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```

1          .TITLE  TSLOCK  Shared file access control
2          .ENABL  LC
3          .DSABL  GBL
4          ;
5          ; Copyright (c) 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985.
6          ;
7          ; S&H Computer Systems, Inc.
8          ; Nashville, Tennessee
9          ;
10         ; Written by Phil Sherrod.
11         ;
12         ; The routines in this module perform management
13         ; functions such as record (block) locking for shared files.
14         ;
15 000000         .CSECT  TSLOCK
16         ;
17         ; Macro calls
18         ;
19         .MCALL  .ADDR
20         ;
21         ; Global definitions
22         ;
23         .GLOBL  DCCSIZ, TSLOCK
24         ;
25         ; Global references
26         ;
27         .GLOBL  LSTATE, LPRI, ENQTL
28         .GLOBL  FC$CHN, FC$FDB, FC$FLK
29         .GLOBL  FC$CLK, FC$LBN, FL$ACT, FC$UN, FC$ACC, FL$SPN
30         .GLOBL  DCTRD, DCCRD, FL$NDC, IOWAIT, DC$BLK, DCTWR
31         .GLOBL  DCCWR, DCTOTU, VALADW, DCAGE, NUMCDB
32         .GLOBL  FF$FID, FF$CDB, FF$FWD, FF$FLK
33         .GLOBL  FW$DBN, FW$UN, FW$WLK, VMXSF, VMXSFC, NLINES
34         .GLOBL  VMLBLK, EMTBLK, CORUSR, CHNADR, VNUMDC, DC$$SZ
35         .GLOBL  JCDB, CHNNUM, NUMDCD, LOKCSH
36         .GLOBL  FC$LBN, FF$$SZ, FW$$SZ, DC$NXT, DC$PAR
37         .GLOBL  LDBASE, LOKMEM, VPAR5, DC$FDB, DC$USE, DC$LNK
38         .GLOBL  CHKABT, QHIPRI, QNSPND, S$SFWT
39         .GLOBL  FL$EFL, FT$EFL, FF$NLB, FF$FLG, FC$FLG
40         .GLOBL  FF$DCD
41         .GLOBL  LDDEVX, LDPDEV
42         .GLOBL  C. CSW, C. SBLK, C. DEVQ
43         .GLOBL  CS$OPN, SETERR, EMTXIT, KPAR5, FC$$SS, FC$NLB, CS$NMX
44         ;
45         ; Macro to map kernel par 5 to a specified region
46         ;
47         .MACRO  MAPTO  BASE
48         MOV    BASE, @#KPAR5
49         .ENDM  MAPTO
50         ;
51         ;-----
52         ; Module header.  Must be first data in segment.
53         ;
54 000000 046543  TSLOCK: .RAD50  /LOK/          ;System overlay region ID name
55         ;
56         ; Table of offsets to entry points in this module
57         ;

```

58	000002	000112	. WORD	LOKINI-TSLOCK
59	000004	000552	. WORD	DOOPAP-TSLOCK
60	000006	000560	. WORD	DOCOPN-TSLOCK
61	000010	001136	. WORD	SFSVST-TSLOCK
62	000012	001200	. WORD	SFRSST-TSLOCK
63	000014	001414	. WORD	DORLK-TSLOCK
64	000016	001470	. WORD	DOTLK-TSLOCK
65	000020	001574	. WORD	DOCULK-TSLOCK
66	000022	001622	. WORD	DOULK1-TSLOCK
67	000024	001726	. WORD	DOSFCK-TSLOCK
68	000026	002246	. WORD	SFCLS-TSLOCK
69	000030	004630	. WORD	SFWRIT-TSLOCK
70	000032	003706	. WORD	CLSCDB-TSLOCK
71	000034	005000	. WORD	DCRD1-TSLOCK
72	000036	005162	. WORD	DCRD2-TSLOCK

```
1 ;-----  
2 ; Define symbols for returned error codes  
3 ;  
4 000000 EC0 = 0.  
5 000001 EC1 = 1.  
6 000002 EC2 = 2.  
7 000003 EC3 = 3.  
8 000004 EC4 = 4.
```

```

1      ;
2      ; Shared file open access protection table.
3      ;
4      ; Access-protection enable flags:
5      ;
6      000001 AC$SU = 1 ; Shared update
7      000002 AC$SI = 2 ; Shared input
8      000004 AC$PU = 4 ; Protected update
9      000010 AC$PI = 10 ; Protected input
10     000020 AC$EU = 20 ; Exclusive update
11     000040 AC$EI = 40 ; Exclusive input
12     ;
13     ; Format of access code passed from user to us:
14     ;
15     ; Bit 0 : 0==> input, 1==> update.
16     ; Bits 1-2: 0==> Exclusive,
17     ;           1==> Protected,
18     ;           2==> Shared.
19     ; Bit 8 : 1==> Suppress data caching.
20     ;
21     ; Table to convert user access code into AC$ access bits.
22     ;
23     000040 040 ACCBIT: .BYTE AC$EI ; Exclusive input
24     000041 020 .BYTE AC$EU ; Exclusive update
25     000042 010 .BYTE AC$PI ; Protected input
26     000043 004 .BYTE AC$PU ; Protected update
27     000044 002 .BYTE AC$SI ; Shared input
28     000045 001 .BYTE AC$SU ; Shared update
29     ;
30     ; Table of access exclusion masks.
31     ; (Bit set implies that access type is denied)
32     ;
33     000046 377 ACCMSK: .BYTE ^C<0> ; Exclusive input
34     000047 377 .BYTE ^C<0> ; Exclusive update
35     000050 365 .BYTE ^C<AC$PI+AC$SI> ; Protected input
36     000051 375 .BYTE ^C<AC$SI> ; Protected update
37     000052 360 .BYTE ^C<AC$PI+AC$PU+AC$SI+AC$SU> ; Shared update
38     000053 374 .BYTE ^C<AC$SI+AC$SU> ; Shared update
39     .EVEN
40     ;
41     ; Data structure list heads
42     ;
43     000054 000000 000000 FFFREE: .WORD 0,0 ; Head of free FDB list
44     000060 000000 000000 FFHEAD: .WORD 0,0 ; Head of active FDB list
45     000064 000000 000000 FCFREE: .WORD 0,0 ; Head of free CDB list
46     000070 000000 000000 FWFREE: .WORD 0,0 ; Head of free wait element list
47     000074 000000 000000 DCDBAS: .WORD 0,0 ; Head of list of data cache descriptors
48     000100 000000 CBLOCK: .WORD 0 ; Block being read or written
49     000102 000000 CBUF: .WORD 0 ; Address of user's buffer
50     000104 000000 CWORDS: .WORD 0 ; Number of words being read or written
51     ;
52     ; 2-word file ID for file to which record locking operation is being directed
53     ;
54     000106 000000 CURFID: .WORD 0 ; Device index in low byte, unit # high byte
55     000110 000000 .WORD 0 ; Starting block number of file on phys device

```

```

1          .SBTTL  LOKINI -- Initialization for record locking system
2          ;-----
3          ; LOKINI is called during system initialization to initialize the
4          ; record locking data base.
5          ;
6 000112 010146 LOKINI: MOV     R1,-(SP)
7 000114 010246          MOV     R2,-(SP)
8 000116 010346          MOV     R3,-(SP)
9 000120 010446          MOV     R4,-(SP)
10 000122 010546         MOV     R5,-(SP)
11 000124 013746 000000G  MOV     @#KPAR5,-(SP)
12          ;
13          ; Initialize pointer to data area
14          ;
15 000130 012704 000000G  MOV     #VPAR5,R4      ;Get virtual addr to use to access data
16 000134 013705 000000G  MOV     @#LOKMEM,R5    ;Get physical 64-byte blk # of data area
17          ;
18          ; Allocate space for wait queue elements
19          ;
20 000140 012701 000000G  MOV     #FW##SZ,R1     ;Get size of a wait queue element
21 000144 010467 177720   MOV     R4,FWFREE      ;Init head of free list
22 000150 010567 177716   MOV     R5,FWFREE+2
23 000154 012700 177777G  MOV     #NLINES-1,R0   ;Get # elements to allocate - 1
24 000160 001407          BEQ     2$             ;Br if only one element to allocate
25 000162 004767 000272   1$:  CALL  ALLOCL      ;Allocate space for an element
26 000166 010462 000000G  MOV     R4,FW$WLK(R2)  ;Make previous one point to new one
27 000172 010562 000002G  MOV     R5,FW$WLK+2(R2)
28 000176 077007          SOB     R0,1$         ;Loop if more to allocate
29 000200 004767 000272   2$:  CALL  ALLOC       ;Allocate last one
30          ;
31          ; Allocate FDB tables
32          ;
33 000204 010467 177644   MOV     R4,FFFREE     ;Set pointer to 1st free FDB
34 000210 010567 177642   MOV     R5,FFFREE+2
35 000214 012701 000000G  MOV     #FF##SZ,R1     ;Get size of each entry
36 000220 013700 000000G  MOV     @#VMXSF,R0     ;Get # to allocate
37 000224 005300          DEC     R0             ;Minus one
38 000226 003407          BLE     3$             ;Br if only one wanted
39 000230 004767 000224   4$:  CALL  ALLOCL      ;Allocate space
40 000234 010462 000000G  MOV     R4,FF$FLK(R2)  ;Make previous point to new one
41 000240 010562 000002G  MOV     R5,FF$FLK+2(R2)
42 000244 077007          SOB     R0,4$         ;Loop if more to allocate
43 000246 004767 000224   3$:  CALL  ALLOC       ;Allocate space for last one
44          ;
45          ; Allocate CDB tables
46          ;
47 000252 010467 177606   MOV     R4,FCFREE     ;Set pointer to 1st free one
48 000256 010567 177604   MOV     R5,FCFREE+2
49 000262 013701 000000G  MOV     @#VMLBLK,R1    ;Get max # blocks each chan can lock
50 000266 006301          ASL     R1             ;Reserve two bytes per locked block
51 000270 062701 000000G  ADD     #FC$LBN,R1     ;Add space needed by rest of entry
52 000274 013700 000000G  MOV     @#VMXSFC,R0    ;Get # to allocate
53 000300 005300          DEC     R0             ;Minus one
54 000302 003407          BLE     5$             ;Br if only one wanted
55 000304 004767 000150   6$:  CALL  ALLOCL      ;Allocate space
56 000310 010462 000000G  MOV     R4,FC$CLK(R2)  ;Make previous entry point to new one
57 000314 010562 000002G  MOV     R5,FC$CLK+2(R2)

```

```

58 000320 077007          SOB      R0,6$      ;Loop if more to allocate
59 000322 004767 000150  5$:      CALL     ALLOC      ;Allocate space for last one
60                               ;
61                               ; Allocate data cache descriptors
62                               ;
63 000326 013700 000000G   MOV      @#VNUMDC,R0    ;Get # DCD's wanted
64 000332 001442          BEQ      20$      ;Br if shared file data caching not wanted
65 000334 010467 177534   MOV      R4,DCDBAS     ;Set pointer to 1st DCD
66 000340 010567 177532   MOV      R5,DCDBAS+2
67 000344 012701 000000G   MOV      #DC$SZ,R1     ;Get size of data cache descriptor block
68 000350 005300          DEC      R0            ;Get 1 less DCD
69 000352 003407          BLE      B$      ;Br if only 1 wanted
70 000354 004767 000100  7$:      CALL     ALLOCL     ;Allocate space for a DCD
71 000360 010462 000000G   MOV      R4,DC$NXT(R2) ;Make previous entry point to new one
72 000364 010562 000002G   MOV      R5,DC$NXT+2(R2)
73 000370 077007          SOB      R0,7$
74 000372 004767 000100  8$:      CALL     ALLOC      ;Allocate last one
75                               ;
76                               ; Set up pointers to data cache buffers
77                               ;
78 000376 016704 177472   MOV      DCDBAS,R4     ;Get pointer to 1st DCD
79 000402 016705 177470   MOV      DCDBAS+2,R5
80 000406 013701 000000G   MOV      @#LOKCSH,R1   ;Get par value for start of area
81 000412          9$:      MAPTO    R5            ;Map to next DCD
82 000416 010164 000000G   MOV      R1,DC$PAR(R4) ;Set pointer to cache buffer
83 000422 062701 000010   ADD      #512./64.,R1  ;Point to next 512-byte buffer
84 000426 016405 000002G   MOV      DC$NXT+2(R4),R5 ;Get pointer to next DCD
85 000432 016404 000000G   MOV      DC$NXT(R4),R4
86 000436 001365          BNE      9$      ;Br if more to allocate
87                               ;
88                               ; Finished
89                               ;
90 000440 012637 000000G  20$:   MOV      (SP)+,@#KPAR5
91 000444 012605          MOV      (SP)+,R5
92 000446 012604          MOV      (SP)+,R4
93 000450 012603          MOV      (SP)+,R3
94 000452 012602          MOV      (SP)+,R2
95 000454 012601          MOV      (SP)+,R1
96 000456 000207          RETURN

```

```
1 ;-----  
2 ; Save the pointer to a current list element, allocate and new element,  
3 ; and set mapping to point to the previous element.  
4 ;  
5 ; Inputs:  
6 ; R1 = Size of element to allocate  
7 ; R4,R5 = Pointer to current element  
8 ;  
9 ; Outputs:  
10 ; R4,R5 = Pointer to new element  
11 ; R2,R3 = Pointer to previous element  
12 ; Mapping is set up to access previous element  
13 ; All registers are preserved.  
14 ;  
15 000460 ALLOCL:  
16 ;  
17 ; Save pointer to current element  
18 ;  
19 000460 010402 MOV R4,R2 ; Save pointer to current element  
20 000462 010503 MOV R5,R3  
21 ;  
22 ; Allocate a new element  
23 ;  
24 000464 004767 000006 CALL ALLOC ; Allocate a new element  
25 ;  
26 ; Set mapping to previous element  
27 ;  
28 000470 MAPTD R3 ; Map to previous element  
29 ;  
30 ; Finished  
31 ;  
32 000474 000207 RETURN
```

```

1 ;-----
2 ; Allocate space for a list element.
3 ; Adjust both the virtual and physical address pointers to keep the
4 ; virtual address within the par 5 region.
5 ;
6 ; Inputs:
7 ; R1 = Size of element to allocate (bytes)
8 ; R4 = Virtual address where we are to start allocation
9 ; R5 = Physical address where we are to start allocation
10 ;
11 ; Outputs:
12 ; R4 = New virtual address
13 ; R5 = New physical address
14 ; All registers are preserved.
15 ;
16 000476 010246 ALLOC: MOV R2,-(SP)
17 ;
18 ; Zero the space we are allocating
19 ;
20 000500 010102 MOV R1,R2 ;Get # bytes to allocate
21 000502 006202 ASR R2 ;Get # words to allocate
22 000504 MAPTO R5 ;Map to area we are allocating
23 000510 005024 1$: CLR (R4)+ ;Zero the area
24 000512 077202 SOB R2,1$
25 ;
26 ; If we are getting too near the end of the par 5 region, reset phys addr
27 ;
28 000514 020427 0176440 CMP R4,#VPAR5+8100. ;Are we getting near end of par 5 region?
29 000520 101412 BLOS 9$ ;Br if not
30 ;
31 ; We must advance physical address and reset virtual address
32 ;
33 000522 162704 0000000 SUB #VPAR5,R4 ;Remove par 5 virtual address bias
34 000526 010402 MOV R4,R2 ;Get virtual address within 8Kb region
35 000530 072227 177772 ASH #-6,R2 ;Get # blocks allocated within region
36 000534 060205 ADD R2,R5 ;Advance physical base address
37 000536 042704 177700 BIC #^C<77>,R4 ;Leave only byte-within-block virtual addr
38 000542 062704 0000000 ADD #VPAR5,R4 ;Rebias virtual address
39 ;
40 ; Finished
41 ;
42 000546 012602 9$: MOV (SP)+,R2
43 000550 000207 RETURN

```

```
1          .SBTTL DOOPAP -- EMT to open shared file with access protection
2          ;-----
3          ; The DOOPAP entry point is the newer form of the shared file open EMT
4          ; which functions like the simple shared file open except it also
5          ; supports an access protection code stored in the 2nd word of the
6          ; EMT argument block. See comments at the front of this module for
7          ; a description of the format of the access codes.
8          ;
9          ; Format of the EMT argument block:
10         ;
11         ;     .BYTE   chan,125
12         ;     .WORD   access_code
13         ;
14 000552 013701 0000020 DOOPAP: MOV    @#EMTBLK+2,R1    ;Get access code
15 000556 000402          BR      OPNCOM      ;Enter common open code
```

```

1          .SBTTL  DDCOPN -- EMT to open channel to shared file
2          ;-----
3          ; This (obsolete) form of the shared file open EMT does not provide for
4          ; an access code so shared update access is assumed.
5          ;
6 000560  012701  000005  DDCOPN: MOV      #5,R1          ;Get shared update access code
7          ;
8          ; Enter common open code.  R1 = Open access code.
9          ; See if this channel is already opened to a shared file.
10         ;
11 000564  004767  003564  OPNCDB: CALL     FNDCDB         ;Is channel opened to a shared file?
12 000570  103402                BCS      1$          ;Br if not
13         ;
14         ; This channel is already opened to a shared file.
15         ; Close channel before reopening.
16         ;
17 000572  004767  003110                CALL     CLSCDB         ;Close shared file channel
18         ;
19         ; Make sure a .LOOKUP or .ENTER has been done to a file.
20         ;
21 000576  013700  000000G  1$:      MOV      @#CHNADR,R0    ;Point to channel descriptor block
22 000602  032760  000000G  000000G  BIT      #CS$OPN,C.CSW(R0);Has this channel been opened?
23 000610  001004                BNE      2$          ;Br if yes
24         ;
25         ; Error -- Channel is not open to a file.
26         ;
27 000612  012700  000001                MOV      #EC1,R0      ;Return error code 1
28 000616  000137  000000G                JMP      @#SETERR
29         ;
30         ; Channel is open to a file.
31         ; Try to get a free Channel Descriptor Block (CDB).
32         ;
33 000622  016704  177236  2$:      MOV      FCFREE,R4      ;Point to free CDB
34 000626  001004                BNE      3$          ;Br if there is a free CDB
35 000630  012700  000002                MOV      #EC2,R0      ;Error 2 if no free CDB's
36 000634  000137  000000G                JMP      @#SETERR
37 000640  016705  177222  3$:      MOV      FCFREE+2,R5    ;Get PAR pointer
38 000644  005337  000000G                DEC      @#NUMCDB     ;One fewer free CDB's
39 000650                MAPTD   R5          ;Map to the CDB
40 000654  016467  000000G  177202  MOV      FC$CLK(R4),FCFREE ;Set new free list pointer
41 000662  016467  000002G  177176  MOV      FC$CLK+2(R4),FCFREE+2 ;New free-list PAR pointer
42         ;
43         ; We have a free CDB (virtual address in R4, PAR pointer in R5).
44         ; Add this CDB to the list of CDB's for this job and init the CDB.
45         ;
46 000670  004767  001076                CALL     INICDB       ;Initialize the CDB
47         ;
48         ; Search for FDB for file being opened
49         ;
50 000674  004767  003546                CALL     FNDFDB       ;Try to locate FDB for file
51 000700  103051                BCC      4$          ;Br if found the FDB
52         ;
53         ; File is not currently opened (as a shared file).
54         ; Try to find a free FDB.
55         ;
56 000702  016702  177146                MOV      FFFREE,R2    ;Is there a free FDB?
57 000706  001006                BNE      5$          ;Br if yes

```

```

58 ;
59 ; There are no free FDB's
60 ;
61 000710 004767 002772 CALL CLSCDB ;Release the CDB we got for the channel
62 000714 012700 000003 MOV #EC3,R0 ;Return error 3
63 000720 000137 000000G JMP @SETERR
64 ;
65 ; There is a free FDB.
66 ; Initially zero the FDB.
67 ;
68 000724 016703 177126 5$: MOV FFFREE+2,R3 ;Get PAR pointer to FDB
69 000730 MAPTO R3 ;Map to the new FDB
70 000734 016267 000000G 177112 MOV FF$FLK(R2),FFFREE ;Remove FDB from free list
71 000742 016267 000002G 177106 MOV FF$FLK+2(R2),FFFREE+2
72 000750 010201 MOV R2,R1 ;Get virtual address of FDB
73 000752 012700 000000C MOV #FF$$SZ/2,R0 ;Get # words to zero
74 000756 005021 7$: CLR (R1)+ ;Zero the entire FDB
75 000760 077002 SOB R0,7$
76 ;
77 ; Add the new FDB to the linked list of active FDB's
78 ;
79 000762 016762 177072 000000G MOV FFHEAD,FF$FLK(R2);Add FDB to active list
80 000770 016762 177066 000002G MOV FFHEAD+2,FF$FLK+2(R2)
81 000776 010267 177056 MOV R2,FFHEAD ;Put new FDB at head of active list
82 001002 010367 177054 MOV R3,FFHEAD+2
83 ;
84 ; Initialize the FDB
85 ;
86 001006 016762 177074 000000G MOV CURFID,FF$FID(R2);Set dev # in low byte, unit # in high byte
87 001014 016762 177070 000002G MOV CURFID+2,FF$FID+2(R2);Set starting block number for file
88 001022 000417 BR B$
89 ;
90 ; An FDB already exists for this file.
91 ; See if access protection set by other users allows us to
92 ; access the file.
93 ;
94 001024 004767 001102 4$: CALL CHKACC ;See if we can access this file
95 001030 103406 BCS 10$ ;Br if access is not allowed
96 001032 005737 000000G TST @NUMDCD ;Are we doing data caching?
97 001036 001411 BEQ B$ ;Br if not
98 001040 004767 004662 CALL CLSDCD ;Flush all data cache entries for file
99 001044 000406 BR B$
100 ;
101 ; Error: Access protection disallows our access to this file.
102 ;
103 001046 004767 002634 10$: CALL CLSCDB ;Release the CDB we got
104 001052 012700 000004 MOV #EC4,R0 ;Return error code 4
105 001056 000137 000000G JMP @SETERR
106 ;
107 ; Access to the file is allowed.
108 ; Make linkage connections between CDB and FDB.
109 ;
110 001062 8$: MAPTO R3 ;Map to FDB
111 001066 016200 000000G MOV FF$CDB(R2),R0 ;Get pointer to current CDB at head of list
112 001072 016201 000002G MOV FF$CDB+2(R2),R1
113 001076 010462 000000G MOV R4,FF$CDB(R2) ;Set new CDB as head of list for file
114 001102 010562 000002G MOV R5,FF$CDB+2(R2)

```

```
115 001106          MAPTD  R5          ;Map to our CDB
116 001112  010064  0000000  MOV    R0,FC$FLK(R4) ;Make new CDB point to old CDB list head
117 001116  010164  0000020  MOV    R1,FC$FLK+2(R4)
118 001122  010264  0000000  MOV    R2,FC$FDB(R4) ;Make CDB point to FDB
119 001126  010364  0000020  MOV    R3,FC$FDB+2(R4)
120                ;
121                ; Finished opening the file
122                ;
123 001132  000137  0000000  JMP    @#EMTXIT
```

```
1 .SBTTL SFSVST -- EMT to save channel status (.SAVESTATUS)
2 -----
3 ; This routine is called when a .SAVESTATUS EMT is executed.
4 ; It checks to see if the channel is currently opened to a shared file
5 ; and if so marks the CDB for the channel as suspended.
6 ;
7 001136 010446 SFSVST: MOV R4,-(SP)
8 001140 010546 MOV R5,-(SP)
9 001142 013746 0000000 MOV @#KPAR5,-(SP)
10 ;
11 ; See if this channel is currently opened to a shared file
12 ;
13 001146 004767 003202 CALL FNDCDB ;See if channel is opened to a shared file
14 001152 103405 BCS 9$ ;Br if not
15 ;
16 ; Channel is opened to a shared file.
17 ; Mark CDB as suspended.
18 ;
19 001154 MAPTD R5 ;Map to the CDB
20 001160 152764 0000000 0000000 BISB #FL$SPN,FC$FLG(R4) ;Mark CDB as suspended
21 ;
22 ; Finished
23 ;
24 001166 012637 0000000 9$: MOV (SP)+,@#KPAR5
25 001172 012605 MOV (SP)+,R5
26 001174 012604 MOV (SP)+,R4
27 001176 000207 RETURN
```

```

1          .SBTTL  SFRSST -- EMT to reopen a channel (.REOPEN)
2          ;-----
3          ; This routine is called when a .REOPEN EMT is executed.  It checks to see
4          ; if the file being reopened is a shared file.
5          ;
6 001200 010246 SFRSST: MOV     R2,-(SP)
7 001202 010346      MOV     R3,-(SP)
8 001204 010446      MOV     R4,-(SP)
9 001206 010546      MOV     R5,-(SP)
10 001210 013746 0000000      MOV     @#KPAR5,-(SP)
11          ;
12          ; See if an FDB exists for the file being reopened
13          ;
14 001214 004767 003226      CALL    FDNFDB      ;Search for an FDB for this file
15 001220 103466      BCS     9$          ;Br if no FDB
16          ;
17          ; We found an FDB for the file.
18          ; First check to see if there is a suspended CDB for this user that has
19          ; the same channel number as channel being reopened.
20          ;
21          ;           MAPTO   R3          ;Map to the FDB
22 001222 016204 0000000      MOV     FF$CDB(R2),R4  ;Get virtual address of 1st CDB for file
23 001232 016205 0000020      MOV     FF$CDB+2(R2),R5 ;Get par mapping for 1st CDB
24 001236 001457      BEQ     9$          ;Br if no CDB's for file (should never happen)
25 001240 113700 0000000      MOVVB  @#CORUSR,R0     ;Get current job index number
26 001244          1$: MAPTO   R5          ;Map to the CDB
27 001250 132764 0000000 0000000      BITB   #FL$SPN,FC$FLG(R4) ;Is this a suspended CDB?
28 001256 001407      BEQ     2$          ;Br if not
29 001260 120064 0000000      CMPB   R0,FC$UN(R4)    ;Is this CDB for this user?
30 001264 001004      BNE     2$          ;Br if not
31 001266 123764 0000000 0000000      CMPB   @#CHNNUM,FC$CHN(R4) ;Does the channel number match?
32 001274 001435      BEQ     6$          ;Br if yes -- We found the suspended CDB
33 001276 016405 0000020      2$: MOV     FC$FLK+2(R4),R5 ;Get par mapping for next CDB
34 001302 016404 0000000      MOV     FC$FLK(R4),R4  ;Get virtual address of next CDB
35 001306 001356      BNE     1$          ;Loop if another CDB to check
36          ;
37          ; We could not find a suspended CDB with a matching channel number.
38          ; See if we can find any suspended CDB (in case user is reopening with
39          ; a different channel than originally used).
40          ;
41          ;           MAPTO   R3          ;Map to the FDB
42 001310 016204 0000000      MOV     FF$CDB(R2),R4  ;Get virtual address of 1st CDB for file
43 001314 016205 0000020      MOV     FF$CDB+2(R2),R5 ;Get par mapping for 1st CDB
44 001324          4$: MAPTO   R5          ;Map to the CDB
45 001330 132764 0000000 0000000      BITB   #FL$SPN,FC$FLG(R4) ;Is this a suspended CDB?
46 001336 001403      BEQ     5$          ;Br if not
47 001340 120064 0000000      CMPB   R0,FC$UN(R4)    ;Is this CDB for this user?
48 001344 001406      BEQ     3$          ;Br if yes -- Use this CDB
49 001346 016405 0000020      5$: MOV     FC$FLK+2(R4),R5 ;Get par mapping for next CDB
50 001352 016404 0000000      MOV     FC$FLK(R4),R4  ;Get virtual address of next CDB
51 001356 001362      BNE     4$          ;Loop if another CDB to check
52          ;
53          ; The file being reopened is not a shared file for this user
54          ;
55 001360 000406      BR     9$
56          ;
57          ; The file being reopened is a shared file for this user

```

```
58 ;  
59 001362 113764 0000000 0000000 3#: MOVB  @#CHNNUM,FC#CHN(R4);Set channel number in CDB  
60 001370 142764 0000000 0000000 6#: BICB  #FL$SPN,FC#FLG(R4) ;Say CDB no longer suspended  
61 ;  
62 ; Finished  
63 ;  
64 001376 012637 0000000 9#: MOV  (SP)+,@#KPAR5  
65 001402 012605 MOV  (SP)+,R5  
66 001404 012604 MOV  (SP)+,R4  
67 001406 012603 MOV  (SP)+,R3  
68 001410 012602 MOV  (SP)+,R2  
69 001412 000207 RETURN
```

```
1 .SBTTL DORLK -- EMT to lock a block with wait
2 -----
3 ; This routine is called when an EMT is executed which requests that
4 ; a block be locked and the job suspended if the block is already locked.
5 ;
6 001414 DORLK:
7 ;
8 ; See if this channel is opened to a shared file
9 ;
10 001414 004767 002734 CALL FNDCDB ;Try to find a CDB for this channel
11 001420 103004 BCC 1$ ;Br if we found a CDB
12 ;
13 ; This channel is not open to a shared file. Return error code 1.
14 ;
15 001422 012700 000001 MOV #EC1,R0 ;Return error code 1
16 001426 000137 000000G JMP @SETERR
17 ;
18 ; This channel is opened to a shared file.
19 ; Get number of the block we want to lock.
20 ;
21 001432 013701 000002G 1$: MOV @EMTBLK+2,R1 ;Get # of block to lock
22 001436 005201 INC R1 ;Bias the block number
23 ;
24 ; Try to lock the requested block
25 ;
26 001440 004767 000636 CALL TRYLK ;Try to lock the block
27 001444 103007 BCC 2$ ;Br if we were able to lock the block
28 001446 005700 TST R0 ;Is block locked by someone else?
29 001450 001402 BEQ 3$ ;Br if yes
30 001452 000137 000000G JMP @SETERR ;Some other error
31 ;
32 ; The block is locked by someone else.
33 ; Suspend our job until the block is unlocked.
34 ;
35 001456 004767 001260 3$: CALL LKWAIT ;Wait for block to be unlocked
36 001462 000763 BR 1$ ;Now go try again
37 ;
38 ; We successfully locked the block
39 ;
40 001464 000137 000000G 2$: JMP @EMTXIT
```

```

1          .SBTTL  DOTLK  -- EMT to lock a block with status
2          ;-----
3          ; This routine is jumped to when an EMT is executed to try to lock a block
4          ; with a status code being returned is the block is not available.
5          ;
6 001470   DOTLK:
7          ;
8          ; See if this channel is opened to a shared file
9          ;
10 001470  004767  002660          CALL  FNDCDB          ;See if channel is opened to a shared file
11 001474  103004          BCC   1$          ;Br if channel is opened to a shared file
12 001476  012700  000001          MOV   #EC1,R0        ;Return error code 1 if not opened to shared
13 001502  000137  000000G        JMP   @#SETERR
14          ;
15          ; Try to lock the requested block.
16          ;
17 001506  013701  000002G  1$:   MOV   @#EMTBLK+2,R1  ;Get # of block to lock
18 001512  005201          INC   R1          ;Bias the block number
19 001514  004767  000562          CALL  TRYLK        ;Try to lock the block
20 001520  103402          BCS  2$          ;Br if unable to lock the block
21          ;
22          ; We successfully locked the block
23          ;
24 001522  000137  000000G        JMP   @#EMTXIT
25          ;
26          ; The block is not available
27          ;
28 001526  005700          2$:   TST   R0          ;Block locked by another job?
29 001530  001017          BNE  3$          ;Br if some other error
30 001532  012700  000003          MOV   #EC3,R0        ;Assume single block locked
31 001536          MAPTD  R5          ;Map to the CDB
32 001542  016402  000000G        MOV   FC#FDB(R4),R2  ;Get pointer to FDB for file
33 001546          MAPTD  FC#FDB+2(R4)  ;Map to the FDB
34 001554  132762  000000G  000000G  BITB  #FT#EFL,FF#FLG(R2) ;Is the entire file locked?
35 001562  001402          BEQ  3$          ;Br if not
36 001564  012700  000004          MOV   #EC4,R0        ;Return error code 4
37 001570  000137  000000G  3$:   JMP   @#SETERR

```

```
1 .SBTTL DOCULK -- EMT to unlock all blocks for a channel
2 ;-----
3 ; This routine is called by the EMT which is used to unlock all locked
4 ; blocks for a channel.
5 ;
6 001574 DOCULK:
7 ;
8 ; Make sure this channel is opened to a shared file
9 ;
10 001574 004767 002554 CALL FNDCDB ;Locate CDB for shared file
11 001600 103004 BCC 1$ ;Br if found the CDB
12 001602 012700 000001 MOV #EC1,RO ;Return error 1 if not opened to shared file
13 001606 000137 000000G JMP @#SETERR
14 ;
15 ; Unlock all of the blocks for this channel
16 ;
17 001612 004767 001442 1$: CALL CHNULK ;Unlock all blocks for the channel
18 ;
19 ; Finished
20 ;
21 001616 000137 000000G JMP @#EMTXIT
```

DOULK1 -- EMT to unlock a single block

```

1          .SBTTL  DOULK1 -- EMT to unlock a single block
2          ;-----
3          ; This routine is executed in response to the EMT which unlocks a
4          ; single block.
5          ;
6 001622   DOULK1:
7          ;
8          ; Make sure this channel is opened to a shared file
9          ;
10 001622 004767 002526      CALL    FNDCDB      ;Locate CDB for this channel
11 001626 103004             BCC     1$          ;Br if channel is opened to a shared file
12 001630 012700 000001     MOV     #EC1,R0      ;Error code 1 if not opened to shared file
13 001634 000137 000000G    JMP     @#SETERR
14          ;
15          ; If we currently have the entire file locked, unlock the file now.
16          ;
17 001640      1$:  MAPTO   R5          ;Map to the CDB
18 001644 132764 000000G 000000G BITB   #FL$EFL,FC$FLG(R4);Do we have the entire file locked?
19 001652 001004             BNE     4$          ;Br if yes
20          ;
21          ; Get the number of the block to unlock
22          ;
23 001654 013700 000002G    3$:  MOV     @#EMTBLK+2,R0 ;Get # of block to unlock
24 001660 005200             INC     R0          ;Bias the block number
25 001662 001003             BNE     2$          ;Br if unlocking a single block
26          ;
27          ; Block number was -1, unlock all of the locked blocks.
28          ;
29 001664 004767 001370     4$:  CALL    CHNULK      ;Unlock all locked blocks
30 001670 000414             BR     9$
31          ;
32          ; Unlock a single block
33          ;
34 001672 010403     2$:  MOV     R4,R3          ;Get virtual address of CDB
35 001674 062703 000000G    ADD     #FC$LBN,R3      ;Point to start of block # vector in CDB
36 001700 013702 000000G    MOV     @#VMLBLK,R2     ;Get # locked block entries in CDB
37 001704 020023     5$:  CMP     R0,(R3)+      ;See if block is in lock list
38 001706 001402             BEQ     6$          ;Br if it is
39 001710 077203             SOB     R2,5$          ;Keep looking
40 001712 000403             BR     9$          ;Specified block is not locked
41 001714 004767 001434     6$:  CALL    UNLOCK      ;Unlock the block
42 001720 005043             CLR     -(R3)         ;Remove block # from lock table
43          ;
44          ; Finished
45          ;
46 001722 000137 000000G    9$:  JMP     @#EMTXIT

```

```
1 . SBTTL DOSFCK -- EMT to check for shared file modification
2 ;-----
3 ; This EMT is used to check to see if any other users have written
4 ; to the shared file specified by our channel #.
5 ; If no writes by other users have occurred since the last time
6 ; this EMT was executed, no error is returned by the EMT.
7 ; If writes have been performed to the file, an error status of 2 is
8 ; returned.
9 ;
10 001726 DOSFCK:
11 ;
12 ; Make sure this channel is opened to a shared file.
13 ;
14 001726 004767 002422 CALL FNDCDB ;Find CDB for this channel
15 001732 103415 BCS 9$ ;Br if channel not opened to shared file
16 ;
17 ; See if file-modification flag set in our CDB
18 ;
19 001734 MAPTD R5 ;Map to our CDB
20 001740 132764 0000000 0000000 BITB #FL$ACT,FC$FLG(R4) ;Has the file been modified by others?
21 001746 001407 BEQ 9$ ;Br if not
22 ;
23 ; The file has been modified
24 ;
25 001750 142764 0000000 0000000 BICB #FL$ACT,FC$FLG(R4) ;Reset the modification flag
26 001756 012700 000002 MOV #EC2,R0 ;Return error code 2
27 001762 000137 0000000 JMP @#SETERR
28 ;
29 ; The file has not been modified
30 ;
31 001766 000137 0000000 9$: JMP @#EMTXIT
```

INICDB -- Initialize a new CDB

```

1          .SBTTL  INICDB -- Initialize a new CDB
2          ;-----
3          ; Add a new CDB to the list of CDB's for the current job and initialize
4          ; the CDB.
5          ;
6          ; Inputs:
7          ; R4 = Virtual address of CDB.
8          ; R5 = PAR pointer for CDB.
9          ; R1 = Open access mode flags.
10         ;
11 001772 010146 INICDB: MOV     R1, -(SP)
12 001774 010246      MOV     R2, -(SP)
13 001776 013746 000000G      MOV     @#KPAR5, -(SP)
14         ;
15         ; Initialize the CDB
16         ;
17 002002      MAPTO   R5          ; Map to the CDB
18 002006 010402      MOV     R4, R2          ; Get pointer to CDB
19 002010 013700 000000G      MOV     @#VMLBLK, R0          ; Get # locked block entries
20 002014 062700 000000C      ADD     #FC$LBN/2, R0          ; Add size of rest of entry
21 002020 005022      1#:  CLR     (R2)+          ; Initially zero the entire CDB
22 002022 077002      SOB     R0, 1#
23 002024 113764 000000G 000000G      MOVB   @#CORUSR, FC#UN(R4); Store job number into CDB
24 002032 113764 000000G 000000G      MOVB   @#CHNNUM, FC#CHN(R4); Store channel number
25 002040 032701 000400      BIT     #400, R1          ; Should we suppress data caching?
26 002044 001403      BEQ     2#
27 002046 152764 000000G 000000G      BISB   #FL$NDC, FC$FLG(R4); Set flag in CDB to suppress data caching
28 002054 042701 177770      2#:  BIC     #^C<7>, R1          ; Mask out all but protection code
29 002060      .ADDR   #ACCMSK, R0          ; Get address of access mask table
30 002066 060100      ADD     R1, R0          ; Point to correct entry in table
31 002070 111064 000000G      MOVB   (R0), FC$ACC(R4) ; Set access protection flags
32         ;
33         ; Add CDB to linked list of CDB's for current job.
34         ;
35 002074 013764 000000G 000000G      MOV     @#JCDB, FC$CLK(R4); Make new CDB point to rest of list
36 002102 013764 000002G 000002G      MOV     @#JCDB+2, FC$CLK+2(R4)
37 002110 010437 000000G      MOV     R4, @#JCDB          ; Make list head of job point to new CDB
38 002114 010537 000002G      MOV     R5, @#JCDB+2
39         ;
40         ; Finished
41         ;
42 002120 012637 000000G      MOV     (SP)+, @#KPAR5
43 002124 012602      MOV     (SP)+, R2
44 002126 012601      MOV     (SP)+, R1
45 002130 000207      RETURN

```

```

1          .SBTTL  CHKACC -- Check for file open access conflicts
2          ;-----
3          ;  CHKACC is called during a file open operation to determine if the
4          ;  access protection set up by other users allows us to access the file.
5          ;
6          ;  Inputs:
7          ;  R2,R3 = Pointer to FDB for file being opened.
8          ;  R1 = File access code as provided in open argument block.
9          ;
10         ;  Outputs:
11         ;  C-flag cleared ==> File access is ok.
12         ;  C-flag set    ==> File access denied.
13         ;
14 002132 010146  CHKACC: MOV     R1,-(SP)
15 002134 010446          MOV     R4,-(SP)
16 002136 010546          MOV     R5,-(SP)
17 002140 013746 000000G  MOV     @#KPAR5,-(SP) ; Preserve mapping
18         ;
19         ;  Convert access code to a bit mask
20         ;
21 002144          .ADDR  #ACCBIT,R0 ; Point to bit mask vector
22 002152 042701 177770  BIC     #^C<7>,R1 ; Clear all but access flags
23 002156 060100          ADD     R1,R0 ; Point to cell of interest
24 002160 111000          MOVVB  (R0),R0 ; Get bit mask
25         ;
26         ;  Begin loop which will examine each CDB on list for file
27         ;
28 002162          MAPTO  R3 ; Map to the FDB
29 002166 016204 000000G  MOV     FF%CDB(R2),R4 ; Get virtual address of 1st CDB for file
30 002172 016205 000002G  MOV     FF%CDB+2(R2),R5 ; Get PAR mapping for 1st CDB
31 002176 001412          BEQ     3$ ; Br if there are no CDB's
32         ;
33         ;  See if there is an access conflict with this CDB
34         ;
35 002200 1$: MAPTO  R5 ; Map to the CDB
36 002204 130064 000000G  BITB   R0,FC%ACC(R4) ; Check for access conflict
37 002210 001007          BNE     2$ ; Br if there is a conflict
38         ;
39         ;  No conflict with this CDB. See if there are more to check.
40         ;
41 002212 016405 000002G  MOV     FC%FLK+2(R4),R5 ; Get Par mapping for next CDB
42 002216 016404 000000G  MOV     FC%FLK(R4),R4 ; Get pointer to next CDB
43 002222 001366          BNE     1$ ; Br if there are more CDB's to check
44         ;
45         ;  There is no access conflict.
46         ;
47 002224 000241 3$: CLC ; Signal success on return
48 002226 000401          BR     9$
49         ;
50         ;  There is an access conflict
51         ;
52 002230 000261 2$: SEC ; Signal error on return
53         ;
54         ;  Finished
55         ;
56 002232 012637 000000G  9$: MOV     (SP)+,@#KPAR5 ; Restore par mapping
57 002236 012605          MOV     (SP)+,R5

```

58	002240	012604	MOV	(SP)+,R4
59	002242	012601	MOV	(SP)+,R1
60	002244	000207	RETURN	

SFCLS -- Close a shared file channel

```

1          .SBTTL  SFCLS  -- Close a shared file channel
2          ;-----
3          ; The SFCLS subroutine is called from the close channel routine to see
4          ; if the channel is opened to a shared file.
5          ;
6 002246 010446 SFCLS:  MOV     R4,-(SP)
7 002250 010546      MOV     R5,-(SP)
8 002252 013746 000000G      MOV     @#KPAR5,-(SP)
9          ;
10         ; See if this channel is open to a shared file
11         ;
12 002256 004767 002072      CALL    FNDCDB      ;Try to find CDB for this channel
13 002262 103402      BCS     9#          ;Br if channel not opened to shared file
14         ;
15         ; This channel is opened to a shared file.
16         ; Close the CDB.
17         ;
18 002264 004767 001416      CALL    CLSCDB      ;Close this CDB
19         ;
20         ; Finished
21         ;
22 002270 012637 000000G 9#:  MOV     (SP)+,@#KPAR5
23 002274 012605      MOV     (SP)+,R5
24 002276 012604      MOV     (SP)+,R4
25 002300 000207      RETURN

```

TRYLK -- Try to lock a block

```

1          .SBTTL  TRYLK  -- Try to lock a block
2          ;-----
3          ; TRYLK is called to attempt to lock a block.
4          ; A biased block number of 0 (original block number 177777) represents
5          ; a request to lock the entire file.
6          ;
7          ; Inputs:
8          ; R1 = Bias block number.
9          ; R4,R5 = Pointer to CDB for channel locking block.
10         ;
11         ; Outputs:
12         ; C-flag cleared ==> Block successfully locked.
13         ; C-flag set ==> Block could not be locked...
14         ; RO = 0 ==> Block locked by another user.
15         ; RO = 2 ==> User has attempted to lock too many blocks.
16         ;
17 002302 010246 TRYLK:  MOV     R2,-(SP)
18 002304 010346      MOV     R3,-(SP)
19 002306 013746 0000000  MOV     @#KPAR5,-(SP)
20 002312 010146      MOV     R1,-(SP)      ; Save block # on top of stack
21         ;
22         ; If we already have the entire file locked, then this block is locked too
23         ;
24 002314          MAPTD   R5          ; Map to the CDB
25 002320 132764 0000000 0000000 BITB   #FL$EFL,FC$FLG(R4); Do we have entire file locked?
26 002326 001116          BNE     19$          ; Br if yes -- Block is already locked
27         ;
28         ; If this is a request to lock the entire file, unlock any blocks
29         ; we currently have locked.
30         ;
31 002330 005716          TST     (SP)          ; Request to lock entire file?
32 002332 001003          BNE     1$          ; Br if not
33 002334 004767 000720  CALL   CHNULK          ; Unlock any blocks we have locked already
34 002340 000413          BR     8$
35         ;
36         ; See if we already have the block locked
37         ;
38 002342 105764 0000000 1$:    TSTB   FC$NLB(R4)      ; Does this CDB have any blocks locked?
39 002346 001410          BEQ     8$          ; Br if not
40 002350 010402          MOV     R4,R2          ; Get pointer to CDB
41 002352 062702 0000000  ADD     #FC$LBN,R2      ; Point to locked-block list in CDB
42 002356 013703 0000000  MOV     @#VMLBLK,R3     ; Get # locked-block entries in list
43 002362 021622          9$:    CMP     (SP),(R2)+     ; See if block is already locked by CDB
44 002364 001477          BEQ     19$          ; Br if block is already locked
45 002366 077303          SOB    R3,9$
46         ;
47         ; Get pointer to FDB for file
48         ;
49 002370 016402 0000000 8$:    MOV     FC$FDB(R4),R2  ; Get pointer to FDB
50 002374 016403 0000020  MOV     FC$FDB+2(R4),R3
51         ;
52         ; If there are no blocks locked for this file, we can immediately
53         ; satisfy the request.
54         ;
55 002400          MAPTD   R3          ; Map to the FDB
56 002404 005762 0000000  TST     FF$NLB(R2)      ; Are there any blocks locked now?
57 002410 001412          BEQ     4$          ; if none locked then we can satisfy request

```

TRYLK -- Try to lock a block

```

58 002412 005716          TST      (SP)          ;Is this a request to lock entire file?
59 002414 001460          BEQ      18$          ;Br if yes -- Can't satisfy now
60                          ;
61                          ; This is a request to lock a single block and some blocks are locked
62                          ; in the file. If the entire file is locked, we cannot satisfy request.
63                          ;
64 002416 132762 000000G 000000G      BITB     #FT#EFL,FF#FLG(R2);Is the entire file locked now?
65 002424 001054          BNE      18$          ;Br if entire file locked
66                          ;
67                          ; Run down chain of CDB's for this file and see if some other
68                          ; user has this block locked.
69                          ;
70 002426 011601          MOV      (SP),R1       ;Get # of block to lock for CHKLOK
71 002430 004767 000146      CALL     CHKLOK        ;See if any other user has this block locked
72 002434 103450          BCS     18$          ;Br if block locked by another user
73                          ;
74                          ; The block is free so claim it for our channel.
75                          ; (SP)=block #: R2,R3=FDB pointer; R4,R5=CDB pointer.
76                          ;
77 002436 005716 4$:      TST      (SP)          ;Lock entire file?
78 002440 001017          BNE      5$          ;Br if not
79                          ;
80                          ; Lock entire file
81                          ;
82 002442          MAPTO    R3          ;Map to the FDB
83 002446 152762 000000G 000000G      BISB     #FT#EFL,FF#FLG(R2);Say entire file is locked
84 002454 005262 000000G      INC      FF#NLB(R2)   ;Count # locked blocks
85 002460          MAPTO    R5          ;Map to the CDB
86 002464 152764 000000G 000000G      BISB     #FL#EFL,FC#FLG(R4);Say this channel has entire file locked
87 002472 105264 000000G      INCB     FC#NLB(R4)   ;Say channel has a block locked
88 002476 000432          BR       19$          ;Finished
89                          ;
90                          ; Lock a single block
91                          ;
92 002500 5$:      MAPTO    R5          ;Map to the CDB
93 002504 126437 000000G 000000G      CMPB     FC#NLB(R4),@#VMLBLK ;Max # blocks already locked?
94 002512 103015          BHIS     6$          ;Br if yes -- Error cannot lock another
95 002514 010401          MOV      R4,R1       ;Get addr of CDB
96 002516 062701 000000G      ADD      #FC#LBN,R1   ;Point to list of block numbers
97 002522 005721 7$:      TST      (R1)+        ;Search for free entry in list
98 002524 001376          BNE      7$          ;(free entry will be zero)
99 002526 011641          MOV      (SP),-(R1)   ;Store new block number into list
100 002530 105264 000000G      INCB     FC#NLB(R4)   ;Say another block locked by channel
101 002534          MAPTO    R3          ;Map to the FDB
102 002540 005262 000000G      INC      FF#NLB(R2)   ;Say another block locked in file
103 002544 000407          BR       19$          ;Finished
104                          ;
105                          ; User is requesting to simultaneously lock more blocks than allowed
106                          ;
107 002546 012700 000002 6$:      MOV      #EC2,R0       ;Return error 2
108 002552 000261          SEC                      ;Signal error on return
109 002554 000404          BR       20$
110                          ;
111                          ; The requested block is locked by another job
112                          ;
113 002556 005000 18$:      CLR      R0          ;Return error 0
114 002560 000261          SEC                      ;Signal error on return

```

TRYLK -- Try to lock a block

```
115 002562 000401          BR      20$
116                          ;
117                          ; We successfully locked the block
118                          ;
119 002564 000241          19$:   CLC                      ;Signal success on return
120                          ;
121                          ; Finished
122                          ;
123 002566 012601          20$:   MOV      (SP)+, R1
124 002570 012637 00000000      MOV      (SP)+, @#KPAR5
125 002574 012603          MOV      (SP)+, R3
126 002576 012602          MOV      (SP)+, R2
127 002600 000207          RETURN
```

```

1          .SBTTL  CHKLOK -- See if a block is locked by another job
2          ;-----
3          ; This routine is called to determine if a specific block is locked
4          ; by another job.
5          ;
6          ; Inputs:
7          ; R1 = Biased block number.
8          ; R2,R3 = Pointer to FDB for file to be checked.
9          ;
10         ; Outputs:
11         ; C-flag set ==> Block is locked by another job.
12         ; C-flag cleared ==> Block is not locked.
13         ;
14 002602 010146  CHKLOK: MOV     R1,-(SP)
15 002604 010246          MOV     R2,-(SP)
16 002606 010346          MOV     R3,-(SP)
17 002610 010446          MOV     R4,-(SP)
18 002612 010546          MOV     R5,-(SP)
19 002614 013746 000000G  MOV     @#KPAR5,-(SP)
20         ;
21         ; Get pointer to start of CDB chain for this file
22         ;
23 002620          MAPTD   R3          ;Map to FDB
24 002624 016204 000000G  MOV     FF$CDB(R2),R4 ;Get virtual address of 1st CDB for file
25 002630 001431          BEQ     B$          ;Br if no CDB's for file
26 002632 016205 000002G  MOV     FF$CDB+2(R2),R5 ;Get par mapping for 1st CDB
27 002636 113700 000000G  MOVB   @#CORUSR,R0    ;Get our job index number
28         ;
29         ; See if next CDB has specified block locked
30         ;
31 002642 1$:          MAPTD   R5          ;Map the CDB
32 002646 105764 000000G  TSTB   FC$NLB(R4)    ;Does this CDB have any blocks locked?
33 002652 001413          BEQ     2$          ;Br if not
34 002654 120064 000000G  CMPB   R0,FC$UN(R4)  ;Does this CDB belong to our job?
35 002660 001410          BEQ     2$          ;Br if yes -- We only care about other jobs
36 002662 010402          MOV     R4,R2        ;Get address of base of CDB
37 002664 062702 000000G  ADD     #FC$LBN,R2    ;Point to vector of locked block #'s
38 002670 013703 000000G  MOV     @#VMLBLK,R3   ;Get # locked block entries
39 002674 020122 3$:          CMP     R1,(R2)+      ;See if requested block is locked
40 002676 001410          BEQ     7$          ;Br if yes
41 002700 077303          SOB    R3,3$        ;Check all entries in CDB
42         ;
43         ; Block not locked by this CDB, check next CDB
44         ;
45 002702 016405 000002G  2$:          MOV     FC$FLK+2(R4),R5 ;Get par for next CDB
46 002706 016404 000000G  MOV     FC$FLK(R4),R4 ;Get virtual address of next CDB
47 002712 001353          BNE    1$          ;Loop if more CDB's to check
48         ;
49         ; This block is not locked by any channel
50         ;
51 002714 000241 8$:          CLC          ;Signal success on return
52 002716 000401          BR     9$
53         ;
54         ; This block is locked by another job
55         ;
56 002720 000261 7$:          SEC          ;Signal failure on return
57         ;

```

```
58 ; Finished  
59 ;  
60 002722 012637 0000006 9#: MOV (SP)+, @#KPAR5  
61 002726 012605 MOV (SP)+, R5  
62 002730 012604 MOV (SP)+, R4  
63 002732 012603 MOV (SP)+, R3  
64 002734 012602 MOV (SP)+, R2  
65 002736 012601 MOV (SP)+, R1  
66 002740 000207 RETURN
```

LKWAIT -- Wait for a locked block

```

1          .SBTTL  LKWAIT -- Wait for a locked block
2          ;-----
3          ; LKWAIT is called to suspend the execution of the current job until
4          ; a requested block is unlocked.
5          ;
6          ; Inputs:
7          ; R1 = Number of block to lock (biased by adding 1).
8          ; R4,R5 = Pointer to CDB.
9          ;
10         LKWAIT: MOV     R1,-(SP)
11         MOV     R2,-(SP)
12         MOV     R3,-(SP)
13         MOV     R4,-(SP)
14         MOV     R5,-(SP)
15         MOV     @#KPAR5,-(SP)
16         ;
17         ; Get the address of the FDB for this file.
18         ;
19         MAPTO   R5          ; Map to the CDB
20         MOV     FC#FDB(R4),R2 ; Get virtual address of FDB
21         MOV     FC#FDB+2(R4),R3 ; Get par mapping for FDB
22         ;
23         ; Before we suspend the job, check to see if it has been aborted.
24         ;
25         CALL    @#CHKABT    ; See if job has been aborted
26         ;
27         ; Get a free wait queue element.
28         ;
29         MOV     FWFREE,R4    ; Get virtual addr of free wait queue element
30         MOV     FWFREE+2,R5  ; Get par mapping
31         MAPTO   R5          ; Map to the wait element
32         MOV     FW$WLK(R4),FWFREE ; Remove block from free list
33         MOV     FW$WLK+2(R4),FWFREE+2
34         ;
35         ; Set up information in the wait queue element
36         ;
37         MOVB   @#CORUSR,FW$UN(R4) ; Set job number
38         MOV     R1,FW$DBN(R4)  ; Set # of block we are waiting for
39         CLR     FW$WLK(R4)    ; Say we are end of linked list
40         CLR     FW$WLK+2(R4)
41         ;
42         ; Add entry to tail of wait list for file
43         ;
44         MOV     R2,R0        ; Get pointer to FDB
45         MOV     R3,R1
46         ADD     #FF$FWD-FW$WLK,R0 ; Fake pointer so FDB looks like wait block
47         1$: MAPTO   R1        ; Map to the next wait block (or FDB if 1st tm)
48         TST     FW$WLK(R0)    ; Is this the last wait block on the list?
49         BEQ     3$          ; Br if yes
50         MOV     FW$WLK+2(R0),R1 ; Get pointer to next wait block on list
51         MOV     FW$WLK(R0),R0
52         BR      1$          ; Continue looking for end of list
53         3$: MOV     R4,FW$WLK(R0) ; Add our wait block to end of list
54         MOV     R5,FW$WLK+2(R0)
55         ;
56         ; Suspend job and wait for desired block to be unlocked
57         ;

```

```

58 003116 012700 0000000      MOV    #S$SFWT,R0      ;Get shared-file wait state code
59 003122 004737 0000000      CALL   @#QNSPND        ;Change job state and suspend execution
60                               ;
61                               ; We have been restarted.
62                               ; Either the desired block was unlocked or job was aborted.
63                               ; Release the wait block we used.
64                               ;
65 003126                               MAPTO  R5                ;Map to the wait block
66 003132 016400 0000000      MOV    FW$WLK(R4),R0   ;Get pointer to following wait block
67 003136 016401 0000020      MOV    FW$WLK+2(R4),R1
68 003142 062702 0000000      ADD    #FF$FWD-FW$WLK,R2 ;Fake pointer so FDB looks like wait block
69 003146                               4$:  MAPTO  R3                ;Map to next wait block (or FDB if 1st time)
70 003152 026204 0000000      CMP    FW$WLK(R2),R4   ;Are we next entry in list?
71 003156 001003                               BNE    6$                ;Br if not
72 003160 026205 0000020      CMP    FW$WLK+2(R2),R5
73 003164 001405                               BEQ    7$                ;Br if yes
74 003166 016203 0000020      6$:  MOV    FW$WLK+2(R2),R3 ;Get pointer to next wait block for file
75 003172 016202 0000000      MOV    FW$WLK(R2),R2
76 003176 000763                               BR     4$                ;Continue searching
77 003200 010062 0000000      7$:  MOV    R0,FW$WLK(R2) ;Relink wait-block list around us
78 003204 010162 0000020      MOV    R1,FW$WLK+2(R2)
79                               ;
80                               ; Return the wait block to the free list
81                               ;
82 003210                               5$:  MAPTO  R5                ;Map to wait block being freed
83 003214 016764 174650 0000000      MOV    FWFREE,FW$WLK(R4) ;Put on free list
84 003222 016764 174644 0000020      MOV    FWFREE+2,FW$WLK+2(R4)
85 003230 010467 174634                               MOV    R4,FWFREE
86 003234 010567 174632                               MOV    R5,FWFREE+2
87                               ;
88                               ; Finished
89                               ;
90 003240 012637 0000000      MOV    (SP)+,@#KPAR5
91 003244 012605      MOV    (SP)+,R5
92 003246 012604      MOV    (SP)+,R4
93 003250 012603      MOV    (SP)+,R3
94 003252 012602      MOV    (SP)+,R2
95 003254 012601      MOV    (SP)+,R1
96 003256 000207      RETURN

```

```

1          .SBTTL  CHNULK -- Unlock all blocks for a channel
2          ;-----
3          ; CHNULK is called to unlock all the blocks which are locked by a
4          ; channel.
5          ;
6          ; Inputs:
7          ; R4,R5 = Pointer to CDB for channel.
8          ;
9 003260 010246 CHNULK: MOV     R2,-(SP)
10 003262 010346      MOV     R3,-(SP)
11 003264 013746 0000000      MOV     @#KPAR5,-(SP)
12          ;
13          ; See if we have the entire file locked
14          ;
15 003270          MAPTD   R5          ;Map to the CDB
16 003274 132764 0000000 0000000 BITB   #FL#EFL,FC#FLG(R4);Do we have the entire file locked?
17 003302 001404          BEQ     1$          ;Br if not
18 003304 005000          CLR     R0          ;Say we want to unlock the entire file
19 003306 004767 000042      CALL   UNLOCK          ;Unlock the file
20 003312 000413          BR     9$
21          ;
22          ; We do not have the entire file locked.
23          ; Unlock the specific blocks that we have locked.
24          ;
25 003314 010402 1$:      MOV     R4,R2          ;Get pointer to CDB
26 003316 062702 0000000      ADD     #FC#LBN,R2      ;Point to list of block numbers
27 003322 013703 0000000      MOV     @#VMLBLK,R3     ;Get # blocks in list
28 003326 011200 2$:      MOV     (R2),R0        ;Get next block number
29 003330 001402          BEQ     3$          ;Br if this entry not used
30 003332 004767 000016      CALL   UNLOCK          ;Unlock that block
31 003336 005022 3$:      CLR     (R2)+          ;Say this block no longer locked by us
32 003340 077306          SOB     R3,2$          ;Loop if more to check
33          ;
34          ; Finished
35          ;
36 003342 012637 0000000 9$:      MOV     (SP)+,@#KPAR5
37 003346 012603          MOV     (SP)+,R3
38 003350 012602          MOV     (SP)+,R2
39 003352 000207          RETURN

```

UNLOCK -- Unlock a specific block

```

1          .SBTTL  UNLOCK -- Unlock a specific block
2          ;-----
3          ;  Unlock a specific block for a channel.
4          ;  If there are any users waiting for this block, they are restarted.
5          ;
6          ;  Inputs:
7          ;  RO = Biased block number to be unlocked (0==>Unlock entire file).
8          ;  R4,R5 = Pointer to CDB.
9          ;
10         UNLOCK: MOV    R1,-(SP)
11         MOV    R2,-(SP)
12         MOV    R3,-(SP)
13         MOV    R4,-(SP)
14         MOV    R5,-(SP)
15         MOV    @#KPAR5,-(SP)
16         MOV    R0,R1          ;Carry block number in R1
17         ;
18         ;  Decrement block lock count in CDB and FDB
19         ;
20         MAPTO  R5          ;Map to the CDB
21         DECB  FC#NLB(R4)   ;Say channel has one fewer blocks locked
22         BICB  #FL#EFL,FC#FLG(R4);Say channel does not have whole file locked
23         MOV   FC#FDB(R4),R2 ;Get pointer to FDB
24         MOV   FC#FDB+2(R4),R3
25         MAPTO  R3          ;Map to the FDB
26         DEC   FF#NLB(R2)   ;Say one fewer locked blocks in file
27         BICB  #FT#EFL,FF#FLG(R2);Say entire file is not locked
28         ;
29         ;  Get pointer to first wait block for this file
30         ;
31         MOV   FF#FWD(R2),R4 ;Get pointer to 1st wait block for file
32         MOV   FF#FWD+2(R2),R5
33         BEQ   9$           ;Br if no waiting users
34         ;
35         ;  There are some jobs waiting for blocks in this file.
36         ;  See if we are unlocking the entire file.
37         ;
38         TST   R1           ;Are we unlocking entire file?
39         BNE   1$           ;Br if not
40         MAPTO  R5           ;Map to the first wait block
41         TST   FW#DBN(R4)   ;1st user waiting for entire file?
42         BEQ   8$           ;Br if yes -- Restart him only
43         3$: CALL  RESTRT    ;Restart this user
44         4$: MOV   FW#WLK+2(R4),R5 ;Get pointer to next wait block
45         MOV   FW#WLK(R4),R4
46         BEQ   9$           ;Br if hit end of list
47         MAPTO  R5           ;Map to next wait block
48         TST   FW#DBN(R4)   ;Does this job want to lock whole file?
49         BNE   3$           ;Br if not
50         BR    4$           ;He can't have all since we started others
51         ;
52         ;  We are unlocking a specific block
53         ;
54         1$: MOV   FF#NLB(R2),R0 ;Get # blocks remaining locked in file
55         5$: MAPTO  R5           ;Map to wait block
56         TST   FW#DBN(R4)   ;Waiting for entire file?
57         BNE   7$           ;Br if not

```

UNLOCK -- Unlock a specific block

```

58 003540 005700          TST      R0          ; Is entire file free?
59 003542 001412          BEQ      B$          ; Br if yes
60 003544 000403          BR       6$
61 003546 020164 0000000 7$:    CMP      R1,FW$DBN(R4) ; Is he waiting for block we are freeing?
62 003552 001406          BEQ      B$          ; Br if yes
63 003554 016405 0000020 6$:    MOV      FW$WLK+2(R4),R5 ; Get par mapping for next wait block
64 003560 016404 0000000      MOV      FW$WLK(R4),R4 ; Get pointer to next wait block
65 003564 001360          BNE      5$          ; Br if more wait blocks to check
66 003566 000402          BR       9$          ; No waiting jobs to restart
67                          ;
68                          ; Restart a job
69                          ;
70 003570 004767 000020 8$:    CALL     RESTRT      ; Restart this waiting job
71                          ;
72                          ; Finished
73                          ;
74 003574 012637 0000000 9$:    MOV      (SP)+,@#KPAR5
75 003600 012605          MOV      (SP)+,R5
76 003602 012604          MOV      (SP)+,R4
77 003604 012603          MOV      (SP)+,R3
78 003606 012602          MOV      (SP)+,R2
79 003610 012601          MOV      (SP)+,R1
80 003612 000207          RETURN

```

RESTRT -- Restart a job that is waiting for a lock

```

1          .SBTTL  RESTRT -- Restart a job that is waiting for a lock
2          ;-----
3          ; Restart a job that is waiting for a locked block.
4          ;
5          ; Inputs:
6          ; R4,R5 = Pointer to wait block for job being restarted.
7          ;
8 003614  010146  RESTRT: MOV     R1,-(SP)
9 003616  010246      MOV     R2,-(SP)
10 003620  013746  0000000      MOV     @#KPAR5,-(SP)
11          ;
12          ; Get number of job to restart
13          ;
14 003624          MAPTD   R5          ;Map to the wait block
15 003630  116401  0000000      MOVVB  FW$UN(R4),R1  ;Get # of job to restart
16          ;
17          ; Place job in high-priority execution state
18          ;
19 003634  004737  0000000      CALL   @#QHIPRI      ;Place job in high-prio state
20          ;
21          ; If the job we are restarting has the same execution state as the
22          ; currently executing job, requeue the currently executing job
23          ; to the tail of the execution queue in order to give the restarted
24          ; job an opportunity to get the block we released before our
25          ; job relocks it.
26          ;
27 003640  113702  0000000      MOVVB  @#CORUSR,R2    ;Get # of currently running job
28 003644  016200  0000000      MOV     LSTATE(R2),R0  ;Get our execution state
29 003650  020061  0000000      CMP     R0,LSTATE(R1) ;Same as job we restarted?
30 003654  001007          BNE     9$            ;Br if not
31 003656  126261  0000000  0000000      CMPB   LPRI(R2),LPRI(R1);Same execution priority too?
32 003664  001003          BNE     9$            ;Br if not
33 003666  010201          MOV     R2,R1          ;Get our job index number
34 003670  004737  0000000      CALL   @#ENQTL       ;Requeue our job at tail of execution list
35          ;
36          ; Finished
37          ;
38 003674  012637  0000000  9$:  MOV     (SP)+,@#KPAR5
39 003700  012602          MOV     (SP)+,R2
40 003702  012601          MOV     (SP)+,R1
41 003704  000207          RETURN

```

```

1          .SBTTL  CLSCDB -- Close a CDB
2          ;-----
3          ; CLSCDB is called to close a CDB.
4          ; All locked blocks are freed, the CDB is freed, and the FDB is also
5          ; freed if this is the last CDB associated with it.
6          ;
7          ; Inputs:
8          ; R4,R5 = Pointer to CDB being closed.
9          ;
10         003706 010146 CLSCDB: MOV     R1,-(SP)
11         003710 010246         MOV     R2,-(SP)
12         003712 010346         MOV     R3,-(SP)
13         003714 013746 000000G        MOV     @#KPAR5,-(SP)
14         ;
15         ; Unlock all blocks for this channel
16         ;
17         003720 004767 177334         CALL    CHNULK          ;Unlock all blocks assoc with the CDB
18         ;
19         ; Remove CDB from CDB list for this job
20         ;
21         003724         MAPTO   R5          ;Map to CDB being released
22         003730 016400 000000G        MOV     FC$CLK(R4),R0    ;Get pointer to following CDB
23         003734 016401 000002G        MOV     FC$CLK+2(R4),R1
24         003740 012702 000000C        MOV     #JCDB-FC$CLK,R2 ;Get fake pointer to JCDB, make like CDB
25         003744 026204 000000G        1$:    CMP     FC$CLK(R2),R4    ;Are we the next CDB on the list?
26         003750 001003         BNE     3$              ;Br if not
27         003752 026205 000002G        CMP     FC$CLK+2(R2),R5
28         003756 001407         BEQ     4$              ;Br if yes
29         003760 016203 000002G        3$:    MOV     FC$CLK+2(R2),R3 ;Get pointer to next CDB for job
30         003764 016202 000000G        MOV     FC$CLK(R2),R2
31         003770         MAPTO   R3          ;Map to the next CDB
32         003774 000763         BR      1$              ;Continue searching
33         003776 010062 000000G        4$:    MOV     R0,FC$CLK(R2) ;Relink chain around us
34         004002 010162 000002G        MOV     R1,FC$CLK+2(R2)
35         ;
36         ; Return CDB to free list
37         ;
38         004006         MAPTO   R5          ;Map to CDB being freed
39         004012 016764 174046 000000G  MOV     FCFREE,FC$CLK(R4);Add CDB to free list
40         004020 016764 174042 000002G  MOV     FCFREE+2,FC$CLK+2(R4)
41         004026 010467 174032         MOV     R4,FCFREE      ;Put element at head of free list
42         004032 010567 174030         MOV     R5,FCFREE+2
43         004036 005237 000000G        INC     @#NUMCDB       ;One more free CDB
44         ;
45         ; Remove CDB from list of CDB's for file
46         ;
47         004042 016400 000000G        MOV     FC$FLK(R4),R0    ;Get pointer to following CDB for file
48         004046 016401 000002G        MOV     FC$FLK+2(R4),R1
49         004052 016402 000000G        MOV     FC$FDB(R4),R2    ;Get pointer to FDB
50         004056 016403 000002G        MOV     FC$FDB+2(R4),R3
51         004062 001443         BEQ     20$             ;Br if no FDB set up
52         004064 010246         MOV     R2,-(SP)        ;Save the FDB pointer
53         004066 010346         MOV     R3,-(SP)
54         004070 062702 000000C        ADD     #FF$CDB-FC$FLK,R2 ;Fake pointer so FDB looks like a CDB
55         004074         5$:    MAPTO   R3          ;Map to the next CDB (or FDB if 1st time)
56         004100 026204 000000G        CMP     FC$FLK(R2),R4    ;Are we next CDB on list?
57         004104 001003         BNE     6$              ;Br if not

```

```

58 004106 026205 0000020          CMP      FC$FLK+2(R2),R5
59 004112 001405                   BEQ      7$          ;Br if yes
60 004114 016203 0000020      6$:     MOV      FC$FLK+2(R2),R3 ;Get pointer to next CDB
61 004120 016202 0000000          MOV      FC$FLK(R2),R2
62 004124 000763                   BR       5$          ;Continue searching
63 004126 010062 0000000      7$:     MOV      R0,FC$FLK(R2) ;Relink chain around us
64 004132 010162 0000020          MOV      R1,FC$FLK+2(R2)
65                                     ;
66                                     ; Release all data cache descriptors associated with this file
67                                     ;
68 004136 012603                   MOV      (SP)+,R3    ;Get back pointer to the FDB
69 004140 012602                   MOV      (SP)+,R2
70 004142 005737 0000000          TST      @#NUMDCD    ;Are we doing data caching?
71 004146 001402                   BEQ      8$          ;Br if not
72 004150 004767 001552          CALL     CLSDCD      ;Release data cache entries for file
73                                     ;
74                                     ; See if there are any CDB's left associated with this file.
75                                     ;
76 004154      8$:     MAPTO   R3          ;Map to the FDB
77 004160 005762 0000000          TST      FF$CDB(R2) ;Are there any CDB's left assoc with file?
78 004164 001002                   BNE     20$         ;Br if yes
79                                     ;
80                                     ; We just released the last CDB associated with this file.
81                                     ; Free the FDB.
82                                     ;
83 004166 004767 000014          CALL     FREFDB      ;Free the FDB
84                                     ;
85                                     ; Finished
86                                     ;
87 004172 012637 0000000      20$:    MOV      (SP)+,@#KPAR5
88 004176 012603                   MOV      (SP)+,R3
89 004200 012602                   MOV      (SP)+,R2
90 004202 012601                   MOV      (SP)+,R1
91 004204 000207                   RETURN

```

```

1          .SBTTL  FREFDB -- Free a FDB
2          ;-----
3          ; Release a File Descriptor Block (FDB).
4          ;
5          ; Inputs:
6          ; R2,R3 = Pointer to FDB being freed.
7          ;
8 004206 010146 FREFDB: MOV     R1,-(SP)
9 004210 010246      MOV     R2,-(SP)
10 004212 010346      MOV     R3,-(SP)
11 004214 013746 000000G      MOV     @#KPAR5,-(SP)
12          ;
13          ; Release the FDB
14          ;
15 004220          MAPTO   R3          ;Map to the FDB
16 004224 016200 000000G      MOV     FF$FLK(R2),R0 ;Get pointer to FDB that follows one freed
17 004230 016201 000002G      MOV     FF$FLK+2(R2),R1
18 004234          .ADDR   #FFHEAD,R4 ;Construct fake pointer to FFHEAD that makes
19 004242 162704 000000G      SUB     #FF$FLK,R4    ; FFHEAD look like link within a FDB
20 004246 026402 000000G 1$:  CMP     FF$FLK(R4),R2 ;Are we the next FDB in list?
21 004252 001003          BNE     3$          ;Br if not
22 004254 026403 000002G      CMP     FF$FLK+2(R4),R3
23 004260 001407          BEQ     6$          ;Br if yes
24 004262 016405 000002G 3$:  MOV     FF$FLK+2(R4),R5 ;Get pointer to next FDB in list
25 004266 016404 000000G      MOV     FF$FLK(R4),R4
26 004272          MAPTO   R5          ;Map to the next FDB
27 004276 000763          BR     1$          ;Continue search
28 004300 010064 000000G 6$:  MOV     R0,FF$FLK(R4) ;Relink list around us
29 004304 010164 000002G      MOV     R1,FF$FLK+2(R4)
30          ;
31          ; Return the FDB to the free list
32          ;
33 004310 2$:  MAPTO   R3          ;Map to FDB being freed
34 004314 016762 173534 000000G      MOV     FFFREE,FF$FLK(R2);Put us on free list
35 004322 016762 173530 000002G      MOV     FFFREE+2,FF$FLK+2(R2)
36 004330 010267 173520          MOV     R2,FFFREE
37 004334 010367 173516          MOV     R3,FFFREE+2
38          ;
39          ; Finished
40          ;
41 004340 012637 000000G      MOV     (SP)+,@#KPAR5
42 004344 012603          MOV     (SP)+,R3
43 004346 012602          MOV     (SP)+,R2
44 004350 012601          MOV     (SP)+,R1
45 004352 000207          RETURN

```

```

1          .SBTTL FNDCDB -- Locate a CDB for a channel
2          ;-----
3          ; FNDCDB is called to try to find an active CDB block for the current
4          ; user and channel.
5          ;
6          ; Outputs:
7          ; C-flag set ==> Could not find CDB for channel.
8          ; C-flag cleared ==> Found CDB for channel.
9          ; R4,R5 = Pointer to CDB found.
10         ;
11 004354 013746 0000000 FNDCDB: MOV     @#KPAR5,-(SP)
12         ;
13         ; Get pointer to first CDB for job and see if job has any CDB's
14         ;
15 004360 013704 0000000         MOV     @#JCDB,R4      ;Get pointer to 1st CDB for this job
16 004364 001422         BEQ     7$              ;Br if there are none
17 004366 013705 0000020         MOV     @#JCDB+2,R5    ;Get par mapping for 1st CDB
18 004372 113700 0000000         MOVB   @#CHNUM,R0     ;Get channel # we are searching for
19         ;
20         ; Search CDB chain for job
21         ;
22 004376         1$: MAPTD   R5              ;Map to the next CDB for job
23 004402 132764 0000000 0000000 BITB   #FL$SPN,FC$FLG(R4) ;Is this a suspended CDB?
24 004410 001003         BNE     2$              ;Br if suspended
25 004412 120064 0000000         CMPB   R0,FC$CHN(R4)   ;Is this the correct CDB?
26 004416 001407         BEQ     8$              ;Br if yes
27 004420 016405 0000020         2$: MOV     FC$CLK+2(R4),R5 ;Get pointer to next CDB for job
28 004424 016404 0000000         MOV     FC$CLK(R4),R4
29 004430 001362         BNE     1$              ;Loop if more CDB's to check
30         ;
31         ; There is no CDB for this channel
32         ;
33 004432 000261         7$: SEC                      ;Signal failure on return
34 004434 000401         BR     9$
35         ;
36         ; We found a CDB for this channel
37         ;
38 004436 000241         8$: CLC                      ;Signal success on return
39         ;
40         ; Finished
41         ;
42 004440 012637 0000000         9$: MOV     (SP)+,@#KPAR5
43 004444 000207         RETURN

```

```

1          .SBTTL  FNDFDB -- Locate a FDB for a file
2          ;-----
3          ; FNDFDB is called to try to locate a FDB corresponding to a particular file.
4          ; The 2-word internal identification for the file is also computed.
5          ;
6          ; Inputs:
7          ;   CHNADR = Pointer to 5 word channel status block for the channel that
8          ;             is open to the file.
9          ;
10         ; Outputs:
11         ;   C-flag set ==> Could not find FDB for file.
12         ;   C-flag cleared ==> Found FDB for file.
13         ;   R2,R3 = Pointer to FDB.
14         ;   CURFID = 2 word internal file identification.
15         ;
16 004446 010446 FNDFDB: MOV     R4,-(SP)
17 004450 013746 000000G      MOV     @#KPAR5,-(SP)
18         ;
19         ; Build 2-word ID which uniquely identifies the file
20         ;
21 004454 013700 000000G      MOV     @#CHNADR,R0      ;Point to channel status block
22 004460 016003 000000G      MOV     C.CSW(R0),R3    ;Get Channel Status Word
23 004464 016004 000000G      MOV     C.SBLK(R0),R4   ;Get file starting block number
24 004470 042703 000000C      BIC     #^C<CS$NMX>,R3 ;Get device index number
25 004474 116002 000000G      MOV     C.DEVQ(R0),R2   ;Get unit number
26 004500 042702 177770      BIC     #^C<7>,R2      ;Extract unit number
27 004504 020337 000000G      CMP     R3,@#LDDEVX    ;Is device a logical disk?
28 004510 001006              BNE     1$              ;Br if not
29 004512 006302              ASL     R2                ;Convert unit number to word table index
30 004514 016203 000000G      MOV     LDPDEV(R2),R3   ;Get real device # and unit #
31 004520 066204 000000G      ADD     LDBASE(R2),R4   ;Bias starting block number by base of LD
32 004524 000402              BR      7$              ;
33 004526 000302              1$: SWAB    R2                ;Put unit # in upper byte
34 004530 050203              BIS     R2,R3            ;Form composite device ID (dev # & unit #)
35 004532 010367 173350      7$: MOV     R3,CURFID      ;1st word of file ID (device # and unit #)
36 004536 010467 173346      MOV     R4,CURFID+2     ;2nd word of file ID (starting block number)
37         ;
38         ; Search for a FDB which is open to this file
39         ;
40 004542 016702 173312      MOV     FFHEAD,R2       ;Get pointer to 1st active FDB
41 004546 001421              BEQ     2$              ;Br if there are no active FDB's
42 004550 016703 173306      MOV     FFHEAD+2,R3    ;Get par mapping
43 004554              4$: MAPTO   R3                ;Map to the FDB
44 004560 026267 000000G 173320  CMP     FF$FID(R2),CURFID ;Compare 1st word of file ID
45 004566 001004              BNE     3$              ;Br if not this file
46 004570 026267 000002G 173312  CMP     FF$FID+2(R2),CURFID+2 ;Compare 2nd word of file ID
47 004576 001407              BEQ     6$              ;Br if found FDB for file
48 004600 016203 000002G      3$: MOV     FF$FLK+2(R2),R3 ;Get pointer to next FDB
49 004604 016202 000000G      MOV     FF$FLK(R2),R2
50 004610 001361              BNE     4$              ;Loop if more FDB's to check
51         ;
52         ; Cannot find a FDB for this file
53         ;
54 004612 000261              2$: SEC                      ;Signal failure on return
55 004614 000401              BR      9$
56         ;
57         ; Found FDB for this file

```

```
58 ;  
59 004616 000241 6#: CLC ;Signal success on return  
60 ;  
61 ; Finished  
62 ;  
63 004620 012637 0000000 9#: MOV (SP)+, @#KPAR5  
64 004624 012604 MOV (SP)+, R4  
65 004626 000207 RETURN
```

```

1          .SBTTL  SFWRIT -- Monitor writes to shared files
2          ;-----
3          ; SFWRIT is called each time a .WRITE EMT is executed to see if the
4          ; write is being directed to a shared file.
5          ; If the file is shared, the following things are done:
6          ; 1. A flag is set in the CDB's for all other users indicating the
7          ;    file has been modified.
8          ;
9          ; Inputs:
10         ; CHNUM = Number of I/O channel
11         ; EMTBLK+2 = File block number
12         ; EMTBLK+4 = Base address of user's buffer
13         ; EMTBLK+6 = Number of words being written
14         ;
15 004630 010246 SFWRIT: MOV     R2,-(SP)
16 004632 010346         MOV     R3,-(SP)
17 004634 010446         MOV     R4,-(SP)
18 004636 010546         MOV     R5,-(SP)
19 004640 013746 0000000 MOV     @#KPAR5,-(SP)
20         ;
21         ; See if channel is opened to a shared file
22         ;
23 004644 004767 177504         CALL    FNDCDB      ;See if channel is opened to a shared file
24 004650 103444         BCS     9$          ;Br if not
25         ;
26         ; This is a write to a shared file.
27         ; Set file-modified flag in CDB's for all other jobs using this file.
28         ; (R4,R5 = Pointer to CDB)
29         ;
30         ; MAPTO R5          ;Map to the CDB
31 004656 016402 0000000 MOV     FC$FDB(R4),R2 ;Get pointer to the FDB
32 004662         MAPTO FC$FDB+2(R4) ;Map to the FDB
33 004670 016203 0000020 MOV     FF$CDB+2(R2),R3 ;Get pointer to 1st CDB for the file
34 004674 016202 0000000 MOV     FF$CDB(R2),R2
35 004700 3$: MAPTO R3          ;Map to the CDB
36 004704 020204         CMP     R2,R4          ;Is the same CDB that is doing the write?
37 004706 001002         BNE     1$          ;Br if not
38 004710 020305         CMP     R3,R5
39 004712 001403         BEQ     2$          ;Br if yes
40 004714 152762 0000000 0000000 1$: BISB   #FL$ACT,FC$FLG(R2);Set flag saying file has been modified
41 004722 016203 0000020 2$: MOV     FC$FLK+2(R2),R3 ;Get pointer to next CDB
42 004726 016202 0000000 MOV     FC$FLK(R2),R2
43 004732 001362         BNE     3$          ;Br if there is another CDB
44         ;
45         ; See if we need to check for updating the shared-file data cache
46         ;
47 004734 005737 0000000 TST     @#NUMDCD      ;Are we doing data caching?
48 004740 001410         BEQ     9$          ;Br if not
49 004742         MAPTO R5          ;Map to the CDB
50 004746 016402 0000000 MOV     FC$FDB(R4),R2 ;Get pointer to FDB
51 004752 016403 0000020 MOV     FC$FDB+2(R4),R3
52 004756 004767 000532         CALL    DCWRT       ;Check for update to data cache
53         ;
54         ; Finished
55         ;
56 004762 012637 0000000 9$: MOV     (SP)+,@#KPAR5
57 004766 012605         MOV     (SP)+,R5

```

58	004770	012604	MOV	(SP)+, R4
59	004772	012603	MOV	(SP)+, R3
60	004774	012602	MOV	(SP)+, R2
61	004776	000207	RETURN	

\*\* Data Caching Routines \*\*

```

1          .SBTTL  ** Data Caching Routines **
2          ;
3          ; Note: The code related to shared file data caching is not loaded
4          ; unless data caching is wanted.
5          ;
6 005000   DCCBAS:          ; Start of data caching code
7          ;
8          .SBTTL  DCRD1  -- Try to read data from cache
9          ;-----
10         ; DCRD1 is called from the .READ routine to attempt to obtain
11         ; the data needed by the read from the data cache.
12         ; If the desired data is in the data cache, it is transferred to the
13         ; user's buffer.
14         ;
15         ; Inputs:
16         ;   CHNNUM = # of I/O channel
17         ;   EMTBLK+2 = File block # where transfer starts
18         ;   EMTBLK+4 = Base address of user's buffer
19         ;   EMTBLK+6 = Number of words to be transferred
20         ;
21         ; Outputs:
22         ;   C-flag cleared if data was found in cache
23         ;
24 005000   010146   DCRD1:  MOV     R1,-(SP)
25 005002   010246       MOV     R2,-(SP)
26 005004   010346       MOV     R3,-(SP)
27 005006   010446       MOV     R4,-(SP)
28 005010   010546       MOV     R5,-(SP)
29 005012   013746   0000006  MOV     @#KPAR5,-(SP)
30         ;
31         ; See if this channel is opened to a shared file
32         ;
33 005016   004767   177332   CALL    FNDCDB          ; Search for CDB for this channel
34 005022   103447       BCS     9$              ; Br if this channel not opened to shared file
35         ;
36         ; This channel is opened to a shared file.
37         ; Get pointer to FDB for the file.
38         ;
39 005024       MAPTO   R5          ; Map to the CDB
40 005030   016402   0000006  MOV     FC$FDB(R4),R2   ; Get pointer to the FDB
41 005034   016403   0000026  MOV     FC$FDB+2(R4),R3
42         ;
43         ; Set up information about the transfer
44         ;
45 005040   013767   0000026  173032  MOV     @#EMTBLK+2,CBLOCK; Get base block number
46 005046   013767   0000046  173026  MOV     @#EMTBLK+4,CBUF  ; Get base address of user's buffer
47 005054   013767   0000066  173022  MOV     @#EMTBLK+6,CWORDS; Get # words to transfer
48         ;
49         ; Try to find data block in the cache
50         ;
51 005062   005237   0000006  1$:     INC     @#DCTRD          ; Inc total # reads from shared files
52 005066   001002       BNE     4$              ; Br if did not overflow
53 005070   004767   001510       CALL    CLRST          ; Reset cache statistics
54 005074   004767   000540   4$:     CALL    FNDDCD          ; See if block is in cache
55 005100   103420       BCS     9$              ; Br if block is not in cache
56         ;
57         ; Found data block in cache --- Move data to user's buffer

```

```
58 ;  
59 005102 005237 0000000 ; INC @#DCCRD ; Inc # reads satisfied by cache data  
60 005106 004767 001304 ; CALL DCMVTU ; Move data to user's buffer  
61 ;  
62 ; Increment use count for cache entry  
63 ;  
64 005112 004767 001172 ; CALL DCINCU ; Increment use count for cache entry  
65 ;  
66 ; See if we need more data  
67 ;  
68 005116 005267 172756 ; INC CBLOCK ; Increment file block number  
69 005122 062767 001000 172752 ; ADD #512.,CBUF ; Advance buffer address  
70 005130 162767 000400 172746 ; SUB #256.,CWORDS ; Dec # words left to be transferred  
71 005136 003351 ; BGT 1$ ; Br if more needed  
72 ;  
73 ; Successful completion  
74 ;  
75 005140 000241 ; CLC ; Say read was satisfied from cache  
76 ;  
77 ; Finished  
78 ;  
79 005142 012637 0000000 9$: MOV (SP)+, @#KPAR5  
80 005146 012605 ; MOV (SP)+, R5  
81 005150 012604 ; MOV (SP)+, R4  
82 005152 012603 ; MOV (SP)+, R3  
83 005154 012602 ; MOV (SP)+, R2  
84 005156 012601 ; MOV (SP)+, R1  
85 005160 000207 ; RETURN
```

DCRD2 -- Update cache following read

```

1          .SBTTL  DCRD2  --- Update cache following read
2          ;-----
3          ; DCRD2 is called following a .READ operation to see if the data
4          ; just read should be placed in the data cache.
5          ;
6          ; Inputs:
7          ;   CHNUM = # of I/O channel
8          ;   EMTBLK+2 = File block number
9          ;   EMTBLK+4 = Base address of user's buffer
10         ;   EMTBLK+6 = Number of words transferred
11         ;
12 005162 010146 DCRD2:  MOV     R1,-(SP)
13 005164 010246        MOV     R2,-(SP)
14 005166 010346        MOV     R3,-(SP)
15 005170 010446        MOV     R4,-(SP)
16 005172 010546        MOV     R5,-(SP)
17 005174 013746 0000000 MOV     @#KPAR5,-(SP)
18         ;
19         ; See if this channel is opened to a shared file
20         ;
21 005200 004767 177150   CALL    FNDCDB      ;Search for CDB for this channel
22 005204 103533         BCS     9$          ;Br if channel not open to shared file
23         ;
24         ; See if data caching is being suppressed on this channel
25         ;
26 005206         MAPTO   R5          ;Map to the CDB
27 005212 132764 0000000 0000000 BITB   #FL$NDC,FC$FLG(R4);Is data caching being suppressed?
28 005220 001125         BNE     9$          ;Br if yes
29         ;
30         ; We are doing data caching for this file.
31         ; Wait for .READ operation to finish.
32         ;
33 005222 004737 0000000   CALL    @#IQWAIT    ;Wait for .READ to finish
34         ;
35         ; Set up data about the transfer
36         ;
37 005226 013767 0000020 172644   MOV     @#EMTBLK+2,CBLOCK;File block number
38 005234 013767 0000040 172640   MOV     @#EMTBLK+4,CBUF ;Buffer address
39 005242 013767 0000060 172634   MOV     @#EMTBLK+6,CWORDS;Number of words read
40 005250         MAPTO   R5          ;Map to the CDB
41 005254 016402 0000000        MOV     FC$FDB(R4),R2 ;Get pointer to FDB for file
42 005260 016403 0000020        MOV     FC$FDB+2(R4),R3
43         ;
44         ; See if data block is currently in cache
45         ;
46 005264 026727 172614 000400 3$:  CMP     CWORDS,#256. ;Are there at least 256 words left?
47 005272 103453         BLO     2$          ;Br if not -- Don't have a block left
48 005274 004767 000340        CALL    FNDDCD      ;See if this block is in the cache
49 005300 103037         BCC     1$          ;Br if yes -- Don't need to put it there
50         ;
51         ; This data block is not currently in the cache -- Put it there
52         ;
53 005302 004767 000646        CALL    NEWDCD      ;Get a new data cache descriptor block
54 005306 103445         BCS     2$          ;Br if no free cache descriptor blocks
55         ;
56         ; Initialize a new data cache descriptor block (pointer in R4,R5)
57         ;

```

```

58 005310          MAPTO  R3          ;Map to the FDB
59 005314 016200 000000G  MOV    FF$DCD(R2),R0  ;Get pointer to 1st DCD for file
60 005320 016201 000002G  MOV    FF$DCD+2(R2),R1
61 005324 010462 000000G  MOV    R4,FF$DCD(R2) ;Set us as the 1st DCD for file
62 005330 010562 000002G  MOV    R5,FF$DCD+2(R2)
63 005334          MAPTO  R5          ;Map to the new DCD
64 005340 010064 000000G  MOV    R0,DC$LNK(R4) ;Add us to chain for this FDB
65 005344 010164 000002G  MOV    R1,DC$LNK+2(R4)
66 005350 010264 000000G  MOV    R2,DC$FDB(R4) ;Make DCD point to FDB
67 005354 010364 000002G  MOV    R3,DC$FDB+2(R4)
68 005360 016764 172514 000000G  MOV    CBLOCK,DC$BLK(R4);Remember the file block number
69 005366 012764 177777 000000G  MOV    #-1,DC$USE(R4) ;Temporarily set use count very high
70          ;
71          ; Move data from user's buffer to cache
72          ;
73 005374 004767 001114          CALL   DCMVTC          ;Move data to cache
74          ;
75          ; See if there is more data to be moved to cache
76          ;
77 005400 005267 172474 1$: INC    CBLOCK          ;Advance file block number
78 005404 062767 001000 172470  ADD    #512.,CBUF        ;Advance buffer address
79 005412 162767 000400 172464  SUB    #256.,CWORDS     ;Reduce # words left to transfer
80 005420 003321          BGT    3$              ;Br if more data remaining
81          ;
82          ; Reset use counters for cache blocks just added
83          ;
84 005422 2$: MAPTO  R3          ;Map to the FDB
85 005426 016204 000000G  MOV    FF$DCD(R2),R4  ;Get pointer to 1st DCD for file
86 005432 016205 000002G  MOV    FF$DCD+2(R2),R5
87 005436 001416          BEQ    9$              ;Br if not DCD's for file
88 005440 4$: MAPTO  R5          ;Map to the DCD
89 005444 026427 000000G 177777  CMP    DC$USE(R4),#-1 ;Is this one that we just added?
90 005452 001010          BNE    9$              ;Br if not
91 005454 012764 000004 000000G  MOV    #4,DC$USE(R4) ;Set initial use count
92 005462 016405 000002G  MOV    DC$LNK+2(R4),R5 ;Chain to next DCD
93 005466 016404 000000G  MOV    DC$LNK(R4),R4
94 005472 001362          BNE    4$              ;Br if more DCD's to check
95          ;
96          ; Finished
97          ;
98 005474 012637 000000G  9$:  MOV    (SP)+,@#KPAR5
99 005500 012605          MOV    (SP)+,R5
100 005502 012604          MOV    (SP)+,R4
101 005504 012603          MOV    (SP)+,R3
102 005506 012602          MOV    (SP)+,R2
103 005510 012601          MOV    (SP)+,R1
104 005512 000207          RETURN

```

DCWRT -- Check for writes to shared file data cache

```

1          .SBTTL  DCWRT  -- Check for writes to shared file data cache
2          ;-----
3          ; DCWRT is called each time a .WRITE operation is done to a shared file.
4          ; It checks to see if the data being written needs to be placed in the
5          ; shared file data cache.
6          ;
7          ; Inputs:
8          ; R2,R3 = Pointer to FDB for file being written to.
9          ; CHNNUM = Number of I/O channel.
10         ; EMTBLK+2 = File block number
11         ; EMTBLK+4 = Base address of user's buffer
12         ; EMTBLK+6 = Number of words being written
13         ;
14 005514  010446  DCWRT:  MOV     R4,-(SP)
15 005516  010546          MOV     R5,-(SP)
16         ;
17         ; Set up information about the transfer
18         ;
19 005520  013767  0000020 172352          MOV     @#EMTBLK+2,CBLOCK;Block number
20 005526  013767  0000040 172346          MOV     @#EMTBLK+4,CBUF ;Buffer address
21 005534  013767  0000060 172342          MOV     @#EMTBLK+6,CWORDS;Number of words being written
22         ;
23         ; See if data block is in cache now
24         ;
25 005542  005237  0000000          6$:    INC     @#DCTWR          ;Inc total # writes to shared files
26 005546  001002          BNE     7$                  ;Br if count did not overflow
27 005550  004767  001030          CALL   CLRST                ;Reset statistics
28 005554  004767  000060          7$:    CALL   FNDDCD            ;Is this block in the cache now?
29 005560  103413          BCS    5$                  ;Br if not
30         ;
31         ; Block is in cache -- Update it
32         ;
33 005562  005237  0000000          INC     @#DCCWR            ;Inc # writes that update cache
34 005566  026727  172312  000400          CMP     CWORDS,#256.       ;Do we have a full block of data?
35 005574  103003          BHS    4$                  ;Br if yes
36 005576  004767  000222          CALL   RELDCD              ;Remove the cache entry if short write
37 005602  000402          BR     5$                  ;
38 005604  004767  000704          4$:    CALL   DCMVTC           ;Move data from user's buffer to cache
39         ;
40         ; See if there are more blocks to update
41         ;
42 005610  005267  172264          5$:    INC     CBLOCK          ;Increment block number
43 005614  062767  001000  172260          ADD     #512.,CBUF         ;Advance buffer address
44 005622  162767  000400  172254          SUB     #256.,CWORDS       ;Reduce # words left
45 005630  003344          BGT    6$                  ;Br if some data left
46         ;
47         ; Finished
48         ;
49 005632  012605          MOV     (SP)+,R5
50 005634  012604          MOV     (SP)+,R4
51 005636  000207          RETURN

```

```

1          .SBTTL FNDDCD -- Try to find data cache descriptor for data block
2          ;-----
3          ; FNDDCD is called to try to find a data cache descriptor for a disk
4          ; data block that is being held by the shared file data cache.
5          ;
6          ; Inputs:
7          ; R2,R3 = Pointer to FDB for shared file.
8          ; CBLOCK = Block number
9          ;
10         ; Outputs:
11         ; C-flag cleared if block is currently in cache.
12         ; R4,R5 = Pointer to data cache descriptor block for entry if found.
13         ;
14 005640 013746 000000G FNDDCD: MOV     @#KPAR5,-(SP)
15         ;
16         ; Get pointer to 1st DCD for this file
17         ;
18 005644         MAPTO   R3           ;Map to the FDB
19 005650 016204 000000G MOV     FF$DCD(R2),R4 ;Get pointer to 1st DCD for file
20 005654 001416         BEQ     2$           ;Br if file has no DCD's
21 005656 016205 000002G MOV     FF$DCD+2(R2),R5
22 005662 016700 172212 MOV     CBLOCK,R0 ;Get file block number
23         ;
24         ; Search for DCD for block of interest
25         ;
26 005666 1$: MAPTO   R5           ;Map to the DCD
27 005672 020064 000000G CMP     R0,DC$BLK(R4) ;Is this DCD for the right block?
28 005676 001407         BEQ     3$           ;Br if yes
29 005700 016405 000002G MOV     DC$LNK+2(R4),R5 ;Get pointer to next DCD
30 005704 016404 000000G MOV     DC$LNK(R4),R4
31 005710 001366         BNE     1$           ;Br if more DCD's for this file
32         ;
33         ; Could not find data cache entry for this block
34         ;
35 005712 000261 2$: SEC           ;Signal failure on return
36 005714 000401         BR      9$
37         ;
38         ; Found data cache entry for block
39         ;
40 005716 000241 3$: CLC           ;Signal success on return
41         ;
42         ; Finished
43         ;
44 005720 012637 000000G 9$: MOV     (SP)+,@#KPAR5
45 005724 000207         RETURN

```

```
1 .SBTTL CLSDCD -- Release all data cache entries for a file
2 ;-----
3 ; CLSDCD is called to release all data cache entries associated with
4 ; a shared file.
5 ;
6 ; Inputs:
7 ; R2,R3 = Pointer to FDB for the file
8 ;
9 005726 010446 CLSDCD: MOV R4,-(SP)
10 005730 010546 MOV R5,-(SP)
11 005732 013746 000000@ MOV @#KPAR5,-(SP)
12 ;
13 ; Release all data cache blocks associated with the file
14 ;
15 005736 MAPTO R3 ;Map to the FDB
16 005742 016204 000000@ MOV FF$DCD(R2),R4 ;Point to 1st DCD
17 005746 016205 000002@ MOV FF$DCD+2(R2),R5
18 005752 001417 BEQ 5$ ;Br if no data cache descriptors for file
19 005754 005062 000000@ CLR FF$DCD(R2) ;Say FDB has no associated cache descriptors
20 005760 005062 000002@ CLR FF$DCD+2(R2)
21 005764 4$: MAPTO R5 ;Map to data cache descriptor
22 005770 005064 000000@ CLR DC$FDB(R4) ;Say data cache descriptor is free
23 005774 005064 000002@ CLR DC$FDB+2(R4)
24 006000 016405 000002@ MOV DC$LNK+2(R4),R5 ;Get pointer to next DCD
25 006004 016404 000000@ MOV DC$LNK(R4),R4
26 006010 001365 BNE 4$ ;Br if more DCD's to free
27 ;
28 ; Finished
29 ;
30 006012 012637 000000@ 5$: MOV (SP)+,@#KPAR5
31 006016 012605 MOV (SP)+,R5
32 006020 012604 MOV (SP)+,R4
33 006022 000207 RETURN
```

```

1          .SBTTL RELDCD -- Release a data cache entry
2          ;-----
3          ; RELDCD is called to release (deallocate) a data cache entry and
4          ; mark it as free.
5          ;
6          ; Inputs:
7          ; R4,R5 = Pointer to DCD to be released.
8          ;
9 006024 010146 RELDCD: MOV R1,-(SP)
10 006026 010246      MOV R2,-(SP)
11 006030 010346      MOV R3,-(SP)
12 006032 013746 000000G      MOV @#KPAR5,-(SP)
13          ;
14          ; Unlink DCD from linked list associated with shared file
15          ;
16 006036      MAPTO R5 ;Map to the DCD
17 006042 016400 000000G      MOV DC$LNK(R4),R0 ;Get pointer to DCD that follows our one
18 006046 016401 000002G      MOV DC$LNK+2(R4),R1
19 006052 016402 000000G      MOV DC$FDB(R4),R2 ;Get pointer to FDB
20 006056 016403 000002G      MOV DC$FDB+2(R4),R3
21 006062 005064 000000G      CLR DC$FDB(R4) ;Mark the DCD as free
22 006066 005064 000002G      CLR DC$FDB+2(R4)
23 006072 062702 000000C      ADD #FF$DCD-DC$LNK,R2 ;Fake pointer to link cell
24 006076      1$: MAPTO R3 ;Map to the next DCD (or FDB if 1st time)
25 006102 026204 000000G      CMP DC$LNK(R2),R4 ;Are we next DCD on list?
26 006106 001003      BNE 3$ ;Br if not
27 006110 026205 000002G      CMP DC$LNK+2(R2),R5
28 006114 001405      BEQ 2$ ;Br if yes
29 006116 016203 000002G      3$: MOV DC$LNK+2(R2),R3 ;Get pointer to next DCD
30 006122 016202 000000G      MOV DC$LNK(R2),R2
31 006126 000763      BR 1$ ;Go check it
32 006130 010062 000000G      2$: MOV R0,DC$LNK(R2) ;Relink chain around us
33 006134 010162 000002G      MOV R1,DC$LNK+2(R2)
34          ;
35          ; Finished
36          ;
37 006140 012637 000000G      MOV (SP)+,@#KPAR5
38 006144 012603      MOV (SP)+,R3
39 006146 012602      MOV (SP)+,R2
40 006150 012601      MOV (SP)+,R1
41 006152 000207      RETURN

```

NEWDCD -- Locate a free data cache descriptor

```

1          .SBTTL  NEWDCD -- Locate a free data cache descriptor
2          ;-----
3          ; NEWDCD is called to find a data cache descriptor to be used for a
4          ; new cache entry.  It finds a free entry or the least used non-free entry.
5          ;
6          ; Outputs:
7          ; C-flag set on return if there are no free entries.
8          ; R4,R5 = Pointer to new entry if one was found.
9          ;
10         NEWDCD:  MOV     R1,-(SP)
11                MOV     R2,-(SP)
12                MOV     R3,-(SP)
13         006154  010146  00000000  MOV     @KPAR5,-(SP)
14
15         ; Search for a free or least-used data cache descriptor
16         ;
17         006166  013701  00000000  MOV     @NUMDCD,R1      ;Max # cache entries we are allowed to use
18         006172  016704  171676   MOV     DCDBAS,R4      ;Point to 1st data cache descriptor
19         006176  016705  171674   MOV     DCDBAS+2,R5
20         006202  012700  177777   MOV     #-1,R0        ;Initialize use count
21         006206  1#:     MAPTD  R5          ;Map to the DCD
22         006212  005764  00000000  TST     DC$FDB(R4)    ;Is this cache entry free?
23         006216  001425   BEQ     4$            ;Br if yes -- Use this entry
24         006220  026400  00000000  CMP     DC$USE(R4),R0 ;Is this entry less used than any found so far
25         006224  103004   BHS    2$            ;Br if not
26         006226  010402   MOV     R4,R2        ;Save pointer to least used entry
27         006230  010503   MOV     R5,R3
28         006232  016400  00000000  MOV     DC$USE(R4),R0 ;Save associated use count
29         006236  016405  00000020  2#:     MOV     DC$NXT+2(R4),R5 ;Get pointer to next DCD
30         006242  016404  00000000  MOV     DC$NXT(R4),R4
31         006246  077121   SOB    R1,1$        ;Loop if we are allowed to use more
32
33         ; Finished searching through all cache descriptors.
34         ; See if we found one we can use.
35         ;
36         006250  020027  177777   CMP     R0,-1        ;Did we find an available one?
37         006254  001002   BNE    3$            ;Br if yes
38         006256  000261   SEC
39         006260  000405   BR     9$            ;Signal failure on return
40
41         ; We found a cache entry that we can use
42         ;
43         006262  010204  3#:     MOV     R2,R4          ;Get pointer to entry to use
44         006264  010305   MOV     R3,R5
45         006266  004767  177532   CALL    RELDCD       ;Free the entry
46         006272  000241  4#:     CLC              ;Signal success on return
47
48         ; Finished
49         ;
50         006274  012637  00000000  9#:     MOV     (SP)+,@KPAR5
51         006300  012603   MOV     (SP)+,R3
52         006302  012602   MOV     (SP)+,R2
53         006304  012601   MOV     (SP)+,R1
54         006306  000207   RETURN

```

```

1          . SBTTL  DCINCU -- Increment use count for data cache entry
2          ;-----
3          ; DCINCU is called to increment the use counter for a data cache entry.
4          ; If the total number of increments done for all entires reaches
5          ; DCAGE, all of the use counts are divided by two.
6          ;
7          ; Inputs:
8          ; R4,R5 = Pointer to data cache descriptor which is to be incremented.
9          ;
10         DCINCU: MOV     R2,-(SP)
11         006312 010346      MOV     R3,-(SP)
12         006314 013746 0000000  MOV     @#KPAR5,-(SP)
13         ;
14         ; See if it is time to divide all use counts
15         ;
16         006320 005237 0000000      INC     @#DCTOTU      ;Increment total use count
17         006324 023727 0000000 0000000  CMP     @#DCTOTU,#DCAGE ;Is it time to divide all use counts?
18         006332 103417      BLO     2$          ;Br if not
19         ;
20         ; Divide all use counts by two
21         ;
22         006334 005037 0000000      CLR     @#DCTOTU      ;Reset total use counter
23         006340 016702 171530      MOV     DCDBAS,R2     ;Get pointer to 1st DCD
24         006344 016703 171526      MOV     DCDBAS+2,R3
25         006350      1$:  MAPTO   R3          ;Map to a DCD
26         006354 006262 0000000      ASR     DC$USE(R2)    ;Divide the use count by 2
27         006360 016203 0000020      MOV     DC$NXT+2(R2),R3 ;Get pointer to next DCD
28         006364 016202 0000000      MOV     DC$NXT(R2),R2
29         006370 001367      BNE     1$          ;Loop if more to do
30         ;
31         ; Increment use count for specified entry
32         ;
33         006372      2$:  MAPTO   R5          ;Map to the entry
34         006376 062764 000002 0000000  ADD     #2,DC$USE(R4) ;Increment use count
35         ;
36         ; Finished
37         ;
38         006404 012637 0000000      MOV     (SP)+,@#KPAR5
39         006410 012603      MOV     (SP)+,R3
40         006412 012602      MOV     (SP)+,R2
41         006414 000207      RETURN

```

DCMVTU -- Move data from cache to user's buffer

```

1          .SBTTL  DCMVTU -- Move data from cache to user's buffer
2          ;-----
3          ; DCMVTU is called to move data from a cache entry to the user's buffer.
4          ;
5          ; Inputs:
6          ; R4,R5 = Pointer to data cache descriptor
7          ; CBUF = Virtual address of user's data buffer
8          ; CWORDS = Number of words to move
9          ;
10         DCMVTU:  MOV     R2,-(SP)
11                MOV     R3,-(SP)
12         006416 010246 00000000      MOV     @#KPAR5,-(SP)
13                ;
14                ; Validate the buffer address
15                ;
16         006426 016703 171450      MOV     CBUF,R3      ;Get the buffer address
17         006432 010300      MOV     R3,R0
18         006434 004737 00000000      CALL    @#VALADW     ;Validate it
19                ;
20                ; Map par 5 to the cache buffer
21                ;
22         006440      MAPTO  R5      ;Map to the DCD
23         006444      MAPTO  DC#PAR(R4) ;Map par 5 to cache buffer
24                ;
25                ; Move data from cache to user's buffer
26                ;
27         006452 012702 00000000      MOV     #VPAR5,R2     ;Get virtual address of cache buffer
28         006456 012700 000400      MOV     #256.,R0     ;Get max # words we can move
29         006462 026700 171416      CMP     CWORDS,R0    ;Do we have that much to move?
30         006466 103002      BHIS   1$      ;Br if yes
31         006470 016700 171410      MOV     CWORDS,R0    ;Get # words to move
32         006474 012246      1$:   MOV     (R2)+,-(SP) ;Get word from cache buffer
33         006476 106623      MTPD   (R3)+      ;Move to user's buffer
34         006500 077003      SOB    R0,1$      ;Loop if more words to move
35                ;
36                ; Finished
37                ;
38         006502 012637 00000000      MOV     (SP)+,@#KPAR5
39         006506 012603      MOV     (SP)+,R3
40         006510 012602      MOV     (SP)+,R2
41         006512 000207      RETURN

```

```

1          .SBTTL  DCMVTC -- Move data from user's buffer to cache
2          ;-----
3          ; DCMVTC is called to move a block of data (256 words) from the user's
4          ; buffer to a cache buffer.
5          ;
6          ; Inputs:
7          ; R4,R5 = Pointer to cache descriptor block
8          ; CBUF = Virtual address of user's buffer
9          ;
10         DCMVTC:  MOV     R2,-(SP)
11                MOV     R3,-(SP)
12         006514  010246      MOV     @#KPAR5,-(SP)
13                ;
14                ; Validate the buffer address
15                ;
16         006524  016703  171352      MOV     CBUF,R3      ;Get user's buffer address
17         006530  010300      MOV     R3,R0
18         006532  004737  000000G     CALL    @#VALADW     ;Validate it
19                ;
20                ; Map par 5 to the cache buffer
21                ;
22         006536                MAPTD   R5      ;Map to the DCD
23         006542                MAPTD   DC#PAR(R4) ;Map to the cache buffer
24                ;
25                ; Move data from user's buffer to the cache buffer
26                ;
27         006550  012702  000000G     MOV     #VPAR5,R2     ;Get virtual address of cache buffer
28         006554  012700  000200      MOV     #128.,R0      ;Move 128 double-words
29         006560  106523      1$: MFPD   (R3)+     ;Get a word from user's buffer
30         006562  012622      MOV     (SP)+,(R2)+   ;Move to cache buffer
31         006564  106523      MFPD   (R3)+     ;Get another word from user's buffer
32         006566  012622      MOV     (SP)+,(R2)+   ;Move to cache buffer
33         006570  077005      SOB    R0,1$        ;Loop if more to move
34                ;
35                ; Finished
36                ;
37         006572  012637  000000G     MOV     (SP)+,@#KPAR5
38         006576  012603      MOV     (SP)+,R3
39         006600  012602      MOV     (SP)+,R2
40         006602  000207      RETURN

```

CLRST -- Reset data cache statistics

```

1          .SBTTL CLRST -- Reset data cache statistics
2          ;-----
3          ; CLRST is called to reset the usage statistics counters that
4          ; accumulate data regarding data caching.
5          ;
6 006604 005037 0000000 CLRST: CLR    @#DCTRD    ; Total number of reads from shared files
7 006610 005037 0000000      CLR    @#DCCRD    ; Number of reads satisfied by cache
8 006614 005037 0000000      CLR    @#DCTWR    ; Total number of writes to shared files
9 006620 005037 0000000      CLR    @#DCCWR    ; Number of writes that update cache data
10         ;
11         ; Finished
12         ;
13 006624 000207          RETURN
14         ;
15         ; Compute size of code related to data caching
16         ;
17         001626 DCCSIZ =      .-DCCBAS    ; Size of data caching code
18         ;
19         000001      .END

```

Errors detected: 0

\*\*\* Assembler statistics

Work file reads: 0  
 Work file writes: 0  
 Size of work file: 8518 Words ( 34 Pages)  
 Size of core pool: 17920 Words ( 70 Pages)  
 Operating system: RT-11

Elapsed time: 00:01:26.05  
 DK: TSLOCK, LP: TSLOCK=DK: TSLOCK. MAC/C/N: SYM



DCWRT	29-52	32-14#										
DOCOPN	1-60	8-6#										
DOCULK	1-65	13-6#										
DOOPAP	1-59	7-14#										
DORLK	1-63	11-6#										
DOSFCK	1-67	15-10#										
DOTLK	1-64	12-6#										
DOULK1	1-66	14-6#										
ECO	2-4#											
EC1	2-5#	8-27	11-15	12-12	13-12	14-12						
EC2	2-6#	8-35	15-26	19-107								
EC3	2-7#	8-62	12-30									
EC4	2-8#	8-104	12-36									
EMTBLK	1-34	7-14	11-21	12-17	14-23	30-45	30-46	30-47	31-37	31-38	31-39	32-19
	32-20	32-21										
EMTXIT	1-43	8-123	11-40	12-24	13-21	14-46	15-31					
ENQTL	1-27	24-34										
FC##SS	1-43											
FC#ACC	1-29	16-31*	17-36									
FC#CHN	1-28	10-31	10-59*	16-24*	27-25							
FC#CLK	1-29	4-56*	4-57*	8-40	8-41	16-35*	16-36*	25-22	25-23	25-24	25-25	25-27
	25-29	25-30	25-33*	25-34*	25-39*	25-40*	27-27	27-28				
FC#FDB	1-28	8-118*	8-119*	12-32	12-33	19-49	19-50	21-20	21-21	23-23	23-24	25-49
	25-50	29-31	29-32	29-50	29-51	30-40	30-41	31-41	31-42			
FC#FLG	1-39	9-20*	10-27	10-45	10-60*	14-18	15-20	15-25*	16-27*	19-25	19-86*	22-16
	23-22*	27-23	29-40*	31-27								
FC#FLK	1-28	8-116*	8-117*	10-33	10-34	10-49	10-50	17-41	17-42	20-45	20-46	25-47
	25-48	25-54	25-56	25-58	25-60	25-61	25-63*	25-64*	29-41	29-42		
FC#LBN	1-29	1-36	4-51	14-35	16-20	19-41	19-96	20-37	22-26			
FC#NLB	1-43	19-38	19-87*	19-93	19-100*	20-32	23-21*					
FC#UN	1-29	10-29	10-47	16-23*	20-34							
FCFREE	3-45#	4-47*	4-48*	8-33	8-37	8-40*	8-41*	25-39	25-40	25-41*	25-42*	
FF##SZ	1-36	4-35	8-73									
FF#CDB	1-32	8-111	8-112	8-113*	8-114*	10-22	10-23	10-42	10-43	17-29	17-30	20-24
	20-26	25-54	25-77	29-33	29-34							
FF#DCD	1-40	31-59	31-60	31-61*	31-62*	31-85	31-86	33-19	33-21	34-16	34-17	34-19*
	34-20*	35-23										
FF#FID	1-32	8-86*	8-87*	28-44	28-46							
FF#FLG	1-39	12-34	19-64	19-83*	23-27*							
FF#FLK	1-32	4-40*	4-41*	8-70	8-71	8-79*	8-80*	26-16	26-17	26-19	26-20	26-22
	26-24	26-25	26-28*	26-29*	26-34*	26-35*	28-48	28-49				
FF#FWD	1-32	21-46	21-68	23-31	23-32							
FF#NLB	1-39	19-56	19-84*	19-102*	23-26*	23-54						
FFFREE	3-43#	4-33*	4-34*	8-56	8-68	8-70*	8-71*	26-34	26-35	26-36*	26-37*	
FFHEAD	3-44#	8-79	8-80	8-81*	8-82*	26-18	26-18	28-40	28-42			
FL#ACT	1-29	15-20	15-25	29-40								
FL#EFL	1-39	14-18	19-25	19-86	22-16	23-22						
FL#NDC	1-30	16-27	31-27									
FL#SPN	1-29	9-20	10-27	10-45	10-60	27-23						
FNDCCD	8-11	9-13	11-10	12-10	13-10	14-10	15-14	18-12	27-11#	29-23	30-33	31-21
FNDDCD	30-54	31-48	32-28	33-14#								
FNDFDB	8-50	10-14	28-16#									
FREFDB	25-83	26-8#										
FT#EFL	1-39	12-34	19-64	19-83	23-27							
FW##SZ	1-36	4-20										
FW#DBN	1-33	21-38*	23-41	23-48	23-56	23-61						

FW#UN	1-33	21-37*	24-15										
FW#WLK	1-33	4-26*	4-27*	21-32	21-33	21-39*	21-40*	21-46	21-48	21-50	21-51	21-53*	
	21-54*	21-66	21-67	21-68	21-70	21-72	21-74	21-75	21-77*	21-78*	21-83*	21-84*	
	23-44	23-45	23-63	23-64									
FWFREE	3-46#	4-21*	4-22*	21-29	21-30	21-32*	21-33*	21-83	21-84	21-85*	21-86*		
INICDB	8-46	16-11#											
IDWAIT	1-30	31-33											
JCDB	1-35	16-35	16-36	16-37*	16-38*	25-24	27-15	27-17					
KPAR5	1-43	4-11	4-81*	4-90*	5-28*	6-22*	8-39*	8-69*	8-110*	8-115*	9-9	9-19*	
	9-24*	10-10	10-21*	10-26*	10-41*	10-44*	10-64*	12-31*	12-33*	14-17*	15-19*	16-13	
	16-17*	16-42*	17-17	17-28*	17-35*	17-56*	18-8	18-22*	19-19	19-24*	19-55*	19-82*	
	19-85*	19-92*	19-101*	19-124*	20-19	20-23*	20-31*	20-60*	21-15	21-19*	21-31*	21-47*	
	21-65*	21-69*	21-82*	21-90*	22-11	22-15*	22-36*	23-15	23-20*	23-25*	23-40*	23-47*	
	23-55*	23-74*	24-10	24-14*	24-38*	25-13	25-21*	25-31*	25-38*	25-55*	25-76*	25-87*	
	26-11	26-15*	26-26*	26-33*	26-41*	27-11	27-22*	27-42*	28-17	28-43*	28-63*	29-19	
	29-30*	29-32*	29-35*	29-49*	29-56*	30-29	30-39*	30-79*	31-17	31-26*	31-40*	31-58*	
	31-63*	31-84*	31-88*	31-98*	33-14	33-18*	33-26*	33-44*	34-11	34-15*	34-21*	34-30*	
	35-12	35-16*	35-24*	35-37*	36-13	36-21*	36-50*	37-12	37-25*	37-33*	37-38*	38-12	
	38-22*	38-23*	38-38*	39-12	39-22*	39-23*	39-37*						
LDBASE	1-37	28-31											
LDDEVX	1-41	28-27											
LDPDEV	1-41	28-30											
LKWAIT	11-35	21-10#											
LOKCSH	1-35	4-80											
LOKINI	1-58	4-6#											
LOKMEM	1-37	4-16											
LPRI	1-27	24-31	24-31										
LSTATE	1-27	24-28	24-29										
NEWDCD	31-53	36-10#											
NLINES	1-33	4-23											
NUMCDB	1-31	8-38*	25-43*										
NUMDCD	1-35	8-96	25-70	29-47	36-17								
OPNCOM	7-15	8-11#											
QHIPRI	1-38	24-19											
QNSPND	1-38	21-59											
RELDCD	32-36	35-9#	36-45										
RESTRT	23-43	23-70	24-8#										
S#SFWT	1-38	21-58											
SETERR	1-43	8-28	8-36	8-63	8-105	11-16	11-30	12-13	12-37	13-13	14-13	15-27	
SFCLS	1-68	18-6#											
SFRSST	1-62	10-6#											
SFSVST	1-61	9-7#											
SFWRIT	1-69	29-15#											
TRYLK	11-26	12-19	19-17#										
TSLOCK	1-23	1-54#	1-58	1-59	1-60	1-61	1-62	1-63	1-64	1-65	1-66	1-67	
	1-68	1-69	1-70	1-71	1-72								
UNLOCK	14-41	22-19	22-30	23-10#									
VALADW	1-31	38-18	39-18										
VMLBLK	1-34	4-49	14-36	16-19	19-42	19-93	20-38	22-27					
VMXSF	1-33	4-36											
VMXSFC	1-33	4-52											
VNUMDC	1-34	4-63											
VPAR5	1-37	4-15	6-28	6-33	6-38	38-27	39-27						

