```
RRRRRRRRRRRR     MMM         MMM     SSSSSSSSSSSS
RRRRRRRRRRRR     MMM         MMM     SSSSSSSSSSSS
RRRRRRRRRRRR     MMM         MMM     SSSSSSSSSSSS
RRR         RRR  MMMMMM   MMMMMM  SSS
RRR         RRR  MMMMMM   MMMMMM  SSS
RRR         RRR  MMMMMM   MMMMMM  SSS
RRR         RRR  MMM   MMM   MMM  SSS
RRR         RRR  MMM   MMM   MMM  SSS
RRR         RRR  MMM   MMM   MMM  SSS
RRRRRRRRRRRR     MMM         MMM     SSSSSSSSS
RRRRRRRRRRRR     MMM         MMM     SSSSSSSSS
RRRRRRRRRRRR     MMM         MMM     SSSSSSSSS
RRR   RRR        MMM         MMM              SSS
RRR   RRR        MMM         MMM              SSS
RRR   RRR        MMM         MMM              SSS
RRR      RRR     MMM         MMM              SSS
RRR      RRR     MMM         MMM              SSS
RRR      RRR     MMM         MMM              SSS
RRR         RRR  MMM         MMM  SSSSSSSSSSSS
RRR         RRR  MMM         MMM  SSSSSSSSSSSS
RRR         RRR  MMM         MMM  SSSSSSSSSSSS
```

```
**FILE**ID**RMOJOURNL
```

```
RRRRRRRR    MM      MM    000000          JJ    000000    UU      UU  RRRRRRRR    NN      NN  LL
RRRRRRRR    MM      MM    000000          JJ    000000    UU      UU  RRRRRRRR    NN      NN  LL
RR      RR  MMMM  MMMM  00      00        JJ  00      00  UU      UU  RR      RR  NN      NN  LL
RR      RR  MMMM  MMMM  00      00        JJ  00      00  UU      UU  RR      RR  NN      NN  LL
RR      RR  MM  MM  MM  00    0000        JJ  00      00  UU      UU  RR      RR  NNNN    NN  LL
RR      RR  MM  MM  MM  00    0000        JJ  00      00  UU      UU  RR      RR  NNNN    NN  LL
RRRRRRRR    MM      MM  00  00  00        JJ  00      00  UU      UU  RRRRRRRR    NN  NN  NN  LL
RRRRRRRR    MM      MM  00  00  00        JJ  00      00  UU      UU  RRRRRRRR    NN  NN  NN  LL
RR  RR      MM      MM  0000    00  JJ    JJ  00      00  UU      UU  RR  RR      NN    NNNN  LL
RR  RR      MM      MM  0000    00  JJ    JJ  00      00  UU      UU  RR  RR      NN    NNNN  LL
RR    RR    MM      MM  00      00  JJ    JJ  00      00  UU      UU  RR    RR    NN      NN  LL              ....
RR    RR    MM      MM  00      00  JJ    JJ  00      00  UU      UU  RR    RR    NN      NN  LL              ....
RR      RR  MM      MM    000000      JJJJJJ      000000    UUUUUUUUUU  RR      RR  NN      NN  LLLLLLLLLL      ....
RR      RR  MM      MM    000000      JJJJJJ      000000    UUUUUUUUUU  RR      RR  NN      NN  LLLLLLLLLL      ....

LL            IIIIII      SSSSSSSS
LL            IIIIII      SSSSSSSS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II        SSSSSS
LL              II        SSSSSS
LL              II              SS
LL              II              SS
LL              II              SS
LL              II              SS
LLLLLLLLLL    IIIIII    SSSSSSSS
LLLLLLLLLL    IIIIII    SSSSSSSS
```

RMC
VO4

```
0000          $BEGIN  RM0JOURNL,000,RM$RMS_JOURNAL,<RMS Journaling Manager>
0000
0000    ;
0000    ;****************************************************************************
0000    ;*                                                                          *
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0000    ;*                                                                          *
0000    ;*                                                                          *
0000    ;****************************************************************************
0000    ;
0000    ;++
0000    ; Facility:       RMS-32
0000    ;
0000    ; Abstract:
0000    ;                 This module provides an interface between RMS and the
0000    ;                 Common Journaling Facility.
0000    ;
0000    ; Environment:
0000    ;                 VAX/VMS Operating System
0000    ;
0000    ; Author:         Jeffrey W. Horn,                  Creation Date:  17-Mar-1982
0000    ;
0000    ; Modified By:
0000    ;
0000    ;         V03-044 JWT0162         Jim Teague               8-Mar-1984
0000    ;                 Disable RM$RTVJNL for now.
0000    ;
0000    ;         V03-043 JWT0160         Jim Teague               29-Feb-1984
0000    ;                 Remove calls to RM$DEALLEFN.
0000    ;
0000    ;         V03-042 DAS0014         David Solomon            08-Feb-1984
0000    ;                 Specify ACE$M_NOPROPAGATE for RMSJNLID ACE (they should never
0000    ;                 be propagated, as they are meaningful to only one file). Fix bug
0000    ;                 that journal name ACEs were not being marked hidden/protected.
0000    ;
0000    ;         V03-041 DAS0013         David Solomon            21-Dec-1983
0000    ;                 Support BRO access for journaling.
0000    ;
0000    ;         V03-040 JWT0141         Jim Teague               11-Nov-1983
0000    ;                 Change IFB$V_RUM to IFB$V_ONLY_RU
0000    ;
```

```
0000   ;       V03-039 KPL0015         Peter Lieberwirth       27-Oct-1983
0000   ;               Fix bug introduced in V03-038.  Symptom was breaking relative
0000   ;               file extend journaling.
0000   ;
0000   ;       V03-038 KPL0014         Peter Lieberwirth       20-Oct-1983
0000   ;               If doing AI or BI recovery, avoid allocating IRAB JNLBDB
0000   ;               and buffer in CONJNL.  This is due to interactions with
0000   ;               setting IFB BIO and a recovery process being the only type
0000   ;               of process permitted to journal a file open for mixed
0000   ;               block and record access (BRO).  Symptom is an FTL$_DEALLER
0000   ;               bugcheck because a JNLBDB gets allocated and dropped when
0000   ;               another is allocated in RM$WRITE.  (Bugcheck happens on
0000   ;               close.)
0000   ;
0000   ;       V03-037 KPL0013         Peter Lieberwirth       11-Oct-1983
0000   ;               Deallocate EFNs after finishing with them.  Improper use
0000   ;               of EFNs is causing hangs in asynch situations.  Fix problem
0000   ;               with non-page aligned ALDJNLBUF allocations.
0000   ;
0000   ;       V03-036 DAS0012         David Solomon           27-Sep-1983
0000   ;               Preserve R3 in RM$WRTJNL (ISAM assumed it was preserved).
0000   ;               Corrected some comments.
0000   ;
0000   ;       V03-035 DAS0011         David Solomon           08-Sep-1983
0000   ;               Correct overzealous fix to RM$DSCJNL in V03-034. Fix test in
0000   ;               RM$MAPJNL that decides whether or not this is an open entry.
0000   ;               Return RMS$_JNF if no journal name specified, vs RMS$_NOJ.
0000   ;
0000   ;       V03-034 DAS0010         David Solomon           25-Aug-1983
0000   ;               Fix accvio when no journal name is specified. Set up R10 before
0000   ;               call to RM$RETJNLBDB (also caused an accvio). Use correct ACE
0000   ;               field name for RMS journal names. Replace source.
0000   ;
0000   ;       V03-033 LJA0090         Laurie J. Anderson      18-Aug-1983
0000   ;               1) Fix the writing of the journal entries to not stuff in
0000   ;                  the version number as VER1 but rather as the constant
0000   ;                  MAXVER so that when the versions are increased (as I
0000   ;                  just did) the new version number is filled in.
0000   ;               2) Fill in a new (RJR version V04-000 field - for AT journals
0000   ;                  the FAB/RAB user CTX field, so that it is written to
0000   ;                  the journal for the users discretion.
0000   ;               3) Now that the FAB is available when filling in the RJR
0000   ;                  use the completion status from it, rather than just
0000   ;                  stuff success.
0000   ;
0000   ;       V03-032 KPL0012         Peter Lieberwirth       30-Jul-1983
0000   ;               Allocate a bigger JNLBDB Buffer id AI journaling a relative
0000   ;               file.  The larger buffer will be used for the prolog if
0000   ;               the file is created.
0000   ;
0000   ;       V03-031 KPL0011         Peter Lieberwirth       24-Jul-1983
0000   ;               Fill in file-oriented AT journal record during MAPJNL
0000   ;               call.  Data from IFAB is used to fill in some create/open/close
0000   ;               AT fields.  RM$AT_JOURNAL_RECORD fills in some RJR RAB data.
0000   ;               RM$AT_COM_RAB added to fill AT record in with initial user
0000   ;               search and operation input.
0000   ;
```

```
0000    ;               Also, fix error paths and block-IO success status path in
0000    ;               RM$CONJNL.
0000    ;
0000    ;               Also, use RM$ALDJNLBUF and RM$RETJNLBDB to allocate and
0000    ;               deallocate journaling-specific BDB/Buffers.  Can't just use
0000    ;               ALDBUF etc... because then the BDB will be linked into the
0000    ;               IFABs BDB list - and could get used for file IO.  Also,
0000    ;               now the file-related AT BDB/Buffer can remain allocated for
0000    ;               the duration of the file open - previously it was deallocated
0000    ;               at common create/open exit because all BDBs on the IFAB
0000    ;               list were deallocated at that time.
0000    ;
0000    ;               Add some commentary about RMS Journaling
0000    ;
0000    ;       V03-030 KPL0010         Peter Lieberwirth       1-Jul-1983
0000    ;               Fix FORCE_JNL to always return status.
0000    ;
0000    ;       V03-029 KPL0009         Peter Lieberwirth       16-Jun-1983
0000    ;               Fix some bugs.  Add routine to write AT journal records for
0000    ;               record operations.  Clean up RM$MAPJNL to let it write AT
0000    ;               file operation records.  Remove COP and CQE in favor of CJF.
0000    ;               Move misc IFAB jnl flags to JNLFLG2.
0000    ;
0000    ;       V03-028 TSK0052         Tamar Krichevsky        5-jun-1983
0000    ;               Fix bugs introduced by V03-26.  Move module to RM$RMS_JOURNAL
0000    ;               psect.  Fix broken branches to RM$MAPERR.
0000    ;
0000    ;       V03-027 KPL0008         Peter Lieberwirth       30-May-1983
0000    ;               Fix bugs introduced in V03-026 and earlier.
0000    ;
0000    ;       V03-026 KPL0007         Peter Lieberwirth       26-May-1983
0000    ;               Support new more robust RJR format.  Fix typos in KPL0001.
0000    ;               Turn on sequential file journaling.  Rework RJB/BDB allocation.
0000    ;
0000    ;       V03-025 TSK0050         Tamar Krichevsky        25-May-1983
0000    ;               Modify RM$CONJNL to allocate the proper size journal buffer
0000    ;               for sequential files.  Currently, the user specified bucket
0000    ;               size is used to determine the buffer's length.  For sequential
0000    ;               files, the buffer must be large enough to contain any one
0000    ;               record from the file.
0000    ;               Cleanup calculation of overhead for journal buffer.
0000    ;
0000    ;       V03-024 DAS0009         David Solomon           11-May-1983
0000    ;               Fix WRTACC check in RM$ASSJNL (BBC to BBS). Add missing "#"
0000    ;               in front of two literals that were causing accvio's.  Fix
0000    ;               error path on failure to assign channel to RU journal.  Clear
0000    ;               pointer to RJB upon its deallocation.  Don't allocate IRAB
0000    ;               AT journal buffer if not AT journaling.  Fix ALLOC_MJB to
0000    ;               acquire space from same page as IFAB.  Do better job at
0000    ;               calculating required size of MJB.
0000    ;
0000    ;       V03-023 KPL0006         Peter Lieberwirth       2-May-1983
0000    ;               Turn on $WRITEJNL call.  Add $WRMODDEF.  Fix bug on
0000    ;               error path into RM$DEAJNL.
0000    ;
0000    ;       V03-022 KPL0005         Peter Lieberwirth       1-May-1983
0000    ;               Delete obsolete MJB definitions.
```

```
0000   ;
0000   ;       V03-021 KPL0004          Peter Lieberwirth          1-May-1983
0000   ;               Fix another problem with $WRITEJNL call.
0000   ;
0000   ;       V03-020 KPL0003          Peter Lieberwirth          1-May-1983
0000   ;               Fix call to $WRITEJNL.
0000   ;
0000   ;       V03-019 KPL0002          Peter Lieberwirth          30-Apr-1983
0000   ;               Add omitted macro definition.  Flesh out WRITE_MJB
0000   ;               routine.
0000   ;
0000   ;       V03-018 KPL0001          Peter Lieberwirth          29-Apr-1983
0000   ;               Allocate miscellaneous journaling buffers for IFB and IRB
0000   ;               where necessary.  Generalize cleanup so these always get
0000   ;               deallocated.  Add stub RM$WRITE_MJB routine.
0000   ;
0000   ;       V03-017 JWH0221          Jeffrey W. Horn            26-Apr-1983
0000   ;               If in recovery allow BRO access.  Also temporarily, enable
0000   ;               both AI and BI journaling durring recovery.
0000   ;
0000   ;       V03-016 JWH0205          Jeffrey W. Horn            11-Apr-1983
0000   ;               Implement journal id ACE.  Also add protected and hidden
0000   ;               bits to all ACEs.
0000   ;
0000   ;       V03-015 DAS0008          David Solomon              01-Apr-1983
0000   ;               Save R2 in RM$WRTJNL (for ISAM).
0000   ;
0000   ;       V03-014 RAS0135          Ron Schaefer               17-Mar-1983
0000   ;               More corrections to RAS0132 for registers and RJR$_ names.
0000   ;
0000   ;       V03-013 RAS0135          Ron Schaefer               17-Mar-1983
0000   ;               Corrections to RAS0132 for registers and RJR$_ names.
0000   ;
0000   ;       V03-012 RAS0132          Ron Schaefer               16-Mar-1983
0000   ;               Merge $RMSRDEF into $RJRDEF and revise the interface
0000   ;               for RM$WRTJNL for easier use from ISAM.
0000   ;
0000   ;       V03-011 JWH0185          Jeffrey W. Horn            11-Feb-1983
0000   ;               Set WRFLG$V_BI on RU journal entries.
0000   ;               Use the perm FWA to provide journal entry security and
0000   ;               to fill in the mapping entries.
0000   ;               If file is opened UFO then disable journaling for this open.
0000   ;
0000   ;       V03-010 JWH0180          Jeffrey W. Horn            03-Feb-1983
0000   ;               Change references to RJR$C_MAPLEN from byte to word.
0000   ;
0000   ;       V03-009 JWH0173          Jeffrey W. Horn            24-Jan-1983
0000   ;               Clean up status code returns.
0000   ;               Use BKS instead of MRS to allocate journal BDB.
0000   ;               Allow ISAM journaling.
0000   ;
0000   ;       V03-008 JWH0167          Jeffrey W. Horn            10-Jan-1983
0000   ;               Implement IFB recovery option byte.
0000   ;               Fill in file organization in mapping entry.
0000   ;
0000   ;       V03-007 JWH0155          Jeffrey W. Horn            3-Dec-1982
0000   ;               Seperate journal names into three seperate ACEs.
```

```
                0000  ;                     Prevent journaling on Sequential and Indexed files.
                0000  ;                     For block io, do not create journal BDB and buffer.
                0000  ;
                0000  ;             V03-006 JWH0154         Jeffrey W. Horn         13-Dec-1982
                0000  ;                     Define ACE$C_JNLNAMS (temporary).
                0000  ;
                0000  ;             V03-005 JWH0132         Jeffrey W. Horn         22-Nov-1982
                0000  ;                     Write journal entries with the WRFLG$M_LOCK attribute.
                0000  ;
                0000  ;             V03-004 JWH0128         Jeffrey W. Horn         15-Nov-1982
                0000  ;                     Change SS$_NOCJF code to SS$_IVSSRQ.
                0000  ;
                0000  ;             V03-003 JWH0116         Jeffrey W. Horn         28-Oct-1982
                0000  ;                     If in RCP then don't perfom any journaling execpt AT.
                0000  ;                     Remove CALLS to CJF services and replace with macros.
                0000  ;                     Change logic in FRCJNL which checks for an active RU to
                0000  ;                     reflect changes in RUF.
                0000  ;
                0000  ;             V03-002 JWH0108         Jeffrey W. Horn         23-Sep-1982
                0000  ;                     Remove redefinitions of ACL ACP attributes.
                0000  ;                     Fix problem with setting size for RJB deallocation.
                0000  ;                     Clean up status code returns.
                0000  ;                     Redefine journal names (FWA$T_xxJNLN) as .ASCIC
                0000  ;                     strings.
                0000  ;                     Implement new RMS journaling record (RJR).
                0000  ;                     Use RM$GETBLK and RM$RETBLK instead of RM$GETSPC and
                0000  ;                     RM$RETSPC when allocating and deallocting the RJB.
                0000  ;
                0000  ;             V03-001 JWH0107         Jeffrey W. Horn         23-Sep-1982
                0000  ;                     Redefine ACL ACP attributes to ATR$C_USERLABEL which is a
                0000  ;                     no-op.  Add a .WEAK for CJF$GETJNL.  Clean up status code
                0000  ;                     returns.
                0000  ;
                0000  ;--
```

```
                 0000   264         .SBTTL  DECLARATIONS
                 0000   265
                 0000   266
                 0000   267 ;
                 0000   268 ; Include Files:
                 0000   269 ;
                 0000   270
                 0000   271 ;
                 0000   272 ; Macros:
                 0000   273 ;
                 0000   274
                 0000   275         $ACEDEF
                 0000   276         $ATRDEF
                 0000   277         $BDBDEF
                 0000   278         $CJFDEF
                 0000   279         $DVIDEF
                 0000   280         $FABDEF
                 0000   281         $RABDEF
                 0000   282         $FIBDEF
                 0000   283         $FWADEF
                 0000   284         $IFBDEF
                 0000   285         $IODEF
                 0000   286         $IMPDEF
                 0000   287         $IRBDEF
                 0000   288         $PCBDEF
                 0000   289         $PSLDEF
                 0000   290         $RJBDEF
                 0000   291         $RJRDEF
                 0000   292         $RMSDEF
                 0000   293         $RUCBDEF
                 0000   294         $SSDEF
                 0000   295         $STSDEF
                 0000   296         $WRFLGDEF
                 0000   297         $MJBDEF
                 0000   298         $WRMODDEF
                 0000   299
                 0000   300 ;
                 0000   301 ; Equated Symbols:
                 0000   302 ;
                 0000   303
                 0000   304 ;
                 0000   305 ; Own Storage:
                 0000   306 ;
                 0000   307
          0001   0000   308 FACILITY:       .WORD   RMS$_FACILITY
          0001   0002   309 MODE:           .WORD   PSL$C_EXEC
```

```
0004           .SUBTITLE Introduction to RMS Journaling
0004   ;++
0004   ;       RMS Journaling Manager
0004   ;
0004   ; This module contains routines used to journal RMS operations.  Other modules
0004   ; containing journaling routines (not necessarily an inclusive list) are:
0004   ;
0004   ;       RM3JOURNL.B32, RM1JOURNL.MAR, RM0CRECOM.MAR, RM0BUFMGR.MAR,
0004   ;       RM0EXTEND.MAR, and RM2CREATE.MAR
0004   ;
0004   ; The data structures are defined in:
0004   ;
0004   ;       RMSINTSTR.MDL and the format of the RMS Journaling Record (RJR) is
0004   ; described in RMSFILSTR.SDL.
0004   ;
0004   ; The general flow of journaling control is as follows:
0004   ;
0004   ; 1. When a file marked for journaling is accessed, connections are made
0004   ;    to the journals specified in the file's header in RM$ASSJNL.  Certain
0004   ;    data structures are allocated at this time also.
0004   ;
0004   ; 1a. If the file is being created, the data structures are allocated earlier,
0004   ;    and the JNLXAB is interrogated for journal names.  If no journal names
0004   ;    are specified in the XAB, CJF is asked for default journal names.  This
0004   ;    is done in RM$GETJNL.
0004   ;
0004   ; 2. RM$MAPJNL is called to write entries to the journals at OPEN/CREATE/CLOSE
0004   ;    time.  These entries contain the full filename and other information.
0004   ;    These entries are used when the journal must be interrogated for file
0004   ;    names, and to associate a filename with a journal ID.
0004   ;
0004   ;       A journal ID is a unique identifier associated with a journaled file
0004   ;       (it is kept in the file header in a hidden, protected, access control
0004   ;       entry).  It is used in most RMS journaling records so that the full
0004   ;       filename need not be kept in all entries.  It is also used as a
0004   ;       short-hand identifier to search a journal for RMS entries without
0004   ;       having to fully specify the filename as originally journaled.
0004   ;
0004   ;
0004   ; 3. RM$CONJNL is called at connect time to allocate record-oriented RMS
0004   ;    journaling structures.  These include buffers and buffer descriptors.
0004   ;    These structures are deallocated at disconnect time in RM$DSCJNL.
0004   ;    RM$DSCJNL also forces to the journal any audit-trail journal entries
0004   ;    written to CJF but not yet necessarily forced to the actual journal
0004   ;    (IE the entries may still be in a CJF buffer.)
0004   ;
0004   ; 4. During the course of RMS record operations journal entries describing
0004   ;    file accesses and modifications are written to the appropriate journals.
0004   ;
0004   ;       ISAM AI and BI operations are journaled by writing copies of the
0004   ;       modified buckets to the journal.  The buffers used for these entries
0004   ;       are as follows:
0004   ;
0004   ;               AI - the buffer used is the actual data bucket that is written
0004   ;                    to the file
0004   ;
0004   ;               BI - the buffer used is an extra one allocated at the same time
```

```
0004   ;                         the data buffer is allocated
0004   ;
0004   ;                Both buffers are pointed to by the BDB.
0004   ;
0004   ;        ISAM AI and BI operations are journaled at the bucket-level because
0004   ;        there was no way found to journal on a record basis and ensure that
0004   ;        RFAs would be restored upon recovery.
0004   ;
0004   ;        ISAM recovery unit operations are journaled by writing information
0004   ;        describing the modified record to the journal.  The ISAM code treats
0004   ;        record operations in recovery units in a special fashion:
0004   ;
0004   ;                $DELETEs do not delete the record - the record is merely
0004   ;                marked for deletion.
0004   ;
0004   ;                $UPDATEs never shrink the size of the record - extra space
0004   ;                corresponding to the original size of the record is kept
0004   ;                and described by special fields in the record itself.
0004   ;
0004   ;                The reason for never deleting space in ISAM RUs is to ensure
0004   ;                there will always be space in the bucket if the record
0004   ;                must be rolled back in.  We don't want to invent more
0004   ;                special case ISAM bucket split code.  The RFA basis of the
0004   ;                journal entry also precludes too much bucket entropy before
0004   ;                recovery.
0004   ;
0004   ;        Sequential and Relative file journaling is done on a record basis.
0004   ;        A record journaling buffer is allocated at CONNECT time, and this
0004   ;        buffer is used to build the record used to describe the change needed
0004   ;        to undo or redo the operation.
0004   ;
0004   ;        Audit-trail journaling is done on a file and record level.  A special
0004   ;        BDB and Buffer is allocated off the IFAB to contain file related
0004   ;        audit-trail information.  A journaling buffer descriptor/buffer
0004   ;        is allocated off the IRAB to collect and format record-related
0004   ;        audit trail information.
0004   ;
0004   ;        In order to ensure ISAM AI recovery, $EXTENDs must be journaled.
0004   ;        A special extend buffer descriptor/buffer is allocated off the
0004   ;        IFAB - the journaling record to describe the extend is built in
0004   ;        and written from this buffer.  Sequential and Relative AI extends
0004   ;        are journaled in the same fashion.
0004   ;
0004   ;  5. RMS Journaling Data Structures
0004   ;
0004   ;        RJB     - The RJB is allocated by ASSJNL or CRECOM, and contains
0004   ;                the channels assigned to various journals.  Flags indicating
0004   ;                connections to journals are also present.
0004   ;
0004   ;        IFB JNLFLG - This byte is a copy of the file header byte which
0004   ;                indiates what types of journaling the file is marked for.
0004   ;
0004   ;        IFB JNLFLG2 - This byte contains miscellaneous run-time IFAB related
0004   ;                journaling indicators.
0004   ;
0004   ;        IFB$L_JNLBDB - This field points to a BDB and buffer that is used for
0004   ;                file related AT journaling.
```

```
0004  ;
0004  ;          IFB$L_ATJNLBUF - This field points into the buffer pointed to indirectly
0004  ;                  by IFB$L_JNLBDB.  This field points directly to the RJR within
0004  ;                  the buffer.
0004  ;
0004  ;          RJR - RMS Journaling Record.  The format of the RMS data written to
0004  ;                  the journal.  It is comprised of a common overhead, and several
0004  ;                  different formats following the common overhead that are used
0004  ;                  for different journaling functions.
0004  ;
0004  ;                  Currently implemented:  FILE, RECORD, BLOCK, BUCKET, EXTEND,
0004  ;                  AT_RECORD.
0004  ;
0004  ;          MJB - Miscellaneous Journaling Block  This is used to describe
0004  ;                  miscellaneous journaling records and the information needed
0004  ;                  to describe the WRITEJNL request.  The MJB is written by
0004  ;                  RM$WRITE_MJB and is forced to the journal by RM$FORCE_MJB.
0004  ;
0004  ;                  MJBs are currently used for AT and Extend entries.
0004  ;
0004  ;          IRB$L_ATJNLBUF - points to an MJB/Buffer used to write record level AT
0004  ;                  entries.
0004  ;
0004  ;          Why MJBs and BDBs?  Good question.  The BDB related design is good for
0004  ;          writing buffers containing actual file data to the journals.  The
0004  ;          MJB is used when descriptive entries not directly related to file
0004  ;          data are written.  BDB/Buffer fits into the IO system concept and
0004  ;          ISAM AI and BI benefits from the overlap.  MJB/Buffer fits into
0004  ;          the CJF design better.  The MJB describes the WRITEJNL inputs,
0004  ;          basically.  The only counter-intuitive setup currently is writing
0004  ;          file-level descriptive entries via BDB and not MJB.  The reason for this
0004  ;          is that MAPJNL was originally set up this way.
0004  ;
0004  ;--
```

```
                        0004          .SBTTL  RM$GETJNL - Get Journal Name
                        0004
                        0004  ;++
                        0004  ; RM$GETJNL - Get Journal Name
                        0004  ;
                        0004  ;       This subroutines gets the journal names to use from either CJF
                        0004  ;       or the process-based default journal names.  It then proceeds to
                        0004  ;       set up the attributes for the file creation.
                        0004  ;
                        0004  ;
                        0004  ; Calling sequence:
                        0004  ;
                        0004  ;       BSBW    RM$GETJNL
                        0004  ;
                        0004  ; Input Parameters:
                        0004  ;
                        0004  ;       R9      -       IFAB address
                        0004  ;       R10     -       FWA address
                        0004  ;
                        0004  ; Implicit Inputs:
                        0004  ;
                        0004  ;       IFB$B_JNLFLG -  File's Journaling Flags
                        0004  ;       FWA$L_UIC    -  File's Owner UIC
                        0004  ;       FWA$Q_xxJNL, FWA$T_xxJNLN - may be preset by XAB processing to contain
                        0004  ;                                   some journal names.
                        0004  ;
                        0004  ; Output Parameters:
                        0004  ;
                        0004  ;       R1-R4           Destroyed
                        0004  ;
                        0004  ; Implicit Outputs:
                        0004  ;
                        0004  ;       FWA$Q_xxJNL, FWA$Q_xxJNLN - Set to journal name(s).
                        0004  ;
                        0004  ; Completion Codes:
                        0004  ;
                        0004  ;       JNF - If no journal name found for a particular IFB$B_JNLFLG bit,
                        0004  ;               STV will contain CJF status from $GETJNL.
                        0004  ;
                        0004  ; Side Effects:
                        0004  ;       None.
                        0004  ;
                        0004  ;--
                        0004
                        0004  RM$GETJNL::
        7E    01    D0  0004          MOVL    #1,-(SP)                                ; anticipate success
16 00A0 C9    02    E1  0007          BBC     #IFB$V_BI,IFB$B_JNLFLG(R9),10$          ; branch if no BI bit
   52   08C8 CA     9E  000D          MOVAB   FWA$Q_BIJNL(R10),R2                     ; fwa bi descr
   53   08E0 CA     9E  0012          MOVAB   FWA$T_BIACE(R10),R3                     ; fwa bi buffer
        54    02    D0  0017          MOVL    #CJF$_BI,R4                             ; journal type code
          0084      30  001A          BSBW    GET_JNL                                 ; get journal name
           03 50    E8  001D          BLBS    R0,10$                                  ; get out on error
        6E    50    D0  0020          MOVL    R0,(SP)                                 ; remember error code
                        0023
16 00A0 C9    03    E1  0023  10$:    BBC     #IFB$V_AI,IFB$B_JNLFLG(R9),20$          ; branch if no AI bit
   52   08D0 CA     9E  0029          MOVAB   FWA$Q_AIJNL(R10),R2                     ; fwa AI descr
   53   08F4 CA     9E  002E          MOVAB   FWA$T_AIACE(R10),R3                     ; fwa AI buffer
```

```
           54     03   D0  0033             MOVL    #CJF$_AI,R4                                            ; journal type code
                0068   30  0036             BSBW    GET_JNL                                                ; get journal name
              03  50   E8  0039             BLBS    R0,20$                                                 ; get out on error
           6E     50   D0  003C             MOVL    R0,(SP)                                                ; remember error code
                           003F
    16 00A0 C9    04   E1  003F      20$:   BBC     #IFB$V_AT,IFB$B_JNLFLG(R9),30$                         ; branch if no AT bit
          52    08D8 CA    9E  0045             MOVAB   FWA$Q_ATJNL(R10),R2                                    ; fwa AT descr
          53    0908 CA    9E  004A             MOVAB   FWA$T_ATACE(R10),R3                                    ; fwa AT buffer
           54     04   D0  004F             MOVL    #CJF$_AT,R4                                            ; journal type code
                004C   30  0052             BSBW    GET_JNL                                                ; get journal name
              03  50   E8  0055             BLBS    R0,30$                                                 ; continue on success
           6E     50   D0  0058             MOVL    R0,(SP)                                                ; remember error code
                           005B
   092C CA    01F8 CA   D0  005B      30$:   MOVL    <FWA$T_FIBBUF+FIB$W_FID>(R10),FWA$T_FID(R10) ; put fid in id ace
   0930 CA    01FC CA   B0  0062             MOVW    <FWA$T_FIBBUF+FIB$W_FID+4>(R10),<FWA$T_FID+4>(R10)
                           0069             $GETTIM_S TIMADR=FWA$Q_ID_DATE(R10)                            ; get current time
 091C CA    0E000820 8F  D0  0074             MOVL    #<<<ACE$M_PROTECTED + ACE$M_HIDDEN + ACE$M_NOPROPAGATE> -
                           007D                     @ <ACE$W_FLAGS*8>> + -
                           007D                       <ACE$C_JNLID @ <ACE$B_TYPE*8>> + -
                           007D                       FWA$S_IDACE>, FWA$T_IDACE(R10)
           85     20   B0  007D             MOVW    #FWA$S_IDACE,(R5)+                                     ; set attribute len
           85     1F   B0  0080             MOVW    #ATR$C_ADDACLENT,(R5)+                                 ; set attribute type
       85    091C CA   DE  0083             MOVAL   FWA$T_IDACE(R10),(R5)+                                 ; set attribute address
                           0088             RMSSUC
                           008B
           50     8E   D0  008B      50$:   MOVL    (SP)+,R0                                               ; get status code
              01  50   E9  008E             BLBC    R0,60$                                                 ; skip if error
                       05  0091             RSB
                           0092
           00A0 C9     94  0092      60$:   CLRB    IFB$B_JNLFLG(R9)                                       ; turn off journaling
                           0096             RMSERR  JNF,RT                                                 ; journal not found
       00000000'EF     17  009B             JMP     RM$MAPERR                                              ; go map the error and retur
```

```
                             00A1           .SBTTL  GET_JNL - Common Get Journal name routine
                             00A1
                             00A1   ;++
                             00A1   ; GET_JNL - Common Get Journal name routine
                             00A1   ;
                             00A1   ; If XAB processing did not get a particular journal name, then ask
                             00A1   ; CJF for one.
                             00A1   ;
                             00A1   ; Calling sequence:
                             00A1   ;
                             00A1   ;       BSBW    GET_JNL
                             00A1   ;
                             00A1   ; Input Parameters:
                             00A1   ;
                             00A1   ;       R2      -       Pointer to FWA$Q_xxJNL  (fwa journal name descriptor)
                             00A1   ;       R3      -       Pointer to FWA$T_xxJNLN (fwa journal name buffer)
                             00A1   ;       R4      -       CJF$_xx for the journal type
                             00A1   ;       R5      -       Address of first free slot at end of ACP attribute list
                             00A1   ;
                             00A1   ; Implicit Inputs:
                             00A1   ;
                             00A1   ;       FWA$L_UIC       File Ownership UIC.
                             00A1   ;       FWA$Q_DEVICE    Descriptor of Device name
                             00A1   ;       FWA$L_ATR_LIST  Atribute list for create
                             00A1   ;
                             00A1   ; Output Parameters:
                             00A1   ;       R5              New free ACP attribute list free slot.
                             00A1   ;
                             00A1   ; Implicit Outputs:
                             00A1   ;
                             00A1   ;       FWA$Q_xxJNL, FWA$T_xxJNLN - filled in
                             00A1   ;       FWA$T_ATR_LIST - May have journal name attributes added.
                             00A1   ;
                             00A1   ; Completion Codes:
                             00A1   ;       Any CJF from $GETJNL.
                             00A1   ;
                             00A1   ; Side Effects:
                             00A1   ;       None.
                             00A1   ;--
                             00A1
                             00A1   GET_JNL:
                             00A1
                             00A1   ;
                             00A1   ; If no journal name from XAB processing, ask CJF for one
                             00A1   ;
           7E   01     D0    00A1           MOVL    #1,-(SP)                                ; assume success
                62     95    00A4           TSTB    (R2)                                    ; name length zero?
                32     12    00A6           BNEQ    20$                                     ; no branch
         62     10     3C    00A8           MOVZWL  #FWA$S_BIJNLN,(R2)                      ; set up descriptor
   04 A2     04 A3     DE    00AB           MOVAL   ACE$T_RMSJNLNAM(R3),4(R2)
             28 AA     D5    00B0           TSTL    FWA$L_UIC(R10)                          ; file uic specified?
                0D     12    00B3           BNEQ    10$                                     ; branch if so
 51    00000000'9F     D0    00B5           MOVL    @#CTL$GL_PCB,R1                         ; get PCB address
  28 AA    00BC C1     D0    00BC           MOVL    PCB$L_UIC(R1),FWA$L_UIC(R10)            ; get UIC from PCB
                             00C2
                             00C2   10$:    $GETJNL_S               -                       ; call CJF
                             00C2                   DEVNAM = FWA$Q_DEVICE(R10), -
```

```
                     00C2                    UIC     = FWA$L_UIC(R10), -
                     00C2                    JNLTYP = R4, -
                     00C2                    JNLNAM = (R2), -
                     00C2                    RSLLEN = (R2)
                     00D7
       6E   50   D0  00D7          MOVL    R0,(SP)                                 ; save return code
                     00DA
                     00DA      ;
                     00DA      ; Construct ACE to store journal name and add to attribute list
                     00DA      ;
                     00DA          ASSUME  ACE$C_BIJNL EQ CJF$_BI
                     00DA          ASSUME  ACE$C_AIJNL EQ <ACE$C_BIJNL + 1>
                     00DA          ASSUME  ACE$C_ATJNL EQ <ACE$C_AIJNL + 1>
                     00DA
  63   62   04   81  00DA 20$:     ADDB3   #ACE$T_RMSJNLNAM,(R2),(R3)              ; fill in ACE size
    01 A3   54   90  00DE          MOVB    R4,ACE$B_TYPE(R3)                       ; move type into ACE
     0600   8F   B0  00E2          MOVW    #ACE$M_HIDDEN!ACE$M_PROTECTED,-         ; move flags into ACE
       02 A3         00E6                  ACE$W_FLAGS(R3)
       85   63   9B  00E8          MOVZBW  (R3),(R5)+                              ; move atr len into list
       85   1F   B0  00EB          MOVW    #ATR$C_ADDACLENT,(R5)+                  ; move atr type into list
       85   53   D0  00EE          MOVL    R3,(R5)+                                ; move atr addr into list
       50   8E   D0  00F1          MOVL    (SP)+,R0                                ; restore code
            05       00F4          RSB
```

```
                     00F5          .SBTTL  RM$RTVJNL - Retrieve Journaling Info
                     00F5   ;++
                     00F5   ; RM$RTVJNL - Retrieve Journaling Info
                     00F5   ;
                     00F5   ;      This subroutine adds the neccessary ACP attributes to retrieve
                     00F5   ;      both the journal selection bits and the journal names used for a file.
                     00F5   ;
                     00F5   ; Calling Sequence:
                     00F5   ;
                     00F5   ;      BSBW    RM$RTVJNL
                     00F5   ;
                     00F5   ; Input Parameters
                     00F5   ;      R5      Address of End of attribute list
                     00F5   ;      R9      IFAB address
                     00F5   ;      R10     FWA Address
                     00F5   ;      R11     Impure Area Address
                     00F5   ;
                     00F5   ; Implicit Imputs:
                     00F5   ;      None.
                     00F5   ;
                     00F5   ; Ouput Parameters:
                     00F5   ;
                     00F5   ;      R1      Destroyed
                     00F5   ;      R5      Updated to new end of attribute list
                     00F5   ;
                     00F5   ; Implicit Outputs:
                     00F5   ;
                     00F5   ;      FWA ACP attribute list has attributes filled in to retrieve journaling
                     00F5   ;      bits and journal names.
                     00F5   ;
                     00F5   ; Completion Codes:
                     00F5   ;      None.
                     00F5   ;
                     00F5   ; Side Effects:
                     00F5   ;      None.
                     00F5   ;
                     00F5   ;--
                     00F5
                     00F5   RM$RTVJNL::
                     00F5
                     00F5   ;**JNL** begin temporary code to tie off journaling
                  05 00F5          RSB
                     00F6   ;**JNL** end temporary code to tie off journaling
                     00F6
                     00F6   ;
                     00F6   ; Construct ACEs to get journal names and add ACP attribute
                     00F6   ;
51  08E0 CA       DE 00F6          MOVAL   FWA$T_BIACE(R10),R1                         ; get start of ACE
61  0214 8F       B0 00FB          MOVW    #<<ACE$C_BIJNL@<ACE$B_TYPE*8>>+FWA$S_BIACE>,(R1) ; move in ACE Type.
85    14          B0 0100          MOVW    #FWA$S_BIACE,(R5)+                          ; move atr len into list
85    23          B0 0103          MOVW    #ATR$C_FNDACLTYP,(R5)+                      ; move atr type into list
85    51          D0 0106          MOVL    R1,(R5)+                                    ; move atr addr into list
                     0109
51  08F4 CA       DE 0109          MOVAL   FWA$T_AIACE(R10),R1                         ; get start of ACE
61  0314 8F       B0 010E          MOVW    #<<ACE$C_AIJNL@<ACE$B_TYPE*8>>+FWA$S_AIACE>,(R1) ; move in ACE Type.
85    14          B0 0113          MOVW    #FWA$S_AIACE,(R5)+                          ; move atr len into list
85    23          B0 0116          MOVW    #ATR$C_FNDACLTYP,(R5)+                      ; move atr type into list
```

```
         85   51  D0 0119        MOVL    R1,(R5)+                                     ; move atr addr into list
                     011C
   51   0908  CA  DE 011C        MOVAL   FWA$T_ATACE(R10),R1                          ; get start of ACE
   61   0414  8F  B0 0121        MOVW    #<<ACE$C_ATJNL@<ACE$B_TYPE*8>>+FWA$S_ATACE>,(R1) ; move in ACE Type,
         85   14  B0 0126        MOVW    #FWA$S_ATACE,(R5)+                           ; move atr len into list
         85   23  B0 0129        MOVW    #ATR$C_FNDACLTYP,(R5)+                       ; move atr type into list
         85   51  D0 012C        MOVL    R1,(R5)+                                     ; move atr addr into list
                     012F
   51   091C  CA  DE 012F        MOVAL   FWA$T_IDACE(R10),R1                          ; get start of ACE
61   00000820 8F  D0 0134        MOVL    #<<ACE$C_JNLID@<ACE$B_TYPE*8>>+FWA$S_IDACE>,(R1) ; set up ACE
         85   20  B0 013B        MOVW    #FWA$S_IDACE,(R5)+                           ; move atr len into list
         85   23  B0 013E        MOVW    #ATR$C_FNDACLTYP,(R5)+                       ; move atr type into list
         85   51  D0 0141        MOVL    R1,(R5)+                                     ; move atr addr into list
                     0144
                     0144  ;
                     0144  ; Add journal control bit attributes to list
                     0144  ;
         85   01  B0 0144        MOVW    #1,(R5)+                                     ; move atr len into list
         85   1D  B0 0147        MOVW    #ATR$C_JOURNAL,(R5)+                         ; move atr type into list
   85   00A0  C9  9E 014A        MOVAB   IFB$B_JNLFLG(R9),(R5)+                       ; move atr addr into list
                     014F
                     014F  ;
                     014F  ; Make sure we have the file's UIC in the FWA
                     014F  ;
         85   04  B0 014F        MOVW    #4,(R5)+                                     ; move atr len into list
         85   1A  B0 0152        MOVW    #ATR$C_UIC_RO,(R5)+                          ; move atr type into list
      85   28 AA  DE 0155        MOVAL   FWA$L_UIC(R10),(R5)+                         ; move atr addr into list
                     0159
                  05 0159        RSB
```

```
                     015A          .SBTTL  RM$ASSJNL - Open Journaling for a file
                     015A
                     015A   ;++
                     015A   ; RM$ASSJNL - Open Journaling for a file
                     015A   ;
                     015A   ;       This subroutine builds the necessary data structures for journaling
                     015A   ;       onto the IFAB and opens the journals needed for the file.
                     015A   ;
                     015A   ; Calling sequence:
                     015A   ;
                     015A   ;       BSBW    RM$ASSJNL
                     015A   ;
                     015A   ; Input Parameters:
                     015A   ;
                     015A   ;       R8      FAB Address
                     015A   ;       R9      IFAB Address
                     015A   ;       R10     FWA Address
                     015A   ;       R11     Impure Area Address
                     015A   ;
                     015A   ; Implicit Inputs:
                     015A   ;
                     015A   ;       IFB$B_JNLFLG
                     015A   ;
                     015A   ; Output Parameters:
                     015A   ;
                     015A   ;       R1 - R5 Destroyed
                     015A   ;
                     015A   ; Implicit Outputs:
                     015A   ;
                     015A   ;       IFB$L_RJB       Address of allocated and initialized RJB
                     015A   ;       IFB$B_JNLFLG2   Files Journaling Flags:
                     015A   ;               IFB$V_JNL       Set to indicate journaling initialized for this
                     015A   ;                               file.
                     015A   ;
                     015A   ; Completion Codes:
                     015A   ;
                     015A   ;       Any RMS, particularly, DME.
                     015A   ;       NOJ, Journal device for file not available, CJF status in
                     015A   ;               STV from $ASSJNL.
                     015A   ;       JNS, Journaling not supported for operation
                     015A   ;
                     015A   ; Side Effects:
                     015A   ;       None.
                     015A   ;
                     015A   ;--
                     015A
                     015A   ERRJNS: RMSERR  JNS
                 05  015F           RSB
                     0160
     00A0 C9     94  0160   UFO:    CLRB    IFB$B_JNLFLG(R9)                        ; turn off journaling
                     0164   ASS_DONE:
                     0164           RMSSUC
                 05  0167           RSB
                     0168
                     0168   RM$ASSJNL::
F6 00A2 C9   04  E2  0168           BBSS    #IFB$V_DONE_ASS_JNL,IFB$B_JNLFLG2(R9),ASS_DONE ; already thru
                     016E                                                           ; here during $CREATE.
     ED 04 A8    11   E0  016E          BBS     #FAB$V_UFO,FAB$L_FOP(R8),UFO               ; branch if UFO
     07 22 A9    05   E1  0173          BBC     #IFB$V_BIO,IFB$B_FAC(R9),10$               ; branch if not BIO
      00A0 C9    03   93  0178          BITB    #<IFB$M_RU!IFB$M_ONLY_RU>,IFB$B_JNLFLG(R9)      ; don't allow RU BIO
           DB    12       017D          BNEQ    ERRJNS
                          017F
                          017F  ;
                          017F  ; Next, if the process in which we're executing is a RECOVERY process we
                          017F  ; may not want to journal.  Specifically, if the file we're starting to
                          017F  ; access is one RMS Recovery is recovering, we don't want to
                          017F  ;
                          017F  ;         a. recovery unit journal
                          017F  ;         b. AI or BI journal if we're doing AI recovery
                          017F  ;
                          017F  ; Note: BI recovery must be journaled.  If BI recovery is not journaled,
                          017F  ; the file can be in states never represented by any state representable
                          017F  ; by the RMS journal entries in the journal.  This can happen when a file
                          017F  ; is BI journaled, modified, rolled-back, modified again, and later rolled
                          017F  ; back to a time when first modified.  This is because 'old' record images
                          017F  ; are put in BI journals.  Therefore, a record may get put in the file that
                          017F  ; never shows up in the journal.  Therefore if its backed out by Recovery,
                          017F  ; and recovery is not journaled - that record will never be seen again.
                          017F  ; This problem does not occur with AI journaling because the journal contains
                          017F  ; 'new' record images.
                          017F  ;
                          017F
51   00000000'9F          D0  017F  10$:    MOVL    @#CTL$GL_PCB,R1                            ; get PCB address for test
     16 24 A1    1A   E1  0186          BBC     #PCB$V_RECOVER,PCB$L_STS(R1),20$           ; skip rest if not
                          018B                                                             ;  in RECOVER
      00A1 C9         95  018B          TSTB    IFB$B_RECVRFLGS(R9)                        ; may be in RECOVER, but
                          018F                                                             ;  not recovering this
                          018F                                                             ;  file
           10    13       018F          BEQL    20$                                        ; branch if not in recovery
                          0191
      00A0 C9    03   8A  0191          BICB    #<IFB$M_RU!IFB$M_ONLY_RU>,IFB$B_JNLFLG(R9)      ; clear RU journalin
   05 00A1 C9    01   E1  0196          BBC     #IFB$V_AI_RECVR,IFB$B_RECVRFLGS(R9),20$ ; skip next if not AI
      00A0 C9    0C   8A  019C          BICB    #<IFB$M_AI!IFB$M_BI>,IFB$B_JNLFLG(R9)   ; clear AI, BI if AI
                          01A1
        07 69    30   E0  01A1  20$:    BBS     #IFB$V_WRTACC,(R9),50$                     ; branch if writing
      00A0 C9    0F   8A  01A5          BICB    #<IFB$M_AI!IFB$M_BI!IFB$M_RU!IFB$M_ONLY_RU>,IFB$B_JNLFLG(R9)
                          01AA                                                             ; clear AI,BI,RU
           50    11       01AA          BRB     3000$                                      ; branch to AI test.
                          01AC
                          01AC  50$:                                                       ;
   06 00A0 C9    00   E1  01AC  60$:    BBC     #IFB$V_ONLY_RU,IFB$B_JNLFLG(R9),1000$      ; branch if ONLY_RU
                          01B2          SSB     #IFB$V_RU,IFB$B_JNLFLG(R9)                 ; set RU bit
                          01B8
   13 00A0 C9    02   E1  01B8  1000$:  BBC     #IFB$V_BI,IFB$B_JNLFLG(R9),2000$           ; branch if no BI
   53    08C8 CA      7E  01BE          MOVAQ   FWA$Q_BIJNL(R10),R3                        ; BI descriptor
   54    08E0 CA      9E  01C3          MOVAB   FWA$T_BIACE(R10),R4                        ; BI name
         55      02   D0  01C8          MOVL    #CJF$_BI,R5                                ; indicate BI
            009B      30  01CB          BSBW    OPEN_JNL                                   ; go open channel
        67 50         E9  01CE          BLBC    R0,5000$                                   ; get out on error
                          01D1
   25 00A0 C9    03   E1  01D1  2000$:  BBC     #IFB$V_AI,IFB$B_JNLFLG(R9),3000$           ; branch if no AI
   52     009A 8F     3C  01D7          MOVZWL  #<MJB$C_BLN+RJR$C_EXTLEN>,R2               ; size of MJB for extend
     000006AA'EF      16  01DC          JSB     RM$ALLOC_MJB                               ; get the MJB
        53 50         E9  01E2          BLBC    R0,5000$                                   ; get out on error
      34 A9    51   D0  01E5   832              MOVL    R1,IFB$L_EXTJNLBUF(R9)                          ; set up pointer
    53   08D0  CA   7E  01E9   833              MOVAQ   FWA$Q_AIJNL(R10),R3                             ; AI descriptor
    54   08F4  CA   9E  01EE   834              MOVAB   FWA$T_AIACE(R10),R4                             ; AI name
           55  03   D0  01F3   835              MOVL    #CJF$_AI,R5                                     ; indicate AI
             0070   30  01F6   836              BSBW    OPEN_JNL                                        ; go open channel
            3C 50   E9  01F9   837              BLBC    R0,5000$                                        ; get out on error
                        01FC   838
   13 00A0 C9  04   E1  01FC   839 3000$:       BBC     #IFB$V_AT,IFB$B_JNLFLG(R9),4000$                ; branch if no AT
    53   08D8  CA   7E  0202   840              MOVAQ   FWA$Q_ATJNL(R10),R3                             ; AT descriptor
    54   0908  CA   9E  0207   841              MOVAB   FWA$T_ATACE(R10),R4                             ; AT name
           55  04   D0  020C   842              MOVL    #CJF$_AT,R5                                     ; indicate AT
             0057   30  020F   843              BSBW    OPEN_JNL                                        ; go open channel
            23 50   E9  0212   844              BLBC    R0,5000$                                        ; get out on error
                        0215   845
   4A 00A0 C9  01   E1  0215   846 4000$:       BBC     #IFB$V_RU,IFB$B_JNLFLG(R9),6000$                ; branch if no RU
           55  01   D0  021B   847              MOVL    #CJF$_RU,R5                                     ; indicate RU
             0048   30  021E   848              BSBW    OPEN_JNL                                        ; go open channel
            14 50   E9  0221   849              BLBC    R0,5000$                                        ; return on success
  51     00000000'9F D0 0224   850              MOVL    @#CTL$GL_RUF,R1                                 ; already in RU?
               38   13  022B   851              BEQL    6000$                                           ; branch if not
    36 11 A1   01   E1  022D   852              BBC     #RUCB$V_ACTIVE,RUCB$B_CTRL(R1),7000$
   30 00A2 C9  02   E3  0232   853              BBCS    #IFB$V_RUP,IFB$B_JNLFLG2(R9),7000$              ; set RU in prog
                        0238   854                                                                      ; NOTE: Should never
                        0238   855                                                                      ; fall through
                        0238   856
         00A0 C9   94   0238   857 5000$:       CLRB    IFB$B_JNLFLG(R9)                                ; on error clr flgs
  51    50   0C  10  EF 023C   858              EXTZV   #STS$V_FAC_NO,#STS$S_FAC_NO,R0,R1               ; get error facility
             51  01  D1 0241   859              CMPL    #RMS$_FACILITY,R1                               ; is error from RMS?
                 22  13 0244   860              BEQL    7000$                                           ; don't map if so
             52  50  D0 0246   861              MOVL    R0,R2                                           ; save CJF status
       00000000'EF   16 0249   862              JSB     RM$MAPERR                                       ; fill in STV
  52     00000000'8F D1 024F   863              CMPL    #CJF$_NONAME,R2                                 ; was error no jnl name?
                 07  12 0256   864              BNEQ    5010$                                           ; no, use NOJ error
                        0258   865              RMSERR  JNF                                             ; yes, use JNF error
                 05  11 025D   866              BRB     5020$                                           ;  and continue
                        025F   867 5010$:       RMSERR  NOJ                                             ; use NOJ error
                     05 0264   868 5020$:       RSB                                                     ; return
                        0265   869
                        0265   870 6000$:       RMSSUC                                                  ; yes, indicate success
                        0268   871
                     05 0268   872 7000$:       RSB
```

```
0269         .SBTTL  OPEN_JNL - Common open journal channel
0269
0269  ;++
0269  ; OPEN_JNL - Common open journal channel
0269  ;
0269  ; This routine opens a channel on the specified journal.  It also alocates
0269  ; an RJB if needed.
0269  ;
0269  ; Calling sequence:
0269  ;
0269  ;         BSBW    OPEN_JNL
0269  ;
0269  ; Input Parameters:
0269  ;
0269  ;         R3      Address of Journal Name Descriptor (FWA$Q_xxJNL) (AI,BI,AT only)
0269  ;         R4      Address of Journal Name ACE (FWA$T_xxACE) (AI,BI,AT only)
0269  ;         R5      Journal Type (CJF$_xx)
0269  ;         R9      IFAB address
0269  ;         R10     FWA address
0269  ;         R11     Impure area address
0269  ;
0269  ; Implicit Inputs:
0269  ;
0269  ;         IFB$L_RJB       RJB address
0269  ;         IFB$B_JNLFLG    File's journaling flags
0269  ;         FWA$Q_DEVICE    Device File resides on.
0269  ;         FWA$Q_xxJNL, FWA$T_xxJNLN
0269  ;                         Journal Names for file
0269  ;         FWA$L_UIC       File Owner
0269  ;         FWA$L_PRO       File Protection
0269  ;
0269  ; Output Parameters:
0269  ;
0269  ;         R1-R5           Destroyed
0269  ;
0269  ; Implicit Outputs:
0269  ;
0269  ;         IFB$L_RJB       Address of allocated RJB
0269  ;         IFB$B_JNLFLG2   Files Journaling flags
0269  ;                 IFB$V_JNL       Set to indicate journaling initialized.
0269  ;         RJB$W_FLAGS     A bit is set for each channel opened.
0269  ;         RJB$Q_CHAN      One word is filled in with a channel number.
0269  ;
0269  ; Completion Codes:
0269  ;
0269  ;         Any RMS, particualrly, DME,
0269  ;         Any CJF status value from $ASSJNL.
0269  ;
0269  ;
0269  ; Side Effects:
0269  ;
0269  ;         If journaling not previosly initialized on this file, allocates an RJB
0269  ;         for it.
0269  ;
0269  ;--
0269
0269  OPEN_JNL:
```

```
                0559  30  0269        BSBW    RM$ALLOC_RJB_BDB                    ; get journaling BDB/Buffer
               03 50  E8  026C        BLBS    R0,10$                              ; continue if success
                007D  31  026F        BRW     50$                                 ; out on error
        52      00A4  C9  D0  0272  10$:  MOVL    IFB$L_RJB(R9),R2                ; get RJB address
               01     55  D1  0277        CMPL    R5,#CJF$_RU                     ; Opening RU?
                      3A  13  027A        BEQL    20$                             ; yes, branch
                      63  D4  027C        CLRL    (R3)                            ; set up descriptor
        63     64     04  83  027E        SUBB3   #ACE$T_RMSJNLNAM,(R4),(R3)      ; get length of journal name
                      09  14  0282        BGTR    15$                             ; length is >0
   50      00000000'8F  D0  0284        MOVL    #CJF$_NONAME,R0                   ; journal not specified
                      58  11  028B        BRB     40$                             ; error exit
      04 A3     04 A4     DE  028D  15$:  MOVAL   ACE$T_RMSJNLNAM(R4),4(R3)       ; fill in address of string
                              0292
                              0292        $ASSJNL_S       -                       ; assign journal chan
                              0292                CHAN = RJB$Q_CHAN-2(R2)[R5], -
                              0292                JNLTYP = R5, -
                              0292                JNLNAM = (R3), -
                              0292                ACMODE = MODE, -
                              0292                PROT   = FWA$W_PRO(R10), -
                              0292                OBJUIC = FWA$L_UIC(R10), -
                              0292                FACCOD = FACILITY
                              02B4
                      24  11  02B4        BRB     30$
                              02B6
                              02B6  20$:  $ASSJNL_S       -                       ; open RU chan
                              02B6                CHAN = RJB$Q_CHAN(R2), -
                              02B6                JNLTYP = R5, -
                              02B6                DEVNAM = FWA$Q_DEVICE(R10), -
                              02B6                ACMODE = MODE, -
                              02B6                PROT   = FWA$W_PRO(R10), -
                              02B6                OBJUIC = FWA$L_UIC(R10), -
                              02B6                FACCOD = FACILITY
                              02DA
               08 50      E9  02DA  30$:  BLBC    R0,40$                          ; return on error
                              02DD
                      55  D7  02DD        DECL    R5                              ; one less than type
                              02DF        SSB     R5,RJB$W_FLAGS(R2)              ; turn on bit for chan
                          05  02E4        RSB                                     ; return to caller
                              02E5
                              02E5  ;
                              02E5  ; Error Exit
                              02E5  ;
                      01  BB  02E5  40$:  PUSHR   #^M<R0>                         ; save R0
          000005F2'EF     16  02E7        JSB     RM$DEAJNL                       ; deallocate RJB
                      01  BA  02ED        POPR    #^M<R0>                         ; restore R0
                              02EF
                          05  02EF  50$:  RSB
                      02F0         .SBTTL  RM$CONJNL - Connect Journal BDB
                      02F0
                      02F0    ;++
                      02F0    ; RM$CONJNL - Connect Journal BDB
                      02F0    ;
                      02F0    ; This routine, called from $CONNECT, builds the necessary data
                      02F0    ; structures onto the IRAB for journaling record processing
                      02F0    ; operations
                      02F0    ;
                      02F0    ; Calling sequence:
                      02F0    ;
                      02F0    ;        BSBW    RM$CONJNL
                      02F0    ;
                      02F0    ; Input Parameters:
                      02F0    ;
                      02F0    ;        R9      Address of IRAB
                      02F0    ;        R10     Address of IFAB
                      02F0    ;        R11     Address of Impure area
                      02F0    ;
                      02F0    ; implicit Inputs:
                      02F0    ;
                      02F0    ;        None.
                      02F0    ;
                      02F0    ; Output Parameters:
                      02F0    ;
                      02F0    ;        R1 - R3,R5      Destroyed
                      02F0    ;        R4              Address of BDB for journaling I/O.
                      02F0    ;
                      02F0    ; Implicit Outputs:
                      02F0    ;
                      02F0    ;        IRB$L_JNLBDB    Address of BDB for journaling I/O.
                      02F0    ;
                      02F0    ; Completion Codes:
                      02F0    ;        Any valid RMS, particualarly DME.
                      02F0    ;
                      02F0    ; Side Effects:
                      02F0    ;        A buffer and BDB are allocated, the BDB is marked perm.
                      02F0    ;
                      02F0    ;--
                      02F0
                      02F0    RM$CONJNL::
                      02F0
                      02F0    ;
                      02F0    ; Determine whether or not we need to allocate a journal BDB and buffer. We
                      02F0    ; only need one if connecting for record access. For block I/O access, simply
                      02F0    ; exit (the journal BDB and buffer will be allocated on the first $WRITE).
                      02F0    ;
                      02F0
       05     E0      02F0             BBS     #IFB$V_BIO,-               ; if we're open for BIO, exit
 0A 22 AA             02F2                     IFB$B_FAC(R10),10$         ;
       06     E1      02F5             BBC     #IFB$V_BRO,-               ; if not opening BRO, we're ok
 08 22 AA             02F7                     IFB$B_FAC(R10),20$         ;  (must be open for record access)
       0B     E1      02FA             BBC     #RAB$V_BIO,-               ; if connecting for record access,
 03 04 A8             02FC                     RAB$L_ROP(R8),20$          ;  we're ok
     007C     31      02FF    10$:     BRW     80$                        ; exit
                      0302
                      0302    ;
```

```
                          0302  ; If the file is sequential, determine the largest probable record size to be
                          0302  ; journaled.  A record can be no larger than the maximum record length.  If
                          0302  ; the MRS was not given, then look at the the longest record length or the
                          0302  ; multiblock count.  If none of these values were specified, then punt.
                          0302  ;
                          0302
                          0302                  ASSUME  IFB$C_SEQ EQ 0
                          0302
               23 AA  95  0302  20$:            TSTB    IFB$B_ORGCASE(R10)                    ; is the file sequential?
                  1D  12  0305                  BNEQ    50$                                   ; no, use BKS for buffer len
                          0307
            55  60 AA  3C  0307                 MOVZWL  IFB$W_MRS(R10),R5                     ; use the max rec. size
                  1F  12  030B                  BNEQ    60$                                   ; use it if present
                          030D
            55  52 AA  3C  030D                 MOVZWL  IFB$W_LRL(R10),R5                     ; use the LRL for the buffer
                  19  12  0311                  BNEQ    60$                                   ; finish buffer size calulat
                          0313
            55  37 A8  9A  0313                 MOVZBL  RAB$B_MBC(R8),R5                      ; use the MBC for buffer len
                  04  13  0317                  BEQL    30$                                   ; no, buffer will be 1 page
                  67  19  0319                  BLSS    ERRMBC                                ; MBC must be > 0
                  0B  11  031B                  BRB     55$
                          031D
         55    0200 8F  3C  031D  30$:          MOVZWL  #512,R5                               ; buff. will be 1 page
                  08  11  0322                  BRB     60$
                          0324
                          0324  ;
                          0324  ; file is not sequential.  Use the bucket size as the buffer length.
                          0324  ;
                          0324
            55  5E AA  9A  0324  50$:           MOVZBL  IFB$B_BKS(R10),R5                     ; get bucket size
         55  55   09  78  0328  55$:            ASHL    #9,R5,R5                              ; convert to bytes
                          032C
      55   00000048 8F  C0  032C  60$:          ADDL2   #RJR$C_RECLEN, R5                     ; give some overhead
      55   000001FF 8F  C0  0333                ADDL2   #511,R5                               ; round up to a
      55   000001FF 8F  CA  033A                BICL2   #511,R5                               ; page boundary
                          0341
           00000000'EF  16  0341                JSB     RM$ALDJNLBUF                          ; get BDB and buffer
               37 50  E9  0347                  BLBC    R0,90$                                ; get out on error
                  3E  BB  034A                  PUSHR   #^M<R1,R2,R3,R4,R5>                   ; save regs zeroed by MOVC5
            51  18 A4  D0  034C                 MOVL    BDB$L_ADDR(R4),R1                     ; get RJR address
  61    38   00   61  00  2C  0350              MOVC5   #0,(R1),#0,#RJR$C_HDRLEN,(R1)         ; zero the RJR overhead
                  3E  BA  0356                  POPR    #^M<R1,R2,R3,R4,R5>                   ; restore regs zeroed by MOV
          30 A9   54  D0  0358                  MOVL    R4,IRB$L_JNLBDB(R9)                   ; save BDB addr
                          035C
                          035C                  ASSUME  RJR$C_EXTLEN    GT      RJR$C_BLKLEN
                          035C                  ASSUME  RJR$C_EXTLEN    GT      RJR$C_AT_RECLEN
                          035C
      1C 00A0 CA   04  E1  035C                 BBC     #IFB$V_AT,IFB$B_JNLFLG(R10),80$       ; skip if not AT
      52   009A 8F  3C  0362                    MOVZWL  #<MJB$C_BLN+RJR$C_EXTLEN>,R2          ; length of structure
       02    23 AA  91  0367                    CMPB    IFB$B_ORGCASE(R10),#IFB$C_IDX         ; indexed file?
                  07  12  036B                  BNEQ    70$                                   ; if NEQ no
      52   00000100 8F  C0  036D                ADDL    #256,R2                               ; add in max key size
                0333  30  0374  70$:            BSBW    RM$ALLOC_MJB                          ; allocate MJB
               07 50  E9  0377                  BLBC    R0,90$                                ; branch if error
          2C A9   51  D0  037A                  MOVL    R1,IRB$L_ATJNLBUF(R9)                 ; init pointer
                          037E  80$:            RMSSUC                                        ; indicate success
                  05  0381  90$:                RSB
```

```
        0382  1093
        0382  1094 ERRMBC:
        0382  1095          RMSERR  MBC
   05   0387  1096          RSB
```

```
                0388         .SBTTL  RM$MAPJNL - Write Mapping Entry
                0388
                0388  ;++
                0388  ; RM$MAPJNL - Write Mapping Entry
                0388  ; RM$MAPJNL_RU - Write RU Mapping Entry
                0388  ;
                0388  ; This routine writes a mapping entry into all currently open
                0388  ; journals for a particular file
                0388  ;
                0388  ; Calling sequence:
                0388  ;
                0388  ;        BSBW    RM$MAPJNL
                0388  ;        BSBW    RM$MAPJNL_RU
                0388  ;
                0388  ; Input Parameters:
                0388  ;
                0388  ;        R8      FAB address (used by COMMON_FILE_AT to write CTX field into RJR)
                0388  ;        R9      IFAB address
                0388  ;        R11     Impure area address
                0388  ;        AP      r0 status till now (I know its a hack, but..) only used for AT
                0388  ;
                0388  ; Implicit Inputs:
                0388  ;
                0388  ;        IFB$L_RJB          RJB address
                0388  ;        IFB$L_FWA_PTR      FWA pointer and current contents of FWA
                0388  ;        RJB$V_OPEN         Set to indicate an open entry; cleared if set.
                0388  ;        RJB$W_FLAGS        RMS journal channel flags - these will be used
                0388  ;                           as variable inputs (saved and restored by caller)
                0388  ;                           to allow AT write at a different time from AI, BI, RU.
                0388  ;
                0388  ; Output Parameters:
                0388  ;
                0388  ;        R1 - R5            Destroyed
                0388  ;
                0388  ; Implicit Outputs:
                0388  ;
                0388  ;        RJB$V_OPEN         Cleared if set
                0388  ;
                0388  ; Completion Codes:
                0388  ;
                0388  ;        Any RMS, particularly DME,
                0388  ;        CJF -   CJF error, CJF status in STV
                0388  ;
                0388  ; Side Effects:
                0388  ;        May have switched to EXEC AST level.
                0388  ;
                0388  ;--
                0388
                0388  ;
                0388  ; Alternate Entry Point for RU handler
                0388  ;
                0388
                0388  RM$MAPJNL_RU::
      01   DD   0388         PUSHL   #1                                      ; indicate RU MAPJNL
      02   11   038A         BRB     MAPJNL
                038C
                038C  ;
```

```
                      038C  ; Entry point for AI, BI, AT
                      038C  ;
                      038C  RM$MAPJNL::
            7E    D4  038C          CLRL    -(SP)                                   ; indicate not RU MAPJNL
                      038E
                      038E
      7E    56    7D  038E  MAPJNL: MOVQ    R6,-(SP)                                ; save R6, R7
      7E    5A    D0  0391          MOVL    R10,-(SP)                               ; save R10
                      0394
                      0394  ;
                      0394  ; Get RJR buffer address.
                      0394  ;
          042E    30  0394          BSBW    RM$ALLOC_RJB_BDB                        ; get a journal BDB
                      0397                                                          ; if this is CLOSE
         03 50    E8  0397          BLBS    R0,10$                                  ; continue if OK
          009C    31  039A          BRW     80$                                     ; out on error
     5A   30 A9   D0  039D  10$:    MOVL    IFB$L_JNLBDB(R9),R10                    ; first get BDB address
     56   18 AA   D0  03A1          MOVL    BDB$L_ADDR(R10),R6                      ; get RJR address
                      03A5
                      03A5  ;
                      03A5  ; Fill in file name in entry
                      03A5  ;
     5A   38 A9   D0  03A5          MOVL    IFB$L_FWA_PTR(R9),R10                   ; get FWA address
   53   00C4 C6   DE  03A9          MOVAL   RJR$T_FILENAME(R6),R3                   ; get name buff addr
                      03AE
                      03AE          ASSUME  RJR$S_FILENAME EQ 256
                      03AE
                      03AE  ;
                      03AE  ; Set buffer size to 255 because the GETFILNAM code builds a NAM block, etc...
                      03AE  ; and can only cope with a size that fits in a byte.
                      03AE  ;
   54   00FF 8F   3C  03AE          MOVZWL  #<RJR$S_FILENAME-1>,R4                  ; set size of buffer
    00000000'EF   16  03B3          JSB     RM$GETFILNAM                            ; go get file name
   58 A6    54    90  03B9          MOVB    R4,RJR$B_FNS(R6)                        ; put length in entry
                      03BD
                      03BD  ; Fill in header
                      03BD  ;
     54   30 A9   D0  03BD          MOVL    IFB$L_JNLBDB(R9),R4                     ; retrieve jnl BDB addr
14 A4   01C4 8F   B0  03C1          MOVW    #RJR$C_FILNAMLEN,BDB$W_NUMB(R4)         ; set entry size
   57   00A4 C9   D0  03C7          MOVL    IFB$L_RJB(R9),R7                        ; get RJB address
   03 A6    01    90  03CC          MOVB    #RJR$C_MAPPING,RJR$B_ENTRY_TYPE(R6)     ; fill in file type
04 A6    23 A9    90  03D0          MOVB    IFB$B_ORGCASE(R9),RJR$B_ORG(R6)         ; fill in org
         0C AE    D5  03D5          TSTL    ^X0C(SP)                                ; RU call?
            52    12  03D8          BNEQ    70$                                     ; branch if so
                      03DA
                      03DA          ASSUME  FAB$C_SEQ@-4    EQ      RJR$C_SEQ
                      03DA          ASSUME  FAB$C_REL@-4    EQ      RJR$C_REL
                      03DA          ASSUME  FAB$C_IDX@-4    EQ      RJR$C_IDX
                      03DA
06 0A A7    04    E5  03DA          BBCC    #RJB$V_OPEN,RJB$W_FLAGS(R7),20$         ; branch if not $OPEN
   05 A6    11    90  03DF          MOVB    #RJR$_OPEN,RJR$B_OPER(R6)               ; fill in operation
            04    11  03E3          BRB     30$
                      03E5
   05 A6    02    90  03E5  20$:    MOVB    #RJR$_CLOSE,RJR$B_OPER(R6)              ; fill in operation
                      03E9
                      03E9  ; Write indivdual mapping entries
                      03E9  ;
```

```
                    03E9
  54    30 A9   D0  03E9   30$:    MOVL    IFB$L_JNLBDB(R9),R4                        ; restore BDB addr
     7E    53   7D  03ED           MOVQ    R3,-(SP)                                   ; make type and BDB args
                    03F0           RMSSUC                                             ; success if no jnling
09 0A A7   01   E1  03F3           BBC     #RJB$V_BI,RJB$W_FLAGS(R7),40$              ; branch if no BI
     6E    02   9A  03F8           MOVZBL  #CJF$_BI,(SP)                              ; set BI
      004D      30  03FB           BSBW    RM$WRTJNL                                  ; write the record
     26 50      E9  03FE           BLBC    R0,60$                                     ; get out on error
                    0401
09 0A A7   02   E1  0401   40$:    BBC     #RJB$V_AI,RJB$W_FLAGS(R7),50$              ; branch if no AI
     6E    03   9A  0406           MOVZBL  #CJF$_AI,(SP)                              ; set AI
      003F      30  0409           BSBW    RM$WRTJNL                                  ; write the record
     18 50      E9  040C           BLBC    R0,60$                                     ; get out on error
                    040F
13 0A A7   03   E1  040F   50$:    BBC     #RJB$V_AT,RJB$W_FLAGS(R7),60$              ; branch if no AT
     6E    04   9A  0414           MOVZBL  #CJF$_AT,(SP)                              ; set AT
  2C A9    56   D0  0417           MOVL    R6,IFB$L_ATJNLBUF(R9)                      ; shortcut RJR addr.
      04D9      30  041B           BSBW    COMMON_FILE_AT                             ; fill in fields
        2B      10  041E           BSBB    RM$WRTJNL                                  ; write the record
  52    2C A9   D0  0420           MOVL    IFB$L_ATJNLBUF(R9),R2                      ; get RJR address
                    0424           ASSUME  RJR$L_AT_STV     EQ      RJR$L_AT_STS+4
     24 A2      7C  0424           CLRQ    RJR$L_AT_STS(R2)                           ; init status
                    0427
     5E    08   C0  0427   60$:    ADDL2   #8,SP                                      ; clear arglist
           0D   11  042A           BRB     80$                                        ; exit
                    042C
                    042C   ;+
                    042C   ; RU mapping entry.
                    042C   ;-
                    042C
  05 A6    11   90  042C   70$:    MOVB    #RJR$_OPEN,RJR$B_OPER(R6)                  ; fill in operation
           54   DD  0430           PUSHL   R4                                         ; BDB addr
           01   DD  0432           PUSHL   #CJF$_RU                                   ; Set RU
           0C   10  0434           BSBB    RM$WRTJNL_OBJ                              ; write the record
     5E    08   C0  0436           ADDL2   #8,SP                                      ; delete arglist
                    0439
     5A    8E   D0  0439   80$:    MOVL    (SP)+,R10                                  ; restore FWA addr
     56    8E   7D  043C           MOVQ    (SP)+,R6                                   ; restore R6,R7
           8E   D5  043F           TSTL    (SP)+                                      ; clear off call code
                05  0441           RSB
```

```
                    0442         .SBTTL  RM$WRTJNL - Write Journal Entry
                    0442         .SBTTL  RM$WRTJNL_OBJ - Write Journal Entry with OBJECT_ID Flag
                    0442
                    0442  ;++
                    0442  ; RM$WRTJNL - Write Journal Entry
                    0442  ; RM$WRTJNL_OBJ - Write Journal Entry with OBJECT_ID Flag
                    0442  ;
                    0442  ; This routine fills in the mapping enry sequence number into the
                    0442  ; journaling buffer and then writes it out for either a fab or rab
                    0442  ; operation.
                    0442  ;
                    0442  ; Calling sequence:
                    0442  ;
                    0442  ;        BSBW     RM$WRTJNL
                    0442  ;        BSBW     RM$WRTJNL_OBJ
                    0442  ;
                    0442  ; Input Parameters:
                    0442  ;
                    0442  ;        4(SP)    Type of journal to be written (CJF$_xx)
                    0442  ;        8(SP)    Address of journaling BDB
                    0442  ;        R4       Address of BDB of Related buffer
                    0442  ;        R9       Address of IFB or IRB (depending on call)
                    0442  ;        R10      Address of IFB if IRAB call
                    0442  ;        R11      Address of impure area
                    0442  ;
                    0442  ; Implicit Inputs:
                    0442  ;
                    0442  ;        IFB$L_RJB          Address of RJB
                    0442  ;        RJB$Q_CHAN         One word is used as channel for QIO
                    0442  ;
                    0442  ; Output Parameters:
                    0442  ;
                    0442  ;        R1                 Destroyed
                    0442  ;
                    0442  ; Implicit Outputs:
                    0442  ;
                    0442  ;        BDB$T_JNLSEQ       One longword contains new high water mark
                    0442  ;
                    0442  ; Completion Codes:
                    0442  ;
                    0442  ;        CJF      -         CJF error, CJF status in STV
                    0442  ;
                    0442  ; Side Effects:
                    0442  ;        May have switched to EXEC AST level.
                    0442  ;
                    0442  ;--
                    0442
          00000008  0442  RBDB=8               ; stack offset to related BDB address
          0000001C  0442  JTYP=28              ; stack offset to journal type code
          00000020  0442  JBDB=32              ; stack offset to journal BDB
                    0442
                    0442  ;
                    0442  ; Alternate Entry Point to write entry with OBJECT_ID flag.
                    0442  ;
                    0442  RM$WRTJNL_OBJ::
     00FC 8F    BB  0442         PUSHR    #^M<R2,R3,R4,R5,R6,R7>                  ; save regs
     53   08    D0  0446         MOVL     #WRFLG$M_OBJECT_ID,R3                   ; set P6 flags
```

```
                 07   11  0449                BRB     WRTJNL
                          044B
                          044B  RM$WRTJNL::
             00FC 8F  BB  044B                PUSHR   #^M<R2,R3,R4,R5,R6,R7>                    ; save regs
               53  10 D0  044F                MOVL    #WRFLG$M_LOCK,R3                          ; set P6 flags
        52   1C AE    D0  0452  WRTJNL:       MOVL    JTYP(SP),R2                               ; get typ code
        0A   08 A9    91  0456                CMPB    IRB$B_BID(R9),#IRB$C_BID                  ; IRB operation?
                 11   13  045A                BEQL    10$                                       ; branch if yes
                          045C
                          045C  ;
                          045C  ; IFAB operation
                          045C  ;
        54   38 A9    D0  045C                MOVL    IFB$L_FWA_PTR(R9),R4                      ; get FWA address
      56   00A4 C9    D0  0460                MOVL    IFB$L_RJB(R9),R6                          ; get RJB address
   11 00A2 C9    02   E0  0465                BBS     #IFB$V_RUP,IFB$B_JNLFLG2(R9),15$          ; branch if RUP
                 1C   11  046B                BRB     20$
                          046D
                          046D  ;
                          046D  ; IRAB operation
                          046D  ;
        54   38 AA    D0  046D  10$:          MOVL    IFB$L_FWA_PTR(R10),R4
      56   00A4 CA    D0  0471                MOVL    IFB$L_RJB(R10),R6
   0D 00A2 CA    02   E1  0476                BBC     #IFB$V_RUP,IFB$B_JNLFLG2(R10),20$         ; branch if no RUP
                          047C
                          047C  ;
                          047C  ; IFB, IRB rejoin here if RU in progress.
                          047C  ;
                          047C  15$:          SSB     #WRFLG$V_RUALSO,R3                        ; set RUALSO in P6 flags
            01   52   D1  0480                CMPL    R2,#CJF$_RU                               ; see if RU write
                 04   12  0483                BNEQ    20$                                       ; branch if not
                          0485                SSB     #WRFLG$V_BI,R3                            ; set RU/BI in P6 flags
                          0489
                          0489  ;
                          0489  ; IFB, IRB rejoin here in no RU in progress
                          0489  ;
        55   20 AE    D0  0489  20$:          MOVL    JBDB(SP),R5                               ; get jBDB address
                          048D                SSB     #BDB$V_IOP,BDB$B_FLGS(R5)                 ; indicate IO in prog
        51   18 A5    D0  0492                MOVL    BDB$L_ADDR(R5),R1                         ; get buff address
        02 A1    02   90  0496                MOVB    #RJR$C_MAXVER,RJR$B_VERSION(R1)           ; set journal rec ver #
                 3E   BB  049A                PUSHR   #^M<R1,R2,R3,R4,R5>
  08 A1   0920 C4    1C   28  049C            MOVC3   #FWA$S_JNLID,FWA$T_JNLID(R4),RJR$T_JNLID(R1) ; copy journal id
                 3E   BA  04A3                POPR    #^M<R1,R2,R3,R4,R5>
        57   14 A5    3C  04A5                MOVZWL  BDB$W_NUMB(R5),R7                         ; get record length
       00000000'EF    16  04A9                JSB     RM$SETEFN                                 ; get EFN
                 01   BA  04AF                POPR    #^M<R0>
                          04B1                $QIO_S -                                          ; issue QIO
                          04B1                        EFN     =       R0, -
                          04B1                        CHAN    =       RJB$Q_CHAN-2(R6)[R2], -
                          04B1                        FUNC    =       #IO$_WRITEVBLK, -
                          04B1                        IOSB    =       BDB$L_IOSB(R5), -
                          04B1                        ASTADR  =       RM$STALLAST, -
                          04B1                        ASTPRM  =       R9, -                     ; IRB/IFB
                          04B1                        P1      =       (R1), -                   ; buffer address
                          04B1                        P2      =       R7, -                     ; size of transfer
                          04B1                        P6      =       R3                        ; journal type
              18 50   E9  04D7                BLBC    R0,30$                                    ; get out on error
                          04DA
        00000000'EF  16  04DA              JSB     RM$STALL                                 ; wait for completion
         50    48 A5  D0  04E0              MOVL    BDB$L_IOSB(R5),R0                         ; retrieve status
         52    1C AE  D0  04E4              MOVL    JTYP(SP),R2                               ; get typ code
         54    08 AE  D0  04E8              MOVL    RBDB(SP),R4                               ; get related BDB addr
   34 A442     4C A5  D0  04EC              MOVL    BDB$L_IOSB+4(R5),BDB$T_JNLSEQ-4(R4)[R2]   ; retrieve seq #
                          04F2     30$:     CSB     #BDB$V_IOP,BDB$B_FLGS(R5)                 ; clear IO in prog
             00FC 8F  BA  04F7              POPR    #^M<R2,R3,R4,R5,R6,R7>                    ; restore regs
               0B 50  E8  04FB              BLBS    R0,40$                                    ; get out on success
        00000000'EF  16  04FE              JSB     RM$MAPERR                                 ; fill in STV
                          0504              RMSERR  CJF                                       ; force CJF error
                     05   0509     40$:     RSB                                               ; return to caller
```

```
                          050A         .SBTTL  RMS$FRCJNL - Force All Journal Entries for a buffer
                          050A  ;++
                          050A  ; FORCE_JNL - Force Journal Entries
                          050A  ;
                          050A  ; This routine performs a force operation to all open journals
                          050A  ; at the high water mark for a buffer.
                          050A  ;
                          050A  ; Calling sequence:
                          050A  ;
                          050A  ;      BSBW    RM$FRCJNL
                          050A  ;
                          050A  ; Input Parameters:
                          050A  ;
                          050A  ;      R4          Address of BDB of Related buffer or
                          050A  ;                  Zero to flush all Entries.
                          050A  ;      R9          IFAB or IRAB address
                          050A  ;      R10         IFAB address if IFAB operation
                          050A  ;      R11         Address of Impure Area
                          050A  ;
                          050A  ; Implicit Inputs:
                          050A  ;
                          050A  ;      IFB$L_RJB       Address of RJB
                          050A  ;
                          050A  ; Output Parameters:
                          050A  ;
                          050A  ;      R1 - R3, R5     Destroyed
                          050A  ;
                          050A  ; Implicit Outputs:
                          050A  ;      None.
                          050A  ;
                          050A  ; Completion Codes:
                          050A  ;
                          050A  ;      CJF - CJF error, Status from QIO in STV
                          050A  ;
                          050A  ; Side Effects:
                          050A  ;      May have switched to EXEC AST level.
                          050A  ;--
                          050A
                          050A  RM$FRCJNL::
        7E    01    D0    050A         MOVL    #1,-(SP)                                ; anticipate success
  0A    08 A9      91    050D         CMPB    IRB$B_BID(R9),#IRB$C_BID                ; IRB operation?
              07    13    0511         BEQL    10$                                     ; branch if yes
  55    00A4 C9    D0    0513         MOVL    IFB$L_RJB(R9),R5                        ; get RJB address
              05    11    0518         BRB     15$
  55    00A4 CA    D0    051A  10$:   MOVL    IFB$L_RJB(R10),R5
                          051F
0C 0A A5      01    E1    051F  15$:   BBC     #RJB$V_BI,RJB$W_FLAGS(R5),20$           ; branch if no BI
        52    02    D0    0524         MOVL    #CJF$_BI,R2                             ; indicate BI
          005A      30    0527         BSBW    FORCE_JNL                               ; go do force
          03 50     E8    052A         BLBS    R0,20$                                  ; skip on success
        6E    50    D0    052D         MOVL    R0,(SP)                                 ; save error code
                          0530
0C 0A A5      02    E1    0530  20$:   BBC     #RJB$V_AI,RJB$W_FLAGS(R5),30$           ; branch if no AI
        52    03    D0    0535         MOVL    #CJF$_AI,R2                             ; indicate AI
          0049      30    0538         BSBW    FORCE_JNL                               ; go do force
          03 50     E8    053B         BLBS    R0,30$                                  ; skip on success
        6E    50    D0    053E         MOVL    R0,(SP)                                 ; save error code
```

```
                            0541
     0C 0A A5      03   E1  0541   30$:    BBC     #RJB$V_AT,RJB$W_FLAGS(R5),40$          ; branch if no AT
           52      04   D0  0546           MOVL    #CJF$_AT,R2                            ; indicate AT
                 0038   30  0549           BSBW    FORCE_JNL                              ; go do force
              03   50   E8  054C           BLBS    R0,40$                                 ; skip on success
           6E      50   D0  054F           MOVL    R0,(SP)                                ; save error code
                            0552
     1A 0A A5      00   E1  0552   40$:    BBC     #RJB$V_RU,RJB$W_FLAGS(R5),50$          ; branch if no RU
  51    00000000'9F     D0  0557           MOVL    @#CTL$GL_RUF,R1                        ; RU in prog?
                   11   13  055E           BEQL    50$                                    ; branch if not
     0C 11 A1      01   E1  0560           BBC     #RUCB$V_ACTIVE,RUCB$B_CTRL(R1),50$
           52      01   D0  0565           MOVL    #CJF$_RU,R2                            ; indicate RU
                 0019   30  0568           BSBW    FORCE_JNL                              ; go do force
              03   50   E8  056B           BLBS    R0,50$                                 ; skip on success
           6E      50   D0  056E           MOVL    R0,(SP)                                ; save error code
                            0571
           50      8E   D0  0571   50$:    MOVL    (SP)+,R0                               ; get worst status
              01   50   E9  0574           BLBC    R0,60$                                 ; get out on success
                   05       0577           RSB
        00000000'EF     16  0578   60$:    JSB     RM$MAPERR                              ; fill in STV
                            057E           RMSERR  CJF                                    ; force CJF error
                        05  0583           RSB
```

```
                           0584          .SBTTL  FORCE_JNL - Force Journal Entries
                           0584
                           0584   ;++
                           0584   ; FORCE_JNL - Force Journal Entries
                           0584   ;
                           0584   ; This routine performs a force operation to the specified journal
                           0584   ; at the high water mark for a buffer.
                           0584   ;
                           0584   ; Calling sequence:
                           0584   ;
                           0584   ;        BSBW    RM$FRCJNL
                           0584   ;
                           0584   ; Input Parameters:
                           0584   ;
                           0584   ;        R2      Type of journal to be forced (CJF$_xx)
                           0584   ;        R4      Address of BDB of Related buffer or
                           0584   ;                Zero to flush all entries.
                           0584   ;        R5      Adddress of RJB
                           0584   ;        R9      IFAB or IRAB address
                           0584   ;        R10     IFAB address if IFAB operation
                           0584   ;        R11     Address of Impure Area
                           0584   ;
                           0584   ; Implicit Inputs:
                           0584   ;
                           0584   ;        IFB$L_RJB       Address of RJB
                           0584   ;        RJB$Q_CHAN      One word is used as channel for QIO
                           0584   ;        BDB$T_JNLSEQ    One longword contains high water mark for force
                           0584   ;
                           0584   ; Output Parameters:
                           0584   ;
                           0584   ;        R0 - R3         Destroyed
                           0584   ;
                           0584   ; Implicit Outputs:
                           0584   ;        None.
                           0584   ;
                           0584   ; Completion Codes:
                           0584   ;
                           0584   ;        Any QIO status value,
                           0584   ;        Any IOSB status vaule from a journaling QIO.
                           0584   ;
                           0584   ; Side Effects:
                           0584   ;        May have switched to EXEC AST level.
                           0584   ;--
                           0584
                           0584   FORCE_JNL:
      50    01     D0      0584          MOVL    #1,R0                           ; anticipate success
      53    54     D0      0587          MOVL    R4,R3                           ; see if buffer present
            07     13      058A          BEQL    10$                             ; branch if not
 53   34 A442      D0      058C          MOVL    BDB$T_JNLSEQ-4(R4)[R2],R3       ; get high water mark
            39     13      0591          BEQL    20$                             ; if zero, bdb has not
                           0593                                                  ; been used as part of a
                           0593                                                  ; journaling operation.
   00000000'EF     16      0593   10$:   JSB     RM$SETEFN                       ; get EFN
            01     BA      0598          POPR    #^M<R0>
                           059B          $QIO_S -                                ; issue QIO
                           059B                  EFN     =       R0, -
                           059B                  CHAN    =       RJB$Q_CHAN-2(R5)[R2], -
```

```
                         059B  1516                FUNC    =       #IO$_FORCE, -
                         059B  1517                IOSB    =       IRB$[_IOS(R9), -
                         059B  1518                ASTADR  =       RM$STALLAST, -
                         059B  1519                ASTPRM  =       R9, -
                         059B  1520                P2      =       R3                      ; high water mark
           0A 50    E9   05BF  1521        BLBC    R0,20$                                  ; get out on error
    00000000'EF    16   05C2  1522        JSB     RM$STALL                                ; wait for completion
     50    0C A9    D0   05C8  1523        MOVL    IRB$L_IOS(R9),R0                        ; retrieve status
                         05CC  1524
                    05   05CC  1525 20$:   RSB                                             ; return to caller
```

```
                        05CD           .SBTTL  RM$DSCJNL - Disconnect IRAB Journal Structures
                        05CD
                        05CD      ;++
                        05CD      ; RM$DSCJNL - Disconnect IRAB Journal Structures
                        05CD      ;
                        05CD      ; This routine deallocates the data structures for journaling record
                        05CD      ; processing operations from the IRAB.
                        05CD      ;
                        05CD      ; Calling sequence:
                        05CD      ;
                        05CD      ;        BSBW    RM$DSCJNL
                        05CD      ;
                        05CD      ; Input Parameters:
                        05CD      ;
                        05CD      ;        R9      Address of IRAB
                        05CD      ;        R11     Address of Impure area
                        05CD      ;
                        05CD      ; Implicit Inputs:
                        05CD      ;
                        05CD      ;        IRB$L_JNLBDB    Address of journaling BDB
                        05CD      ;
                        05CD      ; Output Parameters:
                        05CD      ;        R0 - R5         Destroyed
                        05CD      ;
                        05CD      ; Implicit Outputs:
                        05CD      ;        None.
                        05CD      ;
                        05CD      ; Completion Codes:
                        05CD      ;        None.
                        05CD      ;
                        05CD      ; Side Effects:
                        05CD      ;        None.
                        05CD      ;
                        05CD      ;--
                        05CD
                        05CD      RM$DSCJNL::
                        05CD
     54    30 A9   D0   05CD             MOVL    IRB$L_JNLBDB(R9),R4            ; get journal BDB address
              09   13   05D1             BEQL    10$                            ; skip if none
       00000000'EF 16   05D3             JSB     RM$RETJNLBDB                   ; deallocate it
           30 A9   D4   05D9             CLRL    IRB$L_JNLBDB(R9)               ; clear pointer
                        05DC      10$:                                          ;
     54    2C A9   D0   05DC             MOVL    IRB$L_ATJNLBUF(R9),R4          ; get AT MJB address
              0F   13   05E0             BEQL    20$                            ; branch if none
        55    54   D0   05E2             MOVL    R4,R5                          ; copy MJB address for FORCE call
            0188   30   05E5             BSBW    RM$FORCE_MJB                   ; force the IRB AT journaling record
                        05E8                                                    ; Note, errors eaten!
       00000000'EF 16   05E8             JSB     RM$RETBLK1                     ; give it up
           2C A9   D4   05EE             CLRL    IRB$L_ATJNLBUF(R9)             ; clear pointer
              05        05F1      20$:   RSB
```

```
                         05F2         .SBTTL  RM$DEAJNL - Close journaling on file
                         05F2
                         05F2    ;++
                         05F2    ; RM$DEAJNL - Close journaling on file
                         05F2    ;
                         05F2    ; This routine deassigns the journal channels open for the file and
                         05F2    ; deallocates the journaling data structures from the IFAB.
                         05F2    ;
                         05F2    ; Calling sequence:
                         05F2    ;
                         05F2    ;       BSBW    RM$DEAJNL
                         05F2    ;
                         05F2    ; Input Parameters:
                         05F2    ;
                         05F2    ;       R9      Address of IFAB
                         05F2    ;       R11     Impure area address
                         05F2    ;
                         05F2    ; Implicit Inputs:
                         05F2    ;
                         05F2    ;       IRB$L_RJB       Address of RJB
                         05F2    ;
                         05F2    ; Output Parameters:
                         05F2    ;
                         05F2    ;       R1 - R5         Destroyed
                         05F2    ;
                         05F2    ; Implicit Outputs:
                         05F2    ;       None.
                         05F2    ;
                         05F2    ; Completion Codes:
                         05F2    ;       CJF     - CJF Operation Error, CJF status from $DEASJNL in STV
                         05F2    ;
                         05F2    ; Side Effects:
                         05F2    ;       None.
                         05F2    ;
                         05F2    ;--
                         05F2
                         05F2    RM$DEAJNL::
                         05F2
        7E    01    D0   05F2           MOVL    #1,-(SP)                        ; assume success
   54    30 A9      D0   05F5           MOVL    IFB$L_JNLBDB(R9),R4             ; jnl BDB/Buffer address
          11        13   05F9           BEQL    2$                              ; skip if none
          5A        DD   05FB           PUSHL   R10                             ; save R10
       5A   59      D0   05FD           MOVL    R9,R10                          ; R10 must be IFAB
   00000000'EF      16   0600           JSB     RM$RETJNLBDB                    ; deallocate BDB/Buffer
       5A   8E      D0   0606           MOVL    (SP)+,R10                       ; restore R10
        30 A9       D4   0609           CLRL    IFB$L_JNLBDB(R9)                ; clear pointer
        2C A9       D4   060C    2$:    CLRL    IFB$L_ATJNLBUF(R9)              ; clear shortcut pointer
                         060F                                                   ; to AT RJR
   54    34 A9      D0   060F           MOVL    IFB$L_EXTJNLBUF(R9),R4          ; get extend MJB address
          09        13   0613           BEQL    5$                              ; branch if none
   00000000'EF      16   0615           JSB     RM$RETBLK1                      ; give it up
        34 A9       D4   061B           CLRL    IFB$L_EXTJNLBUF(R9)             ; clear pointer
   54  00A4 C9      D0   061E    5$:    MOVL    IFB$L_RJB(R9),R4                ; get RJB address
          03        12   0623           BNEQ    7$                              ; skip if none
        006F        31   0625           BRW     45$                             ; get out
 13 0A A4   01      E5   0628    7$:    BBCC    #RJB$V_BI,RJB$W_FLAGS(R4),10$   ; branch if no BI
                         062D           $DEASJNL_S -
```

```
                             062D   1635                       CHAN = RJB$W_BICHAN(R4)
                             063A   1636
             03 50      E8   063A   1637          BLBS    R0,10$                                  ; continue on success
          6E    50      D0   063D   1638          MOVL    R0,(SP)                                 ; save error code
                             0640   1639
     13 0A A4   02      E5   0640   1640 10$:     BBCC    #RJB$V_AI,RJB$W_FLAGS(R4),20$           ; branch if no AI
                             0645   1641          $DEASJNL_S -                                    ; deassign channel
                             0645   1642                  CHAN = RJB$W_AICHAN(R4)
             03 50      E8   0652   1643          BLBS    R0,20$                                  ; continue on success
          6E    50      D0   0655   1644          MOVL    R0,(SP)                                 ; save error code
                             0658   1645
     13 0A A4   03      E5   0658   1646 20$:     BBCC    #RJB$V_AT,RJB$W_FLAGS(R4),30$           ; branch if no AT
                             065D   1647          $DEASJNL_S -                                    ; deassign channel
                             065D   1648                  CHAN = RJB$W_ATCHAN(R4)
             03 50      E8   066A   1649          BLBS    R0,30$                                  ; continue on success
          6E    50      D0   066D   1650          MOVL    R0,(SP)                                 ; save error code
                             0670   1651
     12 0A A4   00      E5   0670   1652 30$:     BBCC    #RJB$V_RU,RJB$W_FLAGS(R4),40$           ; branch if no RU
                             0675   1653          $DEASJNL_S -                                    ; deassign channel
                             0675   1654                  CHAN = RJB$W_RUCHAN(R4)
             03 50      E8   0681   1655          BLBS    R0,40$                                  ; continue on success
          6E    50      D0   0684   1656          MOVL    R0,(SP)                                 ; save error code
                             0687   1657
             0A A4      B4   0687   1658 40$:     CLRW    RJB$W_FLAGS(R4)                         ; clear open flags
          53    59      D0   068A   1659          MOVL    R9,R3                                   ; deallocate RJB
       00000000'EF      16   068D   1660          JSB     RM$RETBLK                               ;
           00A4 C9      D4   0693   1661          CLRL    IFB$L_RJB(R9)                           ; evaporate pointer
          50    8E      D0   0697   1662 45$:     MOVL    (SP)+,R0                                ; get true error code
             01 50      E9   069A   1663          BLBC    R0,50$                                  ; get out on error
                05      05   069D   1664          RSB
                             069E   1665
       00000000'EF      16   069E   1666 50$:     JSB     RM$MAPERR                               ; set STV
                             06A4   1667          RMSERR  CJF                                     ; force CJF error
                        05   06A9   1668          RSB                                             ; return to caller
```

```
                                06AA          .SBTTL  RM$ALLOC_MJB - Alloc and init MJB
                                06AA
                                06AA  ;++
                                06AA  ;
                                06AA  ; RM$ALLOC_MJB - allocate and initalize a miscellaneous journaling buffer
                                06AA  ;
                                06AA  ;       The MJB is used for audit trail entries and AI extend descriptions.
                                06AA  ;
                                06AA  ; Calling Sequence:
                                06AA  ;
                                06AA  ;       BSBW    RM$ALLOC_MJB
                                06AA  ;
                                06AA  ; Input Parameters:
                                06AA  ;
                                06AA  ;       R10     IFAB address
                                06AA  ;       R2      mjb size in bytes
                                06AA  ;
                                06AA  ; Output Parameters:
                                06AA  ;
                                06AA  ;       R0      status
                                06AA  ;       R1      MJB address
                                06AA  ;
                                06AA  ; Side Effects, Implicit Inputs, Implicit Outputs:
                                06AA  ;
                                06AA  ;       None.
                                06AA  ;
                                06AA  ;--
                                06AA
                                06AA  RM$ALLOC_MJB::
                                06AA
                                06AA          ASSUME  <IRB$C_BID&1>   EQ      0
                                06AA          ASSUME  <IFB$C_BID&1>   EQ      1
                                06AA          ASSUME  IFB$B_BID       EQ      IRB$B_BID
                                06AA
                  51    59  D0  06AA          MOVL    R9,R1                           ; assume ifab addr in r1
               03 08    A9  E8  06AD          BLBS    IFB$B_BID(R9),5$                ; branch if structure is ifab
                  51    69  D0  06B1          MOVL    IRB$L_IFAB_LNK(R9),R1           ; get ifab address from irab
                                06B4  5$:
                  52    07  C0  06B4          ADDL2   #7,R2                           ; round request up
                  52    07  CA  06B7          BICL2   #7,R2                           ; ...
         52       52 FE 8F  78  06BA          ASHL    #-2,R2,R2                       ; change bytes to longwords
            00000000'EF     16  06BF          JSB     RM$GETBLK                       ; alloc an MJB on IFB page
                  1A    50  E9  06C5          BLBC    R0,10$                          ; get out on error
               08 A1    18  90  06C8          MOVB    #MJB$C_BID,MJB$B_BID(R1)        ; identify MJB as MJB
         14 A1    20    A1  DE  06CC          MOVAL   MJB$T_RJR(R1),MJB$L_POINTER(R1) ; init descriptor
                        3E  BB  06D1          PUSHR   #^M<RT,R2,R3,R4,R5>             ; save MOVC5 regs
                  51 20 A1  DE  06D3          MOVAL   MJB$T_RJR(R1),R1                ; get RJR address
   61   38   00   61    00  2C  06D7          MOVC5   #0,(RT),#0,#RJR$C_HDRLEN,(R1)   ; zero the RJR overhead
                        3E  BA  06DD          POPR    #^M<R1,R2,R3,R4,R5>             ; restore MOVC5 regs
                                06DF          RMSSUC
                        05      06E2  10$:    RSB                                     ; return to caller
```

```
                           06E3            .SBTTL  RM$WRITE_MJB - Write Miscellaneous Journaling Buffer
                           06E3
                           06E3      ;++
                           06E3      ;
                           06E3      ; RM$WRITE_MJB
                           06E3      ;
                           06E3      ; This routine is used to write a journaling record described by a
                           06E3      ; miscellaneous journaling buffer.
                           06E3      ;
                           06E3      ; Calling Sequence:
                           06E3      ;
                           06E3      ;       BSBW    RM$WRITE_MJB
                           06E3      ;
                           06E3      ; Input Parameters:
                           06E3      ;
                           06E3      ;       R9      - IFAB or IRAB address
                           06E3      ;       R5      - address of MJB
                           06E3      ;
                           06E3      ; Implicit Inputs:
                           06E3      ;
                           06E3      ;       MJB fields:
                           06E3      ;
                           06E3      ;               JNL     - CJF$_AI, BI, AT, or RU for journal channel to use
                           06E3      ;               FLAGS   - various
                           06E3      ;               DESC    - descriptor of embedded RJR to write
                           06E3      ;
                           06E3      ; Output Parameters:
                           06E3      ;
                           06E3      ;       R0      - status
                           06E3      ;       R6      - destroyed
                           06E3      ;
                           06E3      ; Implicit Outputs:
                           06E3      ;
                           06E3      ;       MJB IOSB has status of operation.
                           06E3      ;
                           06E3      ; Side Effects:
                           06E3      ;
                           06E3      ;       None.
                           06E3      ;
                           06E3      ;--
                           06E3
                           06E3      RM$WRITE_MJB::
                           06E3
             1C       BB   06E3            PUSHR   #^M<R2,R3,R4>                   ; save work registers
        54   59       D0   06E5            MOVL    R9,R4                           ; get potential IFAB address
                           06E8
                           06E8            ASSUME  IFB$B_BID       EQ      IRB$B_BID
                           06E8
   0B    08 A4        91   06E8            CMPB    IFB$B_BID(R4),#IFB$C_BID        ; file or record operation?
             03       13   06EC            BEQL    5$                              ; branch if IFAB
        54   69       D0   06EE            MOVL    IRB$L_IFAB_LNK(R9),R4           ; get IFAB address
                           06F1
   56    00A4 C4      D0   06F1      5$:   MOVL    IFB$L_RJB(R4),R6                ; get pointer to RJB
             5D       13   06F6            BEQL    35$                             ; branch if none
                           06F8
 5E 0A A5    00       E1   06F8            BBC     #MJB$V_INIT,MJB$W_FLAGS(R5),35$ ; skip if RJR in MJB is useless
                           06FD
```

```
               53   D4  06FD             CLRL    R3                                  ; initialize MODIFIER flags
   04 0A A5    01   E1  06FF             BBC     #MJB$V_FORCE,MJB$W_FLAGS(R5),10$;   skip if not write-thru to jnl
      53    40 8F   90  0704             MOVB    #WRMOD$M_FORCE,R3                   ; indicate write-thru to jnl
                        0708
      52    0C A5   9A  0708     10$:    MOVZBL  MJB$B_JNL(R5),R2                    ; get JNL type for channel calculati
         54    59   D0  070C             MOVL    R9,R4                               ; initialize astparm to IRAB address
   03 0A A5    02   E1  070F             BBC     #MJB$V_FILE,MJB$W_FLAGS(R5),20$     ; branch if assumption OK
         54    5A   D0  0714             MOVL    R10,R4                              ; otherwise astprm is IFAB address
                        0717
      00000000'EF   16  0717     20$:    JSB     RM$SETEFN                           ; get an EFN to wait on
               01   BA  071D             POPR    #^M<R0>                             ; and stick it in R0
                        071F
                        071F             $WRITEJNL_S -
                        071F                     CHAN    = RJB$Q_CHAN-2(R6)[R2], -           ; channel of journal
                        071F                     WRTBUF  = MJB$Q_DESC(R5), -                 ; RJR descriptor
                        071F                     MODIF   = R3,-                              ; modifier flags
                        071F                     EFN     = R0,-                              ; event flag to wait on
                        071F                     IOSB    = IRB$L_IOS(R9),-                   ; status of operation
                        071F                     ASTADR  = RM$STALLAST,-                     ; back to RM$STALLAST
                        071F                     ASTPRM  = R4                                ; IFAB or IRAB
                        073F
            21 50   E9  073F             BLBC    R0,50$                              ; go away on error
   14 0A A5    03   E0  0742             BBS     #MJB$V_SYNCH_SHARE,MJB$W_FLAGS(R5),40$  ; branch if SFSB lock
                        0747                                                         ; can't be given up
      00000000'EF   16  0747             JSB     RM$STALL                            ; wait for completion
   18 A5    0C A9   7D  074D     30$:    MOVQ    IRB$L_IOS(R9),MJB$Q_IOSB(R5)        ; save status and seq no in MJB
            0E 50   E9  0752             BLBC    R0,50$                              ; go away on error
                        0755     35$:
               1C   BA  0755             POPR    #^M<R2,R3,R4>                       ; restore registers
                        0757             RMSSUC                                      ; indicate success
               05   075A                 RSB                                         ; return to caller
                        075B
      00000000'EF   16  075B     40$:    JSB     RM$STALL_LOCK                       ; wait, keeping file lock (used for
                        0761                                                         ; extend)
               EA   11  0761             BRB     30$                                 ; go check status
                        0763
                        0763     50$:
               1C   BA  0763             POPR    #^M<R2,R3,R4>                       ; restore work registers
                        0765             RMSERR  CJF,R1                              ; default error status
      00000000'EF   17  076A             JMP     RM$MAPERR                           ; map error code and return
                        0770                                                         ; to caller
                        0770          .SUBTITLE RM$FORCE_MJB - Force MJB Entries
                        0770    ;++
                        0770    ; RM$FORCE_MJB
                        0770    ;
                        0770    ;       This routine is called at disconnect to force the journal entries
                        0770    ;       described by the high water mark in the MJB.  (Currently only used
                        0770    ;       for AT record operations.
                        0770    ;
                        0770    ; Inputs:
                        0770    ;       r5      MJB address
                        0770    ;
                        0770    ; Implicit Inputs:
                        0770    ;       contents of the MJB, including MJB$B_JNL and the sequence number
                        0770    ;       in the IOSB.
                        0770    ;
                        0770    ;       rjb has the channel assigned to the AT journal
                        0770    ;
                        0770    ; Outputs:
                        0770    ;       r0 - success or failure
                        0770    ;
                        0770    ; Side Effects:
                        0770    ;
                        0770    ;       AT record journal entries flushed.
                        0770    ;
                        0770    ;--
                        0770
                        0770    RM$FORCE_MJB::
                        0770
                        0770            RMSSUC                                          ; default to success
                3C  BB  0773            PUSHR   #^M<R2,R3,R4,R5>                        ; save work registers
      54  00A4 CA   D0  0775            MOVL    IFB$L_RJB(R10),R4                       ; get RJB address
                39  13  077A            BEQL    40$                                     ; get out if none
       52  0C A5    9A  077C            MOVZBL  MJB$B_JNL(R5),R2                        ; get JNL identifier
       00000000'EF  16  0780            JSB     RM$SETEFN                               ; allocate an event flag
                01  BA  0786            POPR    #^M<R0>                                 ; get EF in R0
                        0788
                        0788            $FORCEJNL_S -
                        0788                    CHAN    = RJB$Q_CHAN-2(R4)[R2], -       ; channel of journal
                        0788                    SEQNO   = MJB$Q_IOSB+4(R5), -           ; sequence number
                        0788                    EFN     = R0, -                         ; event flag
                        0788                    IOSB    = IRB$L_IOS(R9), -              ; use IOSB in IRB
                        0788                    ASTADR  = RM$STALLAST, -                ; usual AST address
                        0788                    ASTPRM = R9                             ; IRAB operation
                        07A4
             11 50  E9  07A4            BLBC    R0,50$                                  ; out on error
       00000000'EF  16  07A7            JSB     RM$STALL                                ; wait for completion
  18 A5    0C A9    7D  07AD            MOVQ    IRB$L_IOS(R9),MJB$Q_IOSB(R5)            ; grab status for fun
             03 50  E9  07B2            BLBC    R0,50$                                  ; out on error
                3C  BA  07B5    40$:    POPR    #^M<R2,R3,R4,R5>                        ; restore work registers
                05      07B7            RSB                                             ; return to caller
                        07B8
                        07B8    50$:    RMSERR  CJF,R1                                  ; cjf error
       00000000'EF  16  07BD            JSB     RM$MAPERR                               ; map the error code
                F0  11  07C3            BRB     40$                                     ; return to caller
```

```
                         07C5              .SUBTITLE RM$ALLOC_RJB_BDB - Allocate RJB, Journal BDB
                         07C5      ;++
                         07C5      ; RM$ALLOC_RJB_BDB
                         07C5      ;
                         07C5      ;       This routine allocates an RJB and JNL BDB for use by RMS journaling.
                         07C5      ;
                         07C5      ; Inputs:
                         07C5      ;       R9      IFAB
                         07C5      ;
                         07C5      ; Outputs:
                         07C5      ;       R0          status
                         07C5      ;       IFB$L_JNLBDB    address of JNL BDB
                         07C5      ;       IFB$L_RJB       address of RJB
                         07C5      ;
                         07C5      ; Side Effects:
                         07C5      ;       None.
                         07C5      ;
                         07C5      ;--
                         07C5
                         07C5      RM$ALLOC_RJB_BDB::
                         07C5
                38   BB  07C5              PUSHR   #^M<R3,R4,R5>                   ; save work registers
           00A4 C9   D5  07C7              TSTL    IFB$L_RJB(R9)                   ; RJB present?
                1E   12  07CB              BNEQ    10$                             ; branch if yes
             51 59   D0  07CD              MOVL    R9,R1                           ; allocate RJB
             52 03   D0  07D0              MOVL    #RJB$C_BLN/4,R2                 ; size of RJB
       00000000'EF   16  07D3              JSB     RM$GETBLK                       ; get it
             61 50   E9  07D9              BLBC    R0,30$                          ; get out on error
        00A4 C9 51   D0  07DC              MOVL    R1,IFB$L_RJB(R9)                ; save RJB address
          08 A1 16   90  07E1              MOVB    #RJB$C_BID,RJB$B_BID(R1)        ; initialize RJB
                         07E5              SSB     #IFB$V_JNL,IFB$B_JNLFLG2(R9)    ; indicate RJB present
             30 A9   D5  07EB      10$:    TSTL    IFB$L_JNLBDB(R9)                ; JNLBDB already allocated?
                4A   12  07EE              BNEQ    20$                             ; branch if so
                         07F0
                         07F0      ;
                         07F0      ; If AI journaling a relative file - allocate a bigger buffer, on large enough
                         07F0      ; to contain prolog (512 bytes).
                         07F0      ;
   0D 00A0 C9   03   E1  07F0              BBC     #IFB$V_AI,IFB$B_JNLFLG(R9),15$  ; skip if not AI journaling
        23 A9   01   91  07F6              CMPB    #IFB$C_REL,IFB$B_ORGCASE(R9)    ; is it relative file?
                07   12  07FA              BNEQ    15$                             ; branch if not relative
                         07FC
                         07FC              ASSUME  <RJR$C_BLKLEN+512> GT RJR$C_FILNAMLEN
                         07FC
     55    0244 8F   3C  07FC              MOVZWL  #<RJR$C_BLKLEN+512>,R5          ; size of buffer
                05   11  0801              BRB     16$                             ; join common code
                         0803      15$:                                            ;
     55    01C4 8F   3C  0803              MOVZWL  #RJR$C_FILNAMLEN,R5             ; size of buffer to allocate
             7E 5A   D0  0808      16$:    MOVL    R10,-(SP)                       ; save R10, ALDJNLBUF needs R10=IFB
             5A 59   D0  080B              MOVL    R9,R10                          ; copy IFB address
 55    000001FF 8F   C0  080E              ADDL2   #511,R5                         ; round to page boundary
 55    000001FF 8F   CA  0815              BICL2   #511,R5                         ; ...
       00000000'EF   16  081C              JSB     RM$ALDJNLBUF                    ; allocate jnl BDB and buffer
             5A 8E   D0  0822              MOVL    (SP)+,R10                       ; restore R10
             18 50   E9  0825              BLBC    R0,40$                          ; get out on error
        30 A9   54   D0  0828              MOVL    R4,IFB$L_JNLBDB(R9)             ; save address of JNLBDB
                3E   BB  082C              PUSHR   #^M<R1,R2,R3,R4,R5>             ; save regs zeroed by MOVC5
```

```
              51    18 A4   D0 082E              MOVL    BDB$L_ADDR(R4),R1              ; get RJR address
   61   38  00   61    00   2C 0832              MOVC5   #0,(RT),#0,#RJR$C_HDRLEN,(R1)  ; zero the RJR overhead
                       3E   BA 0838              POPR    #^M<R1,R2,R3,R4,R5>            ; restore regs zeroed by MOVC5
                               083A
                               083A      20$:    RMSSUC                                 ; success
                       38   BA 083D      30$:    POPR    #^M<R3,R4,R5>                  ; restore registers
                       05      083F              RSB                                    ; to caller
                               0840      40$:                                           ; deallocate the RJB
                  7E   50   D0 0840              MOVL    R0,-(SP)                       ; save error code
                  53   59   D0 0843              MOVL    R9,R3                          ; address of block holding space
           54   00A4   C9   D0 0846              MOVL    IFB$L_RJB(R9),R4               ; address of RJB
            00000000'EF     16 084B              JSB     RM$RETBLK                      ; return space and to caller
                  50   8E   D0 0851              MOVL    (SP)+,R0                       ; restore error code
                       38   BA 0854              POPR    #^M<R3,R4,R5>                  ; restore registers
                       05      0856              RSB                                    ; to caller
```

```
                    0857            .SUBTITLE RM$AT_JNL_RECORD - Write AT Entry for Records
                    0857
                    0857    ;++
                    0857    ; RM$AT_JNL_RECORD
                    0857    ;
                    0857    ;       This routine is responsible for writing any AT journaling record
                    0857    ;       required to describe a record operation.  This routine's primary
                    0857    ;       task is to make sure the RJR overhead is filled in properly, and
                    0857    ;       the correct MJB inputs are set.  RM$WRITE_MJB is then called to
                    0857    ;       actually perform the CJF write service.
                    0857    ;
                    0857    ; Calling Sequence:
                    0857    ;
                    0857    ;       BSBW    RM$AT_JNL_RECORD
                    0857    ;
                    0857    ;       This routine is called only by RM$EXRMS.
                    0857    ;
                    0857    ; Input Parameters:
                    0857    ;
                    0857    ;       R0      operation status to this point
                    0857    ;       R8      user's RAB
                    0857    ;       R9      IRAB
                    0857    ;       R10     IFAB
                    0857    ;
                    0857    ; Implicit Inputs:
                    0857    ;
                    0857    ;       IRB$L_ATJNLBUF  - pointer to MJB containing RJR
                    0857    ;       RJR$B_OPER      - must be filled in by caller
                    0857    ;
                    0857    ; Output Parameters:
                    0857    ;
                    0857    ;       r0      operation status
                    0857    ;       r1      destroyed
                    0857    ;
                    0857    ; Implicit Outputs:
                    0857    ;
                    0857    ;       None.   (for now)
                    0857    ;
                    0857    ; Side Effects:
                    0857    ;
                    0857    ;       RJR written to CJF
                    0857    ;
                    0857    ;--
                    0857
                    0857    RM$AT_JNL_RECORD::
                    0857
            59  D5  0857            TSTL    R9                      ; any structure address?
            01  12  0859            BNEQ    2$                      ; if no, must be structureless exit
            05      085B    1$:     RSB                             ; nothing to do
                    085C
                    085C            ASSUME  IFB$B_BID       EQ      IRB$B_BID
                    085C
   0A    08 A9  91  085C    2$:     CMPB    IFB$B_BID(R9),#IRB$C_BID ; is this an IRAB?
            F9  12  0860            BNEQ    1$                      ; if neq no, forget it
                    0862
F3 00A0 CA  04  E1  0862            BBC     #IFB$V_AT,IFB$B_JNLFLG(R10),1$ ; skip if not AT journaling
            30  BB  0868            PUSHR   #^M<R4,R5>              ; save work registers
```

```
         55    2C A9   D0  086A          MOVL    IRB$L_ATJNLBUF(R9),R5   ; get MJB address
               67      13  086E          BEQL    70$                     ; skip if none
                           0870
                           0870  ;
                           0870  ; Fill in required MJB fields
                           0870  ;
         0C A5    04   90  0870          MOVB    #CJF$_AT,MJB$B_JNL(R5)  ; indicate we're audit trail journaling
            0A A5      B4  0874          CLRW    MJB$W_FLAGS(R5)         ; nothing special for WRITEJNL call
      10 A5    004C 8F  3C 0877          MOVZWL  #RJR$C_AT_RECLEN,MJB$Q_DESC(R5) ; set up record length
                           087D
         54    20 A5   DE  087D          MOVAL   MJB$T_RJR(R5),R4        ; get RJR address in R4
               05 A4   D5  0881          TSTL    RJR$B_OPER(R4)                   ; any op specified?
                  51   13  0884          BEQL    70$                              ; skip if none
      4F 0A A5    00   E3  0886          BBCS    #MJB$V_INIT,MJB$W_FLAGS(R5),90$ ; skip filling in RJR if already
                           088B                                                   ; done
                           088B  10$:                                             ; RJR overhead filled in
         24 A4    50   D0  088B          MOVL    R0,RJR$L_AT_STS(R4)              ; get status
                           088F          SSB     #16,RJR$L_AT_STS(R4)             ; make it an RMS status
         28 A4    0C A8 D0 0894          MOVL    RAB$L_STV(R8),RJR$L_AT_STV(R4)   ; and get STV also
                           0899  ;
                           0899  ; Pull user's request from RAB into journal record.  Must probe structures.
                           0899  ; All relevant data that was available at the beginning of the operation
                           0899  ; is already in the journal record.  It was put there by RM$AT_COM_RAB.
                           0899  ;
                  58   D5  0899  20$:    TSTL    R8                               ; user structure?
                  17   13  089B          BEQL    60$                              ; branch if no RAB
                           089D          IFNORD  #RAB$C_BLN,(R8),60$              ; skip rest if not readable
            01    68   91  08A5          CMPB    (R8),#RAB$C_BID                  ; is it a RAB?
                  0A   12  08A8          BNEQ    60$                              ; branch if no RAB
                           08AA
                           08AA  ;
                           08AA  ; We found a readable RAB, now fill AT entry in with the RAB contents.
                           08AA  ;
      44 A4    10 A8   D0  08AA          MOVL    RAB$L_RFA0(R8),RJR$L_AT_RFA0(R4);  1st part of RFA
      48 A4    14 A8   B0  08AF          MOVW    RAB$W_RFA4(R8),RJR$W_AT_RFA4(R4);  2nd part of RFA
                           08B4
         51    41 A4   9A  08B4  60$:    MOVZBL  RJR$B_AT_KSZ(R4),R1              ; get key size
      10 A5       51   C0  08B8          ADDL2   R1,MJB$Q_DESC(R5)                ; account for key size
                FE24   30  08BC          BSBW    RM$WRITE_MJB                     ; write the AT record
                           08BF
                           08BF          ASSUME  RJR$L_AT_STV    EQ      RJR$L_AT_STS+4
                           08BF
               24 A4   7C  08BF          CLRQ    RJR$L_AT_STS(R4)                 ; init status for next time
               05 A4   94  08C2          CLRB    RJR$B_OPER(R4)                   ; and operation
                           08C5
                           08C5  ;
                           08C5  ; Now zero search KEY so it doesn't linger in the buffer.
                           08C5  ;
         51    41 A4   9A  08C5          MOVZBL  RJR$B_AT_KSZ(R4),R1              ; get key size for clear
                  0C   13  08C9          BEQL    70$                              ; skip if none
                  0F   BB  08CB          PUSHR   #^M<R0,R1,R2,R3>                 ; save MOVC3 registers
 4C A4    51   00   4C A4   00  2C  08CD  MOVC5   #0,RJR$T_AT_KEY(R4),#0,R1,-     ; zero out KEY for next time
                           08D5                  RJR$T_AT_KEY(R4)                 ;
                  0F   BA  08D5          POPR    #^M<R0,R1,R2,R3>                 ; restore MOVC3 registers
                           08D7
                  30   BA  08D7  70$:    POPR    #^M<R4,R5>                       ; restore work registers
                  05   05  08D9  80$:    RSB                              ; return to caller
```

```
                              08DA  2063
                              08DA  2064 90$:                                        ; fill in RJR overhead
                              08DA  2065
                              08DA  2066         ASSUME RJR$B_ENTRY_TYPE EQ <RJR$B_VERSION+1>
                              08DA  2067
             0602 8F     B0   08DA  2068         MOVW    #<<RJR$C_AT_RECORD@8>+RJR$C_MAXVER>,-
               02 A4          08DE  2069                 RJR$B_VERSION(R4)              ; version, type
       04 A4   23 AA     90   08E0  2070         MOVB    IFB$B_ORGCASE(R10),RJR$B_ORG(R4); file organization
               3F        BB   08E5  2071         PUSHR   #^M<R0,R1,R2,R3,R4,R5>         ; save registers MOVC3 destroys
          55   38 AA     D0   08E7  2072         MOVL    IFB$L_FWA_PTR(R10),R5          ; get FWA address
08 A4   0920 C5   1C     28   08EB  2073         MOVC3   #FWA$S_JNLID,FWA$T_JNLID(R5),RJR$T_JNLID(R4) ; journal id
               3F        BA   08F2  2074         POPR    #^M<R0,R1,R2,R3,R4,R5>         ; restore MOVC3 registers
             FF94        31   08F4  2075         BRW     10$                            ; join common code
```

RMO
V04

```
                    08F7          .SUBTITLE COMMON_FILE_AT - Get common AT file data
                    08F7  ;++
                    08F7  ; COMMON_FILE_AT
                    08F7  ;
                    08F7  ;       This routine is used to fill in the AT journal entry with data from the
                    08F7  ;       IFAB at MAPJNL time.
                    08F7  ;
                    08F7  ; Inputs:
                    08F7  ;
                    08F7  ;       r8      FAB
                    08F7  ;       r9      IFAB
                    08F7  ;
                    08F7  ; Outputs:
                    08F7  ;
                    08F7  ;       AT journal record fields filled in.
                    08F7  ;
                    08F7  ; Side Effects:
                    08F7  ;
                    08F7  ;       Currently, the STS/STV is forced to success due to difficulties
                    08F7  ;       in acquiring the info when the journal entry must be written.
                    08F7  ;       (IE,, can't do it at exit RMS like record operations because
                    08F7  ;       data structures must be deallocated at release time. Better
                    08F7  ;       solution is to make file AT info hendled by an MJB also, and write
                    08F7  ;       and deallocate the file MJB at exit RMS.)
                    08F7  ;--
                    08F7
                    08F7  COMMON_FILE_AT:
                    08F7
           04  BB   08F7          PUSHR   #^M<R2>                         ; save work register
     52    2C A9  D0   08F9          MOVL    IFB$L_ATJNLBUF(R9),R2           ; get address of journal record (RJR)
                    08FD
  5A A2    22 A9  90   08FD          MOVB    IFB$B_FAC(R9),RJR$B_FAC(R2) ; fill in specified file access
  5B A2    4E A9  90   0902          MOVB    IFB$B_SHR(R9),RJR$B_SHR(R2) ; fill in specified file sharing
  48 A2    70 A9  D0   0907          MOVL    IFB$L_HBK(R9),RJR$L_ALLOC(R2) ; fill in high allocation
  24 A2    08 A8  D0   090C          MOVL    FAB$L_STS(R8),RJR$L_AT_STS(R2)  ; status
  28 A2    0C A8  D0   0911          MOVL    FAB$L_STV(R8),RJR$L_AT_STV(R2)  ; STV
  2C A2    18 A8  D0   0916          MOVL    FAB$L_CTX(R8),RJR$L_AT_CTX(R2)  ; User definable CTX field
                    091B
           04  BA   091B  10$:    POPR    #^M<R2>                         ; restore work register
               05   091D          RSB                                     ; to RM$MAPJNL
```

```
                          091E          .SUBTITLE RM$AT_COM_RAB - Get common AT record data
                          091E  ;++
                          091E  ; AT_COM_RAB
                          091E  ;
                          091E  ;       This routine scarfs up and puts in the RMS journaling record the
                          091E  ;       common RAB data at the beginning of an operation.
                          091E  ;
                          091E  ; Inputs:
                          091E  ;
                          091E  ;       R1      rjr operation id
                          091E  ;       R8      RAB (the sucker is assumed to be probed.)
                          091E  ;       R9      irab
                          091E  ;       R10     ifab
                          091E  ;
                          091E  ; Outputs:
                          091E  ;
                          091E  ;       Some AT record RJR fields filled in.
                          091E  ;
                          091E  ;--
                          091E
                          091E  RM$AT_COM_RAB::
                          091E
             10     BB    091E          PUSHR   #^M<R4>                                 ; save work register
      54  2C A9     D0    0920          MOVL    IRB$L_ATJNLBUF(R9),R4                   ; get MJB address
             3C     13    0924          BEQL    60$                                     ; skip if none
                          0926
      54  20 A4     DE    0926          MOVAL   MJB$T_RJR(R4),R4                        ; get RJR address in R4
                          092A
   3C A4  04 A8     D0    092A          MOVL    RAB$L_ROP(R8),RJR$L_AT_ROP(R4)          ; user's ROP
   40 A4  35 A8     90    092F          MOVB    RAB$B_KRF(R8),RJR$B_AT_KRF(R4)          ; user's key of reference
   42 A4  1E A8     90    0934          MOVB    RAB$B_RAC(R8),RJR$B_AT_RAC(R4)          ; user's record access
    05 A4    51     90    0939          MOVB    R1,RJR$B_OPER(R4)                       ; operation code
   2C A4  18 A8     D0    093D          MOVL    RAB$L_CTX(R8),RJR$L_AT_CTX(R4)          ; User context field
                          0942
                          0942  ;
                          0942  ; Probe key buffer before getting key.
                          0942  ;
      01  1E A8     91    0942          CMPB    RAB$B_RAC(R8),#RAB$C_KEY                ; keyed access?
             1A     12    0946          BNEQ    60$                                     ; if not, no key size
   41 A4  34 A8     90    0948          MOVB    RAB$B_KSZ(R8),RJR$B_AT_KSZ(R4)          ; user's key size
             13     13    094D          BEQL    60$                                     ; if zero, no key
                          094F          IFNORD  RJR$B_AT_KSZ(R4),RAB$L_KBF(R8),60$ ; skip if can't get keybuffer
                          0957
                          0957  ;
                          0957  ; Copy search key into journal record
                          0957  ;
             3E     BB    0957          PUSHR   #^M<R1,R2,R3,R4,R5>                     ; save MOVC3 registers
          41 A4     28    0959          MOVC3   RJR$B_AT_KSZ(R4),-                      ; move KEY_SIZE number of chars
          30 B8           095C                  @RAB$L_KBF(R8),-                        ;    from rab keybuffer
          4C A4           095E                  RJR$T_AT_KEY(R4)                        ;    to journal record
             3E     BA    0960          POPR    #^M<R1,R2,R3,R4,R5>                     ; restore MOVC3 egisters
                          0962
             10     BA    0962  60$:    POPR    #^M<R4>                                 ; restore work register
             05           0964  70$:    RSB                                             ; to caller
                          0965
                          0965          .END
```

```
$$.PSECT_EP                    = 00000000                   FWA$Q_DEVICE                   = 000000E0
$$RMSTEST                      = 0000001A                   FWA$Q_ID_DATE                  = 00000934
$$RMS_PBUGCHK                  = 00000010                   FWA$S_AIACE                    = 00000014
$$RMS_TBUGCHK                  = 00000008                   FWA$S_ATACE                    = 00000014
$$RMS_UMODE                    = 00000004                   FWA$S_BIACE                    = 00000014
$$T1                           = 00000000                   FWA$S_BIJNLN                   = 00000010
ACE$B_TYPE                     = 00000001                   FWA$S_IDACE                    = 00000020
ACE$C_AIJNL                    = 00000003                   FWA$S_JNLID                    = 0000001C
ACE$C_ATJNL                    = 00000004                   FWA$T_AIACE                    = 000008F4
ACE$C_BIJNL                    = 00000002                   FWA$T_ATACE                    = 00000908
ACE$C_JNLID                    = 00000008                   FWA$T_BIACE                    = 000008E0
ACE$M_HIDDEN                   = 00000400                   FWA$T_FIBBUF                   = 000001F4
ACE$M_NOPROPAGATE              = 00000800                   FWA$T_FID                      = 0000092C
ACE$M_PROTECTED                = 00000200                   FWA$T_IDACE                    = 0000091C
ACE$T_RMSJNLNAM                = 00000004                   FWA$T_JNLID                    = 00000920
ACE$W_FLAGS                    = 00000002                   FWA$W_PRO                      = 0000002C
ASS_DONE                         00000164 R       01        GET_JNL                          000000A1 R       01
ATR$C_ADDACLENT                = 0000001F                   IFB$B_BID                      = 00000008
ATR$C_FNDACLTYP                = 00000023                   IFB$B_BKS                      = 0000005E
ATR$C_JOURNAL                  = 0000001D                   IFB$B_FAC                      = 00000022
ATR$C_UIC_RO                   = 0000001A                   IFB$B_JNLFLG                   = 000000A0
BDB$B_FLGS                     = 0000000A                   IFB$B_JNLFLG2                  = 000000A2
BDB$L_ADDR                     = 00000018                   IFB$B_ORGCASE                  = 00000023
BDB$L_IOSB                     = 00000048                   IFB$B_RECVRFLGS                = 000000A1
BDB$T_JNLSEQ                   = 00000038                   IFB$B_SHR                      = 0000004E
BDB$V_IOP                      = 00000002                   IFB$C_BID                      = 0000000B
BDB$W_NUMB                     = 00000014                   IFB$C_IDX                      = 00000002
CJF$ASSJNL                       *********   GX   01        IFB$C_REL                      = 00000001
CJF$DEASJNL                      *********   GX   01        IFB$C_SEQ                      = 00000000
CJF$FORCEJNL                     *********   GX   01        IFB$L_ATJNLBUF                 = 0000002C
CJF$GETJNL                       *********   GX   01        IFB$L_EXTJNLBUF                = 00000034
CJF$WRITEJNL                     *********   GX   01        IFB$L_FWA_PTR                  = 00000038
CJF$_AI                        = 00000003                   IFB$L_HBK                      = 00000070
CJF$_AT                        = 00000004                   IFB$L_JNLBDB                   = 00000030
CJF$_BI                        = 00000002                   IFB$L_RJB                      = 000000A4
CJF$_NONAME                      *********    X   01        IFB$M_AI                       = 00000008
CJF$_RU                        = 00000001                   IFB$M_BI                       = 00000004
COMMON_FILE_AT                   000008F7 R       01        IFB$M_ONLY_RU                  = 00000001
CTL$GL_PCB                       *********    X   01        IFB$M_RU                       = 00000002
CTL$GL_RUF                       *********    X   01        IFB$V_AI                       = 00000003
ERRJNS                           0000015A R       01        IFB$V_AI_RECVR                 = 00000001
ERRMBC                           00000382 R       01        IFB$V_AT                       = 00000004
FAB$C_IDX                      = 00000020                   IFB$V_BI                       = 00000002
FAB$C_REL                      = 00000010                   IFB$V_BIO                      = 00000005
FAB$C_SEQ                      = 00000000                   IFB$V_BRO                      = 00000006
FAB$L_CTX                      = 00000018                   IFB$V_DONE_ASS_JNL             = 00000004
FAB$L_FOP                      = 00000004                   IFB$V_JNL                      = 00000001
FAB$L_STS                      = 00000008                   IFB$V_ONLY_RU                  = 00000000
FAB$L_STV                      = 0000000C                   IFB$V_RU                       = 00000001
FAB$V_UFO                      = 00000011                   IFB$V_RUP                      = 00000002
FACILITY                         00000000 R       01        IFB$V_WRTACC                   = 00000030
FIB$W_FID                      = 00000004                   IFB$W_LRL                      = 00000052
FORCE_JNL                        00000584 R       01        IFB$W_MRS                      = 00000060
FWA$L_UIC                      = 00000028                   IO$_FORCE                      = 00000037
FWA$Q_AIJNL                    = 000008D0                   IO$_WRITEVBLK                  = 00000030
FWA$Q_ATJNL                    = 000008D8                   IRB$B_BID                      = 00000008
FWA$Q_BIJNL                    = 000008C8                   IRB$C_BID                      = 0000000A
```

```
                                                               J  3
RMOJOURNL                    RMS Journaling Manager                        16-SEP-1984 00:25:13  VAX/VMS Macro V04-00         Page  49
Symbol table                                                                5-SEP-1984 16:21:57  [RMS.SRC]RMOJOURNL.MAR;1           (22)

IRB$L_ATJNLBUF               = 0000002C                     RJR$B_AT_RAC                 = 00000042
IRB$L_IFAB_LNK               = 00000000                     RJR$B_ENTRY_TYPE             = 00000003
IRB$L_IOS                    = 0000000C                     RJR$B_FAC                    = 0000005A
IRB$L_JNLBDB                 = 00000030                     RJR$B_FNS                    = 00000058
JBDB                         = 00000020                     RJR$B_OPER                   = 00000005
JTYP                         = 0000001C                     RJR$B_ORG                    = 00000004
MAPJNL                         0000038E R      01           RJR$B_SHR                    = 0000005B
MJB$B_BID                    = 00000008                     RJR$B_VERSION                = 00000002
MJB$B_JNL                    = 0000000C                     RJR$C_AT_RECLEN              = 0000004C
MJB$C_BID                    = 00000018                     RJR$C_AT_RECORD              = 00000006
MJB$C_BLN                    = 00000020                     RJR$C_BLKLEN                 = 00000044
MJB$L_POINTER                = 00000014                     RJR$C_EXTLEN                 = 0000007A
MJB$Q_DESC                   = 00000010                     RJR$C_FILNAMLEN              = 000001C4
MJB$Q_IOSB                   = 00000018                     RJR$C_HDRLEN                 = 00000038
MJB$T_RJR                    = 00000020                     RJR$C_IDX                    = 00000002
MJB$V_FILE                   = 00000002                     RJR$C_MAPPING                = 00000001
MJB$V_FORCE                  = 00000001                     RJR$C_MAXVER                 = 00000002
MJB$V_INIT                   = 00000000                     RJR$C_RECLEN                 = 00000048
MJB$V_SYNCH_SHARE            = 00000003                     RJR$C_REL                    = 00000001
MJB$W_FLAGS                  = 0000000A                     RJR$C_SEQ                    = 00000000
MODE                           00000002 R      01           RJR$L_ALLOC                  = 00000048
OPEN_JNL                       00000269 R      01           RJR$L_AT_CTX                 = 0000002C
PCB$L_STS                    = 00000024                     RJR$L_AT_RFA0                = 00000044
PCB$L_UIC                    = 000000BC                     RJR$L_AT_ROP                 = 0000003C
PCB$V_RECOVER                = 0000001A                     RJR$L_AT_STS                 = 00000024
PSL$C_EXEC                   = 00000001                     RJR$L_AT_STV                 = 00000028
RAB$B_KRF                    = 00000035                     RJR$S_FILENAME               = 00000100
RAB$B_KSZ                    = 00000034                     RJR$T_AT_KEY                 = 0000004C
RAB$B_MBC                    = 00000037                     RJR$T_FILENAME               = 000000C4
RAB$B_RAC                    = 0000001E                     RJR$T_JNLID                  = 00000008
RAB$C_BID                    = 00000001                     RJR$W_AT_RFA4                = 00000048
RAB$C_BLN                    = 00000044                     RJR$_CLOSE                   = 00000002
RAB$C_KEY                    = 00000001                     RJR$_OPEN                    = 00000011
RAB$L_CTX                    = 00000018                     RM$ALDJNLBUF                   ********    X     01
RAB$L_KBF                    = 00000030                     RM$ALLOC_MJB                   000006AA RG       01
RAB$L_RFA0                   = 00000010                     RM$ALLOC_RJB_BDB               000007C5 RG       01
RAB$L_ROP                    = 00000004                     RM$ASSJNL                      00000168 RG       01
RAB$L_STV                    = 0000000C                     RM$AT_COM_RAB                  0000091E RG       01
RAB$V_BIO                    = 0000000B                     RM$AT_JNL_RECORD               00000857 RG       01
RAB$W_RFA4                   = 00000014                     RM$CONJNL                      000002F0 RG       01
RBDB                         = 00000008                     RM$DEAJNL                      000005F2 RG       01
RJB$B_BID                    = 00000008                     RM$DSCJNL                      000005CD RG       01
RJB$C_BID                    = 00000016                     RM$FORCE_MJB                   00000770 RG       01
RJB$C_BLN                    = 0000000C                     RM$FRCJNL                      0000050A RG       01
RJB$Q_CHAN                   = 00000000                     RM$GETBLK                      ********    X     01
RJB$V_AI                     = 00000002                     RM$GETFILNAM                   ********    X     01
RJB$V_AT                     = 00000003                     RM$GETJNL                      00000004 RG       01
RJB$V_BI                     = 00000001                     RM$MAPERR                      ********    X     01
RJB$V_OPEN                   = 00000004                     RM$MAPJNL                      0000038C RG       01
RJB$V_RU                     = 00000000                     RM$MAPJNL_RU                   00000388 RG       01
RJB$W_AICHAN                 = 00000004                     RM$RETBLK                      ********    X     01
RJB$W_ATCHAN                 = 00000006                     RM$RETBLK1                     ********    X     01
RJB$W_BICHAN                 = 00000002                     RM$RETJNLBDB                   ********    X     01
RJB$W_FLAGS                  = 0000000A                     RM$RTVJNL                      000000F5 RG       01
RJB$W_RUCHAN                 = 00000000                     RM$SETEFN                      ********    X     01
RJR$B_AT_KRF                 = 00000040                     RM$STALL                       ********    X     01
RJR$B_AT_KSZ                 = 00000041                     RM$STALLAST                    ********    X     01
```

```
                                                                K  3
RMOJOURNL                          RMS Journaling Manager                        16-SEP-1984 00:25:13  VAX/VMS Macro V04-00         Page  50
Symbol table                                                                      5-SEP-1984 16:21:57  [RMS.SRC]RMOJOURNL.MAR;1          (22)

RMS$STALL_LOCK                     ********   X     01
RMS$WRITE_MJB                      000006E3 RG      01
RMS$WRTJNL                         0000044B RG      01
RMS$WRTJNL_OBJ                     00000442 RG      01
RMS$_CJF                         = 0001C164
RMS$_FACILITY                    = 00000001
RMS$_JNF                         = 0001C052
RMS$_JNS                         = 000187F4
RMS$_MBC                         = 00018734
RMS$_NOJ                         = 0001C154
RUCB$B_CTRL                      = 00000011
RUCB$V_ACTIVE                    = 00000001
STS$S_FAC_NO                     = 0000000C
STS$V_FAC_NO                     = 00000010
SYS$GETTIM                         ********   GX    01
SYS$QIO                            ********   GX    01
UFO                                00000160 R       01
WRFLG$M_LOCK                     = 00000010
WRFLG$M_OBJECT_ID                = 00000008
WRFLG$V_BI                       = 00000001
WRFLG$V_RUALSO                   = 00000002
WRMOD$M_FORCE                    = 00000040
WRTJNL                             00000452 R       01

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

PSECT name                         Allocation          PSECT No.  Attributes
----------                         ----------          ---------  ----------
.  ABS  .                          00000000  (    0.)  00 (  0.)  NOPIC   USR   CON   ABS   LCL NOSHR NOEXE NORD   NOWRT NOVEC BYTE
RMS$RMS_JOURNAL                    00000965  ( 2405.)  01 (  1.)    PIC   USR   CON   REL   GBL NOSHR   EXE   RD   NOWRT NOVEC BYTE
$ABS$                              00000000  (    0.)  02 (  2.)  NOPIC   USR   CON   ABS   LCL NOSHR   EXE   RD     WRT NOVEC BYTE

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

Phase                        Page faults    CPU Time       Elapsed Time
-----                        -----------    --------       ------------
Initialization                        30    00:00:00.05    00:00:00.93
Command processing                   119    00:00:00.68    00:00:04.60
Pass 1                               721    00:00:34.00    00:01:34.62
Symbol table sort                      0    00:00:04.93    00:00:08.20
Pass 2                               367    00:00:07.75    00:00:18.28
Symbol table output                   29    00:00:00.26    00:00:00.73
Psect synopsis output                  2    00:00:00.04    00:00:00.11
Cross-reference output                 0    00:00:00.00    00:00:00.00
Assembler run totals                1270    00:00:47.71    00:02:07.48

The working set limit was 2400 pages.
189336 bytes (370 pages) of virtual memory were used to buffer the intermediate code.
There were 170 pages of symbol table space allocated to hold 3235 non-local and 104 local symbols.
2173 source lines were read in Pass 1, producing 20 object records in Pass 2.
51 pages of virtual memory were used to define 50 macros.
```

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

Macro library name                        Macros defined
------------------                        --------------
_$255$DUA28:[RMS.OBJ]RMS.MLB;1                        16
_$255$DUA28:[SYS.OBJ]LIB.MLB;1                         4
_$255$DUA28:[SYSLIB]STARLET.MLB;2                     26
TOTALS (all libraries)                                46

3505 GETS were required to define 46 macros.

There were no errors, warnings or information messages.

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

0318 AH-BT13A-SE
VAX/VMS V4.0

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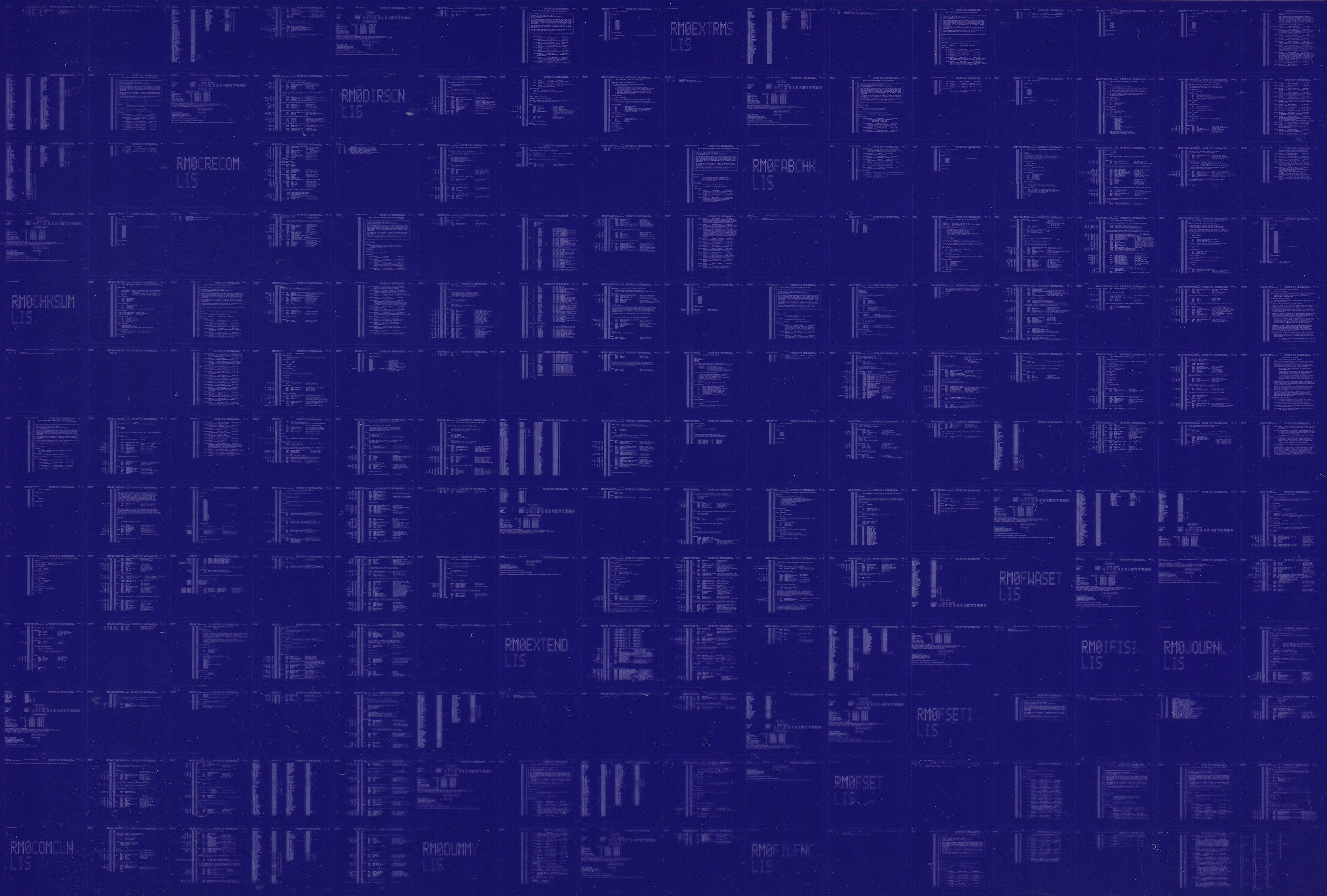

0319 AH-BT13A-SE
VAX/VMS V4.0

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RM0RECLCK
LIS

RM0RSET
LIS

RM0SCAN
LIS

RM0PRFLNM
LIS

RM0RCLCK2
LIS

RM0RABCHK
LIS

RM0RELEAS
LIS

RM0NAMSTR
LIS