)       ; Accumulate total bytes transfered.
;RLRMXBCNT        3A A5    40 A5    B0    03C8    .13         MOVW    IRP$L_ABCNT(R5), -        ; Set accumulated bytes transfered.
;RLRMXBCNT                                03CD    .14                 IRP$L_IOST1+2(R5)         ; (Note movw due to code path that
;RLRMXBCNT                                03CD    .15                                           ; insures < 64K byte transfer.)
;RLRMXBCNT                                03CD    .16
;RLRMXBCNT                 50    DD       03CD    .17 3$:     PUSHL   R0                        ; Save # bytes transferred.
;RLRMXBCNT              51    50    D1    03CF    .18         CMPL    R0, R1                    ; Do bytes xfered and requested match?
;RLRMXBCNT                 13    13       03D2    .19         BEQL    9$                        ; Branch if they match.
;RLRMXBCNT           50    1C A5    D0    03D4    .20         MOVL    IRP$L_UCB(R5),R0          ; R0 => UCB.
;RLRMXBCNT                 05    E0       03D8    .21         BBS     S^#DEV$V_SQD,-
;RLRMXBCNT           0A 38 A0             03DA    .22                 UCB$L_DEVCHAR(R0),9$      ; If SET, sequential device
;RLRMXBCNT           06 38 A5    E9       03DD    .23         BLBC    IRP$L_IOST1(R5), 9$       ; If xfer count wrong, guarantee
;RLRMXBCNT            2234 8F    B0       03E1    .24         MOVW    #SS$_INCSEGTRA, -         ; that final status is an error
;RLRMXBCNT              38 A5              03E5
;RLRMXBCNT                                03E7    .25                 IRP$L_IOST1(R5)           ; (either the driver's or ours).
;RLRMXBCNT           8E    F7 8F    78    03E7    .26 9$:     ASHL    #-VA$S_BYTE,(SP)+, R0     ; Calculate number of blocks transfered.
                              50          03EB
;RLRMXBCNT           48 A5    50    C0    03EC    .27         ADDL    R0, IRP$L_SEGVBN(R5)      ; Calculate next disk segment address.
-20                    4C 38 A5    E9    03F0    691         BLBC    IRP$L_IOST1(R5),20$       ; IF LBC I/O ERROR
                    50    1C A5    D0    03F4    692         MOVL    IRP$L_UCB(R5),R0          ; GET ADDRESS OF DEVICE UCB
                 2E 38 A0    05    E0    03F8    693         BBS     S^#DEV$V_SQD,UCB$L_DEVCHAR(R0),10$ ; IF SET, SEQUENTIAL DEVICE
```

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                    40 A5    C3  03FD   694          SUBL3   IRP$L_ABCNT(R5),-
                    44 A5        0400   695                  IRP$L_OBCNT(R5),-       ; CALCULATE BYTES REMAINING
                    32 A5        0402   696                  IRP$L_BCNT(R5)          ;
                       25    13  0404   697          BEQL    10$                     ; IF EQL NONE
                51  F7 8F    78  0406   698          ASHL    #-VA$S_BYTE,R1,R1       ; CALCULATE NUMBER OF PAGES REQUESTED
                      51         040A
                             040B   699 QNXTSEG:
;STJ3100                     040B    .1 ;
;STJ3100                     040B    .2 ; ADVANCE THE SVAPTE TO POINT TO THE PORTION OF THE PAGE TABLES THAT MAP THE
;STJ3100                     040B    .3 ; BUFFER FOR THIS SEGMENT.  IF THIS IS AN ERASE I/O, DO NOT ADVANCE THE
;STJ3100                     040B    .4 ; SVAPTE, AS THE ENTIRE TRANSFER IS MAPPED BY A SINGLE PAGE TABLE PAGE.
;STJ3100                     040B    .5 ;
;STJ3100          0000'CF    D6  040B    .6          INCL    W^PMS$GL_SPLIT          ; COUNT A SPLIT TRANSFER
;STJ3100               0A    E1  040F    .7          BBC     #IO$V_ERASE,-           ; BRANCH IF NOT ERASE - UPDATE SVAPTE
;STJ3100          06 20 A5         0411    .8                  IRP$W_FUNC(R5),13$      ;
;STJ3100             02F9    30  0414    .9          BSBW    CHECK_ERASE             ; IS THIS AN ERASE I/O REQUEST
;STJ3100             05 50   E8  0417   .10          BLBS    R0,69$                  ; BRANCH IF YES - DO NOT ADVANCE SVAPTE
;STJ3100       2C A5   6341  DE  041A   .11 13$:     MOVAL   (R3)[R1],IRP$L_SVAPTE(R5) ; SET ADDRESS OF NEXT PTE ENTRY
;STJ3100          53    55   D0  041F   .12 69$:     MOVL    R5,R3                   ; COPY I/O REQUEST PACKET ADDRESS
;STJ3100          55  1C A3  D0  0422   .13          MOVL    IRP$L_UCB(R3),R5        ; COPY UCB ADDRESS
-4                      47    10  0426   704          BSBB    IOC$QNXTSEG             ; QUEUE THE NEXT VIRTUAL SEGMNET
                     FBE2    31  0428   705 5$:      BRW     IOPOST
                             042B   706 ;
                             042B   707 ; ALL SEGMENTS OF THIS TRANSFER ARE COMPLETE
                             042B   708 ;
                             042B   709 10$:
                51   44 A5   D0  042B   710          MOVL    IRP$L_OBCNT(R5),R1      ; GET ORIGINAL BYTE COUNT
                53   4C A5   D0  042F   711          MOVL    IRP$L_DIAGBUF(R5),R3    ; GET ORIGINAL PAGE TABLE ADDRESS
;STJ3085               04    12  0433    .1          BNEQ    15$                     ; NEQ implies IRP$L_DIAGBUF was valid.
;STJ3085          53   2C A5   D0  0435    .2          MOVL    IRP$L_SVAPTE(R5),R3     ; If not valid, then IRP$L_SVAPTE is.
;STJ3085          2C A5    53   D0  0439    .3 15$:     MOVL    R3,IRP$L_SVAPTE(R5)     ; SVAPTE MUST BE CORRECT
;STJ3085               FC51    31  043D    .4          BRW     UNLOCK                  ;
;STJ3085                       0440    .5
;STJ3085                       0440    .6 ;
;STJ3085                       0440    .7 ; I/O OPERATION ENDED WITH AN UNSUCCESSFUL STATUS
;STJ3085                       0440    .8 ;
;STJ3085                       0440    .9 ;                IF THE REQUEST IS  LOGICAL I/O, BRANCH BACK TO UNLOCK. (10$)
-4                             0440   716 ;
                               0440   717 ;                IF THE DEVICE IS A SEQUENTIAL DEVICE, THEN THE I/O PACKET IS
                               0440   718 ;                MERELY SENT TO THE ACP FOR NOTIFICATION OF THE ERROR.
                               0440   719 ;
                               0440   720 ;                IF THE DEVICE IS A RANDOM DEVICE, THEN THE VIRTUAL BLOCK NUMBER
                               0440   721 ;                STORED IN IRP$L_SEGVBN IS THE BLOCK THAT HAS AN ERROR.
                               0440   722 ;
                               0440   723
;RLRMXBCNTA                    0440    .1 20$:     BBC     #IRP$V_VIRTUAL,-
;RLRMXBCNTA          E6 2A A5  0442    .2                  IRP$W_STS(R5),10$       ; Branch IF Logical I/O
;RLRMXBCNTA             46 A5  B5  0445    .3          TSTW    IRP$L_OBCNT+2(R5)       ; SEE IF BYTE COUNT > 64K
;RLRMXBCNTA                05  13  0448    .4          BEQL    30$                     ; EQL implies < 64K.
;RLRMXBCNTA             3A A5  D4  044A    .5          CLRL    IRP$L_IOST1+2(R5)       ; Zero byte count before recycleing IRP
;RLRMXBCNTA                03  11  044D    .6          BRB     40$                     ; Branch around
;RLRMXBCNTA                       044F    .7 30$:
;RLRMXBCNTA             3A A5  B4  044F    .8          CLRW    IRP$L_IOST1+2(R5)       ; Zero byte count before recycleing IRP
;RLRMXBCNTA                       0452    .9 40$:
;RLRMXBCNTA             53   55  D0  0452   .10          MOVL    R5,R3                   ; COPY IRP ADDRESS
;ACG0421                  3E A4  B7  0455   .11          DECW    PCB$W_DIOCNT(R4)        ; ADJUST DIRECT I/O COUNT
;ACG0421          2A A3    10    AA  0458   .12          BICW    #IRP$M_VIRTUAL,IRP$W_STS(R3) ; CLEAR VIRTUAL I/O FLAG
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;ACG0421        2C A3   4C A3   D0  045C   .13         MOVL    IRP$L_DIAGBUF(R3),IRP$L_SVAPTE(R3) ; RESET PAGE TABLE ADDRESS
;ACG0421           52   44 A3   D0  0461   .14         MOVL    IRP$L_OBCNT(R3),R2      ; GET ORIGINAL BYTE COUNT
;ACG0421                009F   30  0465   .15         BSBW    IOC$QTOACP              ; QUEUE PACKET TO ACP
-6                        BE   11  0468   730         BRB     5$
                                   046A   731
                                   046A   732         .DSABL  LSB
```

```
                                    046A    734          .SBTTL  QUEUE NEXT SEGMENT
                                    046A    735 ;
                                    046A    736 ; FUNCTIONAL DESCRIPTION:
                                    046A    737 ;
                                    046A    738 ;       IOC$QNXTSEG PERFORMS THE FUNCTION OF QUEUEING THE NEXT
                                    046A    739 ;       SEGMENT OF A VIRTUAL I/O REQUEST THAT DID NOT MAP TO A
                                    046A    740 ;       SINGLE CONTIGUOUS I/O REQUEST.
                                    046A    741 ;
                                    046A    742 ; CALLING SEQUENCE:
                                    046A    743 ;
                                    046A    744 ;       BSBW    IOC$QNXTSEG
                                    046A    745 ;
                                    046A    746 ; INPUTS:
                                    046A    747 ;
                                    046A    748 ;       R3 = I/O REQUEST PACKET ADDRESS
                                    046A    749 ;       R4 = PCB ADDRESS ASSOCIATED WITH THE PID IN THE PACKET
                                    046A    750 ;       R5 = UCB ADDRESS OF THE ASSOCIATED DEVICE
                                    046A    751 ;
                                    046A    752 ; OUTPUTS:
                                    046A    753 ;
                                    046A    754 ;       R4 NOT PRESERVED
                                    046A    755 ;
;ACG0421                            046A     .1
;ACG0421                            046A     .2          .ENABLE LSB
;ACG0421                            046A     .3                                              ; Out of line code for Logical I/O.
;ACG0421                            046A     .4                                              ; This code mimics results of
;ACG0421                            046A     .5                                              ;  IOC$MAPVBLK for Logical I/O.
;ACG0421          51    50    D0    046A     .6 5$:      MOVL    R0,R1                       ; Namely R1 = LBN.
;ACG0421                24    11    046D     .7          BRB     10$                         ; Branch back to common code.
;ACG0421                            046F     .8
                                    046F    756 IOC$QNXTSEG::
          52    18 A3    D0    046F    757          MOVL    IRP$L_WIND(R3),R2               ; GET ADDRESS OF MAPPING WINDOW
          51    32 A3    D0    0473    758          MOVL    IRP$L_BCNT(R3),R1               ; GET SIZE OF NEXT SEGMENT
          50    48 A3    D0    0477    759          MOVL    IRP$L_SEGVBN(R3),R0             ; GET STARTING VIRTUAL BLOCK NUMBER
                                    047B    760 ;
                                    047B    761 ; ALTERNATE ENTRY TO IOC$QNXTSEG:
                                    047B    762 ;
                                    047B    763 ;       BSBW    IOC$QNXTSEG1
                                    047B    764 ;
                                    047B    765 ; ADDITIONAL INPUTS:
                                    047B    766 ;
                                    047B    767 ;       R0 = VIRTUAL BLOCK NUMBER OF START OF NEXT SEGMENT
                                    047B    768 ;       R1 = DESIRED BYTE COUNT OF NEXT SEGMENT
                                    047B    769 ;       R2 = WINDOW ADDRESS
                                    047B    770 ;
                                    047B    771 IOC$QNXTSEG1::
            3E A4    B7    047B    772          DECW    PCB$W_DIOCNT(R4)                ; ADJUST THE DIRECT I/O COUNT
;ADE9005          04    E1    047E     .1          BBC     #IRP$V_VIRTUAL,-                ; Branch to out of line code if this
;ADE9005       E7 2A A3         0480     .2                  IRP$W_STS(R3),5$                ;  is Logical I/O.
;ADE9005  00000000'GF    16    0483     .3          JSB     G^IOC$MAPVBLK                   ; MAP VIRTUAL TO LOGICAL BLOCK
;ACG0422     1C A3    55    D0    0489     .4          MOVL    R5,IRP$L_UCB(R3)                ; STORE POSSIBLY MODIFIED UCB ADDRESS
;ACG0422     32 A3    52    C2    048D     .5          SUBL    R2,IRP$L_BCNT(R3)               ; CALCULATE SIZE OF NEXT SEGMENT
;ACG0422           74    13    0491     .6          BEQL    30$                             ; IF EQL TOTAL MAP FAILURE
;ACG0422     52    00B4 C5    D0    0493     .7 10$:     MOVL    UCB$L_MAXBCNT(R5),R2            ; R2 = 0 or Max. permissible BCNT.
;ACG0422           05    12    0498     .8          BNEQ    15$                             ; NEQ implies Max. permissible BCNT in R0.
;ACG0422     52    FE00 8F    3C    049A     .9          MOVZWL  #512*127,R2             ; If 0, use default Max. permissible.
;ACG0422           0A    E1    049F    .10 15$:     BBC     #IO$V_ERASE,-                   ; BRANCH IF DEFINITELY NOT AN ERASE
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;ACG0422                20 20 A3        04A1   .11                      IRP$W_FUNC(R3),17$      ;
;ACG0422                   55   DD      04A4   .12          PUSHL   R5                      ; SAVE UCB ADDRESS
;ACG0422                55 53   D0      04A6   .13          MOVL    R3,R5                   ; COPY IRP ADDRESS
;ACG0422                   0264 30      04A9   .14          BSBW    CHECK_ERASE             ; IS THIS AN ERASE FUNCTION?
;ACG0422                   55 8ED0      04AC   .15          POPL    R5                      ; RESTORE UCB ADDRESS
;ACG0422                12 50   E9      04AF   .16          BLBC    R0,17$                  ; BRANCH IF IT IS NOT AN ERASE
;ACG0422                2C A3   D5      04B2   .17          TSTL    IRP$L_SVAPTE(R3)        ; ARE WE USING A DUMMY PAGE TABLE?
;ACG0422                   0D   13      04B5   .18          BEQL    17$                     ; BRANCH IF NOT
;ACG0422             50 FE00 8F   3C      04B7   .19          MOVZWL  #512*127,R0             ; GET MAX BYTE COUNT FOR PPT
;ACG0422                50   52   D1      04BC   .20          CMPL    R2,R0                   ; CHECK LIMIT AGAINST MAX
;ACG0422                   03   1B      04BF   .21          BLEQU   17$                     ; BRANCH IF OK
;ACG0422                52   50   D0      04C1   .22          MOVL    R0,R2                   ; LIMIT TRANSFER TO PPT SIZE
;ACG0422                         04C4   .23
;ACG0422              32 A3   52   D1      04C4   .24 17$:     CMPL    R2,IRP$L_BCNT(R3)       ; See if BCNT too large.
;ROW0218                      04   1E      04C8   .25          BGEQU   20$                     ; GEQU implies we are OK.
;RLRMXBCNT            32 A3   52   D0      04CA   .26          MOVL    R2,IRP$L_BCNT(R3)       ; Else scale down to maximum allowed.
;RLRMXBCNT                       04CE   .27 20$:
-5                   52   32 A3   D0      04CE   778         MOVL    IRP$L_BCNT(R3),R2       ; GET TRANSFER BYTE COUNT
                             52   D7      04D2   779         DECL    R2                      ; ROUND DOWN AND...
                     52   F7 8F   78      04D4   780         ASHL    #-VA$S_BYTE,R2,R2       ; SHIFT DOWN FOR BLOCK COUNT - 1
                             52           04D8
                        52   51   C0      04D9   781         ADDL    R1,R2                   ; COMPUTE ENDING BLOCK NUMBER
                             13   1F      04DC   782         BCS     25$                     ; BRANCH ON OVERFLOW
                   00B0 C5   52   D1      04DE   783         CMPL    R2,UCB$L_MAXBLOCK(R5)   ; AND CHECK AGAINST DEVICE SIZE
                             0C   1E      04E3   784         BGEQU   25$                     ; BRANCH IF NOT LEGAL
;ACG0421                50   51   D0      04E5    .1         MOVL    R1,R0                   ; COPY STARTING LOGICAL BLOCK NUMBER
;ADE9005              00000000'GF   16      04E8    .2         JSB     G^IOC$CVTLOGPHY         ; CONVERT LOGICAL TO PHYSICAL BLOCK
-1                         FB0F'   31      04EE   786         BRW     EXE$INSIOQ              ; INSERT I/O PACKET IN DEVICE QUEUE
                                   04F1   787                                                 ; AND RETURN
                                   04F1   788 ;
                                   04F1   789 ; TO HERE IF THE VIRTUAL BLOCKS MAP OFF THE END OF THE VOLUME. COMPLETE THE
                                   04F1   790 ; I/O WITH AN ERROR. WE QUEUE THE PACKET FOR PROCESSING, RATHER THAN WANDERING
                                   04F1   791 ; OFF INTO THE COMPLETION CODE BECAUSE THIS IS A GENERALLY CALLABLE ROUTINE.
                                   04F1   792 ;
                      00DC 8F   3C      04F1   793 25$:     MOVZWL  #SS$_ILLBLKNUM,IRP$L_IOST1(R3) ; SET ILLEGAL BLOCK NUMBER STATUS
                         38 A3          04F5
                         3C A3   D4      04F7   794         CLRL    IRP$L_IOST2(R3)         ; ZERO 2ND I/O STATUS LONGWORD
                             63   0E      04FA   795         INSQUE  (R3),@IOC$GL_PSBL       ; INSERT AT TAIL OF I/O POST QUEUE
                   00000000'FF            04FC
                             03   12      0501   796         BNEQ    26$                     ; BRANCH IF NOT EMPTY
                                  05       0503   797         SOFTINT #IPL$_IOPOST            ; WAKE UP I/O COMPLETION
                                           0506   798 26$:     RSB
                                           0507   799
                                           0507   800 30$:
;ACG0421                                    0507    .1         .DISABLE LSB
                                           0507   801 ;
                                           0507   802 ; ALTERNATE ENTRY TO IOC$WAKACP:
                                           0507   803 ;
                                           0507   804 ;       BSBW    IOC$QTOACP
                                           0507   805 ;
                                           0507   806 ; INPUTS:
                                           0507   807 ;
                                           0507   808 ;       R2 = DESIRED BYTE COUNT
                                           0507   809 ;       R3 = IRP ADDRESS
                                           0507   810 ;       PCB$W_DIOCNT(R4) ALREADY DECREMENTED
                                           0507   811 ;
                                           0507   812 IOC$QTOACP:
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                32 A3    52    DO  0507   813          MOVL    R2,IRP$L_BCNT(R3)       ; SET REMAINING BYTES TO TRANSFER
                52    18 A3    DO  050B   814          MOVL    IRP$L_WIND(R3),R2       ; GET WINDOW ADDRESS
                0B A2    02    E0  050F   815          BBS     #WCB$V_NOTFCP,WCB$B_ACCESS(R2),- ; IF SET THEN
                         4E        0513   816                  NOTFCPWCB               ; NOT FCP WINDOW
                52    1C A3    DO  0514   817          MOVL    IRP$L_UCB(R3),R2        ; GET ADDRESS OF DEVICE UCB
                                   0518   818 ;
                                   0518   819 ; FUNCTIONAL DESCRIPTION:
                                   0518   820 ;
                                   0518   821 ;        SUBROUTINE TO QUEUE AN I/O PACKET FOR AN ACP PROCESS AND WAKE
                                   0518   822 ;        THE PROCESS IF ITS QUEUE WAS PREVIOUSLY EMPTY.
                                   0518   823 ;
                                   0518   824 ; CALLING SEQUENCE:
                                   0518   825 ;
                                   0518   826 ;        BSBW    IOC$WAKACP
                                   0518   827 ;
                                   0518   828 ; INPUTS:
                                   0518   829 ;
                                   0518   830 ;        R2 = DEVICE UCB ADDRESS
                                   0518   831 ;        R3 = I/O REQUEST PACKET ADDRESS
                                   0518   832 ;
                                   0518   833 ; OUTPUTS:
                                   0518   834 ;
                                   0518   835 ;        R4 ALTERED
                                   0518   836 ;
;CDS0001                            0518    .1          .ENABL  LSB
;CDS0001                            0518    .2 IOC$WAKACP::                         ; QUEUE I/O PACKET AND WAKE ACP PROCESS
;CDS0001                            0518    .3          DSBINT  #IPL$_SYNCH         ; SYNCHRONIZE ACCESS TO SYSTEM DATA BASE
;CDS0001         52    34 A2    DO  051E    .4          MOVL    UCB$L_VCB(R2),R2    ; GET ASSOCIATED VCB ADDRESS
;CDS0001         52    10 A2    DO  0522    .5          MOVL    VCB$L_AQB(R2),R2    ; GET ACP QUEUE BLOCK ADDRESS
;CDS0001               0C A2    D5  0526    .6          TSTL    AQB$L_ACPPID(R2)    ; PROCEDURE BASED? NO PID IF SO
;CDS0001                  17    13  0529    .7          BEQL    XQP                 ; EQL THEN IS NOT AN ACP
-4                     FAD2'    30  052B   841          BSBW    EXE$INSERTIRP       ; INSERT I/O PACKET IN ACP QUEUE
                         0E    12  052E   842          BNEQ    10$                 ; IF NEQ NOT FIRST IN QUEUE
                51    0C A2    DO  0530   843          MOVL    AQB$L_ACPPID(R2),R1 ; GET ACP PROCESS ID
                       FAC9'    30  0534   844          BSBW    SCH$WAKE            ; WAKE ACP PROCESS
                      04 50    E8  0537   845          BLBS    R0,10$              ; IF LBS ACP STILL PRESENT
                                   053A   846          BUG_CHECK NONEXSTACP        ; NONEXISTENT ACP PROCESS
                                   053E   847 10$:      ENBINT                      ; RESTORE SAVED IPL
                               05  0541   848          RSB                         ;
                                   0542   849 ;
;CDS0002                            0542    .1 ; THIS VOLUME IS BEING HANDLED BY AN XQP INSTEAD OF AN ACP.  CALL THE
;CDS0002                            0542    .2 ; XQP QUEUEING ROUTINE AS A SPECIAL KERNEL AST TO GET IN THE CONTEXT
;CDS0002                            0542    .3 ; OF THE PROCESS THAT INITIATED THIS REQUEST TO HANDLE IT.
;CDS0002                            0542    .4 ;
;CDS0002                            0542    .5
;CDS0002                            0542    .6 XQP:
;CDS0002                  55    DD  0542    .7          PUSHL   R5                  ; PRESERVE R5.
;CDS0002            55    60 A3    9E  0544    .8          MOVAB   IRP$L_FQFL(R3), R5  ; GET TEMP ACB ADDR INTO R5.
;CDS0002      0B A5    80 8F    90  0548    .9          MOVB    #ACB$M_KAST, ACB$B_RMOD(R5) ; NOTE AS SPECIAL KERNEL AST
;CDS0002      0C A5    0C A3    D0  054D   .10          MOVL    IRP$L_PID(R3), ACB$L_PID(R5) ; COPY PID OF PROCESS.
;CDS0002           0000'CF    9E  0552   .11          MOVAB   W^EXE$QXQPPKT, ACB$L_KAST(R5) ; ADDR OF QUEUEING ROUTINE.
                    18 A5        0556
;CDS0002                  52    D4  0558   .12          CLRL    R2                  ; NO PRIORITY INCREMENT.
;CDS0002                FAA3'    30  055A   .13          BSBW    SCH$QAST            ; QUEUE THE AST.
;CDS0002                   55 8ED0  055D   .14          POPL    R5                  ; RESTORE R5.
;CDS0002                   DC    11  0560   .15          BRB     10$                 ; BRANCH TO EXIT.
;CDS0002                           0562   .16
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;CDS0002
;CDS0002

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0562   .17          .DSABL  LSB
0562   .18 ;
0562   850 ; WINDOW IS NOT AN FCP WINDOW, ONLY USED FOR BOOT TIME INTIALIZED WINDOWS
0562   851 ; FOR CONTIGUOUS FILES.  IT IS NOT POSSIBLE TO NEED TO TURN SUCH A WINDOW.
0562   852 ;
0562   853 NOTFCPWCB:
0562   854          BUG_CHECK NOTFCPWCB,FATAL
```

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                     0566   856          .SBTTL  BUFFERED READ COMPLETION AST ROUTINE
                     0566   857 ;++
                     0566   858 ; FUNCTIONAL DESCRIPTION:
                     0566   859 ;
                     0566   860 ;       BUFPOST PERFORMS ALL NECESSARY COMPLETION OPERATIONS REQUIRED
                     0566   861 ;       FOR A BUFFERED READ OPERATION IN THE CONTEXT OF THE PROCESS
                     0566   862 ;       ISSUING THE I/O REQUEST.
                     0566   863 ;
                     0566   864 ; CALLING SEQUENCE:
                     0566   865 ;
                     0566   866 ;       JSB     BUFPOST
                     0566   867 ;
                     0566   868 ; INPUT PARAMETERS:
                     0566   869 ;
                     0566   870 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                     0566   871 ;       R5 = IRP/AST CONTROL BLOCK.
                     0566   872 ;
                     0566   873 ; IMPLICIT INPUTS:
                     0566   874 ;
                     0566   875 ;       SCH$GL_CURPCB - POINTER TO PCB OF CURRENT PROCESS
                     0566   876 ;--
                     0566   877
                     0566   878 BUFPOST:                                    ; BUFFERED READ COMPLETION
     00E0 8F    BB   0566   879          PUSHR   #^M<R5,R6,R7>              ; SAVE REGISTERS
 56   2C A5    D0   056A   880          MOVL    IRP$L_SVAPTE(R5),R6        ; GET ADDRESS OF I/O BUFFER
 57   32 A5    D0   056E   881          MOVL    IRP$L_BCNT(R5),R7          ; GET COUNT OF BYTES OR DESCRIPTORS
4B 2A A5   03    E1   0572   882          BBC     #IRP$V_COMPLX,IRP$W_STS(R5),40$ ;IF CLR, NOT COMPLEX BUFFER FORMAT
59 2A A5   05    E0   0577   883          BBS     #IRP$V_CHAINED,IRP$W_STS(R5),50$ ;IF SET ,CHAINED BUFFERS
     56   66    D0   057C   884          MOVL    (R6),R6                    ; GET ADDRESS OF FIRST BUFFER DESCRIPTOR
 50    02 A6    3C   057F   885 10$:     MOVZWL  2(R6),R0                   ; GET COUNT OF BYTES TO TRANSFER
         32    13   0583   886          BEQL    30$                        ; IF EQL NONE THIS DESCRIPTOR
 51    04 A6    D0   0585   887          MOVL    4(R6),R1                   ; GET ADDRESS OF USER BUFFER
     50   51    C0   0589   888          ADDL    R1,R0                      ; CALCULATE ENDING ADDRESS OF BUFFER
 51   01FF 8F    AA   058C   889          BICW    #VA$M_BYTE,R1              ; TRUNCATE ADDRESS TO PAGE BOUNDARY
     50   51    C2   0591   890          SUBL    R1,R0                      ; COMPUTE NUMBER OF BYTES TO PROBE
     54   66    3C   0594   891          MOVZWL  (R6),R4                    ; GET OFFSET TO DATA AREA
 53   FE00 8F    32   0597   892          CVTWL   #-^X200,R3                 ; SET ADDITION CONSTANT
                     059C   893 20$:     IFNOWRT R0,(R1),35$,(R6)[R4]       ; CAN BUFFER BE WRITTEN?
     51   53    C2   05A3   894          SUBL    R3,R1                      ; UPDATE ADDRESS OF BUFFER
 50   6043    3E   05A6   895          MOVAW   (R0)[R3],R0                ; UPDATE REMAINING LENGTH
         F0    14   05AA   896          BGTR    20$                        ; IF GEQ MORE TO CHECK
       02 A6    28   05AC   897          MOVC    2(R6),1(R6)[R4],@4(R6)     ; MOVE DATA TO USER BUFFER
     01 A644          05AF
       04 B6          05B2
     55   6E    D0   05B4   898          MOVL    (SP),R5                    ; RESTORE ADDRESS OF I/O PACKET
     56   08    C0   05B7   899 30$:     ADDL    #8,R6                      ; ADVANCE TO NEXT BUFFER DESCRIPTOR
       C2 57    F5   05BA   900          SOBGTR  R7,10$                     ; ANY MORE DESCRIPTORS TO PROCESS?
         007D    31   05BD   901          BRW     130$                       ;
           78    11   05C0   902 35$:     BRB     120$                       ; CONTINUE
         017E    30   05C2   903 40$:     BSBW    MOVBUF                     ; MOVE BUFFER TO USER
     55   6E    D0   05C5   904          MOVL    (SP),R5                    ; RETRIEVE ADDRESS OF I/O PACKET
70 2A A5   0A    E1   05C8   905          BBC     #IRP$V_MBXIO,IRP$W_STS(R5),130$; BR IF NOT MAILBOX READ
     50   02    9A   05CD   906          MOVZBL  #RSN$_MAILBOX,R0           ; SET UP RESOURCE RELEASE
         FA2D    30   05D0   907          BSBW    SCH$RAVAIL                 ; DECLARE MAILBOX RESOURCE AVAILABLE
           68    11   05D3   908          BRB     130$                       ;
                     05D5   909
                     05D5   910 ;
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                        05D5   911 ; NB: THE FOLLOWING SECTION OF CODE USES A WORD-SIZE BUFFER LENGTH
                        05D5   912 ;     (ALTHOUGH IRP$L_BCNT WAS EXPANDED TO BE A LONGWORD).
                        05D5   913 ;
     50    57   D0   05D5   914 50$:    MOVL    R7,R0                          ; SET LENGTH OF USER BUFFER
   51    04 A6   D0   05D8   915         MOVL    4(R6),R1                       ; SET ADDRESS OF USER BUFFER
     50    51   C0   05DC   916         ADDL    R1,R0                          ; CALCULATE END OF USER BUFFER
51   01FF 8F   AA   05DF   917         BICW    #VA$M_BYTE,R1                  ; TRUNCATE TO PAGE BOUNDARY
     50    51   C2   05E4   918         SUBL    R1,R0                          ; COMPUTE NUMBER OF BYTES TO PROBE
     02    00   EF   05E7   919         EXTZV   #0,#2,IRP$B_RMOD(R5),R2        ; GET REQUEST ACCESS MODE
   52    0B A5        05EA
53   FE00 8F   32   05ED   920         CVTWL   #-^X200,R3                     ; SET ADDITION CONSTANT
                        05F2   921 60$:    IFNOWRT R0,(R1),90$,R2                 ; CAN BUFFER BE WRITTEN?
     51    53   C2   05F8   922         SUBL    R3,R1                          ; UPDATE ADDRESS OF BUFFER
   50    6043   3E   05FB   923         MOVAW   (R0)[R3],R0                    ; CALCULATE NEW LENGTH
           F1   14   05FF   924         BGTR    60$                            ; IF GEQ MORE TO PROBE
   53    04 A6   D0   0601   925         MOVL    4(R6),R3                       ; GET STARTING ADDRESS OF USER BUFFER
 0C A6    57   B1   0605   926 70$:    CMPW    R7,CXB$W_LENGTH(R6)            ; REMAINING LENGTH LARGER THAN DATA AREA?
           04   1E   0609   927         BGEQU   80$                            ; IF GEQU YES
 0C A6    57   B0   060B   928         MOVW    R7,CXB$W_LENGTH(R6)            ; TRUNCATE LENGTH OF DATA AREA
 96   0C A6   28   060F   929 80$:    MOVC    CXB$W_LENGTH(R6),@(R6)+,(R3) ; MOVE DATA TO USER BUFFER
           63        0613
     55    6E   D0   0614   930         MOVL    (SP),R5                        ; RETRIEVE ADDRESS OF I/O PACKET
 57   08 A6   A2   0617   931         SUBW    CXB$W_LENGTH-4(R6),R7          ; REDUCE REMAINING BYTES TO TRANSFER
           0B   13   061B   932         BEQL    100$                           ; IF EQL DONE
 56   0C A6   D0   061D   933         MOVL    CXB$L_LINK-4(R6),R6            ; GET ADDRESS OF NEXT BUFFER IN CHAIN
           E2   12   0621   934         BNEQ    70$                            ; IF NEQ MORE TO GO
           03   11   0623   935         BRB     100$                           ;
         0138   30   0625   936 90$:    BSBW    ACCVIO                         ; SET ACCESS VIOLATION
 50   2C A5   D0   0628   937 100$:   MOVL    IRP$L_SVAPTE(R5),R0            ; GET ADDRESS OF FIRST BUFFER
 56   10 A0   D0   062C   938 110$:   MOVL    CXB$L_LINK(R0),R6              ; GET ADDRESS OF NEXT BUFFER
           0F   13   0630   939         BEQL    140$                           ; IF EQL NONE
        F9CB'   30   0632   940         BSBW    EXE$DEANONPAGED                ; DEALLOCATE BUFFER
     50    56   D0   0635   941         MOVL    R6,R0                          ; SET ADDRESS OF NEXT BUFFER
           F2   11   0638   942         BRB     110$                           ;
         0123   30   063A   943 120$:   BSBW    ACCVIO                         ; SET ACCESS VIOLATION STATUS
 50   2C A5   D0   063D   944 130$:   MOVL    IRP$L_SVAPTE(R5),R0            ; GET ADDRESS OF BUFFER TO RELEASE
        F9BC'   30   0641   945 140$:   BSBW    EXE$DEANONPAGED                ; DEALLOCATE BUFFER
     00E0 8F   BA   0644   946         POPR    #^M<R5,R6,R7>                  ; RESTORE REGISTERS
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                                0648   948          SBTTL  DIRECT I/O COMPLETION AST ROUTINE
                                0648   949 ;++
                                0648   950 ; FUNCTIONAL DESCRIPTION:
                                0648   951 ;
                                0648   952 ;       DIRPOST PERFORMS ALL GENERAL I/O COMPLETION ACTIVITIES WHICH
                                0648   953 ;       MUST BE DONE IN THE CONTEXT OF THE PROCESS. THESE INCLUDE
                                0648   954 ;       I/O STATUS POSTING IF AN IOSB WAS SPECIFIED, CHANNEL CONTROL
                                0648   955 ;       BLOCK ACTIVITY COUNT DECREMENTING, QUEUEING OF ANY REQUESTED
                                0648   956 ;       AST OR RELEASE OF THE I/O REQUEST PACKET.
                                0648   957 ;
                                0648   958 ; CALLING SEQUENCE:
                                0648   959 ;
                                0648   960 ;       JSB     DIRPOST
                                0648   961 ;
                                0648   962 ; INPUT PARAMETERS:
                                0648   963 ;
                                0648   964 ;       R4 = CURRENT PROCESS PCB ADDRESS.
                                0648   965 ;       R5 = IRP/AST CONTROL BLOCK ADDRESS.
                                0648   966 ;
                                0648   967 ; IMPLICIT INPUTS:
                                0648   968 ;
                                0648   969 ;       SCH$GL_CURPCB - POINTER TO CURRENT PCB
                                0648   970 ;--
                                0648   971
                                0648   972 DIRPOST:                                       ; DIRECT I/O POSTING AST
          01    00    EF        0648   973          EXTZV   #IRP$V_BUFIO,#1,IRP$W_STS(R5),R0 ; GET INDEX TO ACCOUNTING ENTRY
     50    2A A5                064B
    00000000'9F    D0          064E   974          MOVL    @#CTL$GL_PHD,R1                 ; GET PROCESS HEADER ADDRESS
           51                   0654
       54 A140     D6          0655   975          INCL    PHD$L_DIOCNT(R1)[R0]            ; ACCOUNT FOR BUFFERED OR DIRECT I/O
                                0659   976
            00000002            0659   977          .IF NE  CA$_MEASURE                     ; CHECK FOR MEASUREMENT ENABLED
  00000000'EF40     D6          0659   978          INCL    PMS$GL_DIRIO[R0]                ; UPDATE MEASUREMENT I/O COUNTER
                                0660   979          .ENDC
                                0660   980
 1D 2A A5    07     E1          0660   981          BBC     #IRP$V_DIAGBUF,IRP$W_STS(R5),10$ ; IF CLR, NO DIAGNOSTIC BUFFER
       00E0 8F      BB          0665   982          PUSHR   #^M<R5,R6,R7>                   ; SAVE REGISTERS
     56    4C A5    D0          0669   983          MOVL    IRP$L_DIAGBUF(R5),R6            ; GET ADDRESS OF DIAGNOSTIC BUFFER
     57    08 A6    3C          066D   984          MOVZWL  IRP$W_SIZE(R6),R7               ; GET SIZE OF DIAGNOSTIC BUFFER
        57    0C    C2          0671   985          SUBL    #12,R7                          ; REDUCE BY SIZE OF BUFFER HEADER
           00CC     30          0674   986          BSBW    MOVBUF                          ; MOVE DIAGNOSTIC INFORMATION TO USER
       00E0 8F      BA          0677   987          POPR    #^M<R5,R6,R7>                   ; RESTORE REGISTERS
     50    4C A5    D0          067B   988          MOVL    IRP$L_DIAGBUF(R5),R0            ; RETRIEVE ADDRESS OF DIAGNOSTIC BUFFER
           F97E'    30          067F   989          BSBW    EXE$DEANONPAGED                 ; DEALLOCATE DIAGNOSTIC BUFFER
     50    28 A5    32          0682   990 10$:     CVTWL   IRP$W_CHAN(R5),R0               ; GET CHANNEL NUMBER (NEGATED)
  00000000'FF40     9E          0686   991          MOVAB   @CTL$GL_CCBBASE[R0],R1          ; SET CCB BASE ADDRESS
           51                   068D
           0A A1    B7          068E   992          DECW    CCB$W_IOC(R1)                   ; DECREMENT I/O COUNT FOR CHANNEL
              13    12          0691   993          BNEQ    30$                             ; NOT IDLE YET
     53    0C A1    D0          0693   994          MOVL    CCB$L_DIRP(R1),R3               ; GET ADDRESS OF DEACCESS PACKET
              0D    13          0697   995          BEQL    30$                             ; IF EQL NONE
           0C A1    D4          0699   996          CLRL    CCB$L_DIRP(R1)                  ; CLEAR ADDRESS OF DEACCESS PACKET
           0A A1    B6          069C   997          INCW    CCB$W_IOC(R1)                   ; ACCOUNT FOR DEACCESS
;LJK45299
     52    1C A3    D0          069F    .1          MOVL    IRP$L_UCB(R3),R2                ; GET ASSIGNED DEVICE UCB ADDRESS
-1
            FE72     30          06A3   999          BSBW    IOC$WAKACP                      ; QUEUE I/O PACKET AND WAKE ACP
                                06A6  1000                                                  ; R4 ALTERERED
                                06A6  1001 30$:
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                                06A6  1002 ;
                                06A6  1003 ; R4 DOES NOT NECESSARILY HAVE CURRENT PCB ADDRESS IN IT AT THIS POINT
                                06A6  1004 ;
                                06A6  1005 IOC$DIRPOST1::
          50    24 A5    D0     06A6  1006          MOVL    IRP$L_IOSB(R5),R0        ; GET IOSB ADDRESS
                   10    13     06AA  1007          BEQL    35$                      ; IF EQL NONE SPECIFIED
             02    00    EF     06AC  1008          EXTZV   #0,#2,IRP$B_RMOD(R5),R1  ; GET REQUEST ACCESS MODE
          51    0B A5           06AF
                                06B2  1009          IFNOWRT #8,(R0),35$,R1           ; CAN I/O STATUS BE WRITTEN?
          60    38 A5    7D     06B8  1010          MOVQ    IRP$L_IOST1(R5),(R0)     ; MOVE STATUS INTO IOSB
          51    0C A5    D0     06BC  1011 35$:     MOVL    IRP$L_PID(R5),R1         ; PROCESS IDENTIFICATION
;WMC0020 17 2A A5    0B    E0     06C0    .1          BBS     #IRP$V_EXTEND,IRP$W_STS(R5),50$ ; BRANCH TO DEALLOCATE IRPE'S
;WMC0020 05 0B A5    06    E1     06C5    .2 37$:     BBC     #ACB$V_QUOTA,IRP$B_RMOD(R5),40$ ; IF CLR, NO AST SPECIFIED
;WMC0020             52    D4     06CA    .3          CLRL    R2                       ; SET NULL PRIORITY INCREMENT
;WMC0020          F931'    31     06CC    .4          BRW     SCH$QAST                 ; QUEUE AST FOR REQUESTOR
;STJ3049             0A    E1     06CF    .5 40$:     BBC     #IO$V_ERASE,-            ; BRANCH IF NOT AN ERASE REQUEST
;STJ3049       02 20 A5           06D1    .6                  IRP$W_FUNC(R5),42$       ;
;STJ3049             1F    10     06D4    .7          BSBB    CLEANUP_ERASE            ; CLEAN UP AFTER AN ERASE REQUEST
;STJ3049          50    55    D0     06D6    .8 42$:     MOVL    R5,R0                    ; SETUP ADDRESS FOR DEALLOCATE
;STJ3049          F924'    31     06D9    .9          BRW     EXE$DEANONPAGED          ; AND RELEASE I/O PACKET
;STJ3049                            06DC   .10
-11                                 06DC  1023          ;
                                06DC  1024          ; DEALLOCATE IRPE'S
                                06DC  1025          ;
                                06DC  1026
          50    54 A5    D0     06DC  1027 50$:     MOVL    IRP$L_EXTEND(R5),R0      ; GET ADDRESS OF FIRST IRPE
                                06E0  1028
                   54    D4     06E0  1029 60$:     CLRL    R4                       ; WILL HOLD ADDRESS OF NEXT IRPE
04 2A A0    0B    E1     06E2  1030          BBC     #IRPE$V_EXTEND,IRPE$W_STS(R0),70$ ; BR. IF NO MORE IRPE'S
          54    54 A0    D0     06E7  1031          MOVL    IRPE$L_EXTEND(R0),R4     ; SAVE ADDRESS OF NEXT IRPE
             F912'    30     06EB  1032 70$:     BSBW    EXE$DEANONPAGED          ; DEALLOCATE IRPE POINTED TO BY R0
          50    54    D0     06EE  1033          MOVL    R4,R0                    ; PUT ADDRESS OF NEXT IRPE IN R0
                   ED    12     06F1  1034          BNEQ    60$                      ; BR. IF THERE IS ANOTHER IRPE
                   D0    11     06F3  1035          BRB     37$                      ; DONE DEALLOCATING IRPE'S
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;WMC0019                                 06F5    .1          .SBTTL  ERASE I/O HELPER ROUTINES
;WMC0019                                 06F5    .2          ;++
;WMC0019                                 06F5    .3          ; CLEANUP_ERASE
;WMC0019                                 06F5    .4          ;
;WMC0019                                 06F5    .5          ; LOCAL SUBROUTINE TO FINISH PROCESSING AN ERASE REQUEST
;WMC0019                                 06F5    .6          ; THE CLEANUP WILL VARY WITH THE TYPE OF ERASE REQUEST.
;WMC0019                                 06F5    .7          ; SEE THE ROUTINE HEADER OF THE SUBROUTINE "SETUP_ERASE"
;WMC0019                                 06F5    .8          ; IN SYSACPFDT FOR DETAILS.
;WMC0019                                 06F5    .9          ;
;WMC0019                                 06F5   .10          ; INPUT:        R5 = IRP ADDRESS
;WMC0019                                 06F5   .11          ; OUTPUT:       NONE.
;WMC0019                                 06F5   .12          ;--
;WMC0019                                 06F5   .13
;WMC0019                                 06F5   .14 CLEANUP_ERASE:                           ; FINISH UP AFTER AN ERASE REQUEST
;WMC0019                      19   10    06F5   .15          BSBB    CHECK_ERASE             ; IS THIS AN ERASE I/O?
;WMC0019                   15 50   E9    06F7   .16          BLBC    R0,69$                  ; BRANCH IF NOT
;WMC0019              50   2C A5   D0    06FA   .17          MOVL    IRP$L_SVAPTE(R5),R0     ; GET ADDRESS OF PPT
;WMC0019                      0F   13    06FE   .18          BEQL    69$                     ; BRANCH IF NONE
;WMC0019           00000000'GF   D1    0700   .19          CMPL    G^EXE$GL_ERASEPPT,R0    ; IS THIS THE SYSTEM PPT?
                             50         0706
;WMC0019                      06   13    0707   .20          BEQL    69$                     ; BRANCH IF YES
;WMC0019                50   0C   C2    0709   .21          SUBL2   #12,R0                  ; CALC ADDRESS OF HEADER
;WMC0019                   F8F1'   30    070C   .22          BSBW    EXE$DEANONPAGED         ; RETURN THE POOL TO THE SYSTEM
;WMC0019                           05    070F   .23 69$:     RSB                             ; RETURN
;WMC0019                                 0710   .24
;WMC0019                                 0710   .25
;WMC0019                                 0710   .26 ;++
;WMC0019                                 0710   .27 ; CHECK_ERASE
;WMC0019                                 0710   .28 ;
;WMC0019                                 0710   .29 ; LOCAL SUBROUTINE TO DETERMINE IF THIS IRP IS FOR AN ERASE I/O REQUEST.
;WMC0019                                 0710   .30 ; THIS LEVEL OF PARANOIA IS NECESSARY TO PREVENT THE TOTAL CHAOS THAT
;WMC0019                                 0710   .31 ; WOULD ARISE SHOULD AN IRP THAT 'LOOKS' LIKE AN ERASE IRP BE TREATED
;WMC0019                                 0710   .32 ; INCORRECTLY.
;WMC0019                                 0710   .33 ;
;WMC0019                                 0710   .34 ; INPUT:        R5 = IRP ADDRESS
;WMC0019                                 0710   .35 ; OUTPUT:       R0 = STATUS; LOW BIT SET IMPLIES THIS IS AN ERASE IRP
;WMC0019                                 0710   .36 ;--
;WMC0019                                 0710   .37
;WMC0019                                 0710   .38 CHECK_ERASE:                             ; CHECK FOR ERASE I/O REQUEST
;WMC0019              50   1C A5   D0    0710   .39          MOVL    IRP$L_UCB(R5),R0        ; GET UCB ADDRESS.  NOTE: LOW BIT CLEAR
;WMC0019                      0A   E1    0714   .40          BBC     #IO$V_ERASE,-           ; BRANCH IF ERASE MODIFIER NOT SET
;WMC0019                 29 20 A5        0716   .41                  IRP$W_FUNC(R5),13$      ;
;WMC0019                      00   ED    0719   .42          CMPZV   #IRP$V_FCODE,-          ; CHECK FUNCTION CODE
;WMC0019                      06         071B   .43                  #IRP$S_FCODE,-          ;   ONLY DISKS AND TAPES SUPPORT DSE
;WMC0019              15   20 A5         071C   .44                  IRP$W_FUNC(R5),#IO$_DSE ;
;WMC0019                      1E   13    071F   .45          BEQL    11$                     ; BRANCH IF SO
;WMC0019                      01   91    0721   .46          CMPB    #DC$_DISK,-             ; IS THIS A DISK DEVICE?
;WMC0019                   40 A0         0723   .47                  UCB$B_DEVCLASS(R0)      ;
;WMC0019                      1B   12    0725   .48          BNEQ    13$                     ; NO - THEREFORE NOT AN ERASE
;WMC0019                      00   ED    0727   .49          CMPZV   #IRP$V_FCODE,-          ; CHECK FUNCTION CODE
;WMC0019                      06         0729   .50                  #IRP$S_FCODE,-          ;   ONLY DISKS SUPPORT THE MODIFIED-
;WMC0019                   20 A5         072A   .51                  IRP$W_FUNC(R5),-        ;   WRITE TYPE OF ERASE REQUEST
;WMC0019                      0B         072C   .52                  #IO$_WRITEPBLK          ;
;WMC0019                      10   13    072D   .53          BEQL    11$
;WMC0019                      00   ED    072F   .54          CMPZV   #IRP$V_FCODE,-
;WMC0019                      06         0731   .55                  #IRP$S_FCODE,-
;WMC0019                   20 A5         0732   .56                  IRP$W_FUNC(R5),-
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;WMC0019                20      0734   .57                    #IO$_WRITELBLK
;WMC0019                08  13  0735   .58            BEQL    11$
;WMC0019                00  ED  0737   .59            CMPZV   #IRP$V_FCODE,-
;WMC0019                06      0739   .60                    #IRP$S_FCODE,-
;WMC0019              20 A5     073A   .61                    IRP$W_FUNC(R5),-
;WMC0019                30      073C   .62                    #IO$_WRITEVBLK
;WMC0019                03  12  073D   .63            BNEQ    13$                     ; NOT A WRITE - THEREFORE NOT AN ERASE
;WMC0019             50 01  88  073F   .64 11$:       BISB2   #1,R0                   ; SET LOW BIT IN R0 TO INDICATE ERASE
;WMC0019                05  0742   .65 13$:       RSB                             ; RETURN STATUS VALUE
```

```
                        0743  1037          .SBTTL  MOVE DATA TO USER BUFFER
                        0743  1038 ;
                        0743  1039 ; SUBROUTINE TO MOVE DATA FROM A SIMPLE BUFFERED I/O BUFFER TO A USER BUFFER
                        0743  1040 ;
                        0743  1041
                        0743  1042 MOVBUF:                                          ; MOVE BUFFER
     51    57    D0     0743  1043          MOVL    R7,R1                          ; SET LENGTH OF USER BUFFER
           17    13     0746  1044          BEQL    5$                             ; BR IF NULL STRING
  50    04 A6    D0     0748  1045          MOVL    4(R6),R0                       ; GET ADDRESS OF USER BUFFER
     02    00    EF     074C  1046          EXTZV   #0,#2,IRP$B_RMOD(R5),R3        ; GET REQUEST ACCESS MODE
  53    0B A5          074F
 00000000'EF    16     0752  1047          JSB     EXE$PROBEW                     ; CHECK ACCESS
        05 50    E9     0758  1048          BLBC    R0,ACCVIO                      ; IF LBC, NO ACCESS
96    96    57    28     075B  1049          MOVC    R7,@(R6)+,@(R6)+               ; MOVE DATA TO USER BUFFER
                  05     075F  1050 5$:      RSB                                    ; RETURN
  38 A5    0C    B0     0760  1051 ACCVIO:  MOVW    #SS$_ACCVIO,IRP$L_IOST1(R5) ; SET FINAL TRANSFER STATUS
                  05     0764  1052          RSB
```

```
                                0765  1054          SBTTL  UNLOCK AREAS IN IRPE'S
                                0765  1055 ;++
                                0765  1056 ; FUNCTIONAL DESCRIPTION:
                                0765  1057 ;
                                0765  1058 ;       THIS ROUTINE UNLOCKS THE AREAS DESCRIBED BY FIELDS IN THE IRPE'S.  EACH
                                0765  1059 ;       IRPE HAS SPACE TO HOLD TWO AREA DESCRIPTIONS.
                                0765  1060 ;
                                0765  1061 ; CALLING SEQUENCE:
                                0765  1062 ;
                                0765  1063 ;       BSBW    UNLOCK_MORE
                                0765  1064 ;
                                0765  1065 ; INPUT PARAMETERS:
                                0765  1066 ;
                                0765  1067 ;       R5 = I/O REQUEST PACKET ADDRESS
                                0765  1068 ;
                                0765  1069 ; SIDE EFFECTS:
                                0765  1070 ;
                                0765  1071 ;       R0 - R3 ARE NOT PRESERVED
                                0765  1072 ;--
                                0765  1073
                                0765  1074          ASSUME  IRP$L_EXTEND EQ IRPE$L_EXTEND
                                0765  1075
                                0765  1076 UNLOCK_MORE:
                         55   DD  0765  1077          PUSHL   R5                      ; SAVE IRP ADDRESS
                                0767  1078
                                0767  1079 10$:      ; UNLOCK AREAS SPECIFIED IN NEXT IRPE
                                0767  1080
                   55   54 A5   D0  0767  1081          MOVL    IRPE$L_EXTEND(R5),R5    ; GET ADDRESS OF NEXT IRPE
                   53   2C A5   D0  076B  1082          MOVL    IRPE$L_SVAPTE1(R5),R3   ; GET SVAPTE OF FIRST AREA
                           0A   13  076F  1083          BEQL    20$                     ; BR. IF NOTHING TO UNLOCK
                   52   30 A5   3C  0771  1084          MOVZWL  IRPE$W_BOFF1(R5),R2     ; GET BYTE OFFSET IN PAGE
                   51   34 A5   D0  0775  1085          MOVL    IRPE$L_BCNT1(R5),R1     ; GET SIZE OF AREA
                           19   10  0779  1086          BSBB    UNLK                    ; UNLOCK FIRST AREA
                                077B  1087
                   53   38 A5   D0  077B  1088 20$:     MOVL    IRPE$L_SVAPTE2(R5),R3   ; GET SVAPTE OF SECOND AREA
                           0A   13  077F  1089          BEQL    30$                     ; BR. IF NOTHING TO UNLOCK
                   52   3C A5   3C  0781  1090          MOVZWL  IRPE$W_BOFF2(R5),R2     ; GET BYTE OFFSET IN PAGE
                   51   40 A5   D0  0785  1091          MOVL    IRPE$L_BCNT2(R5),R1     ; GET SIZE OF AREA
                           09   10  0789  1092          BSBB    UNLK                    ; UNLOCK SECOND AREA
                                078B  1093
D7 2A A5                    0B   E0  078B  1094 30$:     BBS     #IRPE$V_EXTEND,IRPE$W_STS(R5),10$ ; BR. IF THERE'S ANOTHER IRPE
                         55 8ED0  0790  1095          POPL    R5                      ; RESTORE R5
                              05  0793  1096          RSB
                                0794  1097
                                0794  1098          ;
                                0794  1099          ; LOCAL SUBROUTINE TO UNLOCK PAGES
                                0794  1100          ;
                                0794  1101          ;       R1 = BYTE COUNT (OR SIZE OF AREA)
                                0794  1102          ;       R2 = BYTE OFFSET IN PAGE
                                0794  1103          ;       R3 = SVAPTE OF START OF AREA
                                0794  1104          ;
                                0794  1105
51   01FF C142                  9E  0794  1106 UNLK:    MOVAB   511(R1)[R2],R1          ; COMBINE OFFSET AND SIZE AND ROUND
    51   F7 8F                  78  079A  1107          ASHL    #-VA$S_BYTE,R1,R1       ; CONVERT TO NUMBER OF PAGES TO UNLOCK
            51                      079E
          F85E                  30  079F  1108          BSBW    MMG$UNLOCK              ; UNLOCK PAGES
                                05  07A2  1109          RSB
```

```
        07A3  1110
        07A3  1111
        07A3  1112          .END
```

```
ACB$B_RMOD          =  0000000B
ACB$L_KAST          =  00000018
ACB$L_PID           =  0000000C
ACB$M_KAST          =  00000080
ACB$V_QUOTA         =  00000006
ACCVIO              00000760 R      02
AQB$L_ACPPID        =  0000000C
BRW_QNXTSEG         000000BE R      02
BUFIO               0000011C R      02
BUFPOST             00000566 R      02
BUG$_NONEXSTACP     ********   X    02
BUG$_NOTFCPWCB      ********   X    02
CA$_MEASURE         =  00000002
CCB$L_DIRP          =  0000000C
CCB$W_IOC           =  0000000A
CHECK_ERASE         00000710 R      02
CLEANUP_ERASE       000006F5 R      02
CTL$GL_CCBBASE      ********   X    02
CTL$GL_PHD          ********   X    02
CXB$L_LINK          =  00000010
CXB$W_LENGTH        =  0000000C
DC$_DISK            =  00000001
DEV$V_FOD           =  0000000E
DEV$V_SQD           =  00000005
DIRIO               00000064 R      02
DIRPOST             00000648 R      02
EVT$_COLPGA         ********   X    02
EVT$_PFCOM          ********   X    02
EXE$DEANONPAGED     ********   X    02
EXE$GL_ERASEPPT     ********   X    02
EXE$INSERTIRP       ********   X    02
EXE$INSIOQ          ********   X    02
EXE$PROBEW          ********   X    02
EXE$QXQPPKT         ********   X    02
IO$V_ERASE          =  0000000A
IO$_DSE             =  00000015
IO$_WRITELBLK       =  00000020
IO$_WRITEPBLK       =  0000000B
IO$_WRITEVBLK       =  00000030
IOC$BUFPOST         00000122 RG     02
IOC$CVTLOGPHY       ********   X    02
IOC$DIRPOST1        000006A6 RG     02
IOC$GL_PSBL         ********   X    02
IOC$GL_PSFL         ********   X    02
IOC$IOPOST          00000004 RG     02
IOC$MAPVBLK         ********   X    02
IOC$QNXTSEG         0000046F RG     02
IOC$QNXTSEG1        0000047B RG     02
IOC$QTOACP          00000507 R      02
IOC$WAKACP          00000518 RG     02
IOPOST              0000000D R      02
IPL$_IOPOST         =  00000004
IPL$_SYNCH          =  00000008
IRP$B_EFN           =  00000022
IRP$B_RMOD          =  0000000B
IRP$C_LENGTH        =  000000C4
IRP$L_ABCNT         =  00000040
IRP$L_AST           =  00000010
IRP$L_ASTPRM        =  00000014
IRP$L_BCNT          =  00000032
IRP$L_DIAGBUF       =  0000004C
IRP$L_EXTEND        =  00000054
IRP$L_FQFL          =  00000060
IRP$L_IOSB          =  00000024
IRP$L_IOST1         =  00000038
IRP$L_IOST2         =  0000003C
IRP$L_KEYDESC       =  0000005C
IRP$L_OBCNT         =  00000044
IRP$L_PID           =  0000000C
IRP$L_SEGVBN        =  00000048
IRP$L_SVAPTE        =  0000002C
IRP$L_UCB           =  0000001C
IRP$L_WIND          =  00000018
IRP$M_PAGIO         =  00000004
IRP$M_SWAPIO        =  00000040
IRP$M_VIRTUAL       =  00000010
IRP$S_FCODE         =  00000006
IRP$V_BUFIO         =  00000000
IRP$V_CHAINED       =  00000005
IRP$V_COMPLX        =  00000003
IRP$V_DIAGBUF       =  00000007
IRP$V_EXTEND        =  0000000B
IRP$V_FCODE         =  00000000
IRP$V_FILACP        =  0000000C
IRP$V_FUNC          =  00000001
IRP$V_KEY           =  0000000F
IRP$V_MBXIO         =  0000000A
IRP$V_PAGIO         =  00000002
IRP$V_PHYSIO        =  00000008
IRP$V_SWAPIO        =  00000006
IRP$V_TERMIO        =  00000009
IRP$V_VIRTUAL       =  00000004
IRP$W_BOFF          =  00000030
IRP$W_CHAN          =  00000028
IRP$W_FUNC          =  00000020
IRP$W_SIZE          =  00000008
IRP$W_STS           =  0000002A
IRPE$L_BCNT1        =  00000034
IRPE$L_BCNT2        =  00000040
IRPE$L_EXTEND       =  00000054
IRPE$L_SVAPTE1      =  0000002C
IRPE$L_SVAPTE2      =  00000038
IRPE$V_EXTEND       =  0000000B
IRPE$W_BOFF1        =  00000030
IRPE$W_BOFF2        =  0000003C
IRPE$W_STS          =  0000002A
JIB$L_BYTCNT        =  00000020
MMG$DECPHDREF1      ********   X    02
MMG$GL_MAXPFN       ********   X    02
MMG$GL_SYSPHD       ********   X    02
MMG$INSPFNT         ********   X    02
MMG$REFCNTNEG       ********   X    02
MMG$RELPFN          ********   X    02
MMG$SUBSECREF       ********   X    02
```

```
MMG$UNLOCK                      ********    X   02
MMG$UPDSECAST                   ********    X   02
MOVBUF                          00000743 R      02
NOTACP                          0000012D R      02
NOTFCPWCB                       00000562 R      02
PAGIO                           0000018B R      02
PAGIO_DONE                      00000218 R      02
PAGIO_DONE1                     00000239 R      02
PAGIO_DONE2                     00000240 R      02
PAGIO_ERR                       000002E3 R      02
PAGIO_ERR_DONE                  0000026B R      02
PAGIO_KAST                      00000277 R      02
PAGIO_OR_SWAPIO                 000000C1 R      02
PAGRD_DONE                      000001D6 R      02
PAGRD_ERR                       00000297 R      02
PAGWRT_ERR                      000001D3 R      02
PAGWRT_ERR1                     00000326 R      02
PAGWRT_ERR_DONE                 000001CF R      02
PCB$L_JIB                     = 00000080
PCB$L_PHD                     = 0000006C
PCB$W_BIOCNT                  = 0000003A
PCB$W_DIOCNT                  = 0000003E
PFN$AB_STATE                    ********    X   02
PFN$AB_TYPE                     ********    X   02
PFN$AL_BAK                      ********    X   02
PFN$AW_REFCNT                   ********    X   02
PFN$AW_SWPVBN                   ********    X   02
PFN$C_ACTIVE                  = 00000007
PFN$C_BADPAGLST               = 00000002
PFN$C_PPGTBL                  = 00000004
PFN$C_RDERR                   = 00000004
PFN$M_COLLISION               = 00000010
PFN$M_DELCON                  = 00000010
PFN$M_PAGTYP                  = 00000007
PFN$V_COLLISION               = 00000004
PFN$V_GBLBAK                  = 00000017
PFN$V_MODIFY                  = 00000007
PFN_IO_DONE                     0000037B R      02
PHD$L_DIOCNT                  = 00000054
PHD$W_PHVINDEX                = 00000042
PMS$END_RQ                      ********    X   02
PMS$GL_DIRIO                    ********    X   02
PMS$GL_SPLIT                    ********    X   02
PMS$START_RQ                    ********    X   02
PR$_IPL                       = 00000012
PR$_SIRR                      = 00000014
PRI$_IOCOM                    = 00000001
PRI$_NULL                     = 00000000
PRI$_TICOM                    = 00000004
PRI$_TOCOM                    = 00000003
PRITBL                          00000000 R      02
PTE$M_OWN                     = 01800000
PTE$M_PROT                    = 78000000
PTE$S_PFN                     = 00000015
PTE$V_PFN                     = 00000000
PTE$V_VALID                   = 0000001F
QNXTSEG                         0000040B R      02
RSN$_ASTWAIT                  = 00000001
RSN$_MAILBOX                  = 00000002
SCH$GL_PCBVEC                   ********    X   02
SCH$GQ_COLPGWQ                  ********    X   02
SCH$POSTEF                      ********    X   02
SCH$QAST                        ********    X   02
SCH$RAVAIL                      ********    X   02
SCH$RSE                         ********    X   02
SCH$WAKE                        ********    X   02
SS$_ACCVIO                    = 0000000C
SS$_ILLBLKNUM                 = 000000DC
SS$_INCSEGTRA                 = 00002234
TMP...                        = 00000000
UCB$B_DEVCLASS                = 00000040
UCB$L_DEVCHAR                 = 00000038
UCB$L_MAXBCNT                 = 000000B4
UCB$L_MAXBLOCK                = 000000B0
UCB$L_VCB                     = 00000034
UCB$W_QLEN                    = 0000006A
UNLK                            00000794 R      02
UNLOCK                          00000091 R      02
UNLOCK_MORE                     00000765 R      02
VA$M_BYTE                     = 000001FF
VA$S_BYTE                     = 00000009
VA$V_VPN                      = 00000009
VCB$L_AQB                     = 00000010
VIRTUAL_LOGIO                   000003AC R      02
WCB$B_ACCESS                  = 0000000B
WCB$V_NOTFCP                  = 00000002
WQH$W_WQCNT                   = 00000008
XQP                             00000542 R      02
```

Psect synopsis

PSECT name	Allocation	PSECT No.	Attributes
. ABS	00000000 (0.)	00 (0.)	NOPIC USR CON ABS LCL NOSHR NOEXE NORD NOWRT NOVEC BYTE
ABS	00000000 (0.)	01 (1.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE
$AEXENONPAGED	000007A3 (1955.)	02 (2.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC LONG

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	9	00:00:00.09	00:00:02.62
Command processing	74	00:00:00.57	00:00:04.90
Pass 1	568	00:00:27.01	00:01:48.68
Symbol table sort	0	00:00:03.89	00:00:13.26
Pass 2	250	00:00:07.44	00:00:51.36
Symbol table output	23	00:00:00.20	00:00:00.73
Psect synopsis output	3	00:00:00.03	00:00:00.20
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	930	00:00:39.24	00:03:01.76

The working set limit was 1950 pages.
141145 bytes (276 pages) of virtual memory were used to buffer the intermediate code.
There were 130 pages of symbol table space allocated to hold 2474 non-local and 100 local symbols.
1388 source lines were read in Pass 1, producing 20 object records in Pass 2.
41 pages of virtual memory were used to define 40 macros.

Macro library statistics

Macro library name	Macros defined
_255DUA28:[SYS.OBJ]LIB.MLB;1	28
_255DUA28:[SYSLIB]STARLET.MLB;2	9
TOTALS (all libraries)	37

2625 GETS were required to define 37 macros.

There were no errors, warnings or information messages.

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

COMDRVSUB

Table of contents

(2) 93 COM$DELATTNAST - DELIVER ATTENTION ASTS
(3) 131 COM$FLUSHATTNS - FLUSH ATTENTION AST LIST
(4) 174 COM$POST - POST I.O COMPLETION INDEPENDENT OF UNIT STATUS
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(6) 249 COM$SETATTNAST - SET UP ATTENTION AST
(7) 332.6 COM$DELCTRLAST - DELIVER CONTROL ASTS
(8) 413 COM$FLUSHCTRLS - FLUSH CONTROL AST LIST
(9) 465 COM$SETCTRLAST - SET UP CONTROL AST
(10) 602 COM$BLDCTRLAST - BUILD CONTROL AST
(11) 691 COM$FILLCTRLAST - FILLIN A CONTROL AST CONTROL BLOCK

```
                        0000     1          .TITLE  COMDRVSUB - COMMUNUCATION DRIVERS SUBROUTINES
                        0000     1          .IDENT  'V03-007'
;MHB0137
-1
                        0000     3 ;
                        0000     4 ;*****************************************************************************
                        0000     5 ;*                                                                           *
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                        0000    23 ;*                                                                           *
                        0000    24 ;*                                                                           *
                        0000    25 ;*****************************************************************************
                        0000    26 ;
                        0000    27 ;++
                        0000    28 ; FACILITY:
                        0000    29 ;
                        0000    30 ;       VAX/VMS I/O DRIVERS
                        0000    31 ;
                        0000    32 ; ABSTRACT:
                        0000    33 ;
                        0000    34 ;       THIS MODULE CONTAINS SUBROUTINES FOR THE TERMINAL,MAILBOX AND DMC11 DRIVERS.
                        0000    35 ;
                        0000    36 ; AUTHOR:
                        0000    37 ;
                        0000    38 ;       R.HEINEN 8-SEPT-1977
                        0000    39 ;
                        0000    40 ; REVISION HISTORY:
                        0000    41 ;
;MHB0137                 0000     .1 ;       V03-007 MHB0137         Mark Bramhall           12-Apr-1984
;MHB0137                 0000     .2 ;               Define minimum deallocatable block size as FKB$C_LENGTH.
;MHB0137                 0000     .3 ;               Restore stacked register after BADDALRQSZ bug check.
;MHB0137                 0000     .4 ;
RKS006                  0000     .5 ;       V03-006 RKS006          RICK SPITZ              2-MAR-1984
RKS006                  0000     .6 ;               Make sure that TAST is removed from UCB queue when
RKS006                  0000     .7 ;               TAST replaced and currently busy.
                        0000     .8 ;
;DWT0157                 0000     .9 ;       V03-005 DWT0157         David W. Thiel          30-DEC-1983
;DWT0157                 0000    .10 ;               Modify COM$DRVDEALMEM to avoid unnecessary forks.
;DWT0157                 0000    .11 ;
;JLV0272                 0000    .12 ;       V03-004 JLV0272         Jake VanNoy             14-JUN-1983
;JLV0272                 0000    .13 ;               Add abort I/O flag to out of band logic. Also
;JLV0272                 0000    .14 ;               add new entry points for checking PIDs to qualify
;JLV0272                 0000    .15 ;               AST delivery.
;JLV0272                 0000    .16 ;
```

```
;RKS0003                        0000   .17 ;       V03-003 RKS0003         RICK SPITZ              23-SEP-1982
;RKS0003                        0000   .18 ;               INSURE THAT TAST IS NOT BUSY WHEN A REPLACE CURRENT
;RKS0003                        0000   .19 ;               BLOCK OPERATION OCCURS. IF SO, FLAG THE CURRENT BLOCK
;RKS0003                        0000   .20 ;               FOR DELETE AND BUILD A NEW BLOCK.
;RKS0003                        0000   .21 ;
;KDM0002                        0000   .22 ;       V03-002 KDM0002         Kathleen D. Morse       28-Jun-1982
;KDM0002                        0000   .23 ;               Added $IODEF and $SSDEF.
-20                             0000    62 ;
                                0000    63 ;
                                0000    64 ;--
                                0000    65 ;
                                0000    66 ; EXTERNAL SYMBOLS
                                0000    67 ;
                                0000    68          $ACBDEF                         ; DEFINE AST CONTROL BLOCK
                                0000    69          $CCBDEF                         ; DEFINE CCB
                                0000    70          $DYNDEF                         ; DEFINE DYNAMIC MEMORY BLOCKS
;MHB0137                        0000    .1          $FKBDEF                         ; DEFINE FORK BLOCK
;KDM0002                        0000    .2          $IODEF                          ; DEFINE I/O FUNCTION CODES
                                0000    71          $IPLDEF                         ; DEFINE IPL LEVELS
                                0000    72          $IRPDEF                         ; DEFINE I/O PACKET
                                0000    73          $PCBDEF                         ; DEFINE PCB
                                0000    74          $PRDEF                          ; DEFINE PROCESSOR REGISTERS
                                0000    75          $PRIDEF                         ; DEFINE NEW PRIORITIES
                                0000    76          $PRVDEF                         ; DEFINE PRIVELEGE BITS
                                0000    77          $PSLDEF                         ; DEFINE PSL
                                0000    78          $RSNDEF                         ; DEFINE RESOURCES
;KDM0002                        0000    .1          $SSDEF                          ; DEFINE SYSTEM STATUS CODES
                                0000    79          $TASTDEF                        ; DEFINE TERMINAL AST BLOCK
                                0000    80          $UCBDEF                         ; DEFINE UCB
                                0000    81 ;
                                0000    82 ; LOCAL DEFINITIONS
                                0000    83 ;
                    00000000    0000    84 P1= 0
                    00000004    0000    85 P2= 4
                    00000008    0000    86 P3= 8
                    0000000C    0000    87 P4= 12
                    00000010    0000    88 P5= 16
                    00000014    0000    89 P6= 20
                                0000    90
                            00000000    91          .PSECT  WIONONPAGED
```

```
                                                0000     93          .SBTTL  COM$DELATTNAST - DELIVER ATTENTION ASTS
                                                0000     94 ;++
;JLV0272                                        0000      .1 ; COM$DELATTNAST  - DELIVER ATTENION ASTS
;JLV0272                                        0000      .2 ; COM$DELATTNASTP - DELIVER ATTENION ASTS BY PID
-1                                              0000     96 ;
                                                0000     97 ; FUNCTIONAL DESCRIPTION:
                                                0000     98 ;
                                                0000     99 ; THIS ROUTINE IS USED BY THE TERMINAL AND MAILBOX DRIVERS TO DELIVER
                                                0000    100 ; ALL OF THE ASTS AWAITING ATTENTION. THE CONTROL BLOCKS ARE USED AS FORK BLOCKS
                                                0000    101 ; TO IPL$_QUEUEAST.
                                                0000    102 ;
                                                0000    103 ; INPUTS:
                                                0000    104 ;
                                                0000    105 ;       R4 = ADDRESS OF LIST HEAD OF AST CONTROL BLOCKS
                                                0000    106 ;       R5 = UCB OF UNIT
;JLV0272                                        0000      .1 ;       R6 = ACTIVE PID (AT ENTRY POINT COM$DELATTNASTP)
                                                0000    107 ;
                                                0000    108 ; OUTPUTS:
                                                0000    109 ;
                                                0000    110 ;       R2,R3,R4,R5 ARE PRESERVED.
                                                0000    111 ;--
                                                0000    112 COM$DELATTNAST::                            ; DELIVER ATTENTION ASTS
;JLV0272                  00F8 8F    BB  0000     .1         PUSHR   #^M<R3,R4,R5,R6,R7>     ; SAVE
;JLV0272                       56    D4  0004     .2         CLRL    R6                      ; CLEAR SO ALL ASTs WILL BE DELIVERED
;JLV0272                       04    11  0006     .3         BRB     ATTN2                   ; continue
;JLV0272                                 0008     .4
;JLV0272                                 0008     .5 COM$DELATTNASTP::                        ; DELIVER ATTENTION ASTS BY PID
;JLV0272                  00F8 8F    BB  0008     .6         PUSHR   #^M<R3,R4,R5,R6,R7>     ; SAVE
;JLV0272                                 000C     .7 ATTN2:
;JLV0272                  57    54    D0  000C     .8         MOVL    R4,R7                   ; R7 WILL TRACK LIST
;JLV0272                                 000F     .9
;JLV0272                  55    67    D0  000F    .10 10$:    MOVL    (R7),R5                 ; GET NEXT ENTRY
;JLV0272                       36    13  0012    .11         BEQL    50$                     ; IF EQL THEN NONE
;JLV0272                       56    D5  0014    .12         TSTL    R6                      ; CHECKING PIDS?
;JLV0272                       0B    13  0016    .13         BEQL    30$                     ; NOT IF ZERO
;JLV0272                56     24 A5    D1  0018    .14         CMPL    ACB$L_KAST+12(R5),R6    ; COMPARE PIDS
;JLV0272                       05    13  001C    .15         BEQL    30$                     ; EQUAL, DELIVER AST
;JLV0272                                 001E    .16         ;
;JLV0272                                 001E    .17         ; PIDS NOT EQUAL, SKIP THIS ENTRY AND LEAVE IT IN QUEUE
;JLV0272                                 001E    .18         ;
;JLV0272                  57    55    D0  001E    .19         MOVL    R5,R7                   ; NEXT
;JLV0272                       EC    11  0021    .20         BRB     10$                     ; LOOP
;JLV0272                                 0023    .21         ;
;JLV0272                                 0023    .22         ; DELIVER AST AND CLOSE UP LIST
;JLV0272                                 0023    .23         ;
;JLV0272                  67    65    D0  0023    .24 30$:    MOVL    (R5),(R7)               ; CLOSE LIST
-4                             E6 AF    9F  0026    117         PUSHAB  B^10$                   ; SET UP RETURN ADDRESS
                                        0029    118         FORK                            ; CREATE FORK PROCESS
                                        002F    119 ;
                                        002F    120 ; AST QUEUE FORK PROCESS
                                        002F    121 ;
                10 A5    18 A5    7D  002F    122         MOVQ    ACB$L_KAST(R5),ACB$L_AST(R5); REARRANGE ENTRIES
                0B A5    20 A5    90  0034    123         MOVB    ACB$L_KAST+8(R5),ACB$B_RMOD(R5);
                0C A5    24 A5    D0  0039    124         MOVL    ACB$L_KAST+12(R5),ACB$L_PID(R5);
                         18 A5    D4  003E    125         CLRL    ACB$L_KAST(R5)          ;
                      52    01    9A  0041    126         MOVZBL  #PRI$_IOCOM,R2          ; SET UP PRIORITY INCREMENT
                00000000'GF    17  0044    127         JMP     G^SCH$QAST              ; QUEUE THE AST
```

```
;JLV0272                00F8 8F    BA  004A     .1 50$:     POPR    #^M<R3,R4,R5,R6,R7>     ;
-1                                  05  004E    129         RSB
```

```
                                004F    131          .SBTTL  COM$FLUSHATTNS - FLUSH ATTENTION AST LIST
                                004F    132 ;++
                                004F    133 ; COM$FLUSHATTNS - FLUNS ATTENTION AST LIST
                                004F    134 ;
                                004F    135 ; THIS ROUTINE IS USED BY THE TERMINAL AND MAILBOX DRIVERS TO FLUSH
                                004F    136 ; AN ATTENTION AST LIST. THIS IS DONE AT CANCEL I/O TIME AND WHEN A
                                004F    137 ; QIO SPECIFIES A 0 AST ADDRESS ON A SET ATTENTION AST FUNCTION.
                                004F    138 ; IF THE AST CONTROL BLOCK OWNER IS NO LONGER IN THE SYSTEM THE AST IS ALSO
                                004F    139 ; FLUSHED.
                                004F    140 ;
                                004F    141 ;
                                004F    142 ; INPUTS:
                                004F    143 ;
                                004F    144 ;       R4 = PCB ADDRESS
                                004F    145 ;       R5 = UCB ADDRESS OF RELATED UNIT
                                004F    146 ;       R6 = CHANNEL NUMBER
                                004F    147 ;       R7 = LIST HEAD
                                004F    148 ;
                                004F    149 ; OUTPUTS:
                                004F    150 ;
                                004F    151 ;       R0 = SS$_NORMAL
                                004F    152 ;       R1,R2,R7 ARE DISTROYED.
                                004F    153 ;
                                004F    154 ;--
                                004F    155 COM$FLUSHATTNS::                            ; FLUSH ATTENTION AST LIST
                                004F    156          DSBINT  UCB$B_DIPL(R5)             ; DISABLE INTERRUPTS
        50    67    D0  0056    157 10$:     MOVL    (R7),R0                    ; GET LIST ENTRY
              1F    13  0059    158          BEQL    50$                        ; IF EQL THEN DONE
24 A0   60 A4    D1  005B    159          CMPL    PCB$L_PID(R4),ACB$L_KAST+12(R0); PID MATCH?
              13    12  0060    160          BNEQ    40$                        ; IF NEQ THEN NO
   22 A0    56    B1  0062    161          CMPW    R6,ACB$L_KAST+10(R0)       ; CHANNEL MATCH?
              0D    12  0066    162          BNEQ    40$                        ; IF NEQ THEN NO
        67    60    D0  0068    163          MOVL    (R0),(R7)                  ; CLOSE UP LIST TO REMOVE ENTRY
                        006B    164          ENBINT                             ; REENABLE INTERRUPTS
          38 A4    B6  006E    165          INCW    PCB$W_ASTCNT(R4)           ; RESTORE AST QUOTA
              1C    10  0071    166          BSBB    COM$DRVDEALMEM             ; DEALLOCATE THE BLOCK
              DA    11  0073    167          BRB     COM$FLUSHATTNS             ; CONTINUE
        57    50    D0  0075    168 40$:     MOVL    R0,R7                      ; LOOK TO NEXT ENTRY
              DC    11  0078    169          BRB     10$                        ; CONTINUE
                        007A    170 50$:     ENBINT                             ; REENABLE INTERRUPTS
        50    01    9A  007D    171          MOVZBL  #SS$_NORMAL,R0             ; SET NORMAL RETURN
                        05  0080    172          RSB
```

```
                     0081   174          .SBTTL  COM$POST - POST I.O COMPLETION INDEPENDENT OF UNIT STATUS
                     0081   175 ;++
                     0081   176 ; COM$POST - POST I/O COMPLETION INDEPENDENT OF UNIT STATUS
                     0081   177 ;
                     0081   178 ; FUNCTIONAL DESCRIPTION:
                     0081   179 ;
                     0081   180 ; THIS ROUTINE IS USED BY THE TERMINAL, MAILBOX AND DMC DRIVER TO COMPLETE
                     0081   181 ; I/O OPERATIONS INDEPENDENT OF THE STATUS OF THE UNIT. NO ATTEMPT IS MADE
                     0081   182 ; TO DE-QUEUE ANOTHER PACKET OR CHANGE THE BUSY STATUS OF THE UNIT.
                     0081   183 ;
                     0081   184 ; INPUTS:
                     0081   185 ;
                     0081   186 ;       R3 = I/O PACKET ADDRESS
                     0081   187 ;       R5 = UCB ADDRESS
                     0081   188 ;
                     0081   189 ; IMPLICIT INPUTS:
                     0081   190 ;
                     0081   191 ;       CALLER AT DRIVER FORK IPL OR GREATER.
                     0081   192 ;       IRP$L_MEDIA AND IRP$L_MEDIA+4 ARE THE IOSB QUAD WORD.
                     0081   193 ;
                     0081   194 ; OUTPUTS:
                     0081   195 ;
                     0081   196 ;       R0,R1 ARE DISTROYED.
                     0081   197 ;--
                     0081   198 COM$POST::                                  ; COMPLETE I/O
          70 A5   D6 0081   199          INCL    UCB$L_OPCNT(R5)           ; INCREMENT OPERATION COUNT
            63    0E 0084   200          INSQUE  (R3),@IOC$GL_PSBL         ; INSERT PACKET ON QUEUE
00000000'FF        0086
                     008B   201          SOFTINT #IPL$_IOPOST              ; REQUEST FORK
                  05 008E   202          RSB                               ; RETURN
```

```
                                008F   204          .SBTTL  COM$DRVDEALMEM - DEALLOCATE DRIVER MEMORY
                                008F   205 ;++
                                008F   206 ; COM$DRVDEALMEM - DEALLOCATE DRIVER MEMORY
                                008F   207 ;
                                008F   208 ; FUNCTIONAL DESCRIPTION:
                                008F   209 ;
                                008F   210 ; THIS ROUTINE IS USED BY DRIVERS TO DEALLOCATE SYSTEM DYNAMIC MEMORY.
                                008F   211 ;
                                008F   212 ; IT CAN BE CALLED AT ANY IPL.
                                008F   213 ;
                                008F   214 ; INPUTS:
                                008F   215 ;
                                008F   216 ;       R0 = ADDRESS OF THE BLOCK TO DEALLOCATE
                                008F   217 ;
                                008F   218 ;*****************************************************
                                008F   219 ;
;MHB0137                         008F    .1 ; THE BUFFER MUST BE AT LEAST "FKB$C_LENGTH" BYTES LONG
;MHB0137                         008F    .2 ; IF A FORK IS REQUIRED.  THIS IS BECAUSE WE TURN THE
;MHB0137                         008F    .3 ; BUFFER INTO A FORK BLOCK FOR THE DELAYED DEALLOCATION.
-1                              008F   221 ;
                                008F   222 ;*****************************************************
                                008F   223 ;
                                008F   224 ; OUTPUTS:
                                008F   225 ;
                                008F   226 ;       R0-R5 ARE PRESERVED.
                                008F   227 ;--
                                008F   228 COM$DRVDEALMEM::                             ; DEALLOCATE DRIVER MEMORY
;MHB0137                 53   DD 008F    .1          PUSHL   R3                          ; SAVE A REGISTER
;MHB0137                         0091    .2          SAVIPL  R3                          ; FETCH CURRENT IPL LEVEL
;MHB0137              08 53   D1 0094    .3          CMPL    R3,#IPL$_SYNCH              ; COMPARE CURRENT IPL TO SYNCH
;MHB0137                 0B   14 0097    .4          BGTR    10$                         ; BRANCH IF IPL LEVEL > SYNCH
;MHB0137                 07   BB 0099    .5          PUSHR   #^M<R0,R1,R2>               ; SAVE MORE REGISTERS
;MHB0137       00000000'GF   16 009B    .6          JSB     G^EXE$DEANONPAGED           ; DEALLOCATE MEMORY
;MHB0137                 0F   BA 00A1    .7          POPR    #^M<R0,R1,R2,R3>            ; RESTORE REGISTERS
;MHB0137                      05 00A3    .8          RSB                                 ; RETURN, ALL REGISTERS PRESERVED
;MHB0137                         00A4    .9
;MHB0137              08 A0   18   B1 00A4    .10 10$:    CMPW    #FKB$C_LENGTH,FKB$W_SIZE(R0) ; BIG ENOUGH FOR A FORK BLOCK?
;MHB0137                 25   1A 00A8    .11         BGTRU   30$                         ; IF GTRU THEN NO - ERROR
;MHB0137                 7E   54   7D 00AA    .12         MOVQ    R4,-(SP)            ; SAVE FORKING REGS
;MHB0137                      B0 00AD    .13         MOVW    #<DYN$C_FRK!-               ; INSERT STRUCTURE TYPE
;MHB0137                         00AE    .14                 <IPL$_QUEUEAST@8>>,-        ;  AND PROPER IPL
;MHB0137                 0608 8F 00AE    .15                 FKB$B_TYPE(R0)              ;   FOR THIS TO BE A FORK BLOCK
                                  0A A0 00B1
;MHB0137                         00B3    .16         ASSUME  FKB$B_FIPL EQ FKB$B_TYPE+1
-4                           55   50   D0 00B3   233         MOVL    R0,R5               ; COPY ADDRESS
                               C8'AF   9F 00B6   234         PUSHAB  B^20$               ; SET UP RETURN ADDRESS
                      00000000'GF   16 00B9   235         JSB     G^EXE$FORK          ; CREATE FORK
                                      00BF   236 ;
                                      00BF   237 ; IPL$_QUEUEAST FORK ROUTINE
                                      00BF   238 ;
                                 50   55   D0 00BF   239         MOVL    R5,R0               ; DEALLOCATE THE BLOCK
                                00000000'GF   17 00C2   240         JMP     G^EXE$DEANONPAGED   ;
;MHB0137                          54   8E   7D 00C8    .1 20$:    MOVQ    (SP)+,R4            ; RESTORE REGISTERS
;MHB0137                               53 8ED0 00CB    .2 25$:    POPL    R3                  ; RESTORE R3
;MHB0137                                  05 00CE    .3         RSB                         ;
;MHB0137                                     00CF    .4 ;
;MHB0137                                     00CF    .5 ; BUGCHECK ON TOO SMALL A BUFFER
```

```
;MHB0137                        00CF     .6 ;
;MHB0137                        00CF     .7 30$:     BUG_CHECK BADDALRQSZ            ; BUGCHECK
;MHB0137                F6   11 00D3     .8          BRB     25$                     ; CONTINUE
```

```
                                00D5   249          .SBTTL  COM$SETATTNAST - SET UP ATTENTION AST
                                00D5   250 ;++
                                00D5   251 ; COM$SETATTNAST - SET UP ATTENTION AST
                                00D5   252 ;
                                00D5   253 ; FUNCTIONAL DESCRIPTION:
                                00D5   254 ;
                                00D5   255 ; THIS ROUTINE IS A SUBROUTINE USED BY THE TERMINAL AND MAILBOX DRIVERS
                                00D5   256 ; TO PROCESS REQUESTS FOR ENABLE OR DISABLE OF ATTENTION ASTS.
                                00D5   257 ; P1 IS THE ADDRESS OF THE AST SERVICE FOR ENABLES. P1 = 0 FOR DISABLE.
                                00D5   258 ; FOR DISABLES, THE SPECIFIED LIST IS SEARCHED AND THE ENTRY EXTRACTED AND
                                00D5   259 ; DEALLOCATED.
                                00D5   260 ; FOR ENABLES, A CONTROL BLOCK IS SET UP THAT WILL DOUBLE AS THE AST CONTROL
                                00D5   261 ; BLOCK WHEN THE AST IS DELIVERED. THE BLOCK IS FORMATTED AS FOLLOWS:
                                00D5   262 ;
                                00D5   263 ;       ACB$B_RMOD = IPR$_QUEUEAST
                                00D5   264 ;       ACB$L_KAST = AST PC
                                00D5   265 ;       ACB$L_KAST+4 = AST PARAMETER (P2)
                                00D5   266 ;       ACB$L_KAST+8 = ACCESS MODE OF REQUEST
                                00D5   267 ;       ACB$L_KAST+10 = CHANNEL NUMBER
                                00D5   268 ;       ACB$L_KAST+12 = PID OF REQUEST
                                00D5   269 ;
                                00D5   270 ; THE NEW BLOCK IS PLACED AT THE HEAD OF THE CURRENT LIST.
                                00D5   271 ;
                                00D5   272 ; IN BOTH CASES THE I/O IS COMPLETED.
                                00D5   273 ;
                                00D5   274 ; INPUTS:
                                00D5   275 ;
                                00D5   276 ;       R3 = I/O PACKET ADDRESS
                                00D5   277 ;       R4 = CURRENT PCB
                                00D5   278 ;       R5 = UCB ADDRESS
                                00D5   279 ;       R6 = ASSIGNED CCB
                                00D5   280 ;       R7 = ADDRESS OF THE CONTROL AST LIST HEAD TO CHANGE
                                00D5   281 ;       AP = ADDRESS OF THE QIO ARGLIST
                                00D5   282 ;
                                00D5   283 ; OUTPUTS:
                                00D5   284 ;
                                00D5   285 ;       R0 = STATUS OF THE I/O
                                00D5   286 ;       R3 = PACKET ADDRESS
                                00D5   287 ;       R5 = UCB ADDRESS
                                00D5   288 ;
                                00D5   289 ;       NO OTHER REGISTERS ARE PRESERVED.
                                00D5   290 ;
                                00D5   291 ; COMPLETION CODES:
                                00D5   292 ;
                                00D5   293 ;       SS$_NORMAL
                                00D5   294 ;       SS$_EXQUOTA  -- BUFFERED I/O OR AST QUOTA FAILURE
                                00D5   295 ;       SS$_INSUFMEM -- DYNAMIC MEMORY FAILURE
                                00D5   296 ;--
                                00D5   297 COM$SETATTNAST::                             ; SET UP ATTENTION AST
                      56   28 A3   3C  00D5   298          MOVZWL  IRP$W_CHAN(R3),R6    ; GET PACKET CHANNEL NUMBER
                         58   6C   D0  00D9   299          MOVL    P1(AP),R8            ; GET USER AST ADDRESS
;DWT0157                       5B   13  00DC    .1          BEQL    10$                  ; IF EQL THEN DISABLE FUNCTION
-1                                      00DE   301 ;
                                00DE   302 ; REQUEST TO ENABLE AST
                                00DE   303 ;
                                00DE   304 ; SET UP AST BLOCK
                                00DE   305 ;
```

```
                50   1C    3C   00DE   306          MOVZWL  #SS$_EXQUOTA,R0          ; ASSUME AST QUOTA EXCEEDED
                  38 A4    B5   00E1   307          TSTW    PCB$W_ASTCNT(R4)         ; AST QUOTA ALLOW CONTINUE?
                     56    15   00E4   308          BLEQ    20$                      ; IF LEQ THEN NO
                  38 A4    B7   00E6   309          DECW    PCB$W_ASTCNT(R4)         ; ADJUST QUOTA
                51   28    9A   00E9   310          MOVZBL  #ACB$L_KAST+16,R1        ; SET SIZE OF NEEDED BLOCK
                     53    DD   00EC   311          PUSHL   R3                       ; SAVE PACKET ADDRESS
          00000000'GF      16   00EE   312          JSB     G^EXE$ALLOCBUF           ; ALLOCATE THE BUFFERED BLOCK
                     53 8ED0   00F4   313          POPL    R3                       ; RESTORE PACKET ADDRESS
                  42 50    E9   00F7   314          BLBC    R0,20$                   ; IF LOW SET THEN ALLOCATED
             0B A2    06    90   00FA   315          MOVB    #IPL$_QUEUEAST,ACB$B_RMOD(R2); INSERT FORK IPL
             18 A2    58    D0   00FE   316          MOVL    R8,ACB$L_KAST(R2)        ; INSERT AST ROUTINE ADDRESS
          1C A2    04 AC    D0   0102   317          MOVL    P2(AP),ACB$L_KAST+4(R2)  ; INSERT PARAMETER FOR AST
                02   00    EF   0107   318          EXTZV   #0,#2,P3(AP),R0          ; GET REQUEST ACCESS MODE
                50   08 AC         010A
          00000000'GF      16   010D   319          JSB     G^EXE$MAXACMODE          ; MAXIMIZE ACCESS MODE
             20 A2    50    9A   0113   320          MOVZBL  R0,ACB$L_KAST+8(R2)      ; INSERT IN CONTROL BLOCK
          20 A2    40 8F    88   0117   321          BISB    #ACB$M_QUOTA,ACB$L_KAST+8(R2); INSERT TARGET ACCESS MODE
             22 A2    56    B0   011C   322          MOVW    R6,ACB$L_KAST+10(R2)     ; SAVE CHANNEL
          24 A2    60 A4    D0   0120   323          MOVL    PCB$L_PID(R4),ACB$L_KAST+12(R2); INSERT PID ADDRESS OF REQUESTOR
                            0125   324 ;
                            0125   325 ; LOCK OUT INTERRUPTS TO ENTER BLOCK ON UCB
                            0125   326 ;
                            0125   327          DSBINT  UCB$B_DIPL(R5)           ; LOCK OUT INTERRUPTS
                62   67    D0   012C   328          MOVL    (R7),(R2)                ;  MERGE WITH CURRENT ENTRY
                67   52    D0   012F   329          MOVL    R2,(R7)                  ; INSERT NEW ENTRY VALUE
                            0132   330          ENBINT                           ; LOWER IPL
                50   01    9A   0135   331          MOVZBL  #SS$_NORMAL,R0           ; SET NORMAL RETURN
                            05   0138   332          RSB                              ; RETURN VIA CALLER
;DWT0157                     0139    .1
;DWT0157           FF13      31   0139    .2 10$:    BRW     COM$FLUSHATTNS           ; DISABLE FUNCTION
;DWT0157                     013C    .3
;DWT0157     00000000'GF      17   013C    .4 20$:    JMP     G^EXE$ABORTIO            ; ABORT THE I/O
```

```
;DWT0157                         0142     .6          .SBTTL  COM$DELCTRLAST - DELIVER CONTROL ASTS
;DWT0157                         0142     .7 ;++
;JLV0272                         0142     .8 ;COM$DELCTRLAST  - DELIVER CONTROL ASTS
;JLV0272                         0142     .9 ;COM$DELCTRLASTP - DELIVER CONTROL ASTS AND CHECK PIDS
-5                               0142   338 ;
                                 0142   339 ; FUNCTIONAL DESCRIPTION:
                                 0142   340 ;
                                 0142   341 ; THIS ROUTINE IS USED BY THE TERMINAL  SERVICES TO DELIVER
                                 0142   342 ; ALL OF THE ASTS AWAITING ATTENTION WHICH MATCH THE CONDITION.
                                 0142   343 ; THE AST BLOCK IS NOT DELETED AND IS REUSED.
                                 0142   344 ;
                                 0142   345 ; INPUTS:
                                 0142   346 ;
                                 0142   347 ;       R3 = MATCH CHARACTER
                                 0142   348 ;       R4 = ADDRESS OF LIST HEAD OF AST CONTROL BLOCKS
                                 0142   349 ;       R5 = UCB OF UNIT
;JLV0272                         0142     .1 ;       R6 = ACTIVE PID (AT ENTRY POINT COM$DELCTRLASTP)
;JLV0272                         0142     .2 ;
;JLV0272                         0142     .3 ; OUTPUTS:
;JLV0272                         0142     .4 ;
;JLV0272                         0142     .5 ;       R3 = (low byte) CHARACTER TO INCLUDE IN DATA STREAM OR NULL
;JLV0272                         0142     .6 ;               TAST$V_ABO - set to signal driver to abort I/O in progress
;JLV0272                         0142     .7 ;               TAST$V_INC - set to include this character in datastream
;JLV0272                         0142     .8 ;
;JLV0272                         0142     .9 ;       R1,R4 DESTROYED
;JLV0272                         0142   .10 ;--
;JLV0272                         0142   .11
;JLV0272                         0142   .12 COM$DELCTRLAST::                         ; DELIVER CONTROL ASTS
;JLV0272          006C 8F    BB  0142   .13          PUSHR   #^M<R2,R3,R5,R6>        ; SAVE REGISTERS
;JLV0272               56    D4  0146   .14          CLRL    R6                      ; CLEAR SO ALL ASTs WILL BE DELIVERED
;JLV0272               04    11  0148   .15          BRB     CTRL2                   ; continue
;JLV0272                         014A   .16
;JLV0272                         014A   .17 COM$DELCTRLASTP::                        ; DELIVER CONTROL ASTS BY PID
;JLV0272          006C 8F    BB  014A   .18          PUSHR   #^M<R2,R3,R5,R6>        ;
;JLV0272                         014E   .19 CTRL2:
-11                    52    D4  014E   361          CLRL    R2                      ; INIT RETURN CHARACTER
                  51   54    D0  0150   362          MOVL    R4,R1                   ; LIST HEAD ADDRESS
                                0153   363 10$:
                  51   61    D0  0153   364          MOVL    (R1),R1                 ; ADDRESS FIRST BLOCK
                       69    13  0156   365          BEQL    50$                     ; NO MORE
              55   51   1C    C3  0158   366          SUBL3   #TAST$L_FLINK,R1,R5             ; ADDRESS START OF BLOCK
            30 A5    04 AE    E1  015C   367          BBC     4(SP),TAST$L_MASK(R5),10$       ; SKIP IF CHARACTER NOT IN MASK
                             F1  0161
;JLV0272                         0162     .1          ;
;JLV0272                         0162     .2          ; Check PID
;JLV0272                         0162     .3          ;
;JLV0272                    56   D5  0162     .4          TSTL    R6                      ; checking pids?
;JLV0272                    06   13  0164     .5          BEQL    11$                     ; Branch if not
;JLV0272               56   28 A5   D1  0166     .6          CMPL    TAST$L_PID(R5),R6       ; compare
;JLV0272                    E7   12  016A     .7          BNEQ    10$                     ; skip if not equal
;JLV0272                         016C     .8 11$:
;JLV0272                         016C     .9          ;
;JLV0272                         016C   .10          ; This one matches, check include and abort
;JLV0272                         016C   .11          ;
;JLV0272                    05   E1  016C   .12          BBC     #TAST$V_ABORT,-
;JLV0272                 0B 2D A5        016E   .13                  TAST$B_CTRL(R5),12$             ; BRANCH IF NOT ABORT
;JLV0272               52   04 AE   9A  0171   .14          MOVZBL  4(SP),R2                        ; FETCH CHARACTER
```

```
;JLV0272          52    4000 8F    A8  0175    .15          BISW    #TAST$M_ABO,R2                  ; SET ABORT
;JLV0272                    0D    11  017A    .16          BRB     15$                             ;
;JLV0272                          017C    .17 12$:
;JLV0272                    01    E1  017C    .18          BBC     #TAST$V_INCLUDE,-
;JLV0272                08 2D A5        017E    .19                  TAST$B_CTRL(R5),15$             ; SKIP IF STRIP CHARACTER
;JLV0272                52    04 AE     9A  0181    .20          MOVZBL  4(SP),R2                        ; CHARACTER NOT STRIPPED
;JLV0272                00 52    0F    E2  0185    .21          BBSS    #TAST$V_INC,R2,15$              ; MARK CHARACTER PRESENT
;JLV0272                          0189    .22 15$:
;JLV0272                    03    E2  0189    .23          BBSS    #TAST$V_BUSY,-
;JLV0272                C5 2D A5        018B    .24                  TAST$B_CTRL(R5),10$             ; SKIP IF IN USE/ MARK IN USE
-5                  24 A5    04 AE     9A  018E    373          MOVZBL  4(SP),TAST$L_ASTPRM(R5)         ; RETURN CHARACTER TO USER
                                    0193    374 20$:
                   0B A5    06    90  0193    375          MOVB    #IPL$_QUEUEAST,ACB$B_RMOD(R5)   ; INSERT FORK IPL,TO ALLOW USE AS
                                    0197    376                                                  ; FORK BLOCK
                         B9 AF     9F  0197    377          PUSHAB  B^10$                   ; SET UP RETURN ADDRESS
                                     19A    378          FORK                            ; CREATE FORK PROCESS
                                     1A0    379 ;
                                     1A0    380 ; AST QUEUE FORK PROCESS
                                     1A0    381 ;
                                     1A0    382          ASSUME  TAST$L_ASTPRM EQ <TAST$L_AST + 4>
                                     1A0    383          ASSUME  ACB$L_ASTPRM EQ <ACB$L_AST + 4>
;JLV0272          10 A5    20 A5    7D  01A0     .1 22$:     MOVQ    TAST$L_AST(R5),ACB$L_AST(R5)    ; REARRANGE ENTRIES
;JLV0272                    30    88  01A5     .2          BISB    #<ACB$M_NODELETE!ACB$M_PKAST>,-
;JLV0272                2C A5        01A7     .3                  TAST$B_RMOD(R5)                 ; PK AST, NODELETE
;JLV0272          0B A5    2C A5    90  01A9     .4          MOVB    TAST$B_RMOD(R5),ACB$B_RMOD(R5)  ; MODE
;JLV0272          0C A5    28 A5    D0  01AE     .5          MOVL    TAST$L_PID(R5),ACB$L_PID(R5)    ; PID
;JLV0272          18 A5    CA AF    DE  01B3     .6          MOVAL   B^ASTACNTNG,ACB$L_KAST(R5)      ; ADDRESS OF PIGGY-BACK KERNEL ROUTI
;JLV0272                52    01    9A  01B8     .7          MOVZBL  #PRI$_IOCOM,R2                  ; SET UP PRIORITY INCREMENT
;JLV0272             00000000'GF    17  01BB     .8          JMP     G^SCH$QAST                      ; QUEUE THE AST
;JLV0272                          01C1     .9 50$:
;JLV0272             04 AE    52    D0  01C1    .10          MOVL    R2,4(SP)                ; RETURN  ANY CHARACTER
;JLV0272                006C 8F    BA  01C5    .11          POPR    #^M<R2,R3,R5,R6>        ; RESTORE REGISTERS
-11                              05    01C9    395          RSB
                                    01CA    396 ;
                                    01CA    397 ; PIGGY-BACK KERNEL MODE ROUTINE TO:
                                    01CA    398 ;       1. MARK TAST AVAILABLE FOR USE
                                    01CA    399 ;       2. DEALLOCATE "LOST" BLOCK(S) AND RETURN THEIR QUOTA
                                    01CA    400 ;
                                    01CA    401
                                    01CA    402 ASTACNTNG:
                   2D A5    08    8A  01CA    403          BICB    #TAST$M_BUSY, TAST$B_CTRL(R5) ; Mark block available.
                15 2D A5    04    E1  01CE    404          BBC     #TAST$V_LOST, -         ; Branch if still using this block.
                                    01D3    405                  TAST$B_CTRL(R5), 150$   ; Otherwise,
                   50    28 A5    3C  01D3    406          MOVZWL  TAST$L_PID(R5), R0      ;  use PID index to locate PCB for
                00000000'FF40    D0  01D7    407          MOVL    @L^SCH$GL_PCBVEC[R0], R0 ; this process.
                         50        01DE
                      38 A0    B6  01DF    408          INCW    PCB$W_ASTCNT(R0)        ;  Then return AST quota for and
                   50    55    D0  01E2    409          MOVL    R5,R0                   ;  deallocate this block.
                      FE18'    30  01E5    410          BSBW    EXE$DEANONPAGED
                               05  01E8    411 150$:    RSB                             ; That completes piggy-back accounting.
```

```
                                01E9   413          .SBTTL  COM$FLUSHCTRLS - FLUSH CONTROL AST LIST
                                01E9   414 ;++
                                01E9   415 ; COM$FLUSHCTRLS - FLUSH CONTROL AST LIST
                                01E9   416 ;
                                01E9   417 ; THIS ROUTINE IS USED BY THE TERMINAL SERVICES TO FLUSH
                                01E9   418 ; THE CONTROL AST LIST. THIS IS DONE AT CANCEL I/O TIME AND WHEN A
                                01E9   419 ; QIO SPECIFIES A 0 AST ADDRESS ON A SET AST FUNCTION.
                                01E9   420 ; THE SUMMARY MASK POINTED TO BY R2 IS UPDATED.
                                01E9   421 ;
                                01E9   422 ; INPUTS:
                                01E9   423 ;
                                01E9   424 ;       R2 = ADDRESS OF SUMMARY MASK
                                01E9   425 ;       R4 = PCB ADDRESS
                                01E9   426 ;       R5 = UCB ADDRESS OF RELATED UNIT
                                01E9   427 ;       R6 = CHANNEL NUMBER
                                01E9   428 ;       R7 = LIST HEAD
                                01E9   429 ;
                                01E9   430 ; OUTPUTS:
                                01E9   431 ;
                                01E9   432 ;       R0 = SS$_NORMAL
                                01E9   433 ;       R1 AND R7 ARE DESTROYED.
                                01E9   434 ;
                                01E9   435 ;--
                                01E9   436 COM$FLUSHCTRLS::                             ; FLUSH CONTROL AST LIST
                                01E9   437          DSBINT  UCB$B_DIPL(R5)              ; DISABLE INTERRUPTS
                          51    D4  01F0   438          CLRL    R1                          ; INIT RETURN MASK
                     50   67    D0  01F2   439 5$:      MOVL    (R7),R0                     ; GET LIST ENTRY
                          34    13  01F5   440          BEQL    50$                         ; IF EQL THEN DONE
                     50   1C    C2  01F7   441          SUBL    #TAST$L_FLINK,R0            ; COMPUTE START OF BLOCK
                28 A0    60 A4  D1  01FA   442          CMPL    PCB$L_PID(R4),TAST$L_PID(R0); PID MATCH?
                          20    12  01FF   443          BNEQ    40$                         ; IF NEQ THEN NO
                   2E A0  56    B1  0201   444          CMPW    R6,TAST$W_CHAN(R0)          ; CHANNEL MATCH?
                          1A    12  0205   445          BNEQ    40$                         ; IF NEQ THEN NO
                67   1C A0    D0  0207   446          MOVL    TAST$L_FLINK(R0),(R7)       ; CLOSE UP LIST TO REMOVE ENTRY
                                020B   447
                06 2D A0    03  E1  020B   448          BBC     #TAST$V_BUSY,TAST$B_CTRL(R0),20$; BLOCK CAN BE DELETED NOW?
                   2D A0    10  88  0210   449          BISB    #TAST$M_LOST,TAST$B_CTRL(R0) ; NO, FLAG IT FOR LATER DELETION
                          DC    11  0214   450          BRB     5$                          ; THAT'S ALL WE CAN DO RIGHT NOW
                                0216   451
                  0000008F'GF   16  0216   452 20$:     JSB     G^COM$DRVDEALMEM            ; DEALLOCATE THE BLOCK
                       38 A4    B6  021C   453          INCW    PCB$W_ASTCNT(R4)            ; RESTORE AST QUOTA
                          D1    11  021F   454          BRB     5$                          ; CONTINUE
                                0221   455
                51   30 A0    C8  0221   456 40$:     BISL    TAST$L_MASK(R0),R1          ; OR IN ACTIVE CONTROL CHARACTERS
                57   1C A0    DE  0225   457          MOVAL   TAST$L_FLINK(R0),R7         ; LOOK TO NEXT ENTRY
                          C7    11  0229   458          BRB     5$                          ; CONTINUE
                                022B   459
                     62   51    D0  022B   460 50$:     MOVL    R1,(R2)                     ; UPDATE SUMMARY MASK
                                022E   461          ENBINT                              ; REENABLE INTERRUPTS
                     50   01    9A  0231   462          MOVZBL  #SS$_NORMAL,R0              ; SET NORMAL RETURN
                                05  0234   463          RSB
```

```
0235   465          .SBTTL  COM$SETCTRLAST - SET UP CONTROL AST
0235   466 ;++
0235   467 ; COM$SETCTRLAST - SET CONTROL AST
0235   468 ;
0235   469 ; FUNCTIONAL DESCRIPTION:
0235   470 ;
0235   471 ; This routine is used by the terminal services FDT routines during the
0235   472 ; processing of requests to enable out-of-band ASTs.  The current list is
0235   473 ; scanned for a block with a requestor matching that of the request being
0235   474 ; processed.  If a match is found, the specified mask and AST routine address
0235   475 ; in the matching block are replaced.  If no match is found, COM$BLDCTRLAST is
0235   476 ; called to create a new block.  The summary mask pointed to by R2 is updated
0235   477 ; to be the inclusive or of all masks in the control AST list pointed to by R7.
0235   478 ;
0235   479 ; If either the AST routine address or the out-of-band enable mask --
0235   480 ; @<P2(AP)+4> -- is zero, all out-of-band AST requests entered by this
0235   481 ; requestor are flushed from queue pointed to by R7.
0235   482 ;
0235   483 ; INPUTS:
0235   484 ;
0235   485 ;       R2 = CURRENT SUMMARY MASK ADDRESS
0235   486 ;       R3 = I/O PACKET ADDRESS
0235   487 ;       R4 = CURRENT PCB
0235   488 ;       R5 = UCB ADDRESS
0235   489 ;       R7 = ADDRESS OF THE CONTROL AST LIST HEAD TO CHANGE
0235   490 ;       AP = ADDRESS OF THE QIO ARGLIST
0235   491 ;
0235   492 ;       P1(AP) = ADDRESS OF AST ROUTINE TO CALL WHEN OUT-OF-BAND CHARATER IS
0235   493 ;                TYPED (0 ==> FLUSH QUEUE)
0235   494 ;       P2(AP) = ADDRESS OF SHORT FORM TERMINATOR MASK GIVING WHICH OUT-OF-
0235   495 ;                BAND CHARACTERS WILL PRECIPATATE DELIVERY OF AN AST
0235   496 ;                (0 MASK VALUE ==> FLUSH QUEUE:  This address will be passed
0235   497 ;                as the AST parameter when the AST is delivered)
0235   498 ;       P3(AP) = ACCESS MODE IN WHICH THE AST IS TO BE DELIVERED
0235   499 ;                (This is maximized against the caller's access mode)
0235   500 ;
0235   501 ;       IPL at entry is assumed to be IPL$_ASTDEL.
0235   502 ;
0235   503 ; OUTPUTS:
0235   504 ;
0235   505 ;       R0 = STATUS OF THE I/O
0235   506 ;            (SS$_NORMAL only; all others return via EXE$ABORTIO)
;JLV0272 0235    .1 ;       R2 = ADDRESS OF TAST BLOCK
0235   507 ;       R3 = I/O PACKET ADDRESS
0235   508 ;       R4 = CURRENT PCB ADDRESS
0235   509 ;       R5 = UCB ADDRESS
0235   510 ;       NO OTHER REGISTERS ARE PRESERVED.
0235   511 ;
0235   512 ;       IPL at exit is the same as IPL at entry.
0235   513 ;
0235   514 ;       The summary mask pointed to by R2 is updated to be the inclusive or of
0235   515 ;       all masks in the control AST list pointed to by R7.
0235   516 ;
0235   517 ;       The control AST list pointed to by R7 is flushed, extended, or an
0235   518 ;       entry in the list is updated.
0235   519 ;
0235   520 ; COMPLETION CODES:
```

```
                                0235   521 ;
                                0235   522 ;       SS$_NORMAL
                                0235   523 ;
                                0235   524 ;     The following return codes are reported by a JMP to EXE$ABORTIO:
                                0235   525 ;       SS$_ACCVIO   -- specified mask not accessable
                                0235   526 ;       SS$_EXQUOTA  -- buffered I/O or AST quota failure
                                0235   527 ;       SS$_INSUFMEM -- dynamic memory failure
                                0235   528 ;--
                                0235   529
                                0235   530 ; COM$SETCTRLAST, COM$BLDCTRLAST, and COM$FILLCTRLAST build and use the
                                0235   531 ; following information block.  COM$SETCTRLAST builds the block on the stack
                                0235   532 ; and points R11 to it.  COM$BLDCTRLAST and COM$FILLCTRLAST use infomation
                                0235   533 ; stored to build or update a TAST control block.
                                0235   534
                                0235   535         $OFFSET 0,POSITIVE,<-
                                0235   536                 ASTROUT,-               ; User's AST routine address
                                0235   537                 ASTPARM,-               ; AST routine parameter
                                0235   538                 USRMSKADR,-             ; Pointer to user's OOB mask
                                0235   539                 CURMSKADR,-             ; Pointer to current summary mask
                                0235   540                 <TINFOSIZE,0>-          ; Size of the block
                                0235   541                 >
                                0000       ASTROUT:
                                0004       ASTPARM:
                                0008       USRMSKADR:
                                000C       CURMSKADR:
                                0010       TINFOSIZE:
                                0235   542
                                0235   543
                                0235   544 COM$SETCTRLAST::                        ; SET UP  CONTROL AST
                                0235   545
                      56  28 A3   3C  0235   546         MOVZWL  IRP$W_CHAN(R3), R6      ; Get packet channel number.
                         58   6C   D0  0239   547         MOVL    P1(AP), R8              ; Get user AST address.
                              AB   13  023C   548         BEQL    COM$FLUSHCTRLS          ; If its zero, flush OOB requests.
                      59   04 AC   D0  023E   549         MOVL    P2(AP), R9              ; Get address of user OOB mask.
RKS006                   50   0C   3C  0242    .1         MOVZWL  #SS$_ACCVIO, R0         ; Assume no access
RKS006                                0245    .2         IFNORD  #8, (R9), 5$            ; Probe for read access.
RKS006                   50   14   3C  024B    .3         MOVZWL  #SS$_BADPARAM, R0       ; Assume invalid mask format
RKS006                        69   D5  024E    .4         TSTL    (R9)                    ; Verify short form terminator
RKS006                        08   12  0250    .5         BNEQ    5$                      ; mask format.
RKS006                     04 A9   D5  0252    .6         TSTL    4(R9)                   ; Any OOB characters specified?
RKS006                        09   12  0255    .7         BNEQ    7$                      ; If there are some, proceed.
RKS006                    FF8F   31  0257    .8         BRW     COM$FLUSHCTRLS          ; Otherwise, flush OOB requests.
RKS006          00000000'GF   17  025A    .9 5$:      JMP     G^EXE$ABORTIO           ; I/O failed, abort request
-10                                   0260   560 7$:
                                0260   561
                                0260   562 ;
                                0260   563 ; We are now holding a valid request of enable an out-of-band character AST
                                0260   564 ;
                                0260   565
                                0260   566         ASSUME  ASTPARM EQ <ASTROUT + 4>
                      5E   F0 AE   9E  0260   567         MOVAB   -TINFOSIZE(SP), SP      ; Allocate info. block on the stack.
                         5B   5E   D0  0264   568         MOVL    SP, R11                 ; Save info. block address.
                         6B   58   7D  0267   569         MOVQ    R8, ASTROUT(R11)        ; Save AST routine and parameter info.
                   08 AB   04 A9   DE  026A   570         MOVAL   4(R9), USRMSKADR(R11)   ; Save address of user OOB mask.
                      0C AB   52   D0  026F   571         MOVL    R2, CURMSKADR(R11)      ; Save current summary mask address.
                              58   7C  0273   572         CLRQ    R8                      ; Clear accumulation summary mask and
                                0275   573                                             ; a local flags longword.
```

```
;JLV0272                                5A    D4  0275    .1          CLRL    R10                             ; TAST address
                                                  0277  574           DSBINT  UCB$B_DIPL(R5)                  ; Interlock queue access.
                                                  027E  575
                                    52    67    D0  027E  576 10$:    MOVL    (R7), R2                        ; Get list entry.
                                          36    13  0281  577         BEQL    20$                             ; Branch if no more entries in list.
                                 52     E4 A2    9E  0283  578         MOVAB   -TAST$L_FLINK(R2), R2           ; Compute start of block.
                              28 A2     60 A4    D1  0287  579         CMPL    PCB$L_PID(R4), TAST$L_PID(R2) ; Do the PIDs match?
                                          21    12  028C  580         BNEQ    15$                             ; Branch if PIDs don't match.
                                 2E A2    56    B1  028E  581         CMPW    R6, TAST$W_CHAN(R2)             ; Is the channel right?
                                          1B    12  0292  582         BNEQ    15$                             ; Branch if not the right channel.
                                                  0294  583
RKS006                        0D 2D A2    03    E1  0294    .1        BBC     #TAST$V_BUSY,TAST$B_CTRL(R2),12$; Block can be reused now
RKS006                           2D A2    10    88  0299    .2        BISB    #TAST$M_LOST,TAST$B_CTRL(R2) ; No, flag it for later deletion
RKS006                           67    1C A2    D0  029D    .3        MOVL    TAST$L_FLINK(R2),(R7)           ; Remove the entry from the queue
RKS006                              59    02    C8  02A1    .4        BISL    #2, R9                          ; Indicate that a match was found
RKS006                                    13    11  02A4    .5        BRB     20$                             ; And build a new one, since the old
RKS006                                                02A6    .6                                              ; one is busy and will be deleted when
RKS006                                                02A6    .7                                              ; the AST is delivered.
RKS006                                 5A     52    D0  02A6    .8 12$:   MOVL    R2,R10                          ; Save TAST address
                                             006D    30  02A9  584         BSBW    COM$FILLCTRLAST                 ; Update matching TAST control block.
                                          59    01    C8  02AC  585         BISL    #1, R9                          ; Indicate that an update was done.
                                                  02AF  586
                                    58     30 A2    C8  02AF  587 15$:    BISL    TAST$L_MASK(R2), R8             ; Accumulate OOB mask data for queue.
                                    57     1C A2    DE  02B3  588         MOVAL   TAST$L_FLINK(R2), R7            ; Advance to next queue entry.
                                                  C5  11  02B7  589         BRB     10$                             ; Loop until entire queue processed.
                                                  02B9  590
                                    0C BB     58    D0  02B9  591 20$:    MOVL    R8, @CURMSKADR(R11)             ; Make accumulated OOB mask for queue
                                                  02BD  592                                                     ; the current OOB mask for the queue.
                                                  02BD  593         ENBINT                                      ; Return to caller's IPL.
                                          50    01    3C  02C0  594         MOVZWL  #SS$_NORMAL, R0                 ; Assume work completed successfully.
RKS006                                    52    5A    D0  02C3    .1        MOVL    R10,R2                          ; Valid only if R9 LBS
RKS006                                       02 59    E8  02C6    .2        BLBS    R9, 30$                         ; If no blocks in the queue were
RKS006                                          0E    10  02C9    .3        BSBB    COM$BLDCTRLAST                  ; updated, build a new block.
RKS006                                 5E     10 AE    9E  02CB    .4 30$:   MOVAB   TINFOSIZE(SP), SP       ; Restore stack.
RKS006                                       01 50    E9  02CF    .5        BLBC    R0, 50$                         ; Was COM$BLDCTRLAST successful?
RKS006                                                05  02D2    .6        RSB                                 ; if so, return to caller.
RKS006                                                02D3    .7 50$:
RKS006                           00000000'GF    17    02D3    .8        JMP     G^EXE$ABORTIO                   ; If it failed, abort I/O request.
RKS006                                                02D9    .9
```

```
02D9   602          .SBTTL  COM$BLDCTRLAST - BUILD CONTROL AST
02D9   603 ;++
02D9   604 ; COM$BLDCTRLAST - BUILD NEW CONTROL AST PACKET
02D9   605 ;
02D9   606 ; FUNCTIONAL DESCRIPTION:
02D9   607 ;
02D9   608 ; This routine builds a new terminal AST control block and inserts it after
02D9   609 ; the TAST entry pointed to by R7.  The control block will double as an AST
02D9   610 ; control block when a AST is delivered.  The block will be reused until the
02D9   611 ; out-of-band AST request is canceled.  The summary mask pointed to by
02D9   612 ; CURMSKADR(R11) is inclusively or'ed with the user out-of-band mask pointed
02D9   613 ; to by USRMSKADR(R11).
02D9   614 ;
02D9   615 ; INPUTS:
02D9   616 ;
02D9   617 ;       R3 = I/O PACKET ADDRESS
02D9   618 ;       R4 = CURRENT PCB
02D9   619 ;       R5 = UCB ADDRESS
02D9   620 ;       R6 = CHANNEL ON WHICH OOB REQUEST IS BEING MADE
02D9   621 ;       R7 = ADDRESS OF THE CONTROL AST LIST ENTRY PRECEDING THE POINT WHERE
02D9   622 ;            THE NEW ENTRY IS TO BE ADDED.
02D9   623 ;       R11= THE ADDRESS OF A TAST INFORMATION LIST (SEE COM$SETCTRLAST)
02D9   624 ;       AP = ADDRESS OF THE QIO ARGLIST
02D9   625 ;
02D9   626 ;       P3(AP) = ACCESS MODE IN WHICH THE AST IS TO BE DELIVERED
02D9   627 ;                (This is maximized against the caller's access mode)
02D9   628 ;
02D9   629 ;       ASTROUT(R11)   = ADDRESS OF AST ROUTINE TO CALL WHEN OUT-OF-BAND
02D9   630 ;                        CHARACTER IS TYPED
02D9   631 ;       ASTPARM(R11)   = AST PARAMETER VALUE TO BE PASSED TO AST ROUTINE WHEN
02D9   632 ;                        OUT-OF-BAND AST IS DELIVERED
02D9   633 ;       CURMSKADR(R11)= ADDRESS OF THE CURRENT OUT-OF-BAND SUMMARY MASK
02D9   634 ;       USRMSKADR(R11)= ADDRESS OF OUT-OF-BAND MASK SPECIFIED BY USER FOR
02D9   635 ;                       THIS AST ENABLE
02D9   636 ;
02D9   637 ;       IPL at entry is assumed to be IPL$_ASTDEL.
02D9   638 ;
02D9   639 ; OUTPUTS:
02D9   640 ;
02D9   641 ;       R0 = STATUS OF THE I/O
02D9   642 ;       R1 & R2 DESTROYED
02D9   643 ;       ALL OTHER REGISTERS PRESERVED
02D9   644 ;
02D9   645 ;       IPL at entry is assumed to be IPL$_ASTDEL.
02D9   646 ;
02D9   647 ;       A TAST control block is allocated, filled in, and linked after the
02D9   648 ;       entry pointed to by R7
02D9   649 ;
02D9   650 ; COMPLETION CODES:
02D9   651 ;
02D9   652 ;       SS$_NORMAL
02D9   653 ;       SS$_EXQUOTA  -- BUFFERED I/O OR AST QUOTA FAILURE
02D9   654 ;       SS$_INSUFMEM -- DYNAMIC MEMORY FAILURE
02D9   655 ;--
02D9   656
02D9   657 COM$BLDCTRLAST:
02D9   658
```

```
                38 A4    B5  02D9   659          TSTW    PCB$W_ASTCNT(R4)          ; Is there enough AST quota?
                   31    15  02DC   660          BLEQ    91$                       ; Branch if insufficient AST quota.
                38 A4    B7  02DE   661          DECW    PCB$W_ASTCNT(R4)          ; Deduct from AST quota.
                   53    DD  02E1   662          PUSHL   R3                        ; Save reg. destroyed by EXE$ALLOCBUF.
              51   34    9A  02E3   663          MOVZBL  #TAST$C_LENGTH, R1        ; Set size of TAST block.
00000000'GF        16    FB  02E6   664          JSB     G^EXE$ALLOCBUF            ; Allocate for the TAST control block.
                53 8ED0    02EC   665          POPL    R3                        ; Restore saved register.
                21 50    E9  02EF   666          BLBC    R0, 93$                   ; Branch if allocation failed.
                   25    10  02F2   667          BSBB    COM$FILLCTRLAST           ; Fill in newly allocated block.
                             02F4   668
                             02F4   669 ;
                             02F4   670 ; INSERT NEWLY BUILD TAST CONTROL BLOCK
                             02F4   671 ;
                             02F4   672
                             02F4   673          DSBINT  UCB$B_DIPL(R5)            ; Interlock access to queue links.
             1C A2      67   D0  02F7   674          MOVL    (R7), TAST$L_FLINK(R2)    ; Move list for. pointer to new entry.
             67    1C A2     DE  02FF   675          MOVAL   TAST$L_FLINK(R2), (R7)    ; Link new entry to current list.
          0C BB    30 A2     C8  0303   676          BISL    TAST$L_MASK(R2), @CURMSKADR(R11) ; Update summary mask.
                             0308   677          ENBINT                            ; Restore previous IPL.
                50   01    3C  030B   678          MOVZWL  #SS$_NORMAL, R0           ; Indicate that build succeeded.
                             05  030E   679          RSB                               ; Return to caller.
                             030F   680
                             030F   681 ;
                             030F   682 ; ERROR RETURNS:
                             030F   683 ;
                             030F   684
                50   1C    3C  030F   685 91$:     MOVZWL  #SS$_EXQUOTA, R0          ; AST quota exceeded.
                             05  0312   686          RSB
                             0313   687
             50   0124 8F    3C  0313   688 93$:     MOVZWL  #SS$_INSFMEM, R0          ; Insufficient dynamic memory.
                             05  0318   689          RSB
```

```
                                0319   691          .SBTTL  COM$FILLCTRLAST - FILLIN A CONTROL AST CONTROL BLOCK
                                0319   692 ;++
                                0319   693 ; COM$FILLCTRLAST - FILLIN A CONTROL AST CONTROL BLOCK
                                0319   694 ;
                                0319   695 ; FUNCTIONAL DESCRIPTION:
                                0319   696 ;
                                0319   697 ; This routine fills in the terminal AST control block pointed to by R2.  The
                                0319   698 ; block may be either a previously allocated block which is already linked to
                                0319   699 ; a control AST queue, or a newly allocated block which is being filled in for
                                0319   700 ; the first time.
                                0319   701 ;
                                0319   702 ; INPUTS:
                                0319   703 ;
                                0319   704 ;       R2 = ADDRESS OF TAST CONTROL BLOCK TO BE FILLED IN
                                0319   705 ;       R3 = I/O PACKET ADDRESS
                                0319   706 ;       R4 = CURRENT PCB
                                0319   707 ;       R6 = CHANNEL ON WHICH OOB AST REQUEST IS BEING MADE
                                0319   708 ;       R11= THE ADDRESS OF A TAST INFORMATION LIST (SEE COM$SETCTRLAST)
                                0319   709 ;       AP = ADDRESS OF THE QIO ARGLIST
                                0319   710 ;
                                0319   711 ;       P3(AP) = ACCESS MODE IN WHICH THE AST IS TO BE DELIVERED
                                0319   712 ;                (This is maximized against the caller's access mode)
                                0319   713 ;
                                0319   714 ;       ASTROUT(R11)  = ADDRESS OF AST ROUTINE TO CALL WHEN OUT-OF-BAND
                                0319   715 ;                       CHARACTER IS TYPED
                                0319   716 ;       ASTPARM(R11)  = AST PARAMETER VALUE TO BE PASSED TO AST ROUTINE WHEN
                                0319   717 ;                       OUT-OF-BAND AST IS DELIVERED
                                0319   718 ;       USRMSKADR(R11)= ADDRESS OF OUT-OF-BAND MASK SPECIFIED BY USER FOR
                                0319   719 ;                       THIS AST ENABLE
                                0319   720 ;
                                0319   721 ;       If this routine is called to operate on a TAST block which is already
                                0319   722 ;       linked to a control queue, it should be called at device IPL.
                                0319   723 ;       Otherwise, it can be called at IPL$_ASTDEL.
                                0319   724 ;
                                0319   725 ; OUTPUTS:
                                0319   726 ;
                                0319   727 ;       R0 & R1 ARE DESTROYED.
                                0319   728 ;       ALL OTHER REGISTERS ARE PRESERVED.
                                0319   729 ;
                                0319   730 ;       IPL at exit is the same as IPL at entry.
                                0319   731 ;
                                0319   732 ;       The TAST control block pointed to by R2 is filled in.
                                0319   733 ;
                                0319   734 ; COMPLETION CODES:
                                0319   735 ;
                                0319   736 ;       There is no completion status.  This routine is always successful.
                                0319   737 ;--
                                0319   738
                                0319   739 COM$FILLCTRLAST:
                                0319   740
                                0319   741         ASSUME  TAST$L_ASTPRM EQ <TAST$L_AST + 4>
                                0319   742         ASSUME  ASTPARM EQ <ASTROUT + 4>
                    20 A2   6B  7D  0319   743         MOVQ    ASTROUT(R11), -         ; Plant AST routine and
                                031D   744                 TAST$L_AST(R2)          ; parameter addresses.
;JLV0272         30 A2   08 BB  D0  031D    .1         MOVL    @USRMSKADR(R11), -
;JLV0272                            0322    .2                 TAST$L_MASK(R2)         ; Plant OOB mask.
;JLV0272                 50  D4  0322    .3         CLRL    R0                      ; Assume no flags
```

```
;JLV0272                                0324     .4          ;
;JLV0272                                0324     .5          ; Check for ABORT
;JLV0272                                0324     .6          ;
;JLV0272          05 20 A3    0C    E1 0324     .7          BBC     #IO$V_TT_ABORT, -
;JLV0272                                0329     .8                  IRP$W_FUNC(R3),5$       ; Branch if not abort
;JLV0272                50    20    88 0329     .9          BISB    #TAST$M_ABORT,R0        ; Else set abort flag.
;JLV0272                      08    11 032C     .10         BRB     10$                     ; Ignore INCLUDE
;JLV0272                                032E     .11         ;
;JLV0272                                032E     .12         ; Check for INCLUDE
;JLV0272                                032E     .13         ;
;JLV0272          03 20 A3    0B    E1 032E     .14 5$:     BBC     #IO$V_INCLUDE, -
;JLV0272                                0333     .15                 IRP$W_FUNC(R3), 10$     ; BR if striping OOB chars.
;JLV0272                50    02    88 0333     .16         BISB    #TAST$M_INCLUDE,R0      ; Else set no-strip flag.
;JLV0272                                0336     .17         
;JLV0272             2D A2    50    90 0336     .18 10$:    MOVB    R0,TAST$B_CTRL(R2)      ; Set TAST control field.
;JLV0272                02    00    EF 033A     .19         EXTZV   #0, #2, P3(AP), R0      ; Get requested delivery  access mode.
                       50    08 AC    033D
-5                                51    DC 0340    750         MOVPSL  R1                      ; Get access mode of requestor.
                51     02    16    EF 0342    751         EXTZV   #PSL$V_PRVMOD, #PSL$S_PRVMOD, R1, R1 ; If requestor's access
                                   51 0346
                       51    50    91 0347    752         CMPB    R0, R1                  ; mode is bigger than delivery access
                             03    18 034A    753         BGEQ    20$                     ; mode, then delivery AST in
                       50    51    90 034C    754         MOVB    R1, R0                  ; requestor's access mode.
                   2C A2     50    90 034F    755 20$:    MOVB    R0, TAST$B_RMOD(R2)     ; Plant delivery access mode.
                   2E A2     56    B0 0353    756         MOVW    R6, TAST$W_CHAN(R2)     ; Plant requestor's channel.
               28 A2    60 A4    D0 0357    757         MOVL    PCB$L_PID(R4), TAST$L_PID(R2) ; Plant requestor's PID.
                                05 035C    758         RSB                             ; Return to caller.
                                   035D    759
                                   035D    760         .END
```

```
ACB$B_RMOD                = 0000000B
ACB$L_AST                 = 00000010
ACB$L_ASTPRM              = 00000014
ACB$L_KAST                = 00000018
ACB$L_PID                 = 0000000C
ACB$M_NODELETE            = 00000020
ACB$M_PKAST               = 00000010
ACB$M_QUOTA               = 00000040
ASTACNTNG                   000001CA R      02
ASTPARM                     00000004
ASTROUT                     00000000
ATTN2                       0000000C R      02
BUG$_BADDALRQSZ             ********   X    02
COM$BLDCTRLAST              000002D9 R      02
COM$DELATTNAST              00000000 RG     02
COM$DELATTNASTP             00000008 RG     02
COM$DELCTRLAST              00000142 RG     02
COM$DELCTRLASTP             0000014A RG     02
COM$DRVDEALMEM              0000008F RG     02
COM$FILLCTRLAST             00000319 R      02
COM$FLUSHATTNS              0000004F RG     02
COM$FLUSHCTRLS              000001E9 RG     02
COM$POST                    00000081 RG     02
COM$SETATTNAST              000000D5 RG     02
COM$SETCTRLAST              00000235 RG     02
CTRL2                       0000014E R      02
CURMSKADR                   0000000C
DIR...                    = 00000001
DYN$C_FRK                 = 00000008
EXE$ABORTIO                 ********   X    02
EXE$ALLOCBUF                ********   X    02
EXE$DEANONPAGED             ********   X    02
EXE$FORK                    ********   X    02
EXE$MAXACMODE               ********   X    02
FKB$B_FIPL                = 0000000B
FKB$B_TYPE                = 0000000A
FKB$C_LENGTH              = 00000018
FKB$W_SIZE                = 00000008
IO$V_INCLUDE              = 0000000B
IO$V_TT_ABORT             = 0000000C
IOC$GL_PSBL                 ********   X    02
IPL$_IOPOST               = 00000004
IPL$_QUEUEAST             = 00000006
IPL$_SYNCH                = 00000008
IRP$W_CHAN                = 00000028
IRP$W_FUNC                = 00000020
P1                        = 00000000
P2                        = 00000004
P3                        = 00000008
P4                        = 0000000C
P5                        = 00000010
P6                        = 00000014
PCB$L_PID                 = 00000060
PCB$W_ASTCNT              = 00000038
PR$_IPL                   = 00000012
PR$_SIRR                  = 00000014
PRI$_IOCOM                = 00000001
PSL$S_PRVMOD              = 00000002
PSL$V_PRVMOD              = 00000016
SAVABS...                 = 00000010
SCH$GL_PCBVEC               ********   X    02
SCH$QAST                    ********   X    02
SS$_ACCVIO                = 0000000C
SS$_BADPARAM              = 00000014
SS$_EXQUOTA               = 0000001C
SS$_INSFMEM               = 00000124
SS$_NORMAL                = 00000001
TAST$B_CTRL               = 0000002D
TAST$B_RMOD               = 0000002C
TAST$C_LENGTH             = 00000034
TAST$L_AST                = 00000020
TAST$L_ASTPRM             = 00000024
TAST$L_FLINK              = 0000001C
TAST$L_MASK               = 00000030
TAST$L_PID                = 00000028
TAST$M_ABO                = 00004000
TAST$M_ABORT              = 00000020
TAST$M_BUSY               = 00000008
TAST$M_INCLUDE            = 00000002
TAST$M_LOST               = 00000010
TAST$V_ABORT              = 00000005
TAST$V_BUSY               = 00000003
TAST$V_INC                = 0000000F
TAST$V_INCLUDE            = 00000001
TAST$V_LOST               = 00000004
TAST$W_CHAN               = 0000002E
TINFOSIZE                   00000010
UCB$B_DIPL                = 0000005E
UCB$L_OPCNT               = 00000070
USRMSKADR                   00000008
```

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	00000010 (16.)	01 (1.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE
WIONONPAGED	0000035D (861.)	02 (2.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC BYTE

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	28	00:00:00.07	00:00:01.22
Command processing	99	00:00:00.52	00:00:06.81
Pass 1	457	00:00:19.68	00:01:34.99
Symbol table sort	0	00:00:02.98	00:00:10.33
Pass 2	150	00:00:05.11	00:00:26.99
Symbol table output	11	00:00:00.10	00:00:00.10
Psect synopsis output	2	00:00:00.03	00:00:00.73
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	750	00:00:28.49	00:02:21.17

The working set limit was 1650 pages.
102023 bytes (200 pages) of virtual memory were used to buffer the intermediate code.
There were 100 pages of symbol table space allocated to hold 1859 non-local and 37 local symbols.
860 source lines were read in Pass 1, producing 15 object records in Pass 2.
34 pages of virtual memory were used to define 32 macros.

Macro library statistics

Macro library name	Macros defined
_255DUA28:[SYS.OBJ]LIB.MLB;1	18
_255DUA28:[SYSLIB]STARLET.MLB;2	11
TOTALS (all libraries)	29

2032 GETS were required to define 29 macros.

There were no errors, warnings or information messages.

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

PCDRIVER.LIS
PCDRIVER.COM
PCDRIVER.OPT
LOADER.COM
READV.FOR
RANDWV.FOR
MODE.FOR

Table of contents

(1)	85	External and local symbol definitions
(1)	202	Standard tables
(1)	312	PT_CONTROL_INIT, Controller initialization routine
(1)	341	PT_UNIT_INIT, Unit initialization routine
(1)	389	PT_FDT_ROUTINE, Punch FDT routine
(1)	471	ACP_FDT ACP $QIO FDT Routine
(1)	527	NULL_BYTES FDT Routines for header/trailer
(1)	543	PR_FDT_ROUTINE Reader FDT Routine
(1)	603	PT_START, Start I/O routine
(1)	647	PT_PUNCH, Start a punch operation
(1)	905	PR_START, Start I/O routine (Reader)
(1)	1012	PT_INTERRUPT, Interrupt service routine
(1)	1068	PT_CANCEL, Cancel I/O routine
(1)	1168	PT_REG_DUMP, Device register dump routine

```
0000     1          .TITLE  PCDRIVER - VAX/VMS PAPER TAPE READER/PUNCH DRIVER
0000     2          .IDENT  /V06/
0000     3
0000     4 ;
0000     5 ; COPYRIGHT (C) 1979
0000     6 ; DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS.
0000     7 ;
0000     8 ; THE INFORMATION IN THIS SOFTWARE  IS  SUBJECT TO CHANGE WITHOUT
0000     9 ; NOTICE AND SHOULD NOT BE CONSTRUED  AS  A COMMITMENT BY DIGITAL
0000    10 ; EQUIPMENT CORPORATION.
0000    11 ;
0000    12 ; DEC ASSUMES NO RESPONSIBILITY FOR THE USE OR RELIABILITY OF ITS
0000    13 ; SOFTWARE ON EQUIPMENT THAT IS NOT SUPPLIED BY DEC.
0000    14 ;
0000    15 ;++
0000    16 ;
0000    17 ; FACILITY:
0000    18 ;
0000    19 ;       VAX/VMS Paper Tape Reader/Punch Driver
0000    20 ;
0000    21 ; ABSTRACT:
0000    22 ;
0000    23 ;       This driver controls the PC11 paper tape reader/punch.  READ and
0000    24 ;       WRITE $QIOs are accepted (VBLK, LBLK, AND PBLK), as are MOUNT,
0000    25 ;       ACPCONTROL, and WRITEOF $QIOs (which call on the ACP -- PCACP).
0000    26 ;       MODIFY, DELETE, and DEACCESS $QIOs are valid for the punch,
0000    27 ;       as are CREATE and READPROMPT $QIOs (valid for both reader/punch).
0000    28 ;
0000    29 ;       READVBLK and READLBLK cause characters to be read from the
0000    30 ;       reader with leading null bytes ignored (for the first read
0000    31 ;       request); READPBLK is the same, except that leading null bytes
0000    32 ;       are treated as data characters.  An EOF byte is recognized if
0000    33 ;       the user requested looking for EOF (default if not physical).
0000    34 ;
0000    35 ;       WRITEVBLK and WRITELBLK cause characters to be punched (a
0000    36 ;       header and trailer of null bytes is punched--default is to
0000    37 ;       punch NULL_BYTES null bytes in the header and trailer tape).
0000    38 ;       WRITEPBLK is the same, except that no header/trailer is punched.
0000    39 ;       If first $QIO wasn't physical, an EOF is punched before trailer.
0000    40 ;
0000    41 ;       The MOUNT $QIO is used to synchronize with the ACPMNT program
0000    42 ;       which loads the paper tape punch ACP (PCACP).  The ACPCONTROL
0000    43 ;       $QIO is a no-op function which serves to awaken the ACP if it is
0000    44 ;       hibernating. The WRITEOF $QIO is turned into an equivalent
0000    45 ;       WRITEVBLK $QIO by the ACP.
0000    46 ;
0000    47 ;       The MODIFY $QIO changes the default (NULL_BYTES) number of null
0000    48 ;       bytes to punch in the header/trailer tape.  P2 specifies the
0000    49 ;       new number of null bytes to be punched.
0000    50 ;
0000    51 ;       The DELETE $QIO restores the default (NULL_BYTES) number of null
0000    52 ;       bytes to punch in the header/trailer tape.
0000    53 ;
0000    54 ;       The DEACCESS $QIO returns the current number of null bytes which
0000    55 ;       are to be punched for the header/trailer tape in the high order
0000    56 ;       longword of the IOSB specified in the $QIO call.
0000    57 ;
```

```
0000     58 ;       The CREATE $QIO is used to enable searching for an EOF byte (for
0000     59 ;       the reader), or to enable the punching of an EOF byte (for the
0000     60 ;       punch).
0000     61 ;
0000     62 ;       The READPROMPT $QIO is used to disable searching for an EOF byte
0000     63 ;       (for the reader), or to disable the punching of an EOF byte (for
0000     64 ;       the punch).
0000     65 ;
0000     66 ;       When used, P1 is the starting address of the buffer, and P2 is
0000     67 ;       the buffer length.  The driver performs buffered I/O.
0000     68 ;
0000     69 ;       An EOF character is equal to a decimal 26 (control-Z).
0000     70 ;
0000     71 ;       Note that the ACP (PCACP) is not required for the driver to
0000     72 ;       work. PCDRIVER may be loaded and used independent of the ACP.
0000     73 ;       The ACP's main function is to serve as an instructional tool
0000     74 ;       showing how ACPs are written; the ACP does not provide any
0000     75 ;       added functionality for either the reader or punch.
0000     76 ;
0000     77 ; AUTHOR:
0000     78 ;
0000     79 ;       Vik Muiznieks   --  July  1979
0000     80 ;
0000     81 ;       HISTORY
0000     82 ;               Fred Marsh
0000     83 ;       Added $DYNDEF $PRVDEF and $PCBDEF to external symbol definitions
0000     84 ;--
0000     85         .SBTTL  External and local symbol definitions
```

```
                        0000     87 ;
                        0000     88 ; External symbols
                        0000     89 ;
                        0000     90         $CRBDEF                 ; Channel request block
                        0000     91         $VCBDEF                 ; Volume control block
                        0000     92         $DCDEF                  ; Device classes and types
                        0000     93         $DDBDEF                 ; Device data block
                        0000     94         $DEVDEF                 ; Device characteristics
                        0000     95         $EMBDEF                 ; Error logging fields(not in template)
                        0000     96         $IDBDEF                 ; Interrupt data block
                        0000     97         $IODEF                  ; I/O function codes
                        0000     98         $IPLDEF                 ; Hardware IPL definitions
                        0000     99         $IRPDEF                 ; I/O request packet
                        0000    100         $JIBDEF                 ; Job Information Block
                        0000    101         $SSDEF                  ; System status codes
                        0000    102         $UCBDEF                 ; Unit control block
                        0000    103         $VECDEF                 ; Interrupt vector block
                        0000    104         $DYNDEF                 ;
                        0000    105         $PCBDEF                 ;
                        0000    106         $PRVDEF                 ;
                        0000    107
                        0000    108
                        0000    109 ;
                        0000    110 ; Argument list (AP) offsets for device-dependent $QIO parameters
                        0000    111 ;       (Only P1 and P2 are used in this driver)
                        0000    112 ;
                        0000    113
00000000                0000    114 P1      = 0                     ; First $QIO parameter
00000004                0000    115 P2      = 4                     ; Second $QIO parameter
00000008                0000    116 P3      = 8                     ; Third $QIO parameter
0000000C                0000    117 P4      = 12                    ; Fourth $QIO parameter
00000010                0000    118 P5      = 16                    ; Fifth $QIO parameter
00000014                0000    119 P6      = 20                    ; Sixth $QIO parameter
                        0000    120 ;
                        0000    121 ; Other constants
                        0000    122 ;
                        0000    123
0000000F                0000    124 LOOP_CNT=15                     ; before issuing off-line msg.
00000002                0000    125 SHORT_WAIT=2                    ; # sec for device to go online
0000000C                0000    126 BUF_OVR_HD=12                   ; system buffer overhead
0000000A                0000    127 PT_TIMEOUT_SEC=10               ; 10 second device timeout
00000002                0000    128 PT_NUM_REGS=2                   ; Each device has 2 registers
00000064                0000    129 MY_CLASS=100                    ; My own device class number
00000064                0000    130 MY_TYPE=100                     ; My own device type number
0000000C                0000    131 ERBFSIZE=12                     ; Size of err. log buf. in bytes
00000000                0000    132 NULL=0                          ; null byte
0000001A                0000    133 EOF=26                          ; EOF byte = control-Z
00000032                0000    134 NULL_BYTES=50                   ; for header/trailer
00000001                0000    135 PUNCH_HDR=1                     ; bit pos. flagging
                        0000    136                                 ; header/trailer punched
00000004                0000    137 START=4                         ; mask for punch. hdr.
00000010                0000    138 END=16                          ; mask for punch. trail.
00000008                0000    139 PNCH=8                          ; flag-->punch op. perf. (mask)
00000020                0000    140 RD_HDR=32                       ; flag-->read hdr. tape (mask)
00000007                0000    141 STARTING=7                      ; bit pos.--> 1st operation
00000006                0000    142 FRST_QIO=6                      ; flag-->read 1st header (pos.)
00000001                0000    143 BIT0=1                          ; mask-->EOF byte handling
```

```
00000100  0000    144 BIT8=256                                ; mask-->EOF byte handling
00000200  0000    145 BIT9=512                                ; mask-->EOF byte handling
```

```
                     0000   147 ;
                     0000   148 ; Definitions that follow the standard UCB fields
                     0000   149 ;
                     0000   150         $DEFINI UCB                         ; Start of UCB definitions
                     0000   151
000000A0             0000   152         .=UCB$L_DPC+4                       ; Position at end of error log
                                                                            ; extension to UCB
                     00A0   153
                     00A0   154 $DEF     UCB$L_SAV_R4     .BLKL   1         ; copy of R4 for CANCEL routine
                     00A4   155
                     00A4   156 $DEF     UCB$W_PT_PPS     .BLKW   1         ; copy of status reg. (err. log)
                     00A6   157
                     00A6   158 $DEF     UCB$B_PT_OFLCNT  .BLKB   1         ; Off-line counter
                     00A7   159
                     00A7   160 $DEF     UCB$B_PT_PPB     .BLKB   1         ; Copy of data reg. for err. log
                     00A8   161
                     00A8   162 $DEF     UCB$W_MY_REFCNT  .BLKW   1         ; Counter for channels assigned
                     00AA   163
                     00AA   164 $DEF     UCB$K_PT_UCBLEN                    ; Length of extended UCB
                     00AA   165
                     00AA   166         $DEFEND UCB                         ; End of UCB definitions
                     0000   167 ;
                     0000   168 ; Device register offsets from CSR address
                     0000   169 ;
                     0000   170         $DEFINI PT                          ; Start of status definitions
                     0000   171
                     0000   172 $DEF     PT_PRS                             ; reader Control/status register
00000002             0000   173                          .BLKW   1
                     0002   174 ;
                     0002   175 ; Bit positions for device control/status registers
                     0002   176 ;
                     0002   177         _VIELD PT_CSR,0,<-                  ; Control/status register
                     0002   178                 <RDENA,,M>,-                ; Reader enable bit
                     0002   179                 <,5>,-                      ; Skip five bits
                     0002   180                 <IE,,M>,-                   ; Reader interrupt enable bit
                     0002   181                 <DONE,,M>,-                 ; Reader done bit
                     0002   182                 <,3>,-                      ; Skip three bits
                     0002   183                 <BUSY,,M>,-                 ; Reader busy bit
                     0002   184                 <,3>,-                      ; Skip three bits
                     0002   185                 <ERROR,,M>,-                ; Reader error bit
                     0002   186                 >
                     0002   187 $DEF     PT_PRB                             ; reader data register
00000004             0002   188                          .BLKW   1
                     0004   189 $DEF     PT_PPS                             ; Punch Control/status register
00000006             0004   190                          .BLKW   1
                     0006   191         _VIELD  PT_STS,0,<-                 ; Control/status register
                     0006   192                 <,6>,-                      ; disregard bits
                     0006   193                 <IE,,M>,-                   ; interrupt enable
                     0006   194                 <READY,,M>,-                ; device ready bit
                     0006   195                 <,7>,-                      ; disregard bits
                     0006   196                 <ERROR,,M>,-                ; device error bit
                     0006   197                 >
                     0006   198 $DEF     PT_PPB                             ; Punch data register
00000008             0006   199                          .BLKW   1
                     0008   200         $DEFEND PT                          ; End of device register
                     0000   201                                             ; definitions.
                     0000   202         .SBTTL  Standard tables
```

```
0000    204
0000    205 ;
0000    206 ; Driver prologue table
0000    207 ;
0000    208
0000    209         DPTAB   -                                       ; DPT-creation macro
0000    210                 END=PT_END,-                            ; End of driver label
0000    211                 ADAPTER=UBA,-                           ; Adapter type
0000    212                 UCBSIZE=<UCB$K_PT_UCBLEN>,-             ; Length of UCB
0000    213                 NAME=PCDRIVER                           ; Driver name
0038    214         DPT_STORE INIT                                  ; Start of load
0038    215                                                         ; initialization table
0038    216         DPT_STORE UCB,UCB$B_FIPL,B,8                    ; Device fork IPL
003C    217         DPT_STORE UCB,UCB$B_DIPL,B,20                   ; Device int. IPL (BR4)
0040    218         DPT_STORE UCB,UCB$L_DEVCHAR,L,<-                ; Device characteristics
0040    219                 DEV$M_AVL!-                             ;  e.g., dev. available
0040    220                 DEV$M_ELG!-                             ;  error logging enabled
0040    221                 DEV$M_REC!-                             ;  record oriented
0040    222                 DEV$M_IDV!-                             ;  input device-reader
0040    223                 DEV$M_ODV>                              ;  output device-punch
0047    224         DPT_STORE UCB,UCB$B_DEVCLASS,B,MY_CLASS         ; store my device class
004B    225         DPT_STORE UCB,UCB$B_DEVTYPE,B,MY_TYPE           ; Store my device type
004F    226         DPT_STORE UCB,UCB$W_DEVSTS,W,0                  ; Clear all flags
0054    227         DPT_STORE UCB,UCB$W_DEVBUFSIZ,W,NULL_BYTES      ; init. # null bytes
0059    228
0059    229         DPT_STORE REINIT                                ; Start of reload
0059    230                                                         ; initialization table
0059    231         DPT_STORE DDB,DDB$L_DDT,D,PC$DDT                ; Address of DDT
005E    232         DPT_STORE CRB,CRB$L_INTD+4,D,-                  ; Address of reader int.
005E    233                 PR_INTERRUPT                            ; service routine
0063    234         DPT_STORE CRB,CRB$L_INTD2+4,D,-                 ; Address of punch int.
0063    235                 PT_INTERRUPT                            ; service routine
0068    236         DPT_STORE CRB,-                                 ; Address of controller
0068    237                 CRB$L_INTD+VEC$L_INITIAL,-              ; initialization routine
0068    238                 D,PT_CONTROL_INIT
006D    239
006D    240         DPT_STORE END                                   ; End of initialization
0000    241                                                         ; tables
0000    242
0000    243 ;
0000    244 ; Driver dispatch table
0000    245 ;
0000    246
0000    247         DDTAB   -                                       ; DDT-creation macro
0000    248                 DEVNAM=PC,-                             ; Name of device
0000    249                 START=PT_START,-                        ; Start I/O routine
0000    250                 FUNCTB=PT_FUNCTABLE,-                   ; FDT address
0000    251                 CANCEL=PT_CANCEL,-                      ; Cancel I/O routine
0000    252                 REGDMP=PT_REG_DUMP,-                    ; Register dump routine
0000    253                 UNITINIT=PT_UNIT_INIT,-                 ; Unit init. routine
0000    254                 ERLGBF=ERBFSIZE+EMB$L_DV_REGSAV         ; Size of err. log. buf.
0038    255                                                         ; (plus system overhead)
0038    256 ;
0038    257 ; Function dispatch table
0038    258 ;
0038    259 PT_FUNCTABLE:                                           ; FDT for driver
0038    260         FUNCTAB ,-                                      ;. Valid I/O functions
```

```
0038   261                     <READVBLK,-                     ; READ virtual
0038   262                     READLBLK,-                      ; READ logical
0038   263                     READPBLK,-                      ; READ physical
0038   264                     MOUNT,-                         ; MOUNT ACP function
0038   265                     CREATE,-                        ; CREATE function
0038   266                     READPROMPT,-                    ; READPROMPT function
0038   267                     ACPCONTROL,-                    ; ACPCONTROL function
0038   268                     MODIFY,-                        ; set # null bytes
0038   269                     DELETE,-                        ; reset # null bytes
0038   270                     DEACCESS,-                      ; read # null bytes
0038   271                     WRITEOF,-                       ; write EOF function
0038   272                     WRITEVBLK,-                     ; Write virtual
0038   273                     WRITELBLK,-                     ; Write logical
0038   274                     WRITEPBLK>                      ; Write physical
0040   275             FUNCTAB ,-                              ; Buffered functions
0040   276                     <READVBLK,-                     ; READ virtual
0040   277                     READLBLK,-                      ; READ logical
0040   278                     READPBLK,-                      ; READ physical
0040   279                     MOUNT,-                         ; MOUNT ACP function
0040   280                     CREATE,-                        ; CREATE function
0040   281                     READPROMPT,-                    ; READPROMPT function
0040   282                     ACPCONTROL,-                    ; ACPCONTROL function
0040   283                     MODIFY,-                        ; set # null bytes
0040   284                     DELETE,-                        ; reset # null bytes
0040   285                     DEACCESS,-                      ; read # null bytes
0040   286                     WRITEOF,-                       ; write EOF function
0040   287                     WRITEVBLK,-                     ; Write virtual
0040   288                     WRITELBLK,-                     ; Write logical
0040   289                     WRITEPBLK>                      ; Write physical
0048   290             FUNCTAB PT_FDT_ROUTINE,-                ; FDT write routine for
0048   291                     <WRITEVBLK,-                    ; write virtual,
0048   292                     WRITELBLK,-                     ; write logical,
0048   293                     WRITEPBLK>                      ; and write physical.
0054   294             FUNCTAB PR_FDT_ROUTINE,-                ; FDT READ routine for
0054   295                     <READVBLK,-                     ; READ virtual,
0054   296                     READLBLK,-                      ; READ logical,
0054   297                     READPBLK>                       ; and READ physical.
0060   298             FUNCTAB ACP_FDT,<MOUNT>                 ; FDT ACP routines
006C   299             FUNCTAB Q_TO_ACP,-                      ; Check for ACP FDTs
006C   300                     <ACPCONTROL,-                   ; ACPCONTROL routine
006C   301                     WRITEOF>                        ; WRITE EOF routine
0078   302             FUNCTAB FOR_PNCH,-                      ; Make sure for punch
0078   303                     <MODIFY,-                       ; set # null bytes
0078   304                     DELETE,-                        ; reset # null bytes
0078   305                     DEACCESS>                       ; read # null bytes
0084   306             FUNCTAB SET_FDT,<MODIFY>                ; set # null bytes
0090   307             FUNCTAB +EXE$QIODRVPKT,-                ; no more checking
0090   308                     <DELETE,-                       ; for null byte reset or
0090   309                     CREATE,-                        ; CREATE function or
0090   310                     READPROMPT,-                    ; READPROMPT function or
0090   311                     DEACCESS>                       ; reading # null bytes
009C   312             .SBTTL  PT_CONTROL_INIT, Controller initialization routine
```

```
                009C   314
                009C   315 ;++
                009C   316 ; PT_CONTROL_INIT, Readies controller for I/O operations
                009C   317 ;
                009C   318 ; Functional description:
                009C   319 ;
                009C   320 ;       The operating system calls this routine in 3 places:
                009C   321 ;
                009C   322 ;               at system startup
                009C   323 ;               during driver loading and reloading
                009C   324 ;               during recovery from a power failure
                009C   325 ;
                009C   326 ; Inputs:
                009C   327 ;
                009C   328 ;       R4      - address of the CSR (controller status register)
                009C   329 ;       R5      - address of the IDB (interrupt data block)
                009C   330 ;       R6      - address of the DDB (device data block)
                009C   331 ;       R8      - address of the CRB (channel request block)
                009C   332 ;
                009C   333 ; Outputs:
                009C   334 ;
                009C   335 ;       The routine must preserve all registers except R0-R3.
                009C   336 ;
                009C   337 ;--
                009C   338
                009C   339 PT_CONTROL_INIT:                          ; Initialize controller
05              009C   340         RSB                              ; Return
                009D   341         .SBTTL  PT_UNIT_INIT, Unit initialization routine
```

```
                                009D   343
                                009D   344 ;++
                                009D   345 ; PT_UNIT_INIT, Readies unit for I/O operations
                                009D   346 ;
                                009D   347 ; Functional description:
                                009D   348 ;
                                009D   349 ;       The operating system calls this routine after calling the
                                009D   350 ;       controller initialization routine:
                                009D   351 ;
                                009D   352 ;               at system startup
                                009D   353 ;               during driver loading
                                009D   354 ;               during recovery from a power failure
                                009D   355 ;
                                009D   356 ;       When using the SYSGEN CONNECT command, the reader is
                                009D   357 ;       connected first (as PC0:), and the punch is connected
                                009D   358 ;       second (as PC1:).  The initialization routine sets both
                                009D   359 ;       units on-line, and clears the appropriate device
                                009D   360 ;       characteristics bit (i.e., punch does only output oper-
                                009D   361 ;       ations, reader does only input operations).  Two UCBs
                                009D   362 ;       are used so that operations can be overlapped on the
                                009D   363 ;       reader and punch. No controller channel is ever requested
                                009D   364 ;       (with REQPCHAN) since the PC11 reader/punch is essentially
                                009D   365 ;       two independent devices in one box, and no controller is
                                009D   366 ;       really present. (Therefore operations may occur on both
                                009D   367 ;       the reader and the punch at the same time.)
                                009D   368 ;
                                009D   369 ; Inputs:
                                009D   370 ;
                                009D   371 ;       R4      - address of the CSR (controller status register)
                                009D   372 ;       R5      - address of the UCB (unit control block)
                                009D   373 ;
                                009D   374 ; Outputs:
                                009D   375 ;
                                009D   376 ;       The routine must preserve all registers except R0-R3.
                                009D   377 ;
                                009D   378 ;--
                                009D   379
                                009D   380 PT_UNIT_INIT:                        ; Initialize unit
          64 A5    10    A8    009D   381         BISW    #UCB$M_ONLINE,UCB$W_STS(R5)     ; Set unit online
          50    54 A5    B0    00A1   382         MOVW    UCB$W_UNIT(R5),R0               ; Get unit #
                   50    B5    00A5   383         TSTW    R0                              ; Is unit # 0?
                   0A    13    00A7   384         BEQL    10$                             ; If so, reader
38 A5    04000000 8F    CA    00A9   385         BICL    #DEV$M_IDV,UCB$L_DEVCHAR(R5)    ; No input if punch
                   08    11    00B1   386         BRB     20$
38 A5    08000000 8F    CA    00B3   387 10$:    BICL    #DEV$M_ODV,UCB$L_DEVCHAR(R5)    ; No output if reader
                   05    00BB   388 20$:    RSB                             ; Return
                         00BC   389         .SBTTL  PT_FDT_ROUTINE, Punch FDT routine
```

```
                        00BC    391
                        00BC    392 ;++
                        00BC    393 ; PT_FDT_ROUTINE, Punch FDT routine
                        00BC    394 ;
                        00BC    395 ; Functional description:
                        00BC    396 ;
                        00BC    397 ;       This FDT routine makes all the standard accessibility checks
                        00BC    398 ;       for buffered I/O operations, allocates a buffer from system
                        00BC    399 ;       pool, and copies the user data to be punched to the system
                        00BC    400 ;       buffer.  The standard IRP and PCB fields are updated.  In the
                        00BC    401 ;       case of a WRITEOF function code, the IRP is queued to the ACP.
                        00BC    402 ;       The routine makes sure that the punch UCB is being
                        00BC    403 ;       referenced by the user.
                        00BC    404 ;
                        00BC    405 ; Inputs:
                        00BC    406 ;
                        00BC    407 ;       R0-R2   - scratch registers
                        00BC    408 ;       R3      - address of the IRP (I/O request packet)
                        00BC    409 ;       R4      - address of the PCB (process control block)
                        00BC    410 ;       R5      - address of the UCB (unit control block)
                        00BC    411 ;       R6      - address of the CCB (channel control block)
                        00BC    412 ;       R7      - bit number of the I/O function code
                        00BC    413 ;       R8      - address of the FDT table entry for this routine
                        00BC    414 ;       R9-R11  - scratch registers
                        00BC    415 ;       AP      - address of the 1st function dependent $QIO parameter
                        00BC    416 ;
                        00BC    417 ; Outputs:
                        00BC    418 ;
                        00BC    419 ;       The routine must preserve all registers except R0-R2, and
                        00BC    420 ;       R9-R11.
                        00BC    421 ;
                        00BC    422 ;--
                        00BC    423
                        00BC    424 PT_FDT_ROUTINE:                             ; Punch FDT routine ala CRDRIVER
50   000000F4 8F    D0  00BC    425         MOVL    #SS$_ILLIOFUNC,R0           ; Assume wrong UCB
   06 38 A5    1B  E0  00C3    426         BBS     #DEV$V_ODV,UCB$L_DEVCHAR(R5),5$ ; Check for punch UCB
     00000000'GF   17  00C8    427         JMP     G^EXE$ABORTIO               ; Error if not
        50    6C   D0  00CE    428 5$:     MOVL    P1(AP),R0                   ; Get add. of buffer
     51    04 AC   3C  00D1    429         MOVZWL  P2(AP),R1                   ; Get length of buffer
              5F   13  00D5    430         BEQL    10$                         ; Zero length transfer?
     00000000'GF   16  00D7    431         JSB     G^EXE$WRITECHK              ; Check access of user
                       00DD    432                                             ; buffer -- no return if
                       00DD    433                                             ; no accessibility
     32 A3    51   B0  00DD    434         MOVW    R1,IRP$W_BCNT(R3)           ; Save user buffer len.
              09   BB  00E1    435         PUSHR   #^M<R0,R3>                  ; Save registers
        51    0C   C0  00E3    436         ADDL2   #BUF_OVR_HD,R1              ; Account for overhead
     00000000'GF   16  00E6    437         JSB     G^EXE$BUFFRQUOTA            ; Check buffer quota
           50 50    E9  00EC    438         BLBC    R0,20$                      ; Abort if insufficient
     00000000'GF   16  00EF    439         JSB     G^EXE$ALLOCBUF              ; Allocate system buffer
        47 50    E9  00F5    440         BLBC    R0,20$                      ; Abort on failure
              09   BA  00F8    441         POPR    #^M<R0,R3>                  ; Restore registers
     2C A3    52   D0  00FA    442         MOVL    R2,IRP$L_SVAPTE(R3)         ; Store returned buf add
     30 A3    51   B0  00FE    443         MOVW    R1,IRP$W_BOFF(R3)           ; And byte quota charged
              50   DD  0102    444         PUSHL   R0                          ; Save reg.
   50    0080 C4   D0  0104    445         MOVL    PCB$L_JIB(R4),R0            ; Get JIB address
     20 A0    51   C2  0109    446         SUBL    R1,JIB$L_BYTCNT(R0)         ; Charge process for buf
              50 8ED0  010D    447         POPL    R0                          ; Restore reg.
```

```
                38   BB  0110   448          PUSHR   #^M<R3,R4,R5>                    ; Save reg.'s for MOVC3
          53    52   0C  C1  0112   449          ADDL3   #BUF_OVR_HD,R2,R3              ; Find system data area
                82   53  D0  0116   450          MOVL    R3,(R2)+                       ; Save its address
                62   50  D0  0119   451          MOVL    R0,(R2)                        ; Save user buffer add.
                51   0C  C2  011C   452          SUBL2   #BUF_OVR_HD,R1                 ; Set transfer length
          63    60   51  28  011F   453          MOVC3   R1,(R0),(R3)                   ; Copy user buffer to
                                   0123   454                                         ; system data buffer
                38   BA  0123   455          POPR    #^M<R3,R4,R5>                  ; Restore reg.'s
            59    20  A3  B0  0125   456          MOVW    IRP$W_FUNC(R3),R9              ; Get function code
    28      59    06  00  ED  0129   457          CMPZV   S^#IO$V_FCODE,S^#IO$S_FCODE,R9,-; See if WRITEOF $QIO
                                   012E   458                  S^#IO$_WRITEOF         ; If so,
                43   13  012E   459          BEQL    TO_ACP                         ; Queue IRP to ACP
          00000000'GF   17  0130   460          JMP     G^EXE$QIODRVPKT                ; Queue driver packet
                                   0136   461                                         ; FDT routine done
                                   0136   462
                                   0136   463 ;
                                   0136   464 ;       Entered on zero-length transfer or allocation failure
                                   0136   465 ;
             50   01  3C  0136   466 10$:    MOVZWL  #SS$_NORMAL,R0                 ; Normal completion
          00000000'GF   17  0139   467          JMP     G^EXE$FINISHIOC                ; Goto finish I/O
                0C   BA  013F   468 20$:    POPR    #^M<R2,R3>                     ; Clean up stack
          00000000'GF   17  0141   469          JMP     G^EXE$ABORTIO                  ; Quota or buffer
                                   0147   470                                         ; allocation failure
                                   0147   471          .SBTTL  ACP_FDT ACP $QIO FDT Routine
```

```
                     0147   473 ;++
                     0147   474 ; ACP_FDT, ACP $QIO FDT routine
                     0147   475 ;
                     0147   476 ; Functional description:
                     0147   477 ;
                     0147   478 ;       This FDT routine increments the transaction count in the VCB,
                     0147   479 ;       and queues the IRP to the paper tape ACP (PCACP).  It is
                     0147   480 ;       used for the MOUNT $QIO.  MOUNT privilege is required to
                     0147   481 ;       successfully issue the MOUNT $QIO request.
                     0147   482 ;
                     0147   483 ;       Entry point Q_TO_ACP is used to service both the WRITEOF and
                     0147   484 ;       ACPCONTROL $QIOs.  Control is re-transferred to TO_ACP from
                     0147   485 ;       routine PT_FDT_ROUTINE in the case of a WRITEOF $QIO.
                     0147   486 ;
                     0147   487 ;       No check is made on the punch or reader UCB, since
                     0147   488 ;       requests for ACP operation will find the errors.
                     0147   489 ;
                     0147   490 ; Inputs:
                     0147   491 ;
                     0147   492 ;       R0-R2   - scratch registers
                     0147   493 ;       R3      - address of the IRP (I/O request packet)
                     0147   494 ;       R4      - address of the PCB (process control block)
                     0147   495 ;       R5      - address of the UCB (unit control block)
                     0147   496 ;       R6      - address of the CCB (channel control block)
                     0147   497 ;       R7      - bit number of the I/O function code
                     0147   498 ;       R8      - address of the FDT table entry for this routine
                     0147   499 ;       R9-R11  - scratch registers
                     0147   500 ;       AP      - address of the 1st function dependent $QIO parameter
                     0147   501 ;
                     0147   502 ; Outputs:
                     0147   503 ;
                     0147   504 ;       The routine must preserve all registers except R0-R2, and
                     0147   505 ;       R9-R11.
                     0147   506 ;
                     0147   507 ;--
                     0147   508
                     0147   509 ACP_FDT:                                        ; MOUNT $QIO issued
          50   24   3C  0147   510         MOVZWL  #SS$_NOPRIV,R0               ; Assume insuf. priv.
                     014A   511         IFNPRIV MOUNT,NO_PRIV                ; Have MOUNT privilege?
02 64 A5   09   E5  0150   512         BBCC    #UCB$V_MOUNTING,UCB$W_STS(R5),NT_MNT ; If clr, not sync.
           0B   11  0155   513         BRB     Q_TO_ACP                     ; Yes, continue
 50   007C 8F   3C  0157   514 NT_MNT: MOVZWL  #SS$_DEVNOTMOUNT,R0           ; Not mounting status
  00000000'GF   17  015C   515 NO_PRIV:JMP     G^EXE$ABORTIO                ; Signal error
                015F   516 Q_TO_ACP:                                         ; IRP request okay
  50   34 A5   D0  0162   517         MOVL    UCB$L_VCB(R5),R0             ; Get VCB address
           EF   13  0166   518         BEQL    NT_MNT                       ; Is ACP mounted?
     06   00   ED  0168   519         CMPZV   S^#IO$V_FCODE,S^#IO$S_FCODE,- ; Check for WRITEOF
 28   20 A3        016B   520                 IRP$W_FUNC(R3),S^#IO$_WRITEOF ; Function code
           07   12  016E   521         BNEQ    NT_WRT                       ; If neq, Q to ACP
         FF49   31  0170   522         BRW     PT_FDT_ROUTINE               ; If eql, WRITEOF
  50   34 A5   D0  0173   523 TO_ACP: MOVL    UCB$L_VCB(R5),R0             ; Restore VCB address
                0177   524 NT_WRT: SETIPL  #IPL$_SYNCH                       ; Synch. access to VCB
        0C A0   B6  017A   525         INCW    VCB$W_TRANS(R0)              ; Increment trans. count
  00000000'GF   17  017D   526         JMP     G^EXE$QIOACPPKT              ; Queue IRP to ACP
                0183   527         .SBTTL  NULL_BYTES FDT Routines for header/trailer
```

```
                        0183   529 ;
                        0183   530 ;       FDT routines for processing MODIFY, DELETE, and DEACCESS
                        0183   531 ;       $QIOS.  Very similar, and very simple.
                        0183   532 ;
                        0183   533 FOR_PNCH:                                          ; Have punch UCB?
50   000000F4 8F    D0  0183   534         MOVL    #SS$_ILLIOFUNC,R0                 ; Assume not
   06 38 A5    1B    E0  018A   535         BBS     #DEV$V_ODV,UCB$L_DEVCHAR(R5),5$   ; Check for punch
     00000000'GF    17  018F   536         JMP     G^EXE$ABORTIO                     ; Not punch UCB
         50    01    D0  0195   537 5$:     MOVL    #SS$_NORMAL,R0                    ; Have punch
                     05  0198   538         RSB                                       ; Return to FDT table
                         0199   539 SET_FDT:                                         ; Get # null bytes
   38 A3    04 AC    3C  0199   540         MOVZWL  P2(AP),IRP$L_MEDIA(R3)            ; Store # of null bytes
     00000000'GF    17  019E   541         JMP     G^EXE$QIODRVPKT                   ; Synchronize with other
                        01A4   542                                                   ; I/O requests for unit
                        01A4   543         .SBTTL  PR_FDT_ROUTINE Reader FDT Routine
```

```
                     01A4    545 ;++
                     01A4    546 ; PR_FDT_ROUTINE, READER FDT routine
                     01A4    547 ;
                     01A4    548 ; Functional description:
                     01A4    549 ;
                     01A4    550 ;       This FDT routine makes all the standard accessibility checks
                     01A4    551 ;       for buffered I/O operations, and allocates a buffer from system
                     01A4    552 ;       pool (into which the data will be read).
                     01A4    553 ;       The standard IRP and PCB fields are updated.
                     01A4    554 ;       A check is made to determine if the reader UCB is being
                     01A4    555 ;       referenced.
                     01A4    556 ; Inputs:
                     01A4    557 ;       R0-R2   - scratch registers
                     01A4    558 ;       R3      - address of the IRP (I/O request packet)
                     01A4    559 ;       R4      - address of the PCB (process control block)
                     01A4    560 ;       R5      - address of the UCB (unit control block)
                     01A4    561 ;       R6      - address of the CCB (channel control block)
                     01A4    562 ;       R7      - bit number of the I/O function code
                     01A4    563 ;       R8      - address of the FDT table entry for this routine
                     01A4    564 ;       R9-R11  - scratch registers
                     01A4    565 ;       AP      - address of the 1st function dependent $QIO parameter
                     01A4    566 ; Outputs:
                     01A4    567 ;       The routine must preserve all registers except R0-R2, and
                     01A4    568 ;       R9-R11.
                     01A4    569 ;--
                     01A4    570 PR_FDT_ROUTINE:                             ; reader FDTroutine ala CRDRIVER
50   000000F4 8F     D0  01A4    571         MOVL    #SS$_ILLIOFUNC,R0       ; Assume wrong UCB
   06 38 A5     1A     E0  01AB    572         BBS     #DEV$V_IDV,UCB$L_DEVCHAR(R5),5$ ; Test for reader UCB
      00000000'GF     17  01B0    573         JMP     G^EXE$ABORTIO           ; Error if not
          50     6C     D0  01B6    574 5$:     MOVL    P1(AP),R0               ; Get add. of buffer
        51     04 AC   3C  01B9    575         MOVZWL  P2(AP),R1               ; Get length of buffer
                 46    13  01BD    576         BEQL    10$                     ; Zero length transfer?
      00000000'GF     16  01BF    577         JSB     G^EXE$READCHK           ; Check access of user
                      01C5    578                                             ; buffer -- no return if
                      01C5    579                                             ; no accessibility
        32 A3    51     B0  01C5    580         MOVW    R1,IRP$W_BCNT(R3)       ; Save user buffer len.
                 09     BB  01C9    581         PUSHR   #^M<R0,R3>              ; Save registers
           51    0C     C0  01CB    582         ADDL2   #BUF_OVR_HD,R1          ; Account for overhead
      00000000'GF     16  01CE    583         JSB     G^EXE$BUFFRQUOTA        ; Check buffer quota
             37 50    E9  01D4    584         BLBC    R0,20$                  ; Abort if insufficient
      00000000'GF     16  01D7    585         JSB     G^EXE$ALLOCBUF          ; Allocate system buffer
             2E 50    E9  01DD    586         BLBC    R0,20$                  ; Abort on failure
                 09     BA  01E0    587         POPR    #^M<R0,R3>              ; Restore registers
        2C A3    52     D0  01E2    588         MOVL    R2,IRP$L_SVAPTE(R3)     ; Store returned buf add
        30 A3    51     B0  01E6    589         MOVW    R1,IRP$W_BOFF(R3)       ; And byte quota charged
                 50     DD  01EA    590         PUSHL   R0                      ; Save reg.
     50    0080 C4     D0  01EC    591         MOVL    PCB$L_JIB(R4),R0        ; Get JIB address
        20 A0    51     C2  01F1    592         SUBL    R1,JIB$L_BYTCNT(R0)     ; Charge process for buf
                 50 8ED0     01F5    593         POPL    R0                      ; Restore reg.
        82    0C A2     9E  01F8    594         MOVAB   BUF_OVR_HD(R2),(R2)+    ; Save data area add.
           62    50     D0  01FC    595         MOVL    R0,(R2)                 ; Save user buffer add.
      00000000'GF     17  01FF    596         JMP     G^EXE$QIODRVPKT         ; Queue driver packet
                      0205    597 ;       Entered on zero-length transfer or allocation failure
          50    01     3C  0205    598 10$:    MOVZWL  #SS$_NORMAL,R0          ; Normal completion
      00000000'GF     17  0208    599         JMP     G^EXE$FINISHIOC         ; Goto finish I/O
                 0C     BA  020E    600 20$:    POPR    #^M<R2,R3>              ; Clean up stack
      00000000'GF     17  0210    601         JMP     G^EXE$ABORTIO           ; Quota or buffer
```

```
                                                        ; allocation failure
0216    602
0216    603         .SBTTL  PT_START, Start I/O routine
```

```
                        0216   605
                        0216   606 ;
                        0216   607 ;       Enter here at the start of an I/O operation.  The first step
                        0216   608 ;       is to determine what I/O function code was specified in the
                        0216   609 ;       $QIO being serviced.
                        0216   610 ;
                        0216   611 PT_START:
  00 64 A5    05    E4  0216   612          BBSC    #UCB$V_POWER,UCB$W_STS(R5),1$   ; Det. func. req.
009A C5    20 A3    B0  021B   613 1$:      MOVW    IRP$W_FUNC(R3),UCB$W_FUNC(R5)   ; Make sure bit clear
                        0221   614                                                  ; Allow inhibit of error
                                                                                    ; logging via modifiers
        06    00    ED  0221   615          CMPZV   #IRP$V_FCODE,#IRP$S_FCODE,-     ; Look for MODIFY $QIO
     36    20 A3        0224   616                  IRP$W_FUNC(R3),#IO$_MODIFY
              4D    13  0227   617          BEQL    10$                             ; Found if eql
        06    00    ED  0229   618          CMPZV   #IRP$V_FCODE,#IRP$S_FCODE,-     ; Look for DEACCESS $QIO
     34    20 A3        022C   619                  IRP$W_FUNC(R3),#IO$_DEACCESS
              4C    13  022F   620          BEQL    20$                             ; Found if eql
        06    00    ED  0231   621          CMPZV   #IRP$V_FCODE,#IRP$S_FCODE,-     ; Look for DELETE $QIO
     35    20 A3        0234   622                  IRP$W_FUNC(R3),#IO$_DELETE
              2E    13  0237   623          BEQL    3$                              ; Found if eql
        06    00    ED  0239   624          CMPZV   #IRP$V_FCODE,#IRP$S_FCODE,-     ; Look for CREATE $QIO
     33    20 A3        023C   625                  IRP$W_FUNC(R3),#IO$_CREATE
              19    13  023F   626          BEQL    30$                             ; Found if eql
        06    00    ED  0241   627          CMPZV   #IRP$V_FCODE,#IRP$S_FCODE,-     ; Look for READPROMPT
     37    20 A3        0244   628                  IRP$W_FUNC(R3),#IO$_READPROMPT  ; $QIO
              3A    12  0247   629          BNEQ    100$                            ; Read/write if neq
  11 38 A5    1A    E0  0249   630          BBS     #DEV$V_IDV,UCB$L_DEVCHAR(R5),2$ ; Reader? dsable--> set
     68 A5    01    AA  024E   631 25$:     BICW    #BIT0,UCB$W_DEVSTS(R5)          ; Enable function
68 A5    0100 8F    A8  0252   632          BISW    #BIT8,UCB$W_DEVSTS(R5)          ; Mark enable for read phys.
              11    11  0258   633          BRB     5$                              ; All done
  EF 38 A5    1A    E0  025A   634 30$:     BBS     #DEV$V_IDV,UCB$L_DEVCHAR(R5),25$; Reader? enable-->clr
68 A5    0201 8F    A8  025F   635 2$:      BISW    #BIT0!BIT9,UCB$W_DEVSTS(R5)     ; Disable function
              04    11  0265   636          BRB     5$                              ; All done
     42 A5    32    B0  0267   637 3$:      MOVW    #NULL_BYTES,UCB$W_DEVBUFSIZ(R5) ; Reset # of null bytes
              51    D4  026B   638 5$:      CLRL    R1                              ; No dev. dep. info.
        50    01    D0  026D   639 7$:      MOVL    #SS$_NORMAL,R0                  ; Successful completion
                        0270   640          REQCOM                                  ; All done
  42 A5    38 A3    B0  0276   641 10$:     MOVW    IRP$L_MEDIA(R3),UCB$W_DEVBUFSIZ(R5) ; Set # null bytes
              EE    11  027B   642          BRB     5$                              ; And finish up
     51    42 A5    3C  027D   643 20$:     MOVZWL  UCB$W_DEVBUFSIZ(R5),R1          ; Read # null bytes
              EA    11  0281   644          BRB     7$                              ; And finish up
  03 2A A3    01    E1  0283   645 100$:    BBC     #IRP$V_FUNC,IRP$W_STS(R3),PT_PUNCH ; Write if clear
           024C    31  0288   646          BRW     PR_START                        ; Otherwise, read func
                        028B   647          .SBTTL  PT_PUNCH, Start a punch operation
```

```
                        028B   649 ;++
                        028B   650 ; PT_PUNCH - Start a punch operation
                        028B   651 ;
                        028B   652 ; Functional description:
                        028B   653 ;
                        028B   654 ;       The punch interrupt enable bit is set.  One character at a
                        028B   655 ;       time (from the system buffer pointed to by UCB$L_SVAPTE) is
                        028B   656 ;       moved to the punch's data buffer, and an interrupt is awaited.
                        028B   657 ;       If powerfail occurs, the entire operation is retried (if it is
                        028B   658 ;       the first $QIO for the user); otherwise, the operation is aborted
                        028B   659 ;       (unless the powerfail occurs while punching the trailer, in
                        028B   660 ;       which case the entire trailer may not be punched).  In the case
                        028B   661 ;       of an aborted punch, the high-order word of the first longword
                        028B   662 ;       in the IOSB will contain the number of bytes punched before the
                        028B   663 ;       powerfail occurred (error code = SS$_TAPEPOSLOST).
                        028B   664 ;
                        028B   665 ;       A counter is kept on the number of bytes left to be punched
                        028B   666 ;       (UCB$W_BCNT).  When this counter goes to zero, the request
                        028B   667 ;       is complete.
                        028B   668 ;
                        028B   669 ;       In the case of a virtual or logical I/O operation
                        028B   670 ;       a header of UCB$W_DEVBUFSIZ null bytes is punched
                        028B   671 ;       before the actual data is punched; similarly a trailer
                        028B   672 ;       tape (of UCB$W_DEVBUFSIZ null bytes) is punched when the
                        028B   673 ;       channel to the punch is deassigned/deallocated by the
                        028B   674 ;       user (in the cancel I/O routine (PT_CANCEL)). The user can
                        028B   675 ;       suppress the defaults and/or punching an EOF byte (cntrl-Z).
                        028B   676 ;
                        028B   677 ; Inputs:
                        028B   678 ;       R3      - address of the IRP (I/O request packet)
                        028B   679 ;       R5      - address of the UCB (unit control block)
                        028B   680 ; Outputs:
                        028B   681 ;       R0      - 1st longword of I/O status: contains status code and
                        028B   682 ;                 number of bytes transferred
                        028B   683 ;       R1      - 2nd longword of I/O status: device-dependent
                        028B   684 ;
                        028B   685 ;       The routine must preserve all registers except R0-R2 and R4.
                        028B   686 ;--
                        028B   687 PT_PUNCH:                                    ; Process an I/O packet
        68 A5    10  AA 028B   688         BICW    #END,UCB$W_DEVSTS(R5)         ; Not punching trailer
     78 A5    2C A3  7D 028F   689         MOVQ    IRP$L_SVAPTE(R3),UCB$L_SVAPTE(R5); Note quad transfer
                        0294   690                                               ; for powerfail recovery
        78 A5    0C  C0 0294   691         ADDL2   #BUF_OVR_HD,UCB$L_SVAPTE(R5)  ; Skip sys buf header
                        0298   692 PNCH_HDR:                                    ; Trailer punch entry pt
                        0298   693         .ENABL  LSB
        50    24 A5  D0 0298   694         MOVL    UCB$L_CRB(R5),R0              ; Get CRB
        54    2C B0  D0 029C   695         MOVL    @CRB$L_INTD+VEC$L_IDB(R0),R4  ; Get CSR address
  04 A4    0040 8F  A8 02A0   696         BISW    #PT_STS_M_IE,PT_PPS(R4)       ; Set int. enable bit
     08 68 A5    01  E2 02A6   697         BBSS    #PUNCH_HDR,UCB$W_DEVSTS(R5),5$ ; Hdr already pnchd?
  00A8 C5    5C A5  B0 02AB   698         MOVW    UCB$W_REFC(R5),UCB$W_MY_REFCNT(R5) ; Save reference count
                 03  11 02B1   699         BRB     10$                           ; No - punch header
              00B4  31 02B3   700 5$:      BRW     MAINLP                        ; Punch data
        68 A5    10  B3 02B6   701 10$:     BITW    #END,UCB$W_DEVSTS(R5)         ; Punching trailer?
                 2A  12 02BA   702         BNEQ    12$                           ; Yes, if neq
        50    20 A3  B0 02BC   703         MOVW    IRP$W_FUNC(R3),R0             ; Get function code
0B   50    06   00  ED 02C0   704         CMPZV   S^#IO$V_FCODE,S^#IO$S_FCODE,R0,-; No header punched for
                        02C5   705                 S^#IO$_WRITEPBLK              ; Physical I/O func.
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                 0F   12  02C5   706          BNEQ    11$                                     ; Not phys. if neq
 68 A5     0200 8F   B3  02C7   707          BITW    #BIT9,UCB$W_DEVSTS(R5)                  ; Want trailer byte?
                04   13  02CD   708          BEQL    8$                                      ; No, if eql
      68 A5     01   A8  02CF   709          BISW    #BIT0,UCB$W_DEVSTS(R5)                  ; Mark want trailer
              0094   31  02D3   710 8$:      BRW     MAINLP                                  ; Skip header punching
      68 A5     0D   A8  02D6   711 11$:     BISW    #PNCH!BIT0!START,UCB$W_DEVSTS(R5) ; Set flag bits
 68 A5     0100 8F   B3  02DA   712          BITW    #BIT8,UCB$W_DEVSTS(R5)                  ; No EOF byte?
                04   13  02E0   713          BEQL    12$                                     ; No, if eql
      68 A5     01   AA  02E2   714          BICW    #BIT0,UCB$W_DEVSTS(R5)                  ; No EOF byte, if neq
   44 A5     42 A5   3C  02E6   715 12$:     MOVZWL  UCB$W_DEVBUFSIZ(R5),UCB$L_DEVDEPEND(R5); Set # nullbytes
      68 A5     10   B3  02EB   716          BITW    #END,UCB$W_DEVSTS(R5)                   ; Punching trailer?
                1F   13  02EF   717          BEQL    NUL                                     ; No, if eql
      68 A5     01   B3  02F1   718          BITW    #BIT0,UCB$W_DEVSTS(R5)                  ; Punch EOF byte?
                19   13  02F5   719          BEQL    NUL                                     ; No if eql
             44 A5   D6  02F7   720          INCL    UCB$L_DEVDEPEND(R5)                     ; One extra byte pnchd.
   00A7 C5     1A   90  02FA   721 PUNEOF:  MOVB    #EOF,UCB$B_PT_PPB(R5)                   ; Save for error log.
                     02FF   722          DSBINT                                          ; Raise to powerfail
 39 64 A5      05   E4  0305   723          BBSC    #UCB$V_POWER,UCB$W_STS(R5),20$          ; Check for powerfail
      06 A4     1A   90  030A   724          MOVB    #EOF,PT_PPB(R4)                         ; Punch EOF byte
                14   11  030E   725          BRB     WAIT                                    ; Wait for interrupt
   00A7 C5     00   90  0310   726 NUL:     MOVB    #NULL,UCB$B_PT_PPB(R5)                  ; Save for err. log.
                     0315   727 NULLP:   DSBINT                                          ; No interrupts
 23 64 A5      05   E4  031B   728          BBSC    #UCB$V_POWER,UCB$W_STS(R5),20$          ; Check for powerfail
      06 A4     00   90  0320   729          MOVB    #NULL,PT_PPB(R4)                        ; Punch null byte
                     0324   730 WAIT:    WFIKPCH 25$,#PT_TIMEOUT_SEC                     ; Wait for I/O comp.
                     032E   731 ;
                     032E   732 ;         Enter here after interrupt service routine
                     032E   733 ;
              0065   31  032E   734          BRW     AFTINT                                  ; Check for errors
           44 A5     D7  0331   735 BACK:    DECL    UCB$L_DEVDEPEND(R5)                     ; Dec null byte count
                DF   12  0334   736          BNEQ    NULLP                                   ; Loop if more to punch
      68 A5     04   AA  0336   737          BICW    #START,UCB$W_DEVSTS(R5)                 ; Clear hdr. punch flag
      68 A5     10   B3  033A   738          BITW    #END,UCB$W_DEVSTS(R5)                   ; Punching header?
                2A   13  033E   739          BEQL    MAINLP                                  ; Yes if eql
              031B   31  0340   740          BRW     INCAN                                   ; Return for trailer
                     0343   741 20$:                                                      ; Powerfail recovery
                     0343   742          ENBINT                                          ; Allow interrupts
 00 68 A5      01   E4  0346   743          BBSC    #PUNCH_HDR,UCB$W_DEVSTS(R5),22$ ; Clear hdr. pnchd flag
      68 A5     10   B3  034B   744 22$:     BITW    #END,UCB$W_DEVSTS(R5)                   ; Header or trailer?
                07   13  034F   745          BEQL    23$                                     ; Header if eql
      53     58 A5   D0  0351   746          MOVL    UCB$L_IRP(R5),R3                        ; Retrieve IRP address
              FF40   31  0355   747          BRW     PNCH_HDR                                ; Retry punching trailer
              008D   31  0358   748 23$:     BRW     POW_FAIL                                ; Retry punching header
                     035B   749                                                          ; after powerfail recov.
      68 A5     10   B3  035B   750 25$:     BITW    #END,UCB$W_DEVSTS(R5)                   ; Header or trailer?
                01   13  035F   751          BEQL    30$                                     ; Header if equal
                05   0361   752          RSB                                             ; Return if trailer
 00 68 A5      01   E4  0362   753 30$:     BBSC    #PUNCH_HDR,UCB$W_DEVSTS(R5),35$ ; Report timeout
              C0F5   31  0367   754 35$:     BRW     PT_TIMEOUT                              ; Make sure flag clear
                     036A   755          .DSABL  LSB
 03 64 A5      03   E1  036A   756 MAINLP: BBC     #UCB$V_CANCEL,UCB$W_STS(R5),1$  ; Check for $CANCEL
              0152   31  036F   757          BRW     CANCEL                                  ; $CANCEL if set
                     0372   758 1$:      DSBINT  UCB$B_DIPL(R5)                          ; No device interrupts
00A7 C5     78 B5   90  0379   759          MOVB    @UCB$L_SVAPTE(R5),UCB$B_PT_PPB(R5) ; Save data for err.
                     037F   760                                                          ; log buf. dump routine
                     037F   761          SETIPL  #IPL$_POWER                             ; Raise to powerfail
 5E 64 A5      05   E4  0382   762          BBSC    #UCB$V_POWER,UCB$W_STS(R5),PT_RESTART ; Powerfail?
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                06 A4    78 B5    90  0387    763          MOVB    @UCB$L_SVAPTE(R5),PT_PPB(R4)     ; Load punch data buffer
                                       038C    764          WFIKPCH PT_TIMEOUT,#PT_TIMEOUT_SEC       ; 10 sec. timeout
                                       0396    765 ;
                                       0396    766 ;        Enter here from interrupt service routine (PT_INTERRUPT)
                                       0396    767 ;
             00A4 C5    04 A4    B0  0396    768 AFTINT: MOVW     PT_PPS(R4),UCB$W_PT_PPS(R5)      ; Read CSR (save for
                                       039C    769                                                   ; error logging later)
                                       039C    770          IOFORK                                   ; Return to fork level
             00A4 C5    0080 8F  B3  03A2    771          BITW    #PT_STS_M_READY,UCB$W_PT_PPS(R5); Punch ready again?
                           66    13  03A9    772          BEQL    PT_ERROR                         ; If so, error
             00A4 C5    8000 8F  B3  03AB    773          BITW    #PT_STS_M_ERROR,UCB$W_PT_PPS(R5); Error during punch?
                           5D    12  03B2    774          BNEQ    PT_ERROR                         ; Yes, report it
                 68 A5     04    B3  03B4    775          BITW    #START,UCB$W_DEVSTS(R5)          ; Punching user data?
                           03    13  03B8    776          BEQL    10$                              ; Yes, if eql
                        FF74     31  03BA    777          BRW     BACK                             ; Punching header/trailr
                        78 A5    D6  03BD    778 10$:     INCL    UCB$L_SVAPTE(R5)                 ; Point to next byte to
                                       03C0    779                                                   ; be punched
                        7E A5    B7  03C0    780          DECW    UCB$W_BCNT(R5)                   ; Decrement byte count
                           A5    12  03C3    781          BNEQ    MAINLP                           ; All done?
                04 A4    0040 8F  AA  03C5    782          BICW    #PT_STS_M_IE,PT_PPS(R4)          ; Clear int. enable bit
                   00 68 A5     07  E3  03CB    783          BBCS    #STARTING,UCB$W_DEVSTS(R5),FINISH ; Punched >= 1 oper.
                                       03D0    784 ; After a transfer completes successfully, return the number of bytes
                                       03D0    785 ; transferred and a success status code.
                   10    32 A3    F0  03D0    786 FINISH: INSV     IRP$W_BCNT(R3),#16,-     ; Load number of bytes trans-
                      50    10          03D4    787                  #16,R0                   ; ferred into high word of R0.
                      50    01    B0  03D6    788          MOVW    #SS$_NORMAL,R0                   ; Load a success code into R0.
                                       03D9    789 ;
                                       03D9    790 ; Call I/O postprocessing.
                                       03D9    791 ;
                                       03D9    792 COMPLETE_IO:                                 ; Driver processing is finished.
                68 A5     20    AA  03D9    793          BICW    #RD_HDR,UCB$W_DEVSTS(R5); Make sure reader flag clear
                           51    D4  03DD    794          CLRL    R1                               ; No device dependent information
                                       03DF    795          REQCOM                           ; Complete I/O.
                                       03E5    796 ;
                                       03E5    797 ;        Recover from powerfail by retrying entire operation (for punch).
                                       03E5    798 ;        If powerfail occurred on first $QIO request from user.
                                       03E5    799 ;
                                       03E5    800 PT_RESTART:                                  ; Powerfail entry point
                                       03E5    801          ENBINT                           ; Allow interrupts (POP IPL)
                                       03E8    802 POW_FAIL:                                    ; Enter after timeout
                0F 68 A5     07    E0  03E8    803          BBS     #STARTING,UCB$W_DEVSTS(R5),POWER_FAIL ; No recovery if
                                       03ED    804                                                   ; not punching 1st rec.
                   53    58 A5     D0  03ED    805          MOVL    UCB$L_IRP(R5),R3                 ; Retrieve IRP address
                   00 68 A5     01    E4  03F1    806          BBSC    #PUNCH_HDR,UCB$W_DEVSTS(R5),1$   ; Clear header punched bit
                        FE92     31  03F6    807 1$:      BRW     PT_PUNCH                         ; And retry operation
                                       03F9    808 ;        No recovery possible from reader powerfail; tell user how many
                                       03F9    809 ;        bytes read before powerfail occurred.  Also, no recovery from
                                       03F9    810 ;        punch if not punching 1st $QIO request for this user.  Tell user
                                       03F9    811 ;        how many bytes were punched before powerfail occurred.
                                       03F9    812 PR_POWFAIL:                                  ; Powerfail entry point
                                       03F9    813          ENBINT                           ; Allow interrupts (POP IPL)
                                       03FC    814 POWER_FAIL:                                  ; Enter after timeout
                        0287     30  03FC    815          BSBW    SETOFF                           ; Clear int. enable bit
                                       03FF    816                              ; Note that a BSB-RSB sequence can be used since
                                       03FF    817                              ; the subroutine will not call any system macros
                                       03FF    818                              ; or routines (which would cause unpredictable
                                       03FF    819                              ; results when control would be returned to the
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                                03FF   820                          ; caller's caller)
          32 A3    7E A5   A2  03FF   821          SUBW2   UCB$W_BCNT(R5),IRP$W_BCNT(R3)   ; Record bytes read/pun.
50   10    10     32 A3   F0  0404   822          INSV    IRP$W_BCNT(R3),#16,#16,R0       ; For status return
       50     0224 8F   B0  040A   823          MOVW    #SS$_TAPEPOSLOST,R0             ; Return status
                 C8   11  040F   824          BRB     COMPLETE_IO                     ; Complete I/O
                              0411   825 ;
                              0411   826 ;       Device error has occurred -- signal via SS$_DRVERR
                              0411   827 ;       error code
                              0411   828 ;
                              0411   829 PT_ERROR:                                  ; Error handling
                     0272   30  0411   830          BSBW    SETOFF                  ; Clear interrupt enable bit
          00000000'GF   16  0414   831          JSB     G^ERL$DEVICERR          ; Report device error
       50     008C 8F   3C  041A   832          MOVZWL  #SS$_DRVERR,R0          ; Return error status
          32 A3    7E A5   A2  041F   833          SUBW2   UCB$W_BCNT(R5),IRP$W_BCNT(R3)   ; Record bytes read/pun.
50   10    10     32 A3   F0  0424   834          INSV    IRP$W_BCNT(R3),#16,#16,R0       ; For status return
                    AD   11  042A   835          BRB     COMPLETE_IO             ; Call I/O postprocessing
                              042C   836 ;
                              042C   837 ;       Assume that "no more tape in reader" is error generated, and
                              042C   838 ;       tell user how many bytes were read before error was encountered
                              042C   839 ;       in case P2 parameter specified more bytes than were read.
                              042C   840 ;
                              042C   841 PR_SPERR:                                  ; Entered if no tape in reader,
                              042C   842                                           ; reader off-line after at least
                              042C   843                                           ; one previous character read,
                              042C   844                                           ; or no power to reader
                     0257   30  042C   845          BSBW    SETOFF                          ; Clear int. enable bit
          32 A3    7E A5   A2  042F   846          SUBW2   UCB$W_BCNT(R5),IRP$W_BCNT(R3)   ; Store num bytes read
50   10    10     32 A3   F0  0434   847          INSV    IRP$W_BCNT(R3),#16,#16,R0       ; In return status
       50     0870 8F   B0  043A   848          MOVW    #SS$_ENDOFFILE,R0               ; Set return status code
       00 68 A5    01   E3  043F   849          BBCS    #PUNCH_HDR,UCB$W_DEVSTS(R5),DON ; Special case for $COPY
                              0444   850                                           ; so that reading will end on end
                              0444   851                                           ; of file (COPY issues 2nd read)
                     FF92   31  0444   852 DON:     BRW     COMPLETE_IO                     ; Complete I/O
       50   00000870 8F   D0  0447   853 COPY:    MOVL    #SS$_ENDOFFILE,R0               ; Fudge return to COPY
                     FF88   31  044E   854          BRW     COMPLETE_IO                     ; Finish operation
                              0451   855 ;
                              0451   856 ; Device timeout handling. Return an error status code for punch.
                              0451   857 ; Send message to operator, and loop until reader is set online.
                              0451   858 ;
                              0451   859 PR_TIMEOUT:                                ; Timeout handling
                              0451   860          SETIPL  UCB$B_FIPL(R5)          ; Lower to fork first
       A2 64 A5    05   E4  0455   861          BBSC    #UCB$V_POWER,UCB$W_STS(R5),POWER_FAIL ; Powerfail?
                     11   11  045A   862          BRB     COMMON                  ; Enter common timeout code
                  FF89   31  045C   863 SKIP2:  BRW     POW_FAIL                ; Handle powerfail
                              045F   864 PT_TIMEOUT:                               ; Timeout handling
                              045F   865          SETIPL  UCB$B_FIPL(R5)                  ; Lower to fork first
       38 38 A5    1A   E0  0463   866          BBS     #DEV$V_IDV,UCB$L_DEVCHAR(R5),PUN_OT ; Reader timeout?
       EF 64 A5    05   E4  0468   867          BBSC    #UCB$V_POWER,UCB$W_STS(R5),SKIP2; Powerfail?
       52 64 A5    03   E0  046D   868 COMMON: BBS     #UCB$V_CANCEL,UCB$W_STS(R5),CANCEL  ; Cancel I/O?
       29 38 A5    1B   E0  0472   869          BBS     #DEV$V_ODV,UCB$L_DEVCHAR(R5),PUN_OT ; Punch timeout?
       B0 68 A5    07   E0  0477   870          BBS     #STARTING,UCB$W_DEVSTS(R5),PR_SPERR ; Reader EOF err?
0099 00A6 C5    01   0F  9D  047C   871          ACBB    #LOOP_CNT,#1,UCB$B_PT_OFLCNT(R5),MAIN ; Rdr-wait 30 sec.
              00A6 C5   94  0484   872          CLRB    UCB$B_PT_OFLCNT(R5)             ; Clear off-line counter
                    18   BB  0488   873          PUSHR   #^M<R3,R4>                      ; Save registers
          54    00'8F   9A  048A   874          MOVZBL  #MSG$_DEVOFFLIN,R4              ; Set message type
       53   00000000'GF   9E  048E   875          MOVAB   G^SYS$GL_OPRMBX,R3              ; Get opr. mbx. address
          00000000'GF   16  0495   876          JSB     G^EXE$SNDEVMSG                  ; Send msg. to opr.
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                 18   BA   049B    877          POPR    #^M<R3,R4>                      ; Restore registers
               007D   31   049D    878          BRW     MAIN                            ; Try again
                      04A0    879 ;
                      04A0    880 ;       Note that the punch is always assumed to be on-line, and
                      04A0    881 ;       an error is recorded if it is not.  Also, the I/O request
                      04A0    882 ;       is terminated with an error code. (There is no on/off switch
                      04A0    883 ;       for the punch unit on the PC11).  The reader does have an
                      04A0    884 ;       on/off switch, and the I/O operation is retried until the
                      04A0    885 ;       reader unit is set on-line, with a message being sent to
                      04A0    886 ;       the operator's mailbox (console) every 30 seconds informing
                      04A0    887 ;       the operator that the paper-tape reader (PC0:) is off-line.
                      04A0    888 ;       If an error occurs after some data has been read, it is
                      04A0    889 ;       assumed that the error is "no more tape in reader" rather
                      04A0    890 ;       than "reader is off-line".
                      04A0    891 ;
      03 64 A5    05   E5   04A0    892 PUN_OT: BBCC    #UCB$V_POWER,UCB$W_STS(R5),1$   ; Reader powerfail?
               FF54   31   04A5    893         BRW     POWER_FAIL                      ; Yes, go report powerfail
               01DB   30   04A8    894 1$:     BSBW    SETOFF                          ; Clear interrupt enable bit
         00000000'GF   16   04AB    895         JSB     G^ERL$DEVICTMO                  ; Report timeout error
            50 022C 8F   3C   04B1    896         MOVZWL  #SS$_TIMEOUT,R0                 ; Return error status.
         32 A3   7E A5   A2   04B6    897         SUBW2   UCB$W_BCNT(R5),IRP$W_BCNT(R3)   ; Record bytes read/pun.
50    10   10   32 A3   F0   04BB    898         INSV    IRP$W_BCNT(R3),#16,#16,R0       ; For status return
               FF15   31   04C1    899         BRW     COMPLETE_IO                     ; Call I/O postprocessing.
                      04C4    900 CANCEL:                                             ; Handle cancel I/O
         32 A3   7E A5   A2   04C4    901         SUBW2   UCB$W_BCNT(R5),IRP$W_BCNT(R3)   ; Num bytes read/punch
50    10   10   32 A3   F0   04C9    902         INSV    IRP$W_BCNT(R3),#16,#16,R0       ; In return status
            50 0830 8F   B0   04CF    903         MOVW    #SS$_CANCEL,R0                  ; Return cancel error status
               FF02   31   04D4    904         BRW     COMPLETE_IO                     ; Call I/O postprocessing
                      04D7    905         .SBTTL  PR_START, Start I/O routine (Reader)
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```
                        04D7   907 ;++
                        04D7   908 ; PR_START - Start a reader operation
                        04D7   909 ;
                        04D7   910 ; Functional description:
                        04D7   911 ;
                        04D7   912 ;       One character at a time (from the system buffer pointed to
                        04D7   913 ;       by UCB$L_SVAPTE) is moved to the reader's data buffer.  The
                        04D7   914 ;       interrupt enable bit is then set, after which powerfail is
                        04D7   915 ;       tested for, and an interrupt is awaited. (If powerfail
                        04D7   916 ;       occurs, the entire operation is aborted.)
                        04D7   917 ;
                        04D7   918 ;       A counter is kept on the number of bytes left to be read
                        04D7   919 ;       (UCB$W_BCNT).  When this counter goes to zero, the request
                        04D7   920 ;       is complete.  The request is also considered complete when an
                        04D7   921 ;       EOF byte is read, if looking for EOF bytes is enabled.
                        04D7   922 ;
                        04D7   923 ;       Before the first character is read (in a virtual or
                        04D7   924 ;       logical I/O operation), the tape is first scanned for
                        04D7   925 ;       the first non-null character (i.e. the header part of
                        04D7   926 ;       the tape is skipped). In the case of a physical I/O
                        04D7   927 ;       function, the header null bytes are considered data.
                        04D7   928 ; Inputs:
                        04D7   929 ;       R3      - address of the IRP (I/O request packet)
                        04D7   930 ;       R5      - address of the UCB (unit control block)
                        04D7   931 ; Outputs:
                        04D7   932 ;       R0      - 1st longword of I/O status: contains status code and
                        04D7   933 ;                 number of bytes transferred
                        04D7   934 ;       R1      - 2nd longword of I/O status: device-dependent
                        04D7   935 ;       The routine must preserve all registers except R0-R2 and R4.
                        04D7   936 ;--
                        04D7   937 PR_START:                                    ; Process an I/O packet
  03 68 A5    01    E5  04D7   938         BBCC    #PUNCH_HDR,UCB$W_DEVSTS(R5),1$  ; Special case for $COPY?
           FF68    31  04DC   939         BRW     COPY                           ; Yes, if bit set
 78 A5    2C B3    D0  04DF   940 1$:     MOVL    @IRP$L_SVAPTE(R3),UCB$L_SVAPTE(R5); Get buffer address
 7E A5    32 A3    D0  04E4   941         MOVL    IRP$W_BCNT(R3),UCB$W_BCNT(R5)  ; Byte count, and offset
       00A6 C5    94  04E9   942         CLRB    UCB$B_PT_OFLCNT(R5)            ; Clear off-line counter
    50    20 A3    B0  04ED   943         MOVW    IRP$W_FUNC(R3),R0              ; Get function code
 27 68 A5    06    E2  04F1   944         BBSS    #FRST_QIO,UCB$W_DEVSTS(R5),MAIN ; First $QIO?
00A8 C5    5C A5    B0  04F6   945         MOVW    UCB$W_REFC(R5),UCB$W_MY_REFCNT(R5) ; Save reference count
       06    00    ED  04FC   946         CMPZV   S^#IO$V_FCODE,S^#IO$S_FCODE,-  ; No header read if
       0C    50        04FF   947                 R0,S^#IO$_READPBLK             ; Phys. I/O operation
             0E    13  0501   948         BEQL    FIX                            ; Continue processing
    68 A5    20    A8  0503   949         BISW    #RD_HDR,UCB$W_DEVSTS(R5)       ; Update default flags
68 A5    0200 8F    B3  0507   950         BITW    #BIT9,UCB$W_DEVSTS(R5)         ; Disable EOF search?
             0E    13  050D   951         BEQL    MAIN                           ; No, if eql
             08    11  050F   952         BRB     DSABL                          ; Yes, if neq
68 A5    0100 8F    B3  0511   953 FIX:    BITW    #BIT8,UCB$W_DEVSTS(R5)         ; Look for EOF bytes?
             04    12  0517   954         BNEQ    MAIN                           ; Look for EOF bytes if eql
    68 A5    01    A8  0519   955 DSABL:  BISW    #BIT0,UCB$W_DEVSTS(R5)         ; Update default
                       051D   956 MAIN:   DSBINT  UCB$B_DIPL(R5)                 ; No device interrupts
    50    24 A5    D0  0524   957         MOVL    UCB$L_CRB(R5),R0               ; Get CRB
    54    2C B0    D0  0528   958         MOVL    @CRB$L_INTD+VEC$L_IDB(R0),R4   ; Get CSR address
 64    8000 8F    B3  052C   959         BITW    #PT_CSR_M_ERROR,PT_PRS(R4)     ; Reader on-line?
             12    13  0531   960         BEQL    READ                           ; If eql, yes
                       0533   961         WFIKPCH PR_TIMEOUT,#SHORT_WAIT         ; No, see if now on
                       053D   962         IOFORK                                 ; Lower to fork IPL
             D8    11  0543   963         BRB     MAIN                           ; Check if on-line
```

```
                        0545   964 READ:   SETIPL  #IPL$_POWER                          ; Raise to powerfail
    02 64 A5    05  E4  0548   965          BBSC    #UCB$V_POWER,UCB$W_STS(R5),30$    ; Powerfail?
                03  11  054D   966          BRB     GO                                ; No, try operation
              FEA7  31  054F   967 30$:     BRW     PR_POWFAIL                        ; Yes--abort operation
            41 8F   9B  0552   968 GO:      MOVZBW  #PT_CSR_M_IE!PT_CSR_M_RDENA,-     ; Start reader and
                64      0555   969                  PT_PRS(R4)                        ; Enable reader int.
                        0556   970          WFIKPCH PT_TIMEOUT,#PT_TIMEOUT_SEC        ; 10 sec. timeout
                        0560   971 ;        Enter here from interrupt service routine (PR_INTERRUPT)
     00A4 C5    64  B0  0560   972          MOVW    PT_PRS(R4),UCB$W_PT_PPS(R5)       ; Read CSR (and store
                        0565   973                                                    ; for error logging)
   00A7 C5    02 A4   90  0565   974          MOVB    PT_PRB(R4),UCB$B_PT_PPB(R5)       ; Get data read (also
                        056B   975                                                    ; keep for err. log.)
                        056B   976          IOFORK                                    ; Lower IPL
00A4 C5    8000 8F   B3  0571   977          BITW    #PT_CSR_M_ERROR,UCB$W_PT_PPS(R5); Error during read?
                68  12  0578   978          BNEQ    SKIP1                             ; Yes, special case
00A4 C5    0800 8F   B3  057A   979          BITW    #PT_CSR_M_BUSY,UCB$W_PT_PPS(R5) ; Busy bit set?
                5C  12  0581   980          BNEQ    SKIP                              ; If so, error
00A4 C5    0080 8F   B3  0583   981          BITW    #PT_CSR_M_DONE,UCB$W_PT_PPS(R5) ; Done bit set?
                53  13  058A   982          BEQL    SKIP                              ; If not, error
    00 68 A5    07  E3  058C   983          BBCS    #STARTING,UCB$W_DEVSTS(R5),5$     ; Read >= 1 char.
       68 A5    20  B3  0591   984 5$:      BITW    #RD_HDR,UCB$W_DEVSTS(R5)          ; Reading tape header?
                0B  13  0595   985          BEQL    10$                               ; No, if eql
     00A7 C5    00  91  0597   986          CMPB    #NULL,UCB$B_PT_PPB(R5)            ; See if null byte
                2A  13  059C   987          BEQL    15$                               ; If eql, null
       68 A5    20  AA  059E   988          BICW    #RD_HDR,UCB$W_DEVSTS(R5)          ; Not reading header now
       68 A5    01  B3  05A2   989 10$:     BITW    #BIT0,UCB$W_DEVSTS(R5)            ; Looking for EOF byte?
                0A  12  05A6   990          BNEQ    13$                               ; No, if neq
     00A7 C5    1A  91  05A8   991          CMPB    #EOF,UCB$B_PT_PPB(R5)             ; EOF byte found?
                03  12  05AD   992          BNEQ    13$                               ; No, if neq
              FE7A  31  05AF   993          BRW     PR_SPERR                          ; Report EOF condition
 78 B5    00A7 C5   90  05B2   994 13$:     MOVB    UCB$B_PT_PPB(R5),@UCB$L_SVAPTE(R5) ; Record data read
            78 A5   D6  05B8   995          INCL    UCB$L_SVAPTE(R5)                  ; Point to where next
                        05BB   996                                                    ; byte is to be read
            7E A5   B7  05BB   997          DECW    UCB$W_BCNT(R5)                    ; Decrement byte count
               12   13  05BE   998          BEQL    25$                               ; All done?
    03 64 A5    03  E1  05C0   999          BBC     #UCB$V_CANCEL,UCB$W_STS(R5),15$   ; Check for $CANCEL
              FEFC  31  05C5  1000          BRW     CANCEL                            ; $CANCEL if set
                        05C8  1001 15$:     DSBINT  UCB$B_DIPL(R5)                    ; Put IPL on stack
              FF73  31  05CF  1002          BRW     READ                              ; Read next character
     64   0040 8F   AA  05D2  1003 25$:     BICW    #PT_CSR_M_IE,PT_PRS(R4)           ; Clear int. enable bit
    00 68 A5    07  E4  05D7  1004          BBSC    #STARTING,UCB$W_DEVSTS(R5),30$    ; Clear bit for next $QIO
              FDF1  31  05DC  1005 30$:     BRW     FINISH                            ; And finish up
              FE2F  31  05DF  1006 SKIP:    BRW     PT_ERROR                          ; Need word offsets
    03 68 A5    07  E1  05E2  1007 SKIP1:   BBC     #STARTING,UCB$W_DEVSTS(R5),40$    ; Retry if assume
                        05E7  1008                                                    ; reader off-line
              FE42  31  05E7  1009          BRW     PR_SPERR                          ; Otherwise, assume
                        05EA  1010                                                    ; no more tape in reader
              FE80  31  05EA  1011 40$:     BRW     COMMON                            ; Need word offset
                        05ED  1012          .SBTTL  PT_INTERRUPT, Interrupt service routine
```

```
                     05ED  1014 ;++
                     05ED  1015 ; PT_INTERRUPT, Analyzes interrupts, processes solicited interrupts
                     05ED  1016 ;
                     05ED  1017 ; Functional description:
                     05ED  1018 ;
                     05ED  1019 ;       This driver is for a multiple-unit controller, and the
                     05ED  1020 ;       two interrupt service routines (PR_INTERRUPT and PT_INTERRUPT)
                     05ED  1021 ;       are used to distinguish which unit caused the interrupt.
                     05ED  1022 ;       Common checking for solicited interrupts occurs after
                     05ED  1023 ;       entry point INTCOM, where control is returned back to the
                     05ED  1024 ;       driver after the appropriate WFIKPCH macro.
                     05ED  1025 ;
                     05ED  1026 ; Inputs:
                     05ED  1027 ;
                     05ED  1028 ;        0(SP)  - pointer to the address of the IDB
                     05ED  1029 ;        4(SP)  - saved R0
                     05ED  1030 ;        8(SP)  - saved R1
                     05ED  1031 ;       12(SP)  - saved R2
                     05ED  1032 ;       16(SP)  - saved R3
                     05ED  1033 ;       20(SP)  - saved R4
                     05ED  1034 ;       24(SP)  - saved R5
                     05ED  1035 ;       28(SP)  - saved PSL (program status longword)
                     05ED  1036 ;       32(SP)  - saved PC
                     05ED  1037 ;
                     05ED  1038 ;       The IDB contains the CSR address and the UCB address.
                     05ED  1039 ;
                     05ED  1040 ; Outputs:
                     05ED  1041 ;
                     05ED  1042 ;       The routine must preserve all registers except R0-R5.
                     05ED  1043 ;
                     05ED  1044 ;--
                     05ED  1045 PT_INTERRUPT:                            ; Service punch interrupt
   53    9E    D0  05ED  1046          MOVL    @(SP)+,R3                 ; Get address of IDB and remove
                     05F0  1047                                          ; pointer from stack.
55    1C A3    D0  05F0  1048          MOVL    IDB$L_UCBLST+4(R3),R5     ; Punch is unit # 1 (PC1:)
      07    11    05F4  1049          BRB     INTCOM                    ; Go to common code
                     05F6  1050 PR_INTERRUPT:                            ; Service reader interrupt
   53    9E    D0  05F6  1051          MOVL    @(SP)+,R3                 ; Get IDB address
55    18 A3    D0  05F9  1052          MOVL    IDB$L_UCBLST(R3),R5       ; Reader is unit # 0 (PC0:)
   54    63    D0  05FD  1053 INTCOM: MOVL     IDB$L_CSR(R3),R4          ; Get CSR address
      01    E5    0600  1054          BBCC    #UCB$V_INT,-              ; If device does not expect
      64 A5         0602  1055                  UCB$W_STS(R5),-           ; interrupt, dismiss it.
      07            0604  1056                  UNSOL_INTERRUPT
                     0605  1057 ; This is a solicited interrupt. Restore control to the main driver.
                     0605  1058 RESTORE_DRIVER:                           ; Jump to main driver code.
53    10 A5    D0  0605  1059          MOVL    UCB$L_FR3(R5),R3          ; Restore driver's R3
   0C B5    16  0609  1060          JSB     @UCB$L_FPC(R5)            ; Call driver at interrupt
                     060C  1061                                          ; wait address.
                     060C  1062 ; Dismiss the interrupt.
                     060C  1063 UNSOL_INTERRUPT:                         ; Dismiss unsolicited interrupt.
   50    8E    7D  060C  1064          MOVQ    (SP)+,R0                  ; Restore R0-R5
   52    8E    7D  060F  1065          MOVQ    (SP)+,R2                  ; This is faster than a
   54    8E    7D  0612  1066          MOVQ    (SP)+,R4                  ; POPR #^M<R0,R1,R2,R3,R4,R5>
      02    0615  1067          REI                                       ; Return from interrupt.
                     0616  1068          .SBTTL  PT_CANCEL, Cancel I/O routine
```

```
                     0616  1070
                     0616  1071 ;++
                     0616  1072 ; PT_CANCEL, Cancels an I/O operation in progress
                     0616  1073 ;
                     0616  1074 ; Functional description:
                     0616  1075 ;
                     0616  1076 ;       This routine tests to see if the punch is being deallocated
                     0616  1077 ;       or deassigned by checking the reference count field in the
                     0616  1078 ;       UCB. It checks to see if a trailer needs to be punched,
                     0616  1079 ;       and if so, then a trailer is punched (possibly with an
                     0616  1080 ;       EOF byte).  Also, regardless of whether a
                     0616  1081 ;       header has been punched, the default number of null bytes to
                     0616  1082 ;       punch in a header/trailer is restored to NULL_BYTES.  The
                     0616  1083 ;       flag indicating that a header has not been punched is cleared
                     0616  1084 ;       for the next I/O operation, as is the bit indicating that
                     0616  1085 ;       the current $QIO is the first $QIO for the user (since the
                     0616  1086 ;       channel was assigned to the device).  Other flags are
                     0616  1087 ;       reset to their initial state for the next user.
                     0616  1088 ;
                     0616  1089 ;       This routine calls IOC$CANCELIO to set the cancel bit in the
                     0616  1090 ;       UCB status word if:
                     0616  1091 ;
                     0616  1092 ;               the device is busy,
                     0616  1093 ;               the IRP's process ID matches the cancel process ID,
                     0616  1094 ;               the IRP channel matches the cancel channel.
                     0616  1095 ;
                     0616  1096 ;       The routine then does device-dependent cancel I/O fixups by
                     0616  1097 ;       clearing the interrupt enable bit for either the reader or
                     0616  1098 ;       the punch, as appropriate.
                     0616  1099 ;
                     0616  1100 ; Inputs:
                     0616  1101 ;
                     0616  1102 ;       R2      - negated value of the channel index number
                     0616  1103 ;       R3      - address of the current IRP (I/O request packet)
                     0616  1104 ;       R4      - address of the PCB (process control block) for the
                     0616  1105 ;                 process canceling I/O
                     0616  1106 ;       R5      - address of the UCB (unit control block)
                     0616  1107 ;
                     0616  1108 ; Outputs:
                     0616  1109 ;
                     0616  1110 ;       The routine must preserve all registers except R0-R3.
                     0616  1111 ;
                     0616  1112 ;       The routine sets the UCB$M_CANCEL bit in UCB$W_STS.
                     0616  1113 ;
                     0616  1114 ;       The routine restores UCB fields to their original state.
                     0616  1115 ;
                     0616  1116 ;--
                     0616  1117
                     0616  1118 PT_CANCEL:                                  ; Cancel an I/O operation
                     0616  1119         .ENABL  LSB
00A8 C5   5C A5   B1 0616  1120         CMPW    UCB$W_REFC(R5),UCB$W_MY_REFCNT(R5) ; Deal or deassgn?
             5D   13 061C  1121         BEQL    10$                         ; No, if eql
                     061E  1122                         ; Note that the count is not decremented.
                     061E  1123                         ; Therefore the user will not get two
                     061E  1124                         ; trailers if he allocates the device and
                     061E  1125                         ; assigns a channel; the deallocate will not
                     061E  1126                         ; match the count field (like a $CANCEL).
```

```
                00A0 C5    54    D0  061E  1127          MOVL    R4,UCB$L_SAV_R4(R5)      ; Save R4 since not CSR
             00 68 A5      06    E4  0623  1128          BBSC    #FRST_QIO,UCB$W_DEVSTS(R5),3$ ; Clear read header bit
                68 A5      08    B3  0628  1129 3$:      BITW    #PNCH,UCB$W_DEVSTS(R5)   ; Trailer needed?
                           24    12  062C  1130          BNEQ    4$                       ; Yes, if neq
             34 38 A5      1A    E0  062E  1131          BBS     #DEV$V_IDV,UCB$L_DEVCHAR(R5),8$ ; Reader?, go away
                68 A5      01    B3  0633  1132          BITW    #BIT0,UCB$W_DEVSTS(R5)   ; User want EOF byte?
                           2E    13  0637  1133          BEQL    8$                       ; No, if eql
                44 A5      01    9A  0639  1134          MOVZBL  #1,UCB$L_DEVDEPEND(R5)   ; Punching only EOF byte
                68 A5      14    A8  063D  1135          BISW    #END!START,UCB$W_DEVSTS(R5) ; Flag punching trailer tape
                50    24 A5      D0  0641  1136          MOVL    UCB$L_CRB(R5),R0                 ; Get CRB
                54    2C B0      D0  0645  1137          MOVL    @CRB$L_INTD+VEC$L_IDB(R0),R4     ; Get CSR address
          04 A4    0040 8F      A8  0649  1138          BISW    #PT_STS_M_IE,PT_PPS(R4)          ; Set int. enable bit
                       FCA8      31  064F  1139          BRW     PUNEOF                   ; Punch EOF byte
                68 A5      14    A8  0652  1140 4$:      BISW    #END!START,UCB$W_DEVSTS(R5)      ; Flag punching trailer tape
             00 68 A5      01    E4  0656  1141          BBSC    #PUNCH_HDR,UCB$W_DEVSTS(R5),5$ ; Enable trailer punching
                       FC3A      31  065B  1142 5$:      BRW     PNCH_HDR                 ; Punch trailer tape
                68 A5      08    AA  065E  1143 INCAN:   BICW    #PNCH,UCB$W_DEVSTS(R5)   ; Clear flag for next operation
                54    00A0 C5    D0  0662  1144          MOVL    UCB$L_SAV_R4(R5),R4      ; Restore R4 if changed
             00 68 A5      01    E4  0667  1145 8$:      BBSC    #PUNCH_HDR,UCB$W_DEVSTS(R5),9$ ; Clear for next op.
          68 A5    0311 8F      AA  066C  1146 9$:      BICW    #BIT0!BIT8!BIT9!END,UCB$W_DEVSTS(R5) ; Clear for next user
                42 A5      32    B0  0672  1147          MOVW    #NULL_BYTES,UCB$W_DEVBUFSIZ(R5) ; Restore def nullbytes
             00 68 A5      07    E4  0676  1148          BBSC    #STARTING,UCB$W_DEVSTS(R5),10$  ; Clear for next oper.
               00000000'GF       16  067B  1149 10$:     JSB     G^IOC$CANCELIO           ; Set cancel bit if appropriate.
          1A 64 A5      03    E1  0681  1150          BBC     #UCB$V_CANCEL,UCB$W_STS(R5),OKAY ; If clear, return
                                  0686  1151          .DSABL  LSB
                                  0686  1152
                                  0686  1153 ;
                                  0686  1154 ; Device-dependent cancel operations go next. The appropriate int. ena.
                                  0686  1155 ; bit is cleared. This subroutine is called from several timeout and
                                  0686  1156 ; powerfail recovery routines; it must be very careful NOT to issue
                                  0686  1157 ; a macro (or call on a system routine) that returns control to the
                                  0686  1158 ; caller's caller (since the stack contains "local" return info).
                                  0686  1159 ;
                51    24 A5      D0  0686  1160 SETOFF: MOVL    UCB$L_CRB(R5),R1         ; Get address of CRB
                51    2C B1      D0  068A  1161          MOVL    @CRB$L_INTD+VEC$L_IDB(R1),R1     ; Get address of CSR
             08 38 A5      1A    E0  068E  1162          BBS     #DEV$V_IDV,UCB$L_DEVCHAR(R5),5$ ; Test for reader
          04 A1    0040 8F      AA  0693  1163          BICW    #PT_STS_M_IE,PT_PPS(R1) ; Turn off punch int. ena. bit
                           05    11  0699  1164          BRB     OKAY                     ; And finish up
             61    0040 8F      AA  069B  1165 5$:      BICW    #PT_CSR_M_IE,PT_PRS(R1) ; Turn off reader int. ena. bit
                                  06A0  1166 OKAY:
                           05     05  06A0  1167          RSB                              ; Return
                                  06A1  1168          .SBTTL  PT_REG_DUMP, Device register dump routine
```

```
                     06A1  1170
                     06A1  1171 ;++
                     06A1  1172 ; PT_REG_DUMP, Dumps the contents of device registers to a buffer
                     06A1  1173 ;
                     06A1  1174 ; Functional description:
                     06A1  1175 ;
                     06A1  1176 ;       Writes the number of device registers, and their current
                     06A1  1177 ;       contents into a diagnostic or error buffer.  Reader and
                     06A1  1178 ;       punch both have two registers (a status register, and a
                     06A1  1179 ;       data register).
                     06A1  1180 ;
                     06A1  1181 ; Inputs:
                     06A1  1182 ;
                     06A1  1183 ;       R0      - address of the output buffer
                     06A1  1184 ;       R4      - address of the CSR (controller status register)
                     06A1  1185 ;       R5      - address of the UCB (unit control block)
                     06A1  1186 ;
                     06A1  1187 ; Outputs:
                     06A1  1188 ;
                     06A1  1189 ;       The routine must preserve all registers except R1-R3.
                     06A1  1190 ;
                     06A1  1191 ;       The output buffer contains the current contents of the device
                     06A1  1192 ;       registers. R0 contains the address of the next empty longword in
                     06A1  1193 ;       the output buffer.
                     06A1  1194 ;
                     06A1  1195 ;--
                     06A1  1196
                     06A1  1197 PT_REG_DUMP:                                ; Dump device registers
        80   02   9A  06A1  1198         MOVZBL  #PT_NUM_REGS,(R0)+         ; Store device register count
80      00A4 C5   3C  06A4  1199         MOVZWL  UCB$W_PT_PPS(R5),(R0)+     ; Store status register
80      00A7 C5   9A  06A9  1200         MOVZBL  UCB$B_PT_PPB(R5),(R0)+     ; Store data register
             05   05  06AE  1201         RSB                                ; Return
                     06AF  1202
                     06AF  1203 ;++
                     06AF  1204 ; Label that marks the end of the driver
                     06AF  1205 ;--
                     06AF  1206
                     06AF  1207 PT_END:                                     ; Last location in driver
                     06AF  1208         .END
```

```
$$$                     = 00000020 R      02
$$OP                    = 00000002
ACP_FDT                   00000147 R      03
AFTINT                    00000396 R      03
AT$_UBA                 = 00000001
BACK                      00000331 R      03
BIT0                    = 00000001
BIT8                    = 00000100
BIT9                    = 00000200
BUF_OVR_HD              = 0000000C
CANCEL                    000004C4 R      03
COMMON                    0000046D R      03
COMPLETE_IO               000003D9 R      03
COPY                      00000447 R      03
CRB$L_INTD              = 00000024
CRB$L_INTD2             = 00000048
DDB$L_DDT               = 0000000C
DEV$M_AVL               = 00040000
DEV$M_ELG               = 00400000
DEV$M_IDV               = 04000000
DEV$M_ODV               = 08000000
DEV$M_REC               = 00000001
DEV$V_IDV               = 0000001A
DEV$V_ODV               = 0000001B
DON                       00000444 R      03
DPT$C_LENGTH            = 00000038
DPT$C_VERSION           = 00000004
DPT$INITAB                00000038 R      02
DPT$REINITAB              00000059 R      02
DPT$TAB                   00000000 R      02
DSABL                     00000519 R      03
DYN$C_CRB               = 00000005
DYN$C_DDB               = 00000006
DYN$C_DPT               = 0000001E
DYN$C_UCB               = 00000010
EMB$L_DV_REGSAV         = 0000004E
END                     = 00000010
EOF                     = 0000001A
ERBFSIZE                = 0000000C
ERL$DEVICERR              ********    X   03
ERL$DEVICTMO              ********    X   03
EXE$ABORTIO               ********    X   03
EXE$ALLOCBUF              ********    X   03
EXE$BUFFRQUOTA            ********    X   03
EXE$FINISHIOC             ********    X   03
EXE$IOFORK                ********    X   03
EXE$QIOACPPKT             ********    X   03
EXE$QIODRVPKT             ********    X   03
EXE$READCHK               ********.   X   03
EXE$SNDEVMSG              ********    X   03
EXE$WRITECHK              ********    X   03
FINISH                    000003D0 R      03
FIX                       00000511 R      03
FOR_PNCH                  00000183 R      03
FRST_QIO                = 00000006
FUNCTAB_LEN             = 00000064
GO                        00000552 R      03
IDB$L_CSR               = 00000000
IDB$L_UCBLST            = 00000018
INCAN                     0000065E R      03
INTCOM                    000005FD R      03
IO$S_FCODE              = 00000006
IO$V_FCODE              = 00000000
IO$_ACPCONTROL          = 00000038
IO$_CREATE              = 00000033
IO$_DEACCESS            = 00000034
IO$_DELETE              = 00000035
IO$_MODIFY              = 00000036
IO$_MOUNT               = 00000039
IO$_READLBLK            = 00000021
IO$_READPBLK            = 0000000C
IO$_READPROMPT          = 00000037
IO$_READVBLK            = 00000031
IO$_VIRTUAL             = 0000003F
IO$_WRITELBLK           = 00000020
IO$_WRITEOF             = 00000028
IO$_WRITEPBLK           = 0000000B
IO$_WRITEVBLK           = 00000030
IOC$CANCELIO              ********    X   03
IOC$MNTVER                ********    X   03
IOC$REQCOM                ********    X   03
IOC$RETURN                ********    X   03
IOC$WFIKPCH               ********    X   03
IPL$_POWER              = 0000001F
IPL$_SYNCH              = 00000008
IRP$L_MEDIA             = 00000038
IRP$L_SVAPTE            = 0000002C
IRP$S_FCODE             = 00000006
IRP$V_FCODE             = 00000000
IRP$V_FUNC              = 00000001
IRP$W_BCNT              = 00000032
IRP$W_BOFF              = 00000030
IRP$W_FUNC              = 00000020
IRP$W_STS               = 0000002A
JIB$L_BYTCNT            = 00000020
LOOP_CNT                = 0000000F
MAIN                      0000051D R      03
MAINLP                    0000036A R      03
MASKH                   = 00B80000
MASKL                   = 00000000
MSG$_DEVOFFLIN            ********    X   03
MY_CLASS                = 00000064
MY_TYPE                 = 00000064
NO_PRIV                   0000015C R      03
NT_MNT                    00000157 R      03
NT_WRT                    00000177 R      03
NUL                       00000310 R      03
NULL                    = 00000000
NULLP                     00000315 R      03
NULL_BYTES              = 00000032
OKAY                      000006A0 R      03
P1                      = 00000000
P2                      = 00000004
P3                      = 00000008
```

Symbol table

```
P4                              = 0000000C
P5                              = 00000010
P6                              = 00000014
PC$DDT                            00000000 RG     03
PCB$L_JIB                       = 00000080
PCB$Q_PRIV                      = 00000084
PNCH                            = 00000008
PNCH_HDR                          00000298 R      03
POWER_FAIL                        000003FC R      03
POW_FAIL                          000003E8 R      03
PR$_IPL                           ******** X      03
PRV$V_MOUNT                     = 00000011
PR_FDT_ROUTINE                    000001A4 R      03
PR_INTERRUPT                      000005F6 R      03
PR_POWFAIL                        000003F9 R      03
PR_SPERR                          0000042C R      03
PR_START                          000004D7 R      03
PR_TIMEOUT                        00000451 R      03
PT_CANCEL                         00000616 R      03
PT_CONTROL_INIT                   0000009C R      03
PT_CSR_M_BUSY                   = 00000800
PT_CSR_M_DONE                   = 00000080
PT_CSR_M_ERROR                  = 00008000
PT_CSR_M_IE                     = 00000040
PT_CSR_M_RDENA                  = 00000001
PT_END                            000006AF R      03
PT_ERROR                          00000411 R      03
PT_FDT_ROUTINE                    000000BC R      03
PT_FUNCTABLE                      00000038 R      03
PT_INTERRUPT                      000005ED R      03
PT_NUM_REGS                     = 00000002
PT_PPB                            00000006
PT_PPS                            00000004
PT_PRB                            00000002
PT_PRS                            00000000
PT_PUNCH                          0000028B R      03
PT_REG_DUMP                       000006A1 R      03
PT_RESTART                        000003E5 R      03
PT_START                          00000216 R      03
PT_STS_M_ERROR                  = 00008000
PT_STS_M_IE                     = 00000040
PT_STS_M_READY                  = 00000080
PT_TIMEOUT                        0000045F R      03
PT_TIMEOUT_SEC                  = 0000000A
PT_UNIT_INIT                      0000009D R      03
PUNCH_HDR                       = 00000001
PUNEOF                            000002FA R      03
PUN_OT                            000004A0 R      03
Q_TO_ACP                          00000162 R      03
RD_HDR                          = 00000020
READ                              00000545 R      03
RESTORE_DRIVER                    00000605 R      03
SETOFF                            00000686 R      03
SET_FDT                           00000199 R      03
SHORT_WAIT                      = 00000002
SIZ...                          = 00000001
SKIP                              000005DF R      03
SKIP1                             000005E2 R      03
SKIP2                             0000045C R      03
SS$_CANCEL                      = 00000830
SS$_DEVNOTMOUNT                 = 0000007C
SS$_DRVERR                      = 0000008C
SS$_ENDOFFILE                   = 00000870
SS$_ILLIOFUNC                   = 000000F4
SS$_NOPRIV                      = 00000024
SS$_NORMAL                      = 00000001
SS$_TAPEPOSLOST                 = 00000224
SS$_TIMEOUT                     = 0000022C
START                           = 00000004
STARTING                        = 00000007
SYS$GL_OPRMBX                     ******** X      03
TO_ACP                            00000173 R      03
UCB$B_DEVCLASS                  = 00000040
UCB$B_DEVTYPE                   = 00000041
UCB$B_DIPL                      = 0000005E
UCB$B_FIPL                      = 0000000B
UCB$B_PT_OFLCNT                   000000A6
UCB$B_PT_PPB                      000000A7
UCB$K_PT_UCBLEN                   000000AA
UCB$L_CRB                       = 00000024
UCB$L_DEVCHAR                   = 00000038
UCB$L_DEVDEPEND                 = 00000044
UCB$L_DPC                       = 0000009C
UCB$L_FPC                       = 0000000C
UCB$L_FR3                       = 00000010
UCB$L_IRP                       = 00000058
UCB$L_SAV_R4                      000000A0
UCB$L_SVAPTE                    = 00000078
UCB$L_VCB                       = 00000034
UCB$M_ONLINE                    = 00000010
UCB$V_CANCEL                    = 00000003
UCB$V_INT                       = 00000001
UCB$V_MOUNTING                  = 00000009
UCB$V_POWER                     = 00000005
UCB$W_BCNT                      = 0000007E
UCB$W_DEVBUFSIZ                 = 00000042
UCB$W_DEVSTS                    = 00000068
UCB$W_FUNC                      = 0000009A
UCB$W_MY_REFCNT                   000000A8
UCB$W_PT_PPS                      000000A4
UCB$W_REFC                      = 0000005C
UCB$W_STS                       = 00000064
UCB$W_UNIT                      = 00000054
UNSOL_INTERRUPT                   0000060C R      03
VCB$W_TRANS                     = 0000000C
VEC$L_IDB                       = 00000008
VEC$L_INITIAL                   = 0000000C
WAIT                              00000324 R      03
```

Psect synopsis

PSECT name	Allocation	PSECT No.	Attributes
. ABS .	00000000 (0.)	00 (0.)	NOPIC USR CON ABS LCL NOSHR NOEXE NORD NOWRT NOVEC BYTE
ABS	000000AA (170.)	01 (1.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE
$$$105_PROLOGUE	0000006E (110.)	02 (2.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC BYTE
$$$115_DRIVER	000006AF (1711.)	03 (3.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC LONG

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	122	00:00:00.33	00:00:01.51
Command processing	137	00:00:00.46	00:00:01.04
Pass 1	1976	00:00:31.64	00:00:38.03
Symbol table sort	82	00:00:03.71	00:00:03.81
Pass 2	819	00:00:05.70	00:00:06.79
Symbol table output	31	00:00:00.24	00:00:00.37
Psect synopsis output	7	00:00:00.03	00:00:00.03
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	3180	00:00:42.11	00:00:51.58

The working set limit was 500 pages.
146981 bytes (288 pages) of virtual memory were used to buffer the intermediate code.
There were 130 pages of symbol table space allocated to hold 2469 non-local and 50 local symbols.
1208 source lines were read in Pass 1, producing 20 object records in Pass 2.
45 pages of virtual memory were used to define 42 macros.

Macro library statistics

Macro library name	Macros defined
SYS$SYSROOT:[SYSLIB]LIB.MLB;1	29
SYS$SYSROOT:[SYSLIB]STARLET.MLB;1	10
TOTALS (all libraries)	39

2705 GETS were required to define 39 macros.

There were no errors, warnings or information messages.

MAC/LIS PCDRIVER+SYS$LIBRARY:LIB/LIB

```
100   $!                                                    PCDRIVER.COM
200   $!
300   $SET VERIFY
400   $MAC/LIS PCDRIVER+SYS$LIBRARY:LIB/LIB
500   $LINK/NOTRACE/MAP PCDRIVER/OPT,PCDRIVER,SYS$SYSTEM:SYS.STB/SEL
600   $SET NOVERIFY
```

```
100    !
200    BASE=0
```

```
 100    $!                                                    LOADER.COM
 200    $!
 300    $MCR SYSGEN
 400    LOAD SYS$SYSDISK:[COURSE.DRIVER]PCDRIVER
 500    CONNECT PCA0/ADAPTER=3-
 600    /NUMVEC=2-
 700    /VECTOR=%O70-
 800    /CSR=%O777550-
 900    /DRIVER=PCDRIVER
1000    CONNECT PCA1/ADAPTER=3-
1100    /VECTOR=%O74-
1200    /DRIVER=PCDRIVER
1300    SHO /DEV=PC
1400    EXIT
```

```
C                                                              READV.FOR
C
      EXTERNAL        IO$_READVBLK
      CHARACTER*36 ALPHA
      INTEGER*4 SYS$ASSIGN,SYS$QIOW,IOSB(2)
      INTEGER*2 IOSBW(4)
      EQUIVALENCE (IOSB(1),IOSBW(1))
10    FORMAT(' COMPLETED QIOW ',I2,' -- ',I4,' BYTES READ')
20    FORMAT(' ERROR ID = ',I4,' FOR SS$_VALUE = ',I4)
25    FORMAT(' IOSBW(2) VALUE = ',I2)
30    FORMAT(' BEFORE ASSIGNMENT MADE')
40    FORMAT(' ASSIGNMENT SUCCESSFUL')
50    FORMAT(' DATA READ = ',A)
      WRITE (6,30)
      J=0
      II=SYS$ASSIGN('PCA0:',IC,,)
      IF(.NOT.II)GOTO 200
      WRITE (6,40)
      DO 100 I=1,4
      J=1
      II=SYS$QIOW(,%VAL(IC),IO$_READVBLK,IOSB,,,%REF(ALPHA),
     1%VAL(36),,,,)
      IF(.NOT.II)GOTO 200
      J=2
      IF(IOSBW(1).NE.1)GOTO 200
      WRITE (6,10)I,IOSBW(2)
      WRITE (6,50)ALPHA
100   CONTINUE
      GOTO 300
200   WRITE (6,20)J,II
      WRITE (6,25)IOSBW(2)
      IF(.NOT.II)CALL SYS$EXIT(%VAL(II))
      CALL SYS$EXIT(%VAL(IOSBW(1)))
300   STOP
      END
```

```
C                                                          RANDWV.FOR
C
      EXTERNAL        IO$_WRITEVBLK,IO$_READVBLK
      CHARACTER*36 ALPHA,BETA,GAMMA(18)
      INTEGER*4 SYS$ASSIGN,SYS$QIOW,IOSB(2),SYS$QIO,IOSB1(2)
      INTEGER*2 IOSBW(4),IOSBW1(4)
      EQUIVALENCE (IOSB(1),IOSBW(1)),(IOSB1(1),IOSBW1(1))
10    FORMAT(' IOSBW(2) AND IOSBW1(2) = ',I2,'   ',I2)
15    FORMAT(' COMPLETED READ ',I2)
20    FORMAT(' ERROR ID = ',I4)
25    FORMAT(' DATA READ = ',A)
30    FORMAT(' BEFORE ASSIGNMENTS MADE')
40    FORMAT(' ASSIGNMENTS SUCCESSFUL')
      ALPHA='ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890'
      WRITE (6,30)
      J=0
      II=SYS$ASSIGN('PCA0:',IC,,)
      IF(.NOT.II)GOTO 200
      J=5
      II=SYS$ASSIGN('PCA1:',IC2,,)
      IF(.NOT.II)GOTO 200
      WRITE (6,40)
      J=1
      IP=3
      IR=18
C     IF CHANGE IR, CHANGE GAMMA(IR) TOO IN CHAR STATEMENT
      IRINIT=IR
      K=0
95    II=SYS$QIO(%VAL(1),%VAL(IC2),IO$_WRITEVBLK,IOSB,,,%REF(ALPHA),
     1%VAL(36),,,,)
      IF(.NOT.II)GOTO 200
      J=2
      IF (K .NE. 0) GOTO 99
      K=1
98    II=SYS$QIO(,%VAL(IC),IO$_READVBLK,IOSB1,,,%REF(BETA),
     1%VAL(36),,,,)
      IF(.NOT.II) GOTO 200
      J=4
99    IF (IOSBW1(1).NE.1)GOTO 100
      INDX=IRINIT+1-IR
      GAMMA(INDX)=BETA
      IR=IR-1
      IF(IR .GT. 0) GOTO 98
      IOSBW1(1)=0
      GOTO    150
100   IF (IOSBW(1) .NE. 1) GOTO 99
      IP=IP-1
      IF (IP .GT. 0) GOTO 95
      IOSBW(1)=0
150   IF ((IP .EQ. 0) .AND. (IR .EQ. 0)) GOTO 300
      IF ((IP .LT. 0) .OR. (IR .LT. 0)) GOTO 400
      GOTO 99
200   WRITE (6,20)J
      WRITE (6,10)IOSBW(2),IOSBW1(2)
      IF(.NOT.II)CALL SYS$EXIT(%VAL(II))
      CALL SYS$EXIT(%VAL(IOSBW(1)))
300   DO 350 I=1,IRINIT-1
      WRITE (6,15) I
      WRITE (6,25) GAMMA(I)
```

```
6000    350       CONTINUE
6100              STOP
6200    400       WRITE (6,20) IP
6300              WRITE (6,20) IR
6400              END
```

```
C                                                       MODE.FOR
C
      EXTERNAL IO$_WRITEVBLK,IO$_MODIFY,IO$_DELETE,IO$_DEACCESS
      CHARACTER*36 ALPHA
      INTEGER*4 SYS$ASSIGN,SYS$QIOW,IOSB(2)
      INTEGER*2 IOSBW(4)
      EQUIVALENCE (IOSB(1),IOSBW(1))
10    FORMAT(' COMPLETED QIOW ',I2,' -- ',I4,' BYTES PUNCHED')
20    FORMAT(' ERROR ID = ',I4)
25    FORMAT(' NEW MODE VALUE = ',I4)
30    FORMAT(' BEFORE ASSIGNMENT MADE')
40    FORMAT(' ASSIGNMENT SUCCESSFUL')
      ALPHA='ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890'
      WRITE (6,30)
      J=0
      II=SYS$ASSIGN('PCA1:',IC,,)
      IF(.NOT.II)GOTO 200
      WRITE (6,40)
      J=3
      II=SYS$QIOW(,%VAL(IC),IO$_DEACCESS,IOSB,,,,,,,)
      IF (.NOT. II) GOTO 200
      WRITE (6,25) IOSB(2)
      J=4
      II=SYS$QIOW(,%VAL(IC),IO$_MODIFY,,,,,%VAL(70),,,,)
      IF (.NOT. II) GOTO 200
      J=5
      II=SYS$QIOW(,%VAL(IC),IO$_DEACCESS,IOSB,,,,,,,)
      IF (.NOT. II) GOTO 200
      WRITE (6,25) IOSB(2)
      DO 100 I=1,4
      J=1
      II=SYS$QIOW(,%VAL(IC),IO$_WRITEVBLK,IOSB,,,%REF(ALPHA),
     1%VAL(36),,,,)
      IF(.NOT.II)GOTO 200
      J=2
      IF(IOSBW(1).NE.1)GOTO 200
      WRITE (6,10)I,IOSBW(2)
100   CONTINUE
      J=5
      II=SYS$QIOW(,%VAL(IC),IO$_DELETE,,,,,,,,)
      IF (.NOT. II) GOTO 200
      J=6
      II=SYS$QIOW(,%VAL(IC),IO$_DEACCESS,IOSB,,,,,,,)
      IF (.NOT. II) GOTO 200
      WRITE (6,25) IOSB(2)
      GOTO 300
200   WRITE (6,20)J
      IF(.NOT.II)CALL SYS$EXIT(%VAL(II))
      CALL SYS$EXIT(%VAL(IOSBW(1)))
300   STOP
      END
```

PCDRIVER.LIS
PCDRIVER.COM
PCDRIVER.OPT
PCLOAD.COM
ATTN.FOR

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```
0000     1          .TITLE  PCDRIVER - VAX/VMS PAPER TAPE READER/PUNCH DRIVER
0000     2          .IDENT  /V02/
0000     3
0000     4 ;++
0000     5 ;
0000     6 ; FACILITY:
0000     7 ;
0000     8 ;        VAX/VMS Paper Tape Reader/Punch driver
0000     9 ;
0000    10 ; ABSTRACT:
0000    11 ;
0000    12 ;        This driver allows the user to control the paper tape reader/
0000    13 ;        punch by using the set attention AST scheme.  The following
0000    14 ;        function codes are accepted:
0000    15 ;
0000    16 ;          IO$_SENSECHAR--takes no arguments, and returns the address
0000    17 ;                of the CSR in the high-order longword of the IOSB.
0000    18 ;
0000    19 ;          IO$_SETMODE----takes up to three parameters:
0000    20 ;
0000    21 ;                P1 = address of AST routine to be entered when the paper
0000    22 ;                     tape reader interrupts (P1 is required).
0000    23 ;                P2 = parameter to be passed to the AST routine
0000    24 ;                     specified in P1 (P2 is optional).
0000    25 ;                P3 = access mode in which the AST routine specified in
0000    26 ;                     P1 is to run (P3 is optional).
0000    27 ;
0000    28 ;          IO$_SETCHAR----identical to IO$_SETMODE except that the AST
0000    29 ;                routine specified in P1 will be entered if the punch
0000    30 ;                generates an interrupt (instead of the reader).
0000    31 ;
0000    32 ; AUTHOR:
0000    33 ;
0000    34 ;        Vik Muiznieks           July--1979
0000    35 ;
0000    36 ;        History
0000    37 ;                Fred Marsh      August 1894
0000    38 ;        Added $DYNDEF to the symbol definitions
0000    39 ;--
0000    40          .SBTTL  External and local symbol definitions
```

```
                     0000     42
                     0000     43 ;
                     0000     44 ; External symbols
                     0000     45 ;
                     0000     46
                     0000     47          $CRBDEF                         ; Channel request block
                     0000     48          $DCDEF                          ; Device classes and types
                     0000     49          $DDBDEF                         ; Device data block
                     0000     50          $DEVDEF                         ; Device characteristics
                     0000     51          $IDBDEF                         ; Interrupt data block
                     0000     52          $IODEF                          ; I/O function codes
                     0000     53          $IPLDEF                         ; Hardware IPL definitions
                     0000     54          $IRPDEF                         ; I/O request packet
                     0000     55          $SSDEF                          ; System status codes
                     0000     56          $UCBDEF                         ; Unit control block
                     0000     57          $VECDEF                         ; Interrupt vector block
                     0000     58          $DYNDEF                         ;
                     0000     59 ;
                     0000     60 ; Local symbols
                     0000     61 ;
                     0000     62
                     0000     63 ;
                     0000     64 ; Argument list (AP) offsets for device-dependent $QIO parameters
                     0000     65 ;       (Only P1, P2, and P3 have meaning for this driver.)
                     0000     66 ;
                     0000     67
00000000             0000     68 P1       = 0                             ; First $QIO parameter
00000004             0000     69 P2       = 4                             ; Second $QIO parameter
00000008             0000     70 P3       = 8                             ; Third $QIO parameter
0000000C             0000     71 P4       = 12                            ; Fourth $QIO parameter
00000010             0000     72 P5       = 16                            ; Fifth $QIO parameter
00000014             0000     73 P6       = 20                            ; Sixth $QIO parameter
                     0000     74
                     0000     75 ;
                     0000     76 ; Other constants
                     0000     77 ;
                     0000     78
000000FC             0000     79 MY_CLASS=252                             ; My own device class number
                     0000     80
                     0000     81 ;
                     0000     82 ; Definitions that follow the standard UCB fields
                     0000     83 ;
                     0000     84
                     0000     85          $DEFINI UCB                     ; Start of UCB definitions
                     0000     86
00000090             0000     87          .=UCB$K_LENGTH                  ; Position to end of UCB
                     0090     88
                     0090     89 $DEF     UCB$L_ASTHEAD   .BLKL   1       ; Listhead for reader attn. AST
                     0094     90
                     0094     91 $DEF     UCB$L_PUNCHD    .BLKL   1       ; Listhead for punch attn. AST
                     0098     92
                     0098     93 $DEF     UCB$K_PC_UCBLEN                 ; Length of extended UCB
                     0098     94
                     0098     95          $DEFEND UCB                     ; End of UCB definitions
                     0000     96          .SBTTL  Standard tables
```

```
                        ;
                        ; Driver prologue table
                        ;

0000                    DPTAB   -                                       ; DPT-creation macro
0000                            END=PC_END,-                            ; End of driver label
0000                            ADAPTER=UBA,-                           ; Adapter type
0000                            UCBSIZE=<UCB$K_PC_UCBLEN>,-             ; Length of UCB
0000                            NAME=PCDRIVER                           ; Driver name
0038                    DPT_STORE INIT                                  ; Start of load
                                                                        ; initialization table
0038                    DPT_STORE UCB,UCB$B_FIPL,B,8                    ; Device fork IPL
003C                    DPT_STORE UCB,UCB$B_DIPL,B,20                   ; Device int. IPL (BR4)
0040                    DPT_STORE UCB,UCB$L_DEVCHAR,L,<-                ; Device characteristics
0040                            DEV$M_AVL!-                             ;  e.g., dev. available
0040                            DEV$M_REC!-                             ;  record oriented
0040                            DEV$M_IDV!-                             ;  input device
0040                            DEV$M_ODV>                              ;  output device
0047                    DPT_STORE UCB,UCB$B_DEVCLASS,B,MY_CLASS         ; store my device class
004B
004B                    DPT_STORE REINIT                                ; Start of reload
004B                                                                    ; initialization table
004B                    DPT_STORE DDB,DDB$L_DDT,D,PC$DDT                ; Address of DDT
0050                    DPT_STORE CRB,CRB$L_INTD+4,D,-                  ; Address of reader int.
0050                            ASTINT                                  ; service routine
0055                    DPT_STORE CRB,CRB$L_INTD2+4,D,-                 ; Address of punch int.
0055                            PUNC_INT                                ; service routine
005A                    DPT_STORE CRB,-                                 ; Address of controller
005A                            CRB$L_INTD+VEC$L_INITIAL,-              ; initialization routine
005A                            D,PC_CONTROL_INIT
005F                    DPT_STORE CRB,-                                 ; Address of device
005F                            CRB$L_INTD+VEC$L_UNITINIT,-             ; unit initialization
005F                            D,PC_UNIT_INIT                          ; routine
0064
0064                    DPT_STORE END                                   ; End of initialization
0000                                                                    ; tables
0000
0000                    ;
0000                    ; Driver dispatch table
0000                    ;
0000
0000                    DDTAB   -                                       ; DDT-creation macro
0000                            DEVNAM=PC,-                             ; Name of device
0000                            START=PC_START,-                        ; Start I/O routine
0000                            FUNCTB=PC_FUNCTABLE,-                   ; FDT address
0000                            CANCEL=+IOC$CANCELIO                    ; Cancel I/O routine
0038
0038                    ;
0038                    ; Function dispatch table
0038                    ;
0038
0038                    PC_FUNCTABLE:                                   ; FDT for driver
0038                            FUNCTAB ,-                              ; Valid I/O functions
0038                            <SENSECHAR,-                            ; Get CSR address func.
0038                            SETCHAR,-                               ; Punch attn. AST func.
0038                            SETMODE>                                ; Reader attn. AST func
```

```
0040    155         FUNCTAB ,-                                      ; Buffered functions
0040    156                 <SENSECHAR,-                            ; Get CSR address
0040    157                 SETCHAR,-                               ; Punch attn. AST
0040    158                 SETMODE>                                ; Reader attn. AST
0048    159         FUNCTAB CSR_FDT_ROUTINE,-                       ; FDT get CSR routine
0048    160                 <SENSECHAR>
0054    161         FUNCTAB PUNC_AST_FDT,-                          ; FDT punch attn.
0054    162                 <SETCHAR>                               ; AST routine
0060    163         FUNCTAB SET_AST_FDT,-                           ; FDT reader attn.
0060    164                 <SETMODE>                               ; AST routine
006C    165         .SBTTL  PC_CONTROL_INIT, Controller initialization routine
```

```
                006C    167
                006C    168 ;++
                006C    169 ; PC_CONTROL_INIT, Readies controller for I/O operations
                006C    170 ;
                006C    171 ; Functional description:
                006C    172 ;
                006C    173 ;       The operating system calls this routine in 3 places:
                006C    174 ;
                006C    175 ;               at system startup
                006C    176 ;               during driver loading and reloading
                006C    177 ;               during recovery from a power failure
                006C    178 ;
                006C    179 ; Inputs:
                006C    180 ;
                006C    181 ;       R4      - address of the CSR (controller status register)
                006C    182 ;       R5      - address of the IDB (interrupt data block)
                006C    183 ;       R6      - address of the DDB (device data block)
                006C    184 ;       R8      - address of the CRB (channel request block)
                006C    185 ;
                006C    186 ; Outputs:
                006C    187 ;
                006C    188 ;       The routine must preserve all registers except R0-R3.
                006C    189 ;
                006C    190 ;--
                006C    191
                006C    192 PC_CONTROL_INIT:                        ; Initialize controller
 05             006C    193         RSB                             ; Return
                006D    194         .SBTTL  PC_UNIT_INIT, Unit initialization routine
```

```
                     006D    196
                     006D    197 ;++
                     006D    198 ; PC_UNIT_INIT, Readies unit for I/O operations
                     006D    199 ;
                     006D    200 ; Functional description:
                     006D    201 ;
                     006D    202 ;       The operating system calls this routine after calling the
                     006D    203 ;       controller initialization routine:
                     006D    204 ;
                     006D    205 ;               at system startup
                     006D    206 ;               during driver loading
                     006D    207 ;               during recovery from a power failure
                     006D    208 ;
                     006D    209 ;               This routine sets the on-line bit in the UCB, and
                     006D    210 ;               loads the owner field of the IDB with the UCB address.
                     006D    211 ;
                     006D    212 ; Inputs:
                     006D    213 ;
                     006D    214 ;       R4      - address of the CSR (controller status register)
                     006D    215 ;       R5      - address of the UCB (unit control block)
                     006D    216 ;
                     006D    217 ; Outputs:
                     006D    218 ;
                     006D    219 ;       The routine must preserve all registers except R0-R3.
                     006D    220 ;
                     006D    221 ;--
                     006D    222
                     006D    223 PC_UNIT_INIT:                                       ; Initialize unit
64 A5    10    A8    006D    224         BISW    #UCB$M_ONLINE,UCB$W_STS(R5)       ; Set unit online
50    24 A5    D0    0071    225         MOVL    UCB$L_CRB(R5),R0                  ; Get address of CRB
50    2C A0    D0    0075    226         MOVL    CRB$L_INTD+VEC$L_IDB(R0),R0       ; Get address of IDB
04 A0    55    D0    0079    227         MOVL    R5,IDB$L_OWNER(R0)                ; Set address of dev UCB
                     007D    228                                                   ; as OWNER--will not
                     007D    229                                                   ; change
                 05  007D    230         RSB                                       ; Return
                     007E    231         .SBTTL  CSR_FDT_ROUTINE, Return CSR Address
```

```
                        007E    233
                        007E    234 ;++
                        007E    235 ; CSR_FDT_ROUTINE
                        007E    236 ;
                        007E    237 ; Functional description:
                        007E    238 ;
                        007E    239 ;       This FDT routine returns the address of the device's CSR in
                        007E    240 ;       the high-order longword of the IOSB.  The CSR is found in the
                        007E    241 ;       first longword of the IDB.  R1 is placed into the high-order
                        007E    242 ;       longword of the IOSB by IOPOST.
                        007E    243 ;
                        007E    244 ; Inputs:
                        007E    245 ;
                        007E    246 ;       R0-R2   - scratch registers
                        007E    247 ;       R3      - address of the IRP (I/O request packet)
                        007E    248 ;       R4      - address of the PCB (process control block)
                        007E    249 ;       R5      - address of the UCB (unit control block)
                        007E    250 ;       R6      - address of the CCB (channel control block)
                        007E    251 ;       R7      - bit number of the I/O function code
                        007E    252 ;       R8      - address of the FDT table entry for this routine
                        007E    253 ;       R9-R11  - scratch registers
                        007E    254 ;       AP      - address of the 1st function dependent $QIO parameter
                        007E    255 ;
                        007E    256 ; Outputs:
                        007E    257 ;
                        007E    258 ;       The routine must preserve all registers except R0-R2, and
                        007E    259 ;       R9-R11.
                        007E    260 ;
                        007E    261 ;--
                        007E    262
                        007E    263 CSR_FDT_ROUTINE:
      50    24 A5   D0  007E    264         MOVL    UCB$L_CRB(R5),R0                ; Get CRB address
      51    2C B0   D0  0082    265         MOVL    @CRB$L_INTD+VEC$L_IDB(R0),R1    ; Store CSR in IOSB(2)
         50    01   3C  0086    266         MOVZWL  #SS$_NORMAL,R0                  ; Return normal success
00000000'GF    17   0089    267         JMP     G^EXE$FINISHIO                  ; All done
                    008F    268         .SBTTL  SET_AST_FDT, Reader Attn. AST
```

```
                     008F    270
                     008F    271 ;++
                     008F    272 ; SET_AST_FDT
                     008F    273 ;
                     008F    274 ; Functional description:
                     008F    275 ;
                     008F    276 ;       This FDT routine queues an attention AST for the process
                     008F    277 ;       issuing the SETMODE $QIO.  P1 and P2 are checked for
                     008F    278 ;       accessibility.
                     008F    279 ;
                     008F    280 ; Inputs:
                     008F    281 ;
                     008F    282 ;       R0-R2   - scratch registers
                     008F    283 ;       R3      - address of the IRP (I/O request packet)
                     008F    284 ;       R4      - address of the PCB (process control block)
                     008F    285 ;       R5      - address of the UCB (unit control block)
                     008F    286 ;       R6      - address of the CCB (channel control block)
                     008F    287 ;       R7      - bit number of the I/O function code
                     008F    288 ;       R8      - address of the FDT table entry for this routine
                     008F    289 ;       R9-R11  - scratch registers
                     008F    290 ;       AP      - address of the 1st function dependent $QIO parameter
                     008F    291 ;
                     008F    292 ; Outputs:
                     008F    293 ;
                     008F    294 ;       The routine must preserve all registers except R0-R2, and
                     008F    295 ;       R9-R11.
                     008F    296 ;
                     008F    297 ;--
                     008F    298
                     008F    299 SET_AST_FDT:
          50   6C    D0  008F    300         MOVL    P1(AP),R0               ; Get ast address
               09    13  0092    301         BEQL    NOP1                    ; 0 means disable ast
          51   04    9A  0094    302         MOVZBL  #4,R1                   ; It's a longword
 00000000'GF    16    0097    303         JSB     G^EXE$WRITECHK          ; Can user read it
                      009D    304                                         ; No return on no access
          50   04 AC  D0  009D    305 NOP1:   MOVL    P2(AP),R0               ; Get ast par. if there
               06    13  00A1    306         BEQL    NOP2                    ; No P2 parameter if eql
 00000000'GF    16    00A3    307         JSB     G^EXE$WRITECHK          ; Can user read it?
                      00A9    308                                         ; No return on no access
      57   0090 C5  DE  00A9    309 NOP2:   MOVAL   UCB$L_ASTHEAD(R5),R7     ; Get listhead
 00000000'GF    16    00AE    310         JSB     G^COM$SETATTNAST        ; Set up ast request
 00000000'GF    17    00B4    311         JMP     G^EXE$FINISHIOC         ; Complete SETMODE $QIO
                      00BA    312         .SBTTL  PUNC_AST_FDT, Punch Attn. AST
```

```
                     00BA    314
                     00BA    315 ;++
                     00BA    316 ; PUNC_AST_FDT
                     00BA    317 ;
                     00BA    318 ; Functional description:
                     00BA    319 ;
                     00BA    320 ;       This FDT routine queues an attention AST for the process
                     00BA    321 ;       issuing the SETCHAR $QIO.  P1 and P2 are checked for
                     00BA    322 ;       accessibility.
                     00BA    323 ;
                     00BA    324 ; Inputs:
                     00BA    325 ;
                     00BA    326 ;       R0-R2   - scratch registers
                     00BA    327 ;       R3      - address of the IRP (I/O request packet)
                     00BA    328 ;       R4      - address of the PCB (process control block)
                     00BA    329 ;       R5      - address of the UCB (unit control block)
                     00BA    330 ;       R6      - address of the CCB (channel control block)
                     00BA    331 ;       R7      - bit number of the I/O function code
                     00BA    332 ;       R8      - address of the FDT table entry for this routine
                     00BA    333 ;       R9-R11  - scratch registers
                     00BA    334 ;       AP      - address of the 1st function dependent $QIO parameter
                     00BA    335 ;
                     00BA    336 ; Outputs:
                     00BA    337 ;
                     00BA    338 ;       The routine must preserve all registers except R0-R2, and
                     00BA    339 ;       R9-R11.
                     00BA    340 ;
                     00BA    341 ;--
                     00BA    342
                     00BA    343 PUNC_AST_FDT:
     50    6C    D0  00BA    344         MOVL    P1(AP),R0               ; Get ast address
           09    13  00BD    345         BEQL    NO_P1                   ; 0 means disable ast
     51    04    9A  00BF    346         MOVZBL  #4,R1                   ; It's a longword
00000000'GF    16  00C2    347         JSB     G^EXE$WRITECHK          ; Can user read it
                   00C8    348                                         ; No return on no access
     50    04 AC  D0  00C8    349 NO_P1:  MOVL    P2(AP),R0               ; Get ast par. if there
           06    13  00CC    350         BEQL    NO_P2                   ; No P2 parameter if eql
00000000'GF    16  00CE    351         JSB     G^EXE$WRITECHK          ; Can user read it?
                   00D4    352                                         ; No return on no access
57   0094 C5    DE  00D4    353 NO_P2:  MOVAL   UCB$L_PUNCHD(R5),R7     ; Get listhead
00000000'GF    16  00D9    354         JSB     G^COM$SETATTNAST        ; Set up ast request
00000000'GF    17  00DF    355         JMP     G^EXE$FINISHIOC         ; Complete SETMODE $QIO
                   00E5    356         .SBTTL PC_START, Start I/O Routine
```

```
                00E5    358 ; PC_START
                00E5    359 ;
                00E5    360 ;       The driver really has no start I/O entry point.
                00E5    361 ;       This is a dummy routine which should never be
                00E5    362 ;       called by this driver.
                00E5    363 ;
                00E5    364 PC_START:
 05             00E5    365         RSB
                00E6    366         .SBTTL  ASTINT, Interrupt service routines
```

```
                     00E6    368 ;++
                     00E6    369 ; ASTINT
                     00E6    370 ;
                     00E6    371 ; Functional description:
                     00E6    372 ;
                     00E6    373 ;               The driver is for a single-unit controller, and
                     00E6    374 ;               the unit initialization code has stored the
                     00E6    375 ;               address of the UCB in the owner field of the IDB.
                     00E6    376 ;
                     00E6    377 ;               These routines simply restore the address of the UCB
                     00E6    378 ;               in R5, place the appropriate AST listhead in R4, and
                     00E6    379 ;               call a system routine to queue pending AST's.  Note
                     00E6    380 ;               that no check is made to see if the UCB$V_INT bit is
                     00E6    381 ;               set (in UCB$W_STS), since the routines that set up the
                     00E6    382 ;               attention AST's do not set the bit.
                     00E6    383 ;
                     00E6    384 ; Inputs:
                     00E6    385 ;
                     00E6    386 ;               0(SP)  - pointer to the address of the IDB (interrupt data
                     00E6    387 ;                        block)
                     00E6    388 ;               4(SP)  - saved R0
                     00E6    389 ;               8(SP)  - saved R1
                     00E6    390 ;              12(SP)  - saved R2
                     00E6    391 ;              16(SP)  - saved R3
                     00E6    392 ;              20(SP)  - saved R4
                     00E6    393 ;              24(SP)  - saved R5
                     00E6    394 ;              28(SP)  - saved PSL (program status longword)
                     00E6    395 ;              32(SP)  - saved PC
                     00E6    396 ;
                     00E6    397 ;               The IDB contains the CSR address and the UCB address.
                     00E6    398 ;
                     00E6    399 ; Outputs:
                     00E6    400 ;
                     00E6    401 ;               The routine must preserve all registers except R0-R5.
                     00E6    402 ;
                     00E6    403 ;--
                     00E6    404
                     00E6    405 ASTINT:                                             ; Reader interrupted
     53    9E    D0  00E6    406             MOVL    @(SP)+,R3                       ; Get IDB
   55    04 A3    D0  00E9    407             MOVL    IDB$L_OWNER(R3),R5              ; Get OWNER UCB
 54    0090 C5    DE  00ED    408             MOVAL   UCB$L_ASTHEAD(R5),R4            ; Get reader listhead
  00000000'GF     16  00F2    409 DELIV:      JSB     G^COM$DELATTNAST                ; Deliver attn. ast's
     50    8E    7D  00F8    410             MOVQ    (SP)+,R0                        ; Dismiss interrupt
     52    8E    7D  00FB    411             MOVQ    (SP)+,R2                        ; After restoring
     54    8E    7D  00FE    412             MOVQ    (SP)+,R4                        ; Registers
                 02  0101    413             REI
                     0102    414 PUNC_INT:                                           ; Punch interrupted
     53    9E    D0  0102    415             MOVL    @(SP)+,R3                       ; Get IDB
   55    04 A3    D0  0105    416             MOVL    IDB$L_OWNER(R3),R5              ; Get OWNER UCB
 54    0094 C5    DE  0109    417             MOVAL   UCB$L_PUNCHD(R5),R4             ; Get punch listhead
           E2    11  010E    418             BRB     DELIV                           ; Deliver attn. ast's
                     0110    419             .SBTTL  PC_END, End of driver
```

```
0110   421
0110   422 ;++
0110   423 ; Label that marks the end of the driver
0110   424 ;--
0110   425
0110   426 PC_END:                                ; Last location in driver
0110   427         .END
```

```
$$$                     = 00000020 R      02
$$OP                    = 00000002
ASTINT                    000000E6 R      03
AT$_UBA                 = 00000001
COM$DELATTNAST            ******** X      03
COM$SETATTNAST            ******** X      03
CRB$L_INTD              = 00000024
CRB$L_INTD2             = 00000048
CSR_FDT_ROUTINE           0000007E R      03
DDB$L_DDT               = 0000000C
DELIV                     000000F2 R      03
DEV$M_AVL               = 00040000
DEV$M_IDV               = 04000000
DEV$M_ODV               = 08000000
DEV$M_REC               = 00000001
DPT$C_LENGTH            = 00000038
DPT$C_VERSION           = 00000004
DPT$INITAB                00000038 R      02
DPT$REINITAB              0000004B R      02
DPT$TAB                   00000000 R      02
DYN$C_CRB               = 00000005
DYN$C_DDB               = 00000006
DYN$C_DPT               = 0000001E
DYN$C_UCB               = 00000010
EXE$FINISHIO              ******** X      03
EXE$FINISHIOC             ******** X      03
EXE$WRITECHK              ******** X      03
FUNCTAB_LEN             = 00000034
IDB$L_OWNER             = 00000004
IO$_SENSECHAR           = 0000001B
IO$_SETCHAR             = 0000001A
IO$_SETMODE             = 00000023
IO$_VIRTUAL             = 0000003F
IOC$CANCELIO              ******** X      03
IOC$MNTVER                ******** X      03
IOC$RETURN                ******** X      03
MASKH                   = 00000008
MASKL                   = 00000000
MY_CLASS                = 000000FC
NOP1                      0000009D R      03
NOP2                      000000A9 R      03
NO_P1                     000000C8 R      03
NO_P2                     000000D4 R      03
P1                      = 00000000
P2                      = 00000004
P3                      = 00000008
P4                      = 0000000C
P5                      = 00000010
P6                      = 00000014
PC$DDT                    00000000 RG     03
PC_CONTROL_INIT           0000006C R      03
PC_END                    00000110 R      03
PC_FUNCTABLE              00000038 R      03
PC_START                  000000E5 R      03
PC_UNIT_INIT              0000006D R      03
PUNC_AST_FDT              000000BA R      03
PUNC_INT                  00000102 R      03
SET_AST_FDT               0000008F R      03
SS$_NORMAL              = 00000001
UCB$B_DEVCLASS          = 00000040
UCB$B_DIPL              = 0000005E
UCB$B_FIPL              = 0000000B
UCB$K_LENGTH            = 00000090
UCB$K_PC_UCBLEN           00000098
UCB$L_ASTHEAD             00000090
UCB$L_CRB               = 00000024
UCB$L_DEVCHAR           = 00000038
UCB$L_PUNCHD              00000094
UCB$M_ONLINE            = 00000010
UCB$W_STS               = 00000064
VEC$L_IDB               = 00000008
VEC$L_INITIAL           = 0000000C
VEC$L_UNITINIT          = 00000018
```

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	00000098 (152.)	01 (1.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE
$$$105_PROLOGUE	00000065 (101.)	02 (2.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC BYTE
$$$115_DRIVER	00000110 (272.)	03 (3.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC LONG

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	100	00:00:00.33	00:00:01.16
Command processing	129	00:00:00.46	00:00:01.12
Pass 1	1101	00:00:21.36	00:00:36.45
Symbol table sort	29	00:00:02.85	00:00:05.31
Pass 2	418	00:00:03.19	00:00:03.99
Symbol table output	12	00:00:00.11	00:00:00.14
Psect synopsis output	7	00:00:00.05	00:00:00.19
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	1802	00:00:28.37	00:00:48.37

The working set limit was 500 pages.
96378 bytes (189 pages) of virtual memory were used to buffer the intermediate code.
There were 100 pages of symbol table space allocated to hold 1819 non-local and 0 local symbols.
427 source lines were read in Pass 1, producing 16 object records in Pass 2.
27 pages of virtual memory were used to define 24 macros.

Macro library statistics

Macro library name	Macros defined
SYS$SYSROOT:[SYSLIB]LIB.MLB;1	14
SYS$SYSROOT:[SYSLIB]STARLET.MLB;1	8
TOTALS (all libraries)	22

2058 GETS were required to define 22 macros.

There were no errors, warnings or information messages.

```
MAC/LIS PCDRIVER+SYS$LIBRARY:LIB/LIB
```

```
100   $!                                                    PCDRIVER.COM
200   $!
300   $SET VERIFY
400   $MAC/LIS PCDRIVER+SYS$LIBRARY:LIB/LIB
500   $LINK/NOTRACE/MAP PCDRIVER/OPT,PCDRIVER,SYS$SYSTEM:SYS.STB/SEL
600   $SET NOVERIFY
```

```
100    !                                          PCDRIVER.OPT
200    BASE=0
```

PCLOAD.COM

```
$!
$!
$MCR SYSGEN
LOAD SYS$SYSDISK:[COURSE.DRIVER.RT]PCDRIVER
CONNECT PCA0/ADAPTER=3-
/NUMVEC=2-
/VECTOR=%O70-
/CSR=%O777550-
/DRIVER=PCDRIVER
SHO /DEV=PC
EXIT
```

```
  100   C
  200   C                                                ATTN.FOR
  300   C
  400           PROGRAM MAIN
  500   C
  600   C       This program causes the subroutine SUB to entered
  700   C       in kernel mode.  The subroutine will service
  800   C       interrupts from the paper tape reader, using the
  900   C       set attention ast mechanism.
 1000   C
 1100           INTEGER*4 SYS$CMKRNL,SYS$EXIT
 1200           EXTERNAL SUB,SUBTWO
 1300           COMMON ICSR,K,L,ICHAN
 1400           COMMON /CHAR/ ALPHA
 1410           COMMON /DEBUG/ ICODE,ISTAT
 1500           INTEGER*2 ICHAN
 1600           CHARACTER*36 ALPHA
 1610           ICODE=0
 1700           I=SYS$CMKRNL(SUB,)
 1800   C
 1900   C       Check for error in system service call
 2000   C
 2100           IF (.NOT. I) CALL SYS$EXIT(%VAL(I))
 2110           IF (ICODE .EQ. 0) GOTO 40
 2120                   WRITE (6,30) ICODE
 2130   30              FORMAT (' ERROR ID = ',I4)
 2140                   CALL SYS$EXIT(%VAL(ISTAT))
 2150   40      WRITE (6,50) ALPHA(1:L)
 2175   50      FORMAT(' AFTER HIBER, ALPHA = ',A)
 2200   C
 2300   C       Now enter subroutine SUBTWO in kernel mode to punch some
 2400   C       characters on paper tape
 2500   C
 2600           I=SYS$CMKRNL(SUBTWO,)
 2700           IF (.NOT. I) CALL SYS$EXIT(%VAL(I))
 2710           WRITE (6,60)
 2720   60      FORMAT(' PUNCHING COMPLETE')
 2800           END
 2900
 3000   C       ********************   SUB    ********************
 3100
 3200           SUBROUTINE SUB
 3300   C
 3400   C       This routine assigns a channel to the paper tape
 3500   C       reader, retrieves the address of the paper tape
 3600   C       CSR in IOSB(2) (via a SENSECHAR QIO), and then requests
 3700   C       an attention ast (when the paper tape reader interrupts)
 3800   C       via a SETMODE QIO (in subroutine SETAST).  The paper
 3900   C       tape reader is actually started (and interrupts are
 4000   C       enabled) by subroutine INTENA.
 4100   C
 4200           IMPLICIT INTEGER*4(S)
 4300           EXTERNAL READAST,SETAST,INTENA,IO$_SENSECHAR
 4400   C
 4500   C       Note that integer values and character strings must
 4600   C       be placed in separate common blocks (a FORTRAN
 4700   C       restriction).
 4800   C
 4900           COMMON  ICSR,K,L,ICHAN
```

```
5000            COMMON /CHAR/ ALPHA
5010            COMMON /DEBUG/ ICODE,ISTAT
5100            INTEGER*4 IOSB(2)
5200            INTEGER*2 ICHAN,IOSBW(4)
5300            CHARACTER*36 ALPHA
5400            EQUIVALENCE (IOSB(1),IOSBW(1))
5500    C
5600    C       J is an error indicator flag
5700    C
5800            J=0
5900    C
6000    C       Assign a channel to the paper tape reader
6100    C       and check for system service error.
6200    C
6300            I=SYS$ASSIGN('PCA0:',ICHAN,,)
6400            IF (.NOT. I) GOTO 200
6500            J=1
6600    C
6700    C       K indicates position in character string for next
6800    C         character read
6900    C       L indicates number of characters to be read into
7000    C         the string (note that the character statements
7100    C         in the subroutines need to be changed to reflect
7200    C         the maximum size that L may take on (set to 36)).
7300    C       Also, byte array (BYTE) in subroutine READAST must
7400    C       be increased to the same size as L.
7500    C
7600            K=1
7700            L=36
7800            I=SYS$QIOW(,%VAL(ICHAN),IO$_SENSECHAR,IOSB,,,,,,,,)
7900            ICSR=IOSB(2)
8000            IF (.NOT. I) GOTO 200
8100            J=2
8200            IF (IOSBW(1) .NE. 1) GOTO 200
8300    C
8400    C       Enable attention ast (which is actually handled by
8500    C       subroutine READAST).
8600    C       Note that the %VAL function is used to pass the
8700    C       address of the CSR.  In the subroutine, the address
8800    C       of the subroutine parameter becomes the address of
8900    C       the CSR, and the subroutine can directly reference
9000    C       the CSR by referencing the subroutine parameter.
9100    C
9200            CALL SETAST(0)
9300    C
9400    C       Enable paper tape reader interrupts, and start the
9500    C       paper tape reader (to read the next character).
9600    C
9700            CALL INTENA(%VAL(ICSR))
9800            J=3
9900    C
10000   C       Wait for all characters to be read (determined by
10100   C       subroutine READAST, who issues the WAKE system service).
10200   C
10300           I=SYS$HIBER()
10400           IF (.NOT. I) GOTO 200
10600           RETURN
10700   C
10800   C       Enter here if error condition occurs in a system
10900   C       service (J flags where error occurred).
```

```
11000   C
11100   200     ICODE = J
11110           ISTAT = IOSBW(1)
11120           IF (.NOT. I) ISTAT = I
11200           RETURN
11600           END
11700
11800   C       ********************   READAST    ********************
11900
12000           SUBROUTINE READAST(MYCSR)
12100           IMPLICIT INTEGER*4(S)
12200           CHARACTER*36 ALPHA
12300           EXTERNAL SETAST,INTENA
12400           INTEGER*2 ICHAN,MYCSR(4)
12500           BYTE DATA(36)
12600           COMMON ICSR,K,L,ICHAN
12700           COMMON /CHAR/ ALPHA
12800   C
12900   C       Note that the only valid (FORTRAN) equivalence for
13000   C       a character string is to a BYTE variable.
13100   C
13200           EQUIVALENCE (ALPHA(1:),DATA(1))
13300   C
13400   C       The data buffer register for the paper tape reader
13500   C       follows the paper tape reader CSR.  Note that only
13600   C       the low order byte contains data.  Note also, refer-
13700   C       ences to device registers must reference those
13800   C       locations as bytes or words only, not as longwords.
13900   C
14000           DATA(K)=MYCSR(2)
14100   C
14200   C       Increment index into string, and see if all done
14300   C       reading characters by comparing index to number of
14400   C       characters desired.
14500   C
14600           K=K+1
14700           IF (K .LE. L) GOTO 75
14800   C
14900   C       If all done, awaken main subroutine (SUB).
15000   C
15100           CALL SYS$WAKE(,)
15200           RETURN
15300   C
15400   C       Must reenable attention ast for next character since
15500   C       attention ast only good for one interrupt.  Note that
15600   C       a separate subroutine is required since the QIO is
15700   C       not allowed to specify the same ast routine address as the
15800   C       routine from which the QIO is being issued.  Interrupts
15900   C       are also reenabled, and the next character is read from
16000   C       the paper tape reader (via subroutine INTENA).
16100   C
16200   75      CALL SETAST(0)
16300           CALL INTENA(%VAL(ICSR))
16400           RETURN
16500           END
16600
16700   C       ********************   SETAST    ********************
16800
16900           SUBROUTINE SETAST(ITYPE)
17000           IMPLICIT INTEGER*4(S)
```

```
17100           CHARACTER*36 ALPHA
17200           EXTERNAL IO$_SETMODE,READAST,IO$_SETCHAR,PNCHAST
17300           INTEGER*2 ICHAN,IOSBW(4)
17400           INTEGER*4 IOSB(2)
17500           COMMON ICSR,K,L,ICHAN
17600           COMMON /CHAR/ ALPHA
17700           EQUIVALENCE (IOSBW(1),IOSB(1))
17800   C
17900   C       Check to see if requesting a reader attention ast (ITYPE=0),
18000   C       or a punch attention ast (ITYPE .NE. 0).
18100   C
18200           IF (ITYPE .NE. 0) GOTO 98
18300   C
18400   C       Request reader attention ast, specifying as the routine
18500   C       to service the ast subroutine READAST, and specifying
18600   C       as the ast parameter the CSR of the paper tape reader.
18700   C
18800           I=SYS$QIOW(,%VAL(ICHAN),IO$_SETMODE,IOSB,,,READAST,
18900           1%VAL(ICSR),,,,)
19000           GOTO 99
19100   C
19200   C       Request punch attention ast, specifying as the routine to
19300   C       service the ast subroutine PNCHAST, and specifying as the ast
19400   C       parameter the CSR of the paper tape reader.
19500   C
19600   98      I=SYS$QIOW(,%VAL(ICHAN),IO$_SETCHAR,IOSB,,,PNCHAST,
19700           1%VAL(ICSR),,,,)
19800   C
19900   C       Check on system service error
20000   C
20100   99      IF (.NOT. I) CALL SYS$EXIT(%VAL(I))
20200           IF (IOSBW(1) .NE. 1) CALL SYS$EXIT(%VAL(IOSBW(1)))
20300           RETURN
20400           END
20500
20600   C       ********************   INTENA   ********************
20700
20800           SUBROUTINE INTENA(MYCSR)
20900           INTEGER*2 GO,MYCSR(4)
21000   C
21100   C       DECIMAL 65 = HEX 41 = BINARY 01000001 which corresponds
21200   C       to the READER and INTERRUPT ENABLE bits in the paper
21300   C       tape reader control and status register.  These bits
21400   C       must be set to enable interrupts and to allow the
21500   C       reading of the next character on the paper tape.
21600   C
21700           DATA GO /65/
21800   C
21900   C       Set the appropriate bits in the paper tape CSR
22000   C
22100           MYCSR(1) = (MYCSR(1) .OR. GO)
22200           RETURN
22300           END
22400
22500   C       ********************   PNCHENA   ********************
22600
22700           SUBROUTINE PNCHENA(MYCSR)
22800           INTEGER*2 GO,MYCSR(4)
22900   C
23000   C       DECIMAL 64 = HEX 40 = BINARY 01000000 which corresponds to th
```

```
23100   C       INTERRUPT ENABLE bit in the paper tape punch's control and
23200   C       status register.  This bit must be set to allow the punching of
23300   C       characters.  The bit needs to be set only once.
23400   C
23500           DATA GO /64/
23600   C
23700   C       Set the appropriate bits in the punch's CSR
23800   C
23900           MYCSR(3) = (MYCSR(3) .OR. GO)
24000           RETURN
24100           END
24200
24300   C       ********************   PNCHDAT   ********************
24400
24500           SUBROUTINE PNCHDAT(MYCSR)
24600           IMPLICIT INTEGER*4(S)
24700           CHARACTER*36 ALPHA
24800           CHARACTER*1 NEXT
24900           EXTERNAL SETAST,IO$_SETCHAR
25000           INTEGER*2 ICHAN,MYCSR(4),IOSBW(4)
25100           INTEGER*4 IOSB(2)
25200           BYTE DATA
25300           COMMON ICSR,K,L,ICHAN
25400           COMMON /CHAR/ ALPHA
25500   C
25600   C       Note that the only valid equivalence for a character string
25700   C       is to a BYTE variable.
25800   C
25900           EQUIVALENCE (NEXT,DATA),(IOSBW(1),IOSB(1))
26000   C
26100   C       Reenable attention ast for next character.
26200   C
26300           CALL SETAST(1)
26400   C
26500   C       The paper tape punch is started by writing a character in
26600   C       the punch's data buffer (in this case, MYCSR(4)).  Only the
26700   C       low order byte contains data.
26800   C
26900           NEXT = ALPHA(K:K)
27000           MYCSR(4) = DATA
27100   C
27200   C       Increment index into string, and see if all done punching
27300   C       characters by comparing index (K) to number desired (L).
27400   C
27500           K=K+1
27600           IF (K .LE. L) GOTO 650
27700   C
27800   C       If all done, awaken main subroutine (SUBTWO)
27900   C       after disabling the last attention ast requested
28000   C
28100           I=SYS$QIOW(,%VAL(ICHAN),IO$_SETCHAR,IOSB,,,,,,,)
28200           IF (.NOT. I) CALL SYS$EXIT(%VAL(I))
28300           IF (IOSBW(1) .NE. 1) CALL SYS$EXIT(%VAL(IOSBW(1)))
28400           CALL SYS$WAKE(,)
28500   650     RETURN
28600           END
28700
28800   C       ********************   SUBTWO   ********************
28900
29000           SUBROUTINE SUBTWO
```

```
29100   C
29200   C       This subroutine will punch (L) characters from the character
29300   C       string alpha.  K serves as an index into the string.  If
29400   C       more than (36) characters are desired, the character statement
29500   C       have to be edited to the appropriate maximum length in this
29600   C       subroutine, and all subroutines called by this subroutine.
29700   C
29800           IMPLICIT INTEGER*4(S)
29900           EXTERNAL PNCHAST,SETAST,PNCHENA,PNCHDAT
30000           COMMON ICSR,K,L,ICHAN
30100           COMMON /CHAR/ ALPHA
30200           INTEGER*2 ICHAN
30300           CHARACTER*36 ALPHA
30400   C
30500   C       It is assumed that a channel has already been assigned to the
30600   C       punch (as in subroutine SUB), and that the CSR address has bee
30700   C       placed into ICSR (via a SENSECHAR QIO -- see subroutine SUB).
30800   C
30900           ALPHA='ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789'
31000           K=1
31100           L=36
31200   C
31300   C       Enable punch interrupts
31400   C
31500           CALL PNCHENA(%VAL(ICSR))
31600   C
31700   C       Punch first character (will set up attn. ast)
31800   C
31900           CALL PNCHDAT(%VAL(ICSR))
32000   C
32100   C       Wait for all characters to be punched (determined by
32200   C       subroutine PNCHAST, who issues the WAKE system service).
32300   C
32400           I=SYS$HIBER()
32500           IF (.NOT. I) CALL SYS$EXIT(%VAL(I))
32700           RETURN
32900           END
33000
33100   C       ********************   PNCHAST   ********************
33200
33300           SUBROUTINE PNCHAST(MYCSR)
33400           EXTERNAL PNCHDAT
33500           COMMON ICSR,K,L,ICHAN
33600           COMMON /CHAR/ ALPHA
33700           INTEGER*2 ICHAN,MYCSR(4)
33800           CHARACTER*36 ALPHA
33900   C
34000   C       This subroutine passes control to subroutine PNCHDAT.  It is
34100   C       included so PNCHDAT doesn't specify itself as the ast routine.
34200   C
34300           CALL PNCHDAT(%VAL(ICSR))
34400           RETURN
34500           END
```

PRINTER.LIS
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(1) 2697 Local Data
(1) 9402 System Mapped Data
(1) 10702 System Mapped Routines
(1) 17102 Main Program
(1) 27702 AST Routine For Each Printer Interrupt

```
                     0000    100          .TITLE  PRINTER
                     0000    110          .IDENT  /V01/
                     0000    120 ;
                     0000    130 ;        CONNECT TO INTERRUPT EXAMPLE
                     0000    140 ;
                     0000    200
                     0000    300 ;
                     0000    400 ;        This program controls the line printer using the connect
                     0000    500 ;        to interrupt system service scheme.  The printer's CSR is
                     0000    600 ;        ^O777514, it has two registers (CSR first, then data register).
                     0000    700 ;        The printer is activated by placing a value to be printed in the
                     0000    800 ;        data register.  The printer generates an interrupt after the
                     0000    900 ;        character is printed if the interrupt enable bit in the CSR
                     0000   1000 ;        is set.  The program will prompt the user for data,
                     0000   1100 ;        and then print the data (telling the user each character that
                     0000   1200 ;        was printed).
                     0000   1300 ;
                     0000   1310 ;        AUTHOR:     Viktors J. Muiznieks     25-March-1980
                     0000   1500 ;
                     0000   1600 ;        System macros for defining offsets and symbols
                     0000   1700 ;
                     0000   1800
                     0000   1900          $CINDEF                              ; connect to interrupt
                     0000   2000          $CRBDEF                              ; channel request block
                     0000   2100          $IDBDEF                              ; interrupt data block
                     0000   2200          $IODEF                               ; I/O function codes
                     0000   2300          $IO780DEF                            ; 11-780 adapter codes
                     0000   2400          $UCBDEF                              ; unit control block
                     0000   2500          $VECDEF                              ; CRB vector fields
                     0000   2600
                     0000   2605 ;
                     0000   2610 ;        Local Symbol Definitions
                     0000   2615 ;
                     0000   2620
0003FF4C             0000   2625 CSR = ^O777514                               ; printer CSR register
0000014C             0000   2630 CSR_PAGE_OFFSET = <CSR&^X1FF>                ; page offset of CSR
001009FF             0000   2635 PFN = <IO780$AL_UBOSP+CSR>@-9                 ; PFN for printer reg.'s
                     0000   2640                                              ; @-9 divides by 512
00000001             0000   2645 PAGE_COUNT = 1                               ; reg. fit on 1 page
00000000             0000   2650 STATUS = 0                                   ; status reg. offset
00000002             0000   2655 DATA = 2                                     ; data reg. offset
00000040             0000   2660 INT_ENABLE = ^X40                            ; int. enable bit
00000080             0000   2665 READY = ^X80                                 ; printer ready bit
00008000             0000   2670 ERR_BIT = ^X8000                             ; printer error bit
000001FB             0000   2675 MAX_TT_BYTES = 507                           ; entered by user
00000020             0000   2680 LF_BUFFER_CR = 32                            ; TT carriage control
0000000D             0000   2685 CR = 13                                      ; carriage return
0000000A             0000   2690 LF = 10                                      ; line feed
00000001             0000   2692 EXPECTED = 1                                 ; int. expected bit
                     0000   2695
                     0000   2697          .SBTTL  Local Data
```

```
                                        0000  2700 ;
                                        0000  2800 ;       Parameters for $ASSIGN and $QIO system services
                                        0000  2900 ;
                                        0000  3100 DEVICE_NAME:
3A 30 41 50 4C 5F 00000008'010E0000'    0000  3200         .ASCID  /_LPA0:/                        ; printer descriptor
                                        000E  3300 TT_NAME:
            54 54 00000016'010E0000'    000E  3400         .ASCID  /TT/                            ; terminal descriptor
                                        0018  3500 TT_CHAN:
                                0000    0018  3600         .WORD                                   ; terminal channel #
                                        001A  3700 DEVICE_CHAN:
                                0000    001A  3800         .WORD                                   ; printer channel #
                      00000000 00000000 001C  3900 IOSB:    .QUAD                                   ; IOSB for $QIO calls
                                        0024  4100 ;
                                        0024  4200 ;       Parameters for $CRMPSC system service to map the Unibus I/O page
                                        0024  4300 ;
                                        0024  4500 MAP_ADR:
                            00000200'   0024  4600         .ADDRESS        ^X200                   ; for $CRMPSC
                            00000200'   0028  4700         .ADDRESS        ^X200                   ; start address (P0)
                                        002C  4800                                                 ; end address (P0)
                                        002C  4900 ;
                                        002C  5000 ;       Messages sent to the terminal user
                                        002C  5100 ;
                                        002C  5200
                                        002C  5300 PROMPT_STRING:
70 20 65 62 20 6F 74 20 61 74 61 44     002C  5400         .ASCII  /Data to be printed (<CR> for none): /  ; for terminal user
3E 52 43 3C 28 20 64 65 74 6E 69 72     0038
20 3A 29 65 6E 6F 6E 20 72 6F 66 20     0044
                            00000024    0050  5500 PROMPT_LENGTH = . - PROMPT_STRING
                                        0050  5600 AST_STRING:
69 72 70 20 64 65 68 73 69 6E 69 46     0050  5700         .ASCII  /Finished printing character /  ; sent in AST routine
63 61 72 61 68 63 20 67 6E 69 74 6E     005C
                        20 72 65 74     0068
                                        006C  5800 CHARACTER:
                                  00    006C  5900         .BYTE
                            0000001D    006D  6000 AST_LENGTH = . - AST_STRING
                                        006D  6100 ERROR_STRING:
72 72 75 63 63 6F 20 72 6F 72 72 45     006D  6200         .ASCII  /Error occurred in printing data - program aborting./  ; if print error occurs
69 74 6E 69 72 70 20 6E 69 20 64 65     0079
72 70 20 2D 20 61 74 61 64 20 67 6E     0085
69 74 72 6F 62 61 20 6D 61 72 67 6F     0091
                        2E 67 6E        009D
                            00000033    00A0  6300 ERR_LENGTH = . - ERROR_STRING
                                        00A0  6400
                                        00A0  8200 ;
                                        00A0  8300 ;       Parameters used by connect to interrupt $QIO system service
                                        00A0  8400 ;
                                        00A0  8500
                                        00A0  8600 ROUTINE_OFFSET_LIST:
                            00000000    00A0  8700         .LONG   0
                            00000000    00A4  8800         .LONG   0                               ; powerfail recovery
                            00000200'   00A8  8900         .LONG   LP_INTERRUPT - SHARED_BUFFER_START ; start I/O
                            0000022F'   00AC  9000         .LONG   LP_CANCEL - SHARED_BUFFER_START ; interrupt service
                                        00B0  9100 SHARED_BUFFER_DESC:                             ; cancel I/O
                            0000023D'   00B0  9200         .LONG   SHARED_BUFFER_END - SHARED_BUFFER_START ; buffer length
                            00000000'   00B4  9300         .LONG   SHARED_BUFFER_START             ; buffer starting addr.
                                        00B8  9402         .SBTTL  System Mapped Data
```

System Mapped Data

```
                     00B8  9500 ;
                     00B8  9600 ;       Shared buffer for use by program and service routines.  Note
                     00B8  9700 ;       that the buffer is aligned to begin on a page boundary, and
                     00B8  9800 ;       given write access.  Both the data area and the service
                     00B8  9900 ;       routines are described by the shared buffer descriptor.
                     00B8 10000 ;
                     00B8 10100
                 00000000 10200          .PSECT  SHAREDBUF,PAGE,WRT
                     0000 10300
                     0000 10400 SHARED_BUFFER_START:
                       00 0000 10500          .BYTE   0                       ; used as index
                000001FC 0001 10600 TTDATA: .BLKB   MAX_TT_BYTES            ; max. 507 bytes
                000001FE 01FC 10640          .BLKB   2                       ; for <CR> <LF>
                       00 01FE 10680 CURRENT:.BYTE   0                       ; data printed
                       00 01FF 10690 FLAGS:  .BYTE   0                       ; expected int. flag
                     0200 10700
                     0200 10702          .SBTTL  System Mapped Routines
```

```
                        0200 10800 ;       Note that since offsets must be specified in the routine
                        0200 10900 ;       offset list above, the following service routines must be
                        0200 11000 ;       placed immediately following the shared buffer data area.
                        0200 11100 ;
                        0200 11400 ;       The LP_INTERRUPT routine is called (in kernel mode, in system
                        0200 11500 ;       context) after the printer generates an interrupt.  The inputs are
                        0200 11600 ;               R2 - address of counted argument list
                        0200 11700 ;               R4 - address of IDB
                        0200 11800 ;               R5 - address of UCB
                        0200 11900 ;
                        0200 12000 ;       The counted argument list contains the following items:
                        0200 12100 ;               0(R2) - count of arguments (4)
                        0200 12200 ;               4(R2) - system mapped address of shared buffer
                        0200 12300 ;               8(R2) - address of AST parameter
                        0200 12400 ;              12(R2) - IDB address
                        0200 12500 ;              16(R2) - UCB address
                        0200 12600 ;
                        0200 12700 ;       The routine will place the character printed into the CURRENT
                        0200 12800 ;       location, and request that an AST be delivered (by placing
                        0200 12900 ;       a 1 in R0 before issuing an RSB).  If any error occurred in
                        0200 13000 ;       the print operation, a 0 is placed into CURRENT. If the
                        0200 13010 ;       interrupt is unexpected, no AST is requested (R0 cleared).
                        0200 13100 ;
                        0200 13200 ;       The routine must preserve all registers except R0-R4.
                        0200 13300 ;
                        0200 13800 LP_INTERRUPT:
                50      D4  0200 13810          CLRL    R0                              ; interrupt service
27 F9 AF    01          E5  0202 13820          BBCC    #EXPECTED,FLAGS,NO_AST          ; assume unexpected int.
      F4 AF             94  0207 13900          CLRB    CURRENT                         ; dismiss if unexpected
   54    64             D0  020A 14000          MOVL    IDB$L_CSR(R4),R4                ; assume printer error
64    0080 8F           B3  020D 14100          BITW    #READY,STATUS(R4)               ; get CSR address
         15             13  0212 14200          BEQL    Q_AST                           ; printer ready?
64    8000 8F           B3  0214 14300          BITW    #ERR_BIT,STATUS(R4)             ; error if not
         0E             12  0219 14400          BNEQ    Q_AST                           ; printer error?
   53    04 A2          D0  021B 14500          MOVL    4(R2),R3                        ; yes if NEQ
   54    63             9A  021F 14600          MOVZBL  (R3),R4                         ; get buffer address
   53    54             C0  0222 14700          ADDL2   R4,R3                           ; get index to char.
D5 AF    63             90  0225 14800          MOVB    (R3),CURRENT                    ; point to char.
50    0000 8F           3C  0229 14900 Q_AST:   MOVZWL  #SS$_NORMAL,R0                  ; specify current data
                        05  022E 15000 NO_AST:  RSB                                     ; request AST delivery
                            022F 15200 ;
                            022F 15300 ;       The LP_CANCEL routine is called (in kernel mode, in system
                            022F 15400 ;       context) when the process is being disconnected from the
                            022F 15500 ;       interrupt.  This routine will disable printer interrupts.  The
                            022F 15600 ;       inputs to the routine are as follows:
                            022F 15800 ;               R2 - negated value of channel index number
                            022F 15900 ;               R3 - IRP address
                            022F 16000 ;               R4 - PCB address for process cancelling I/O
                            022F 16100 ;               R5 - UCB address
                            022F 16400 LP_CANCEL:
  50    24 A5               D0  022F 16500          MOVL    UCB$L_CRB(R5),R0                ; cancel I/O routine
  50    2C B0               D0  0233 16600          MOVL    @CRB$L_INTD+VEC$L_IDB(R0),R0    ; get CRB
60    0040 8F               AA  0237 16700          BICW    #INT_ENABLE,STATUS(R0)          ; get CSR address
                            05  023C 16800          RSB                                     ; disable interrupts
                            023D 17000 SHARED_BUFFER_END:
                            023D 17102          .SBTTL  Main Program
```

Main Program

```
                     023D 17200 ;
                     023D 17300 ;       The start of the main routine that will actually control the
                     023D 17400 ;       printer, after mapping to the I/O page and connecting to a
                     023D 17500 ;       printer interrupt.
                     023D 17600 ;
                     023D 17700
                00000000 17800          .PSECT  CODE,EXE,NOWRT,PAGE
                     0000 17900
               0000  0000 18000 START:  .WORD   0                               ; null entry mask
                     0002 18100 ;
                     0002 18200 ;       Assign channels to terminal and printer
                     0002 18300 ;
                     0002 18400         $ASSIGN_S DEVNAM=TT_NAME,CHAN=TT_CHAN
 03 50    E8  0017 18500                BLBS    R0,10$
  014C    31  001A 18600                BRW     ERROR
                     001D 18700 10$:    $ASSIGN_S DEVNAM=DEVICE_NAME,CHAN=DEVICE_CHAN
 03 50    E8  0032 18800                BLBS    R0,20$
  0131    31  0035 18900                BRW     ERROR
                     0038 19000 ;
                     0038 19100 ;       Map Unibus I/O page into process P0 space so device registers
                     0038 19200 ;       are accessible.  Flags indicate that section is to be mapped
                     0038 19300 ;       at end of P0 region (which will be expanded to accomodate the
                     0038 19400 ;       new addresses since the SEC$M_EXPREG bit is set); the P0 region
                     0038 19500 ;       is identified because the INADR argument contains addresses in
                     0038 19600 ;       the P0 range.  The SEC$M_PFNMAP bit indicates that the mapping
                     0038 19700 ;       should be done by a pfn in the VBN argument (rather than by the
                     0038 19800 ;       default virtual block number mapping scheme).  The region
                     0038 19900 ;       mapped can be written to by the program since the SEC$M_WRT
                     0038 20000 ;       bit is also set (i.e., device registers can be written to by
                     0038 20100 ;       the program).
                     0038 20200 ;       Note that only one page (PAGCNT parameter) is mapped.  If the
                     0038 20300 ;       device registers 'straddle' a page boundary, then more than
                     0038 20400 ;       one page should be mapped.
                     0038 20500 ;
                     0038 20600 20$:    $CRMPSC_S       INADR = MAP_ADR ,-          ; map into P0 region
                     0038 20700                      RETADR= MAP_ADR ,-          ; return actual addr.
                     0038 20800                      FLAGS = #SEC$M_WRT!SEC$M_PFNMAP!SEC$M_EXPREG,-
                     0038 20900                      PAGCNT= #PAGE_COUNT ,-      ; only need 1 page
                     0038 21000                      VBN   = #PFN                ; pfn for mapped page
 03 50    E8  0066 21100                BLBS    R0,30$
  00FD    31  0069 21200                BRW     ERROR
                     006C 21300 ;
                     006C 21400 ;       Issue connect to interrupt $QIO
                     006C 21500 ;
                     006C 21600 30$:    $QIO_S  CHAN = DEVICE_CHAN ,-               ; specify printer chan
                     006C 21700                 FUNC = #IO$_CONINTWRITE ,-       ; allow write buffer
                     006C 21900                 P1 = SHARED_BUFFER_DESC ,-       ; shared buffer desc.
                     006C 22000                 P2 = #ROUTINE_OFFSET_LIST ,-     ; routines provided
                     006C 22100         P3=#<<3@16>!CIN$M_EFN!CIN$M_ISR!CIN$M_CANCEL!CIN$M_REPEAT>,-
                     006C 22200                 P4 = #LP_AST ,-                  ; AST after interrupt
                     006C 22300                 P5 = #0 ,-                       ; no AST parameter used
                     006C 22400                 P6 = #1                          ; AST count of 1
 03 50    E8  009F 22500                BLBS    R0,40$
  00C4    31  00A2 22600                BRW     ERROR
                     00A5 22700 ;
                     00A5 22800 ;       Ask user for data to be printed
                     00A5 22900 ;
```

```
                                00A5 23000 40$:     $QIOW_S CHAN=TT_CHAN,FUNC=#IO$_READPROMPT,IOSB=IOSB,-
                                00A5 23100                  P1=TTDATA,P2=#MAX_TT_BYTES,P5=#PROMPT_STRING,-
                                00A5 23200                  P6=#PROMPT_LENGTH
                      03 50   E8 00D6 23300          BLBS     R0,50$
                       008D   31 00D9 23400          BRW      ERROR
                                00DC 23500 ;
                                00DC 23600 ;        Print data user entered, or exit if no data to print
                                00DC 23700 ;
                0000001E'EF   B5 00DC 23800 50$:    TSTW     IOSB+2                              ; check byte count
                         5A   13 00E2 23900          BEQL     DONE                                ; exit if zero
             55  0000001E'EF   3C 00E4 24000          MOVZWL   IOSB+2,R5                           ; save byte count
             52  00000001'EF   DE 00EB 24100          MOVAL    TTDATA,R2                           ; point to data
                    52   55    C0 00F2 24110          ADDL2    R5,R2                               ; point to end of data
                 62  0A0D 8F   B0 00F5 24120          MOVW     #<CR>+<LF@8>,(R2)                   ; insert <CR> <LF>
                    52   55    C2 00FA 24130          SUBL2    R5,R2                               ; restore pointer
                    55   02    C0 00FD 24140          ADDL2    #2,R5                               ; account for <CR> <LF>
54  0000014C 8F   00000024'EF   C1 0100 24200          ADDL3    MAP_ADR,#CSR_PAGE_OFFSET,R4         ; point to CSR
                    53   02 A4  3E 010C 24300          MOVAW    DATA(R4),R3                         ; point to data reg.
                 00000000'EF   94 0110 24400          CLRB     SHARED_BUFFER_START                 ; initialize index
                 64   0040 8F   A8 0116 24500          BISW     #INT_ENABLE,STATUS(R4)              ; set int. enable bit
                 00000000'EF   96 011B 24600 60$:     INCB     SHARED_BUFFER_START                 ; adjust byte index
          00 000001FF'EF   01   E3 0121 24610          BBCS     #EXPECTED,FLAGS,70$                 ; indicate int. expected
                    63   82    90 0129 24700 70$:     MOVB     (R2)+,(R3)                          ; print a character
                                012C 24800          $HIBER_S                                     ; wait for AST to wake
                   E5 55   F5   0133 24900          SOBGTR   R5,60$                              ; loop if more to print
                 64   0040 8F   AA 0136 25000          BICW     #INT_ENABLE,STATUS(R4)              ; disable printer int.
                    FF67   31   013B 25100          BRW      40$                                 ; get more user data
                                013E 25200
                                013E 25300 ;
                                013E 25400 ;        User doesn't want any more data printed
                                013E 25500 ;
                                013E 25600 DONE:    $DASSGN_S CHAN=TT_CHAN                       ; clean up channels
                      1A 50   E9 014C 25700          BLBC     R0,ERROR
                                014F 25800          $DASSGN_S CHAN=DEVICE_CHAN
                      09 50   E9 015D 25900          BLBC     R0,ERROR
                                0160 26000          $EXIT_S
                                0169 26100
                                0169 26200 ;
                                0169 26300 ;        Error occurred -- report it to user
                                0169 26400 ;
                                0169 26500 ERROR:   $EXIT_S CODE=R0
                                0172 26600
                                0172 27702          .SBTTL  AST Routine For Each Printer Interrupt
```

```
                                        0172 27800 ;
                                        0172 27900 ;       This AST routine is entered whenever the device generates
                                        0172 28000 ;       an interrupt, and the process-supplied AST routine places
                                        0172 28100 ;       a success code in R0 before issuing the RSB.
                                        0172 28300 ;       The routine displays for the user the character
                                        0172 28400 ;       printed, and awakens the main procedure to print
                                        0172 28500 ;       the next character (unless there was an error in the
                                        0172 28600 ;       printing of the character, indicated by CURRENT
                                        0172 28700 ;       containing a 0, in which case an error message is displayed
                                        0172 28800 ;       to the user, and the image exits).
                                        0172 28900 ;
                                0000    0172 29000 LP_AST: .WORD   0                                ; null entry mask
            000001FE'EF    0D     91    0174 29140         CMPB    #CR,CURRENT                      ; was character a <CR>?
                           41     13    0177 29180         BEQL    10$                              ; if so, no message
            000001FE'EF    0A     91    017D 29220         CMPB    #LF,CURRENT                      ; was character a <LF>?
                           38     13    0184 29260         BEQL    10$                              ; if so, no message
                 000001FE'EF     95    0186 29300         TSTB    CURRENT                          ; 0 ==> printer error
                           3C     13    018C 29400         BEQL    ERR                              ; report error
0000006C'EF     000001FE'EF     90    018E 29410         MOVB    CURRENT,CHARACTER                ; save char. printed
                                      0199 29500         $QIOW_S CHAN=TT_CHAN,FUNC=#IO$_WRITEVBLK,- ; tell user that
                                      0199 29600                 P1=AST_STRING,P2=#AST_LENGTH,-   ; character has been
                                      0199 29700                 P4=#LF_BUFFER_CR                 ; printed
                                      01BE 29800 10$:    $WAKE_S                                  ; print next character
                                04    01C9 29900         RET
                                      01CA 30000 ERR:    $QIOW_S CHAN=TT_CHAN,FUNC=#IO$_WRITEVBLK,- ; tell user that
                                      01CA 30100                 P1=ERROR_STRING,P2=#ERR_LENGTH,-; error occurred in
                                      01CA 30200                 P4=#LF_BUFFER_CR                 ; printing
                                      01EF 30300         $EXIT_S CODE=#SS$_DRVERR                  ; and stop
                                      01FC 30400
                                      01FC 30500         .END    START
```

```
$$T1                    = 00000001
AST_LENGTH              = 0000001D
AST_STRING                00000050 R      01
CHARACTER                 0000006C R      01
CIN$M_CANCEL            = 00000080
CIN$M_EFN               = 00000001
CIN$M_ISR               = 00000040
CIN$M_REPEAT            = 00000004
CR                      = 0000000D
CRB$L_INTD              = 00000024
CSR                     = 0003FF4C
CSR_PAGE_OFFSET         = 0000014C
CURRENT                   000001FE R      03
DATA                    = 00000002
DEVICE_CHAN               0000001A R      01
DEVICE_NAME               00000000 R      01
DONE                      0000013E R      04
ERR                       000001CA R      04
ERROR                     00000169 R      04
ERROR_STRING              0000006D R      01
ERR_BIT                 = 00008000
ERR_LENGTH              = 00000033
EXPECTED                = 00000001
FLAGS                     000001FF R      03
IDB$L_CSR               = 00000000
INT_ENABLE              = 00000040
IO$_CONINTWRITE         = 0000003D
IO$_READPROMPT          = 00000037
IO$_WRITEVBLK           = 00000030
IO780$AL_UBOSP          = 20100000
IOSB                      0000001C R      01
LF                      = 0000000A
LF_BUFFER_CR            = 00000020
LP_AST                    00000172 R      04
LP_CANCEL                 0000022F R      03
LP_INTERRUPT              00000200 R      03
MAP_ADR                   00000024 R      01
MAX_TT_BYTES            = 000001FB
NO_AST                    0000022E R      03
PAGE_COUNT              = 00000001
PFN                     = 001009FF
PROMPT_LENGTH           = 00000024
PROMPT_STRING             0000002C R      01
Q_AST                     00000229 R      03
READY                   = 00000080
ROUTINE_OFFSET_LIST       000000A0 R      01
SEC$M_EXPREG              ********    X   04
SEC$M_PFNMAP              ********    X   04
SEC$M_WRT                 ********    X   04
SHARED_BUFFER_DESC        000000B0 R      01
SHARED_BUFFER_END         0000023D R      03
SHARED_BUFFER_START       00000000 R      03
SS$_DRVERR                ********    X   04
SS$_NORMAL                ********    X   03
START                     00000000 R      04
STATUS                  = 00000000
SYS$ASSIGN                ********  GX    04
SYS$CRMPSC                ********  GX    04
SYS$DASSGN                ********  GX    04
SYS$EXIT                  ********  GX    04
SYS$HIBER                 ********  GX    04
SYS$QIO                   ********  GX    04
SYS$QIOW                  ********  GX    04
SYS$WAKE                  ********  GX    04
TTDATA                    00000001 R      03
TT_CHAN                   00000018 R      01
TT_NAME                   0000000E R      01
UCB$L_CRB               = 00000024
VEC$L_IDB               = 00000008
```

Psect synopsis

PSECT name	Allocation	PSECT No.	Attributes
. ABS .	00000000 (0.)	00 (0.)	NOPIC USR CON ABS LCL NOSHR NOEXE NORD NOWRT NOVEC BYTE
. BLANK .	000000B8 (184.)	01 (1.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC BYTE
ABS	00000000 (0.)	02 (2.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE
SHAREDBUF	0000023D (573.)	03 (3.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC PAGE
CODE	000001FC (508.)	04 (4.)	NOPIC USR CON REL LCL NOSHR EXE RD NOWRT NOVEC PAGE

Performance indicators

Phase	Page faults	CPU Time	Elapsed Time
Initialization	104	00:00:00.31	00:00:01.24
Command processing	128	00:00:00.50	00:00:02.19
Pass 1	828	00:00:11.02	00:00:14.03
Symbol table sort	14	00:00:01.32	00:00:01.33
Pass 2	207	00:00:01.73	00:00:01.92
Symbol table output	10	00:00:00.08	00:00:00.15
Psect synopsis output	5	00:00:00.03	00:00:00.03
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	1299	00:00:14.99	00:00:20.89

The working set limit was 500 pages.
48128 bytes (94 pages) of virtual memory were used to buffer the intermediate code.
There were 50 pages of symbol table space allocated to hold 852 non-local and 8 local symbols.
307 source lines were read in Pass 1, producing 17 object records in Pass 2.
26 pages of virtual memory were used to define 25 macros.

Macro library statistics

Macro library name	Macros defined
SYS$SYSROOT:[SYSLIB]LIB.MLB;1	6
SYS$SYSROOT:[SYSLIB]STARLET.MLB;1	16
TOTALS (all libraries)	22

996 GETS were required to define 22 macros.

There were no errors, warnings or information messages.

MACRO/LIS PRINTER+SYS$LIBRARY:LIB/LIB

PRINTER.COM

```
100    $!
200    $!
300    $MACRO/LIS PRINTER+SYS$LIBRARY:LIB/LIB
400    $LINK PRINTER,SYS$SYSTEM:SYS.STB/SEL
```

CINLOAD.COM

```
  100   $!
  200   $!
  300   $MCR SYSGEN
  400   CONNECT LPA0/ADAPTER=3-
  500   /VECTOR=%O200-
  600   /CSR=%O777514-
  700   /DRIVER=CONINTERR
  800   SHO /DEV=CON
  900   USE CURRENT
 1000   SHOW REALTIME_SPTS
 1100   EXIT
```

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