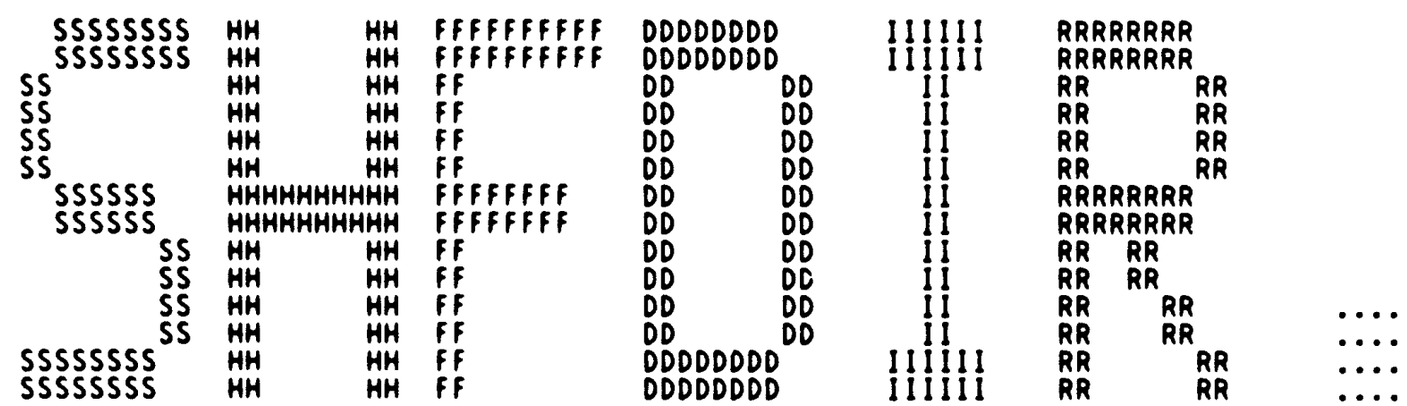
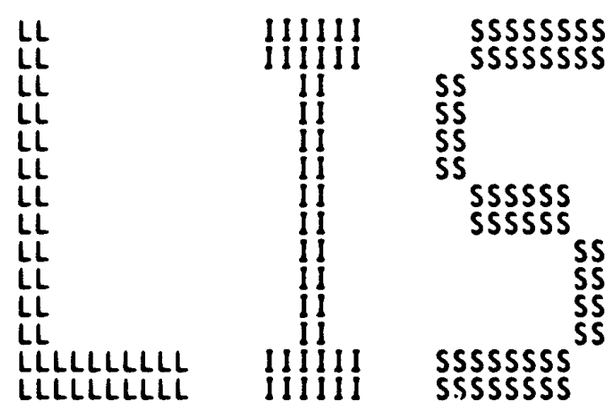
H 5

```
FFFFFFFFFFFFFFF      111        111      XXX         XXX
FFFFFFFFFFFFFFF      111        111      XXX         XXX
FFFFFFFFFFFFFFF      111        111      XXX         XXX
FFF               111111     111111      XXX         XXX
FFF               111111     111111      XXX         XXX
FFF               111111     111111      XXX         XXX
FFF                  111        111         XXX   XXX
FFF                  111        111         XXX   XXX
FFF                  111        111         XXX   XXX
FFFFFFFF.FFF         111        111            XXX
FFFFFFFFFFFF         111        111            XXX
FFFFFFFFFFFF         111        111            XXX
FFF                  111        111         XXX   XXX
FFF                  111        111         XXX   XXX
FFF                  111        111         XXX   XXX
FFF                  111        111      XXX         XXX
FFF                  111        111      XXX         XXX
FFF                  111        111      XXX         XXX
FFF               111111111  111111111   XXX         XXX
FFF               111111111  111111111   XXX         XXX
FFF               111111111  111111111   XXX         XXX
```

```
_$25
Symb
----
IOC1
IO_C
IO_C
IO_D
IO_F
IO_S
KILL

KILL
KILL
LB_E
LB_D
LB_F
LB_H
LB_L
LOCA
LOCA
LOCK

LOCK
LOCK
LOCK
LOC_
LOC_
L_CO
L_CO
L_DA
L_DA
MAIN
MAKE
MAKE
MAKE
MAKE
MAKE
MAKE

MAKE
MAKE
MAP_
MAP_

MAP_
MARK
MARK
MARK
MARK
MARK
```


SSSSSSSS HH HH FFFFFFFFFF DDDDDDDD IIIIII RRRRRRRR
SSSSSSSS HH HH FFFFFFFFFF DDDDDDDD IIIIII RRRRRRRR
SS HH HH FF DD DD II RR RR
SS HH HH FF DD DD II RR RR
SS HH HH FF DD DD II RR RR
SS HH HH FF DD DD II RR RR
SSSSSS HHHHHHHHHH FFFFFFFF DD DD II RRRRRRRR
SSSSSS HHHHHHHHHH FFFFFFFF DD DD II RRRRRRRR
SS HH HH FF DD DD II RR RR
SS HH HH FF DD DD II RR RR
SS HH HH FF DD DD II RR RR ....
SS HH HH FF DD DD II RR RR ....
SSSSSSSS HH HH FF DDDDDDDD IIIIII RR RR ....
SSSSSSSS HH HH FF DDDDDDDD IIIIII RR RR ....


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

```
;     1          0001  0 MODULE SHFDIR (
;     2          0002  0                 LANGUAGE (BLISS32),
;     3          0003  0                 IDENT = 'V04-000'
;     4          0004  0                 ) =
;     5          0005  1 BEGIN
;     6          0006  1
;     7          0007  1 !
;     8          0008  1 !**************************************************************************
;     9          0009  1 !*                                                                        *
;    10          0010  1 !*  COPYRIGHT (c) 1978, 1980, 1982, 1984 BY                               *
;    11          0011  1 !*  DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASSACHUSETTS.                 *
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;    18          0018  1 !*  OTHER PERSON.  NO TITLE TO AND OWNERSHIP OF  THE  SOFTWARE IS  HEREBY   *
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;    22          0022  1 !*  AND  SHOULD  NOT  BE  CONSTRUED AS  A COMMITMENT BY DIGITAL EQUIPMENT   *
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;    26          0026  1 !*  SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.                 *
;    27          0027  1 !*                                                                        *
;    28          0028  1 !*                                                                        *
;    29          0029  1 !**************************************************************************
;    30          0030  1
;    31          0031  1 !++
;    32          0032  1 !
;    33          0033  1 ! FACILITY:  F11ACP Structure Level 2
;    34          0034  1 !
;    35          0035  1 ! ABSTRACT:
;    36          0036  1 !
;    37          0037  1 !       This routine either extends or compresses a directory file.
;    38          0038  1 !
;    39          0039  1 ! ENVIRONMENT:
;    40          0040  1 !
;    41          0041  1 !       STARLET operating system, including privileged system services
;    42          0042  1 !       and internal exec routines.
;    43          0043  1 !
;    44          0044  1 !--
;    45          0045  1 !
;    46          0046  1 !
;    47          0047  1 ! AUTHOR:  Andrew C. Goldstein,  CREATION DATE:  15-Apr-1977  13:25
;    48          0048  1 !
;    49          0049  1 ! MODIFIED BY:
;    50          0050  1 !
;    51          0051  1 !       V03-007 CDS0004         Christian D. Saether    23-Aug-1984
;    52          0052  1 !               Call routine to mark fcbs stale clusterwide when
;    53          0053  1 !               messing with the directory file.
;    54          0054  1 !
;    55          0055  1 !       V03-006 CDS0003         Christian D. Saether    11-Apr-1984
;    56          0056  1 !               When creating new buffers in shuffle operations, use
;    57          0057  1 !               the special lbn of -1 to avoid referencing real lbn's
```

```
;    58          0058  1 !                   in other directories.
;    59          0059  1 !
;    60          0060  1 !       V03-005 LMP0203         L. Mark Pilant,         29-Feb-1984  10:26
;    61          0061  1 !               Ignore the ACL segment in the header when re-initing the
;    62          0062  1 !               directory FCB resulting from a directory extension during
;    63          0063  1 !               a split operation.
;    64          0064  1 !
;    65          0065  1 !       V03-004 CDS0002         Christian D. Saether    30-Dec-1983
;    66          0066  1 !               Use L_NORM linkage and BIND_COMMON macro.
;    67          0067  1 !                                                                              ;
;    68          0068  1 !       V03-003 ACG0367         Andrew C. Goldstein,    26-Oct-1983  19:51
;    69          0069  1 !               Update directory highwater mark when extending
;    70          0070  1 !
;    71          0071  1 !       V03-002 CDS0001         Christian D. Saether     3-Oct-1983
;    72          0072  1 !               Setup CURR_LCKINDX prior to reading directory header.
;    73          0073  1 !
;    74          0074  1 !       V03-001 ACG0271         Andrew C. Goldstein,    23-Mar-1982  9:57
;    75          0075  1 !               Return unique error on directory allocation failure
;    76          0076  1 !
;    77          0077  1 !       V02-007 ACG0208         Andrew C. Goldstein,    15-Oct-1981  18:31
;    78          0078  1 !               Add segmented directory record support
;    79          0079  1 !
;    80          0080  1 !       V02-006 ACG0167         Andrew C. Goldstein,    16-Apr-1980  19:26
;    81          0081  1 !               Previous revision history moved to F11B.REV
;    82          0082  1 !**
;    83          0083  1
;    84          0084  1
;    85          0085  1 LIBRARY 'SYS$LIBRARY:LIB.L32';
;    86          0086  1 REQUIRE 'SRC$:FCPDEF.B32';
;    87          1077  1
;    88          1078  1
;    89          1079  1 FORWARD ROUTINE
;    90          1080  1         SHUFFLE_DIR     : L_NORM NOVALUE, ! extend or compress directory file
;    91          1081  1         FIX_HEADER      : L_NORM NOVALUE, ! update directory file header & FCB
;    92          1082  1         HANDLER;                          ! local condition handler
```

```
;    94          1083  1 GLOBAL ROUTINE SHUFFLE_DIR (DIRECTION) : L_NORM NOVALUE =
;    95          1084  1
;    96          1085  1 !++
;    97          1086  1 !
;    98          1087  1 ! FUNCTIONAL DESCRIPTION:
;    99          1088  1 !
;   100          1089  1 !       This routine extends or compresses a directory file. It is called
;   101          1090  1 !       to make free space in a block which is full or to squish out a block
;   102          1091  1 !       which is completely empty. If allocated but unused blocks are present
;   103          1092  1 !       at the end of the directory or if a squish is being done, the
;   104          1093  1 !       blocks are shuffled in place. Physically extending the directory
;   105          1094  1 !       requires reallocating and copying.
;   106          1095  1 !
;   107          1096  1 ! CALLING SEQUENCE:
;   108          1097  1 !       SHUFFLE_DIR (ARG1)
;   109          1098  1 !
;   110          1099  1 ! INPUT PARAMETERS:
;   111          1100  1 !       ARG1: +1 to extend the directory
;   112          1101  1 !             -1 to squish
;   113          1102  1 !
;   114          1103  1 ! IMPLICIT INPUTS:
;   115          1104  1 !       DIR_FCB: FCB of directory file
;   116          1105  1 !       DIR_VBN: current VBN of directory
;   117          1106  1 !       DIR_BUFFER: address of current directory block
;   118          1107  1 !       DIR_ENTRY: address of current directory record
;   119          1108  1 !       DIR_VERSION: address of version within record
;   120          1109  1 !
;   121          1110  1 ! OUTPUT PARAMETERS:
;   122          1111  1 !       NONE
;   123          1112  1 !
;   124          1113  1 ! IMPLICIT OUTPUTS:
;   125          1114  1 !       (for extension only)
;   126          1115  1 !       DIR_VBN: current VBN of directory, updated
;   127          1116  1 !       DIR_BUFFER: address of current directory block, updated
;   128          1117  1 !       DIR_ENTRY: address of current directory record, updated
;   129          1118  1 !       DIR_VERSION: address of version within record, updated
;   130          1119  1 !       DIR_END: address of end of data in dirrectory block, updated
;   131          1120  1 !       (for compression)
;   132          1121  1 !       DIR_ENTRY: 0
;   133          1122  1 !
;   134          1123  1 ! ROUTINE VALUE:
;   135          1124  1 !       NONE
;   136          1125  1 !
;   137          1126  1 ! SIDE EFFECTS:
;   138          1127  1 !       directory extended, storage map altered, directory FCB altered
;   139          1128  1 !
;   140          1129  1 !--
;   141          1130  1
;   142          1131  2 BEGIN
;   143          1132  2
;   144          1133  2 LINKAGE
;   145          1134  2         L_MAKE_POINTER  = CALL :
;   146          1135  2                           GLOBAL (MAP_POINTER = 9);
;   147          1136  2
;   148          1137  2 BUILTIN
;   149          1138  2         FP;
;   150          1139  2
```

```
;  151          1140  2 LABEL
;  152          1141  2         COPY_BLOCK;                     ! directory block copy code
;  153          1142  2
;  154          1143  2 GLOBAL REGISTER
;  155          1144  2         MAP_POINTER     = 9 : REF BBLOCK; ! pointer to current retrieval pointer
;  156          1145  2
;  157          1146  2 LOCAL
;  158          1147  2         FIB             : REF BBLOCK,   ! address of FIB for this operation
;  159          1148  2         FCB             : REF BBLOCK,   ! address of FCB for directory
;  160          1149  2         HEADER          : REF BBLOCK,   ! address of directory file header
;  161          1150  2         IN_PLACE,                       ! in place copy flag
;  162          1151  2         NEW_SIZE,                       ! size to extend directory to
;  163          1152  2         NEW_LBN,                        ! starting LBN of new space
;  164          1153  2         BUFFER          : REF BBLOCK,   ! buffer address of current directory block
;  165          1154  2         COMP_BUFFER,                    ! buffer address used for compression
;  166          1155  2         NEW_BUFFER,                     ! address of newly read expanded block
;  167          1156  2         OFFSET,                         ! VBN offset in shuffle copy
;  168          1157  2         P1              : REF BBLOCK,   ! directory record pointer
;  169          1158  2         END_POINT       : REF BBLOCK,   ! pointer to end of data in block
;  170          1159  2         REC_OFFSET,                     ! block offset of current record
;  171          1160  2         VER_OFFSET;                     ! block offset of current version
;  172          1161  2
;  173          1162  2 BIND_COMMON;
;  174          1163  2
;  175          1164  2 DIR_CONTEXT_DEF;
;  176          1165  2
;  177          1166  2 EXTERNAL ROUTINE
;  178          1167  2         MAKE_FCB_STALE  : L_NORM NOVALUE, ! mark fcb as stale clusterwide.
;  179          1168  2         SAVE_CONTEXT    : L_NORM,         ! save reentrant context area
;  180          1169  2         RESTORE_CONTEXT : L_NORM,         ! restore reentrant context area
;  181          1170  2         READ_HEADER     : L_NORM,         ! read file header
;  182          1171  2         CHARGE_QUOTA    : L_NORM,         ! charge space to user's quota
;  183          1172  2         ALLOC_BLOCKS    : L_NORM,         ! allocate blocks from storage map
;  184          1173  2         MAKE_POINTER    : L_MAKE_POINTER, ! build header map pointer
;  185          1174  2         READ_BLOCK      : L_NORM,         ! read a disk block
;  186          1175  2         RESET_LBN       : L_NORM,         ! assign new LBN to buffer
;  187          1176  2         WRITE_BLOCK     : L_NORM,         ! write block to disk
;  188          1177  2         CREATE_BLOCK    : L_NORM,         ! fabricate a block buffer
;  189          1178  2         INVALIDATE      : L_NORM,         ! invalidate a block buffer
;  190          1179  2         NEXT_REC        : L_NORM,         ! get next directory record
;  191          1180  2         TRUNCATE_HEADER : L_NORM,         ! truncate file header
;  192          1181  2         ZERO_WINDOWS    : L_NORM;         ! invalidate related file windows
;  193          1182  2
;  194          1183  2
;  195          1184  2 ! First save the current context, since this is a secondary file operation.
;  196          1185  2 ! Set up the secondary context pointers. Then read the directory file header.
;  197          1186  2 !
;  198          1187  2
;  199          1188  2 SAVE_CONTEXT ();
;  200          1189  2 PRIMARY_FCB = FCB = .DIR_FCB;
;  201          1190  2
;  202          1191  2 MAKE_FCB_STALE (.FCB);
;  203          1192  2
;  204          1193  2 CURR_LCKINDX = .DIR_LCKINDX;
;  205          1194  2 FIB = SECOND_FIB;
;  206          1195  2 CH$MOVE (FIB$S_FID, LOCAL_FIB[FIB$W_DID], FIB[FIB$W_FID]);
;  207          1196  2
```

```
;  208          1197  2 HEADER = READ_HEADER (0, .FCB);
;  209          1198  2
;  210          1199  2 ! If the directory is being expanded, see if space is available. If not,
;  211          1200  2 ! allocate a new larger area. The next VBN to use is the current directory
;  212          1201  2 ! EOF block number. If the block is not present in the file, the directory
;  213          1202  2 ! must be physically extended.
;  214          1203  2 !
;  215          1204  2
;  216          1205  3 COPY_BLOCK: BEGIN
;  217          1206  3 IN_PLACE = 1;                          ! assume in place shuffle
;  218          1207  3 IF .DIRECTION GTR 0
;  219          1208  3 THEN
;  220          1209  4     BEGIN
;  221          1210  4     IF .FCB[FCB$L_EFBLK] + 1 GTRU .FCB[FCB$L_FILESIZE]
;  222          1211  4     THEN
;  223          1212  5         BEGIN
;  224          1213  5
;  225          1214  5 ! Compute the number of blocks needed (50% of the current directory size)
;  226          1215  5 ! and allocate the new space contiguously. Limit the number of blocks
;  227          1216  5 ! allocated to what will fit in the map area of the header.
;  228          1217  5 !
;  229          1218  5
;  230          1219  5         IN_PLACE = 0;
;  231          1220  5         NEW_SIZE = .FCB[FCB$L_FILESIZE] + MAXU (.FCB[FCB$L_FILESIZE]/2, 1);
;  232          1221  5         IF .FCB[FCB$L_FILESIZE] GEQU 1024 THEN ERR_EXIT (SS$_DIRFULL);
;  233          1222  5         IF .NEW_SIZE GTRU 1024 THEN NEW_SIZE = 1024;
;  234          1223  5         CHARGE_QUOTA (.HEADER[FH2$L_FILEOWNER], .NEW_SIZE - .FCB[FCB$L_FILESIZE],
;  235          1224  5                       BITLIST (QUOTA_CHECK));
;  236          1225  5
;  237          1226  5         FIB[FIB$V_ALCON] = 1;
;  238          1227  5         FIB[FIB$V_FILCON] = 1;
;  239          1228  5         IF NOT ALLOC_BLOCKS (.FIB, .NEW_SIZE, NEW_LBN, NEW_SIZE)
;  240          1229  5         THEN ERR_EXIT (SS$_DIRALLOC);
;  241          1230  5         UNREC_COUNT = .NEW_SIZE;
;  242          1231  5         UNREC_LBN = .NEW_LBN;
;  243          1232  5         UNREC_RVN = .CURRENT_RVN;
;  244          1233  5         END
;  245          1234  4     ELSE
;  246          1235  4         NEW_LBN = .FCB[FCB$L_STLBN];    ! use existing space
;  247          1236  4
;  248          1237  4 ! Now copy the directory blocks (following code is for expansion). For
;  249          1238  4 ! maximum safety, we copy in reverse order, so that if the operation fails
;  250          1239  4 ! or the system crashes, we have duplicate, rather than missing, directory
;  251          1240  4 ! entries. We update the file header after the first block has been
;  252          1241  4 ! written in an in place copy for the same reason.
;  253          1242  4 !
;  254          1243  4
;  255          1244  4     OFFSET = 0;                         ! shuffle offset
;  256          1245  4     DECR VBN FROM .FCB[FCB$L_EFBLK] TO 1 DO
;  257          1246  5         BEGIN
;  258          1247  5         BUFFER = READ_BLOCK (.VBN+.FCB[FCB$L_STLBN]-1, 1, DIRECTORY_TYPE);
;  259          1248  5
;  260          1249  5 ! When we reach the VBN at which the shuffler was called, we split the
;  261          1250  5 ! block.
;  262          1251  5 ! We find the first record past the midpoint (past the 3/4 mark if
;  263          1252  5 ! this is the last block) and split into two buffers. Note that this logic
;  264          1253  5 ! depends on the availability from the buffer manager two blocks of
```

```
;  265     1254  5 ! adjacent LBN's referenced in direct sequence.
;  266     1255  5 !
;  267     1256  5
;  268     1257  5         IF .VBN EQL .DIR_VBN
;  269     1258  5         THEN
;  270     1259  6             BEGIN
;  271     1260  6             LOCAL P2, BUFFER2 : REF BBLOCK, LIMIT, HEADER_LENGTH;
;  272     1261  6             REC_OFFSET = .DIR_ENTRY - .DIR_BUFFER;
;  273     1262  6             VER_OFFSET = .DIR_VERSION - .DIR_BUFFER;
;  274     1263  6
;  275     1264  6             P1 = .BUFFER;
;  276     1265  6             LIMIT = .BUFFER + 256;
;  277     1266  6             IF .DIR_VBN EQL .FCB[FCB$L_EFBLK]
;  278     1267  6             THEN LIMIT = .LIMIT + 128;
;  279     1268  6
;  280     1269  6             UNTIL .P1 GEQA .LIMIT DO
;  281     1270  7                 BEGIN
;  282     1271  7                 P2 = .P1;
;  283     1272  7                 P1 = NEXT_REC (.P1);
;  284     1273  6                 END;
;  285     1274  6
;  286     1275  6 ! The point at which we split depends on the the relation between the
;  287     1276  6 ! location of the new entry and the two split pointers.
;  288     1277  6 !
;  289     1278  6 !                 +---------------+--------+-----------------+
;  290     1279  6 !                 |               | record |                 |
;  291     1280  6 !                 +---------------+--------+-----------------+
;  292     1281  6 !                                 P2       P1
;  293     1282  6 !
;  294     1283  6 ! P1 is now at the record boundary just past the half (or 3/4) mark,
;  295     1284  6 ! and P2 is at the previous record boundary. If the new entry precedes
;  296     1285  6 ! P2, we split at P2 and the entry goes into the former block. If the
;  297     1286  6 ! new entry is at P1 or later, we split at P1 and the entry goes into
;  298     1287  6 ! the latter block. If the entry is a new version of the record at P2,
;  299     1288  6 ! we split at P1 unless the record is already the last in its block, in
;  300     1289  6 ! which case we split at P2. Finally, if we discover that P1 is at the
;  301     1290  6 ! end of the block and P2 is at the beginning (i.e., the block contains
;  302     1291  6 ! one large record), we have to split the record instead. Got it?
;  303     1292  6 !
;  304     1293  6
;  305     1294  6             IF .REC_OFFSET + .BUFFER GTRA .P2
;  306     1295  6             THEN
;  307     1296  7                 BEGIN
;  308     1297  7                 P2 = .P1;
;  309     1298  7                 REC_OFFSET = .REC_OFFSET + .BUFFER - .P2;
;  310     1299  7                 VER_OFFSET = .VER_OFFSET + .BUFFER - .P2;
;  311     1300  7                 DIR_VBN = .DIR_VBN + 1;
;  312     1301  7                 END
;  313     1302  7
;  314     1303  6             ELSE IF .REC_OFFSET + .BUFFER EQL .P2
;  315     1304  6             AND .DIR_VERSION NEQ 0
;  316     1305  6             THEN
;  317     1306  7                 BEGIN
;  318     1307  7                 IF .P1[DIR$W_SIZE] EQL 65535
;  319     1308  7                 THEN
;  320     1309  8                     BEGIN
;  321     1310  8                     IF .P2 EQL .BUFFER
```

```
;  322          1311  8                    THEN
;  323          1312  8                        P2 = 0          ! flag need for record split
;  324          1313  8                    ELSE
;  325          1314  9                        BEGIN
;  326          1315  9                        REC_OFFSET = .REC_OFFSET + .BUFFER - .P2;
;  327          1316  9                        VER_OFFSET = .VER_OFFSET + .BUFFER - .P2;
;  328          1317  9                        DIR_VBN = .DIR_VBN + 1;
;  329          1318  8                        END;
;  330          1319  8                    END
;  331          1320  7                ELSE
;  332          1321  7                    P2 = .P1;
;  333          1322  6                END;
;  334          1323  6
;  335          1324  6 ! We now do either a block or record split; the latter is flagged here
;  336          1325  6 ! by P2 set to zero. The block split is performed by allocating a new
;  337          1326  6 ! buffer and copying the records past the split point (now denoted by P2)
;  338          1327  6 ! into the new buffer, and then erasing the copied records from the
;  339          1328  6 ! first buffer.
;  340          1329  6 !
;  341          1330  6
;  342          1331  6            IF .P2 NEQ 0
;  343          1332  6            THEN
;  344          1333  7                BEGIN
;  345          1334  7                P1 = .P2 - .BUFFER;             ! save split offset point
;  346          1335  7
;  347          1336  7 ! Use the special lbn of -1 for the new buffer.  A reset_lbn call will
;  348          1337  7 ! establish the correct lbn prior to writing it.
;  349          1338  7 !
;  350          1339  7
;  351          1340  7                BUFFER2 = CREATE_BLOCK (-1, 1, DIRECTORY_TYPE);
;  352          1341  7                CH$MOVE (512-.P1, .P2, .BUFFER2);
;  353          1342  7                CH$COPY (2, UPLIT WORD (-1), 0, 512-.P1, .P2);
;  354          1343  7                END
;  355          1344  7
;  356          1345  7 ! Otherwise we do a record split. The principle is similar to the block
;  357          1346  7 ! split, except that we always split at the point of version insertion.
;  358          1347  7 ! Assumptions: the current directory buffer contains only one record,
;  359          1348  7 ! which fills it, and we are adding a new version. Allocate a buffer and
;  360          1349  7 ! duplicate the block in it to set up the record header. Then carve out
;  361          1350  7 ! the appropriate set of versions from each record and flag the records.
;  362          1351  7 !
;  363          1352  7
;  364          1353  6            ELSE
;  365          1354  7                BEGIN
;  366          1355  7                P1 = .P1 - .BUFFER;
;  367          1356  7                HEADER_LENGTH = (.BUFFER[DIR$B_NAMECOUNT] + 1 AND NOT 1) + DIR$C_LENGTH;
;  368          1357  7
;  369          1358  7 ! Use the special lbn of -1 for the new buffer.  A reset_lbn call will
;  370          1359  7 ! establish the correct lbn prior to writing it.
;  371          1360  7 !
;  372          1361  7
;  373          1362  7                BUFFER2 = CREATE_BLOCK (-1, 1, DIRECTORY_TYPE);
;  374          1363  7                CH$MOVE (512, .BUFFER, .BUFFER2);
;  375          1364  7                CH$COPY (2, UPLIT WORD (-1), 0,
;  376          1365  7                         512-.VER_OFFSET, .BUFFER+.VER_OFFSET);
;  377          1366  7                CH$COPY (.P1-.VER_OFFSET+2, .BUFFER2+.VER_OFFSET, 0,
;  378          1367  7                         512-.HEADER_LENGTH, .BUFFER2+.HEADER_LENGTH);
```

```
;  379          1368  7
;  380          1369  7                BUFFER[DIR$W_SIZE] = .VER_OFFSET - 2;
;  381          1370  7                BUFFER2[DIR$W_SIZE] = .P1 - .VER_OFFSET + .HEADER_LENGTH - 2;
;  382          1371  7
;  383          1372  7  ! Pick the record to contain the new entry. We use the smaller of the
;  384          1373  7  ! two.
;  385          1374  7  !
;  386          1375  7
;  387          1376  7                IF .VER_OFFSET - .HEADER_LENGTH GTRU .P1 - .VER_OFFSET
;  388          1377  7                THEN
;  389          1378  8                    BEGIN
;  390          1379  8                    DIR_VBN = .DIR_VBN + 1;
;  391          1380  8                    VER_OFFSET = .HEADER_LENGTH;
;  392          1381  7                    END;
;  393          1382  6                END;
;  394          1383  6
;  395          1384  6  ! Set the higher block to its new LBN and write it. Bump the offset so
;  396          1385  6  ! that subsequent file to file copies now go to corresponding VBN's.
;  397          1386  6  ! If this is an in place copy then fix up the header now.
;  398          1387  6  !
;  399          1388  6
;  400          1389  6            RESET_LBN (.BUFFER2, .VBN+.NEW_LBN);
;  401          1390  6            OFFSET = -1;
;  402          1391  6            WRITE_BLOCK (.BUFFER2);
;  403          1392  6            IF .IN_PLACE AND .VBN EQL .FCB[FCB$L_EFBLK]
;  404          1393  6            THEN FIX_HEADER (.HEADER, 1);
;  405          1394  5            END;                            ! end of block split condition
;  406          1395  5
;  407          1396  5  ! For the rest of the copy loop, assign the output LBN to the buffer and
;  408          1397  5  ! write it. On an in place copy, kick out of the loop after we have done
;  409          1398  5  ! the block split. Otherwise, fix the header after the first write.
;  410          1399  5  !
;  411          1400  5
;  412          1401  5        RESET_LBN (.BUFFER, .VBN+.NEW_LBN+.OFFSET);
;  413          1402  5        WRITE_BLOCK (.BUFFER);
;  414          1403  5        IF .IN_PLACE
;  415          1404  5        THEN
;  416          1405  6            BEGIN
;  417          1406  6            IF .OFFSET NEQ 0
;  418          1407  6            THEN LEAVE COPY_BLOCK
;  419          1408  6            ELSE IF .VBN EQL .FCB[FCB$L_EFBLK]
;  420          1409  6            THEN FIX_HEADER (.HEADER, 1);
;  421          1410  5            END;
;  422          1411  4        END;                                ! of in place copy loop
;  423          1412  4
;  424          1413  4  ! Now deallocate the old directory blocks. Then build retrieval pointers
;  425          1414  4  ! for the new blocks in the file header. Do the truncation with a local
;  426          1415  4  ! condition handler enabled for special error recovery.
;  427          1416  4  !
;  428          1417  4
;  429          1418  4     .FP = HANDLER;
;  430          1419  4     TRUNCATE_HEADER (.FIB, .HEADER);
;  431          1420  4     .FP = 0;
;  432          1421  4
;  433          1422  4     HEADER[FH2$B_MAP_INUSE] = 0;
;  434          1423  4     CH$FILL (0, (.HEADER[FH2$B_ACOFFSET] - .HEADER[FH2$B_MPOFFSET]) * 2,
;  435          1424  4              .HEADER + .HEADER[FH2$B_MPOFFSET]*2);
```

```
;  436          1425  4     MAP_POINTER = .HEADER + .HEADER[FH2$B_MPOFFSET]*2;
;  437          1426  4     MAKE_POINTER (.NEW_SIZE, .NEW_LBN, .HEADER);
;  438          1427  4
;  439          1428  4     UNREC_COUNT = 0;
;  440          1429  4     KERNEL_CALL (ZERO_WINDOWS, .FCB);
;  441          1430  4     CHARGE_QUOTA (.HEADER[FH2$L_FILEOWNER], .NEW_SIZE - .FCB[FCB$L_FILESIZE],
;  442          1431  4                   BITLIST (QUOTA_CHARGE));
;  443          1432  4
;  444          1433  4     END                             ! of expansion conditional
;  445          1434  4
;  446          1435  4 ! For an inplace compression, we copy the blocks in forward order, again
;  447          1436  4 ! for maximum safety.
;  448          1437  4 !
;  449          1438  4
;  450          1439  3 ELSE
;  451          1440  4     BEGIN
;  452          1441  4     DIR_ENTRY = 0;                  ! indicate no block resident
;  453          1442  4     INVALIDATE (.DIR_BUFFER);       ! punt the block being squished out
;  454          1443  4     INCR VBN FROM .DIR_VBN+1 TO .FCB[FCB$L_EFBLK] DO
;  455          1444  5         BEGIN
;  456          1445  5         COMP_BUFFER = READ_BLOCK (.VBN+.FCB[FCB$L_STLBN]-1, 1, DIRECTORY_TYPE);
;  457          1446  5         RESET_LBN (.COMP_BUFFER, .VBN+.FCB[FCB$L_STLBN]-2);
;  458          1447  5         WRITE_BLOCK (.COMP_BUFFER);
;  459          1448  4         END;
;  460          1449  3     END;
;  461          1450  3
;  462          1451  3 ! Now, for an extension copy or a compression, update the file header.
;  463          1452  3 !
;  464          1453  3
;  465          1454  3 FIX_HEADER (.HEADER, .DIRECTION);
;  466          1455  3
;  467          1456  2 END;                                ! end of block COPY_BLOCK
;  468          1457  2
;  469          1458  2 ! For an extension, read back the block where the new entry will go
;  470          1459  2 ! and update the lookup pointers. For a compression, save the pointer
;  471          1460  2 ! in offset form so it can be used by the remove cleanup in case of error.
;  472          1461  2 !
;  473          1462  2
;  474          1463  2 IF .DIRECTION GTR 0
;  475          1464  2 THEN
;  476          1465  3     BEGIN
;  477          1466  3     NEW_BUFFER = READ_BLOCK (.DIR_VBN+.FCB[FCB$L_STLBN]-1, 1, DIRECTORY_TYPE);
;  478          1467  3     DIR_BUFFER = .NEW_BUFFER;
;  479          1468  3     DIR_ENTRY = .REC_OFFSET + .NEW_BUFFER;
;  480          1469  3     IF .DIR_VERSION NEQ 0
;  481          1470  3     THEN DIR_VERSION = .NEW_BUFFER + .VER_OFFSET;
;  482          1471  3
;  483          1472  3     END_POINT = .NEW_BUFFER;
;  484          1473  3     UNTIL .END_POINT[DIR$W_SIZE] EQL 65535 DO
;  485          1474  3     END_POINT = NEXT_REC (.END_POINT);
;  486          1475  3     DIR_END = .END_POINT + 2;
;  487          1476  2     END;
;  488          1477  2
;  489          1478  2 ! Finally switch back to primary context.
;  490          1479  2 !
;  491          1480  2
;  492          1481  2 RESTORE_CONTEXT ();
```

```
;  493         1482  2
;  494         1483  1 END;                                     ! end of routine EXTEND_DIR

                                                                .TITLE  SHFDIR
                                                                .IDENT  \V04-000\

                                                                .PSECT  $CODE$,NOWRT,2

                                FFFF  00000 P.AAA:    .WORD   -1                                        ;
                                FFFF  00002 P.AAB:    .WORD   -1                                        ;

                                                      .EXTRN  MAKE_FCB_STALE, SAVE_CONTEXT
                                                      .EXTRN  RESTORE_CONTEXT
                                                      .EXTRN  READ_HEADER, CHARGE_QUOTA
                                                      .EXTRN  ALLOC_BLOCKS, MAKE_POINTER
                                                      .EXTRN  READ_BLOCK, RESET_LBN
                                                      .EXTRN  WRITE_BLOCK, CREATE_BLOCK
                                                      .EXTRN  INVALIDATE, NEXT_REC
                                                      .EXTRN  TRUNCATE_HEADER
                                                      .EXTRN  ZERO_WINDOWS

                                 0BFC 00000           .ENTRY  SHUFFLE_DIR, Save R2,R3,R4,R5,R6,R7,R8,R9,- ; 1083
                                                              R11                                 ;
             5E             28  C2 00002              SUBL2   #40, SP                             ;
       0C    AE     00DC    CA  9E 00005              MOVAB   220(BASE), 12(SP)                   ; 1160
             52     0204    CA  9E 0000B              MOVAB   516(BASE), R2                       ;
    0000G    CF             00  FB 00010              CALLS   #0, SAVE_CONTEXT                    ; 1188
             56     00D0    CA  D0 00015              MOVL    208(BASE), FCB                      ; 1189
       08    AA             56  D0 0001A              MOVL    FCB, 8(BASE)                        ;
                            56  DD 0001E              PUSHL   FCB                                 ; 1191
    0000G    CF             01  FB 00020              CALLS   #1, MAKE_FCB_STALE                  ;
       14    AA     00D4    CA  D0 00025              MOVL    212(BASE), 20(BASE)                 ; 1193
       08    AE     0244    CA  9E 0002B              MOVAB   580(BASE), FIB                      ; 1194
57     08    AE             04  C1 00031              ADDL3   #4, FIB, R7                         ; 1195
67     0A    A2             06  28 00036              MOVC3   #6, 10(R2), (R7)                    ;
                            56  DD 0003B              PUSHL   FCB                                 ; 1197
                            7E  D4 0003D              CLRL    -(SP)                               ;
    0000G    CF             02  FB 0003F              CALLS   #2, READ_HEADER                     ;
       04    AE             50  D0 00044              MOVL    R0, HEADER                          ;
             6E             01  D0 00048              MOVL    #1, IN_PLACE                        ; 1206
                      04    AC  D5 0004B              TSTL    DIRECTION                           ; 1207
                            03  14 0004E              BGTR    1$                                  ;
                          02F5  31 00050              BRW     24$                                 ;
50      3C   A6             01  C1 00053 1$:          ADDL3   #1, 60(FCB), R0                     ; 1210
        38   A6             50  D1 00058              CMPL    R0, 56(FCB)                         ;
                            7F  1B 0005C              BLEQU   6$                                  ;
                            6E  D4 0005E              CLRL    IN_PLACE                            ; 1219
50      38   A6             02  C7 00060              DIVL3   #2, 56(FCB), R0                     ; 1220
                            03  12 00065              BNEQ    2$                                  ;
             50             01  D0 00067              MOVL    #1, R0                              ;
       20    AE       38 B640   9E 0006A 2$:          MOVAB   @56(FCB)[R0], NEW_SIZE              ;
 00000400    8F       38    A6  D1 00070              CMPL    56(FCB), #1024                      ; 1221
                            05  1F 00078              BLSSU   3$                                  ;
                  0860      8F  BF 0007A              CHMU    #2144                               ;
                            04  04 0007E              RET                                         ;
 00000400    8F       20    AE  D1 0007F 3$:          CMPL    NEW_SIZE, #1024                     ; 1222
```

```
                              06  1B 00087          BLEQU   4$                                          ;
      20  AE        0400      8F  3C 00089          MOVZWL  #1024, NEW_SIZE                             ;
                              01  DD 0008F 4$:      PUSHL   #1                                          ; 1224
 7E   24  AE          38      A6  C3 00091          SUBL3   56(FCB), NEW_SIZE, -(SP)                    ; 1223
 52   0C  AE                  3C  C1 00097          ADDL3   #60, HEADER, R2                             ;
                              62  DD 0009C          PUSHL   (R2)                                        ;
    0000G CF                  03  FB 0009E          CALLS   #3, CHARGE_QUOTA                            ;
 50   08  AE                  16  C1 000A3          ADDL3   #22, FIB, R0                                ; 1226
          60                  01  88 000A8          BISB2   #1, (R0)                                    ;
 50   08  AE                  16  C1 000AB          ADDL3   #22, FIB, R0                                ; 1227
          60                  04  88 000B0          BISB2   #4, (R0)                                    ;
                        20    AE  9F 000B3          PUSHAB  NEW_SIZE                                    ; 1228
                        28    AE  9F 000B6          PUSHAB  NEW_LBN                                     ;
                        28    AE  DD 000B9          PUSHL   NEW_SIZE                                    ;
                        14    AE  DD 000BC          PUSHL   FIB                                         ;
    0000G CF                  04  FB 000BF          CALLS   #4, ALLOC_BLOCKS                            ;
          05                  50  E8 000C4          BLBS    R0, 5$                                      ;
                    09C8      8F  BF 000C7          CHMU    #2504                                       ; 1229
                                  04 000CB          RET                                                 ;
      28  AA          20      AE  D0 000CC 5$:      MOVL    NEW_SIZE, 40(BASE)                          ; 1230
      24  AA          24      AE  D0 000D1          MOVL    NEW_LBN, 36(BASE)                           ; 1231
      2C  AA          A0      AA  D0 000D6          MOVL    -96(BASE), 44(BASE)                         ; 1232
                              05  11 000DB          BRB     7$                                          ; 1210
      24  AE          30      A6  D0 000DD 6$:      MOVL    48(FCB), NEW_LBN                            ; 1235
                        1C    AE  D4 000E2 7$:      CLRL    OFFSET                                      ; 1244
 57   3C  A6                  01  C1 000E5          ADDL3   #1, 60(FCB), VBN                            ; 1245
                            01DE  31 000EA          BRW     21$                                         ;
                              02  DD 000ED 8$:      PUSHL   #2                                          ; 1247
                              01  DD 000EF          PUSHL   #1                                          ;
 50       57          30      A6  C1 000F1          ADDL3   48(FCB), VBN, R0                            ;
                        FF    A0  9F 000F6          PUSHAB  -1(R0)                                      ;
    0000G CF                  03  FB 000F9          CALLS   #3, READ_BLOCK                              ;
      14  AE                  50  D0 000FE          MOVL    R0, BUFFER                                  ;
      0C  BE                  57  D1 00102          CMPL    VBN, @12(SP)                                ; 1257
                              03  13 00106          BEQL    9$                                          ;
                            018C  31 00108          BRW     19$                                         ;
 50   0C  AE                  08  C1 0010B 9$:      ADDL3   #8, 12(SP), R0                              ; 1261
 51   0C  AE                  04  C1 00110          ADDL3   #4, 12(SP), R1                              ;
 5B       60                  61  C3 00115          SUBL3   (R1), (R0), REC_OFFSET                      ;
 50   0C  AE                  0C  C1 00119          ADDL3   #12, 12(SP), R0                             ; 1262
 51   0C  AE                  04  C1 0011E          ADDL3   #4, 12(SP), R1                              ;
 58       60                  61  C3 00123          SUBL3   (R1), (R0), VER_OFFSET                      ;
      18  AE          14      AE  D0 00127          MOVL    BUFFER, P1                                  ; 1264
 52   14  AE 00000100         8F  C1 0012C          ADDL3   #256, BUFFER, LIMIT                         ; 1265
      3C  A6          0C      BE  D1 00135          CMPL    @12(SP), 60(FCB)                            ; 1266
                              05  12 0013A          BNEQ    10$                                         ;
          52        0080      C2  9E 0013C          MOVAB   128(R2), LIMIT                              ; 1267
          52          18      AE  D1 00141 10$:     CMPL    P1, LIMIT                                   ; 1269
                              12  1E 00145          BGEQU   11$                                         ;
          59          18      AE  D0 00147          MOVL    P1, P2                                      ; 1271
                      18      AE  DD 0014B          PUSHL   P1                                          ; 1272
    0000G CF                  01  FB 0014E          CALLS   #1, NEXT_REC                                ;
      18  AE                  50  D0 00153          MOVL    R0, P1                                      ;
                              E8  11 00157          BRB     10$                                         ; 1269
 50       5B          14      AE  C1 00159 11$:     ADDL3   BUFFER, REC_OFFSET, R0                      ; 1294
          59                  50  D1 0015E          CMPL    R0, P2                                      ;
                              13  1B 00161          BLEQU   12$                                         ;
```

```
                                59      18   AE   D0 00163          MOVL    P1, P2                                          ; 1297
                          5B    50          59   C3 00167          SUBL3   P2, R0, REC_OFFSET                              ; 1298
                          51    58      14  AE   C1 0016B          ADDL3   BUFFER, VER_OFFSET, R1                          ; 1299
                          58    51          59   C3 00170          SUBL3   P2, R1, VER_OFFSET
                                            2A   11 00174          BRB     14$                                             ; 1300
                                            31   12 00176 12$:     BNEQ    16$                                             ; 1303
                          51        0C      AE      0C   C1 00178 ADDL3   #12, 12(SP), R1                                 ; 1304
                                            61   D5 0017D          TSTL    (R1)
                                            28   13 0017F          BEQL    16$
                                  FFFF      8F   18   BE   B1 00181 CMPW    @P1, #65535                                     ; 1307
                                            1C   12 00187          BNEQ    15$
                                    14      AE      59   D1 00189 CMPL    P2, BUFFER                                      ; 1310
                                            04   12 0018D          BNEQ    13$
                                            59   D4 0018F          CLRL    P2                                              ; 1312
                                            16   11 00191          BRB     16$
                          5B                50      59   C3 00193 13$:     SUBL3   P2, R0, REC_OFFSET                      ; 1315
                          50                58  14  AE   C1 00197 ADDL3   BUFFER, VER_OFFSET, R0                          ; 1316
                          58                50      59   C3 0019C SUBL3   P2, R0, VER_OFFSET
                                        0C  BE      D6 001A0 14$:     INCL    @12(SP)                                         ; 1317
                                            04   11 001A3          BRB     16$                                             ; 1307
                                59      18  AE   D0 001A5 15$:     MOVL    P1, P2                                          ; 1321
                                            59   D5 001A9 16$:     TSTL    P2                                              ; 1331
                                            38   13 001AB          BEQL    17$
                    18    AE              59  14  AE   C3 001AD    SUBL3   BUFFER, P2, P1                                  ; 1334
                                            02   DD 001B3          PUSHL   #2                                              ; 1340
                                            01   DD 001B5          PUSHL   #1
                                7E          01   CE 001B7          MNEGL   #1, -(SP)
                                  0000G     CF      03   FB 001BA CALLS   #3, CREATE_BLOCK
                                    10      AE      50   D0 001BF MOVL    R0, BUFFER2
                          50 00000200       8F  18   AE   C3 001C3 SUBL3   P1, #512, R0                                  ; 1341
                    10    BE              69      50   28 001CC MOVC3   R0, (P2), @BUFFER2
                          50 00000200       8F  18   AE   C3 001D1 SUBL3   P1, #512, R0                                  ; 1342
              50          00      FE1D      CF      02   2C 001DA MOVC5   #2, P.AAA, #0, R0, (P2)
                                            69          001E1
                                        0087    31   001E2          BRW     18$                                             ; 1331
                                    18  AE      14  AE   C2 001E5 17$:     SUBL2   BUFFER, P1                              ; 1355
                          50        14  AE          05   C1 001EA ADDL3   #5, BUFFER, R0                                  ; 1356
                                    51              60   9A 001EF MOVZBL  (R0), R1
                                                    51   D6 001F2 INCL    R1
                                    51              01   8A 001F4 BICB2   #1, R1
                                    59      06      A1   9E 001F7 MOVAB   6(R1), HEADER_LENGTH
                                                    02   DD 001FB PUSHL   #2                                              ; 1362
                                                    01   DD 001FD PUSHL   #1
                                7E                  01   CE 001FF MNEGL   #1, -(SP)
                                  0000G             03   FB 00202 CALLS   #3, CREATE_BLOCK
                                    10      AE      50   D0 00207 MOVL    R0, BUFFER2
                    10    BE      14      EF  0200    8F   28 0020B MOVC3   #512, @BUFFER, @BUFFER2                      ; 1363
                          50 00000200       8F      58   C3 00213 SUBL3   VER_OFFSET, #512, R0                           ; 1365
                                        14  BE48  9F   0021B PUSHAB  @BUFFER[R8]
              50          00      FDDA      CF      02   2C 0021F MOVC5   #2, P.AAB, #0, R0, @(SP)+
                                            9E          00226
                          50        18      -E          58   C3 00227 SUBL3   VER_OFFSET, P1, R0                         ; 1366
                                            50          02   C0 0022C ADDL2   #2, R0
                          51 00000200       8F          59   C3 0022F SUBL3   HEADER_LENGTH, #512, R1                    ; 367
                                        10  BE49  9F   00237 PUSHAB  @BUFFER2[R9]
                                        14  BE48  9F   0023B PUSHAB  @BUFFER2[R8]
              51          00                9E          50   2C 0023F MOVC5   R0, @(SP)+, #0, R1, @(SP)+
```

```
                                  9E       00244
       14  BE          58         02    A3 00245          SUBW3    #2, VER_OFFSET, @BUFFER                   ; 1369
           50      18  AE         58    C3 0024A          SUBL3    VER_OFFSET  P1, R0                        ; 1370
                       51   FE A940     9E 0024F          MOVAB    -2(HEADER_LENGTH)[R0], R1                 ;
                   10  BE         51    B0 00254          MOVW     R1, @BUFFER2                              ;
           51          58         59    C3 00258          SUBL3    HEADER_LENGTH, VER_OFFSET, R1             ; 1376
           50      18  AE         58    C3 0025C          SUBL3    VER_OFFSET, P1, R0                        ;
                       50         51    D1 00261          CMPL     R1, R0                                    ;
                                  06    1B 00264          BLEQU    18$                                       ;
                             0C   BE    D6 00266          INCL     @12(SP)                                   ; 1379
                       58         59    D0 00269          MOVL     HEADER_LENGTH, VER_OFFSET                 ; 1380
                             24 BE47    9F 0026C 18$:     PUSHAB   @NEW_LBN[VBN]                             ; 1389
                             14   AE    DD 00270          PUSHL    BUFFER2                                   ;
                0000G  CF         02    FB 00273          CALLS    #2, RESET_LBN                             ;
                   1C  AE         01    CE 00278          MNEGL    #1, OFFSET                                ; 1390
                             10   AE    DD 0027C          PUSHL    BUFFER2                                   ; 1391
                0000G  CF         01    FB 0027F          CALLS    #1, WRITE_BLOCK                           ;
                       10         6E    E9 00284          BLBC     IN_PLACE, 19$                             ; 1392
                   3C  A6         57    D1 00287          CMPL     VBN, 60(FCB)                              ;
                                  0A    12 0028B          BNEQ     19$                                       ;
                                  01    DD 0028D          PUSHL    #1                                        ; 1393
                             08   AE    DD 0028F          PUSHL    HEADER                                    ;
                0000V  CF         02    FB 00292          CALLS    #2, FIX_HEADER                            ;
           50          57    24   AE    C1 00297 19$:     ADDL3    NEW_LBN, VBN, R0                          ; 1401
                             1C BE40    9F 0029C          PUSHAB   @OFFSET[R0]                               ;
                             18   AE    DD 002A0          PUSHL    BUFFER                                    ;
                0000G  CF         02    FB 002A3          CALLS    #2, RESET_LBN                             ;
                             14   AE    DD 002A8          PUSHL    BUFFER                                    ; 1402
                0000G  CF         01    FB 002AB          CALLS    #1, WRITE_BLOCK                           ;
                       18         6E    E9 002B0          BLBC     IN_PLACE, 21$                             ; 1403
                             1C   AE    D5 002B3          TSTL     OFFSET                                    ; 1406
                                  03    13 002B6          BEQL     20$                                       ;
                                00E3    31 002B8          BRW      28$                                       ;
                   3C  A6         57    D1 002BB 20$:     CMPL     VBN, 60(FCB)                              ; 1408
                                  0A    12 002BF          BNEQ     21$                                       ;
                                  01    DD 002C1          PUSHL    #1                                        ; 1409
                             08   AE    DD 002C3          PUSHL    HEADER                                    ;
                0000V  CF         02    FB 002C6          CALLS    #2, FIX_HEADER                            ;
                       02         57    F5 002CB 21$:     SOBGTR   VBN, 22$                                  ; 1245
                                  03    11 002CE          BRB      23$                                       ;
                                FE1A    31 002D0 22$:     BRW      8$                                        ;
                       6D     0000V CF  9E 002D3 23$:     MOVAB    HANDLER, (FP)                             ; 1418
                             04   AE    DD 002D8          PUSHL    HEADER                                    ; 1419
                             0C   AE    DD 002DB          PUSHL    FIB                                       ;
                0000G  CF         02    FB 002DE          CALLS    #2, TRUNCATE_HEADER                       ;
                                  6D    D4 002E3          CLRL     (FP)                                      ; 1420
           50      04  AE         3A    C1 002E5          ADDL3    #58, HEADER, R0                           ; 1422
                                  60    94 002EA          CLRB     (R0)                                      ;
           50      04  AE         01    C1 002EC          ADDL3    #1, HEADER, R0                            ; 1423
                       51         60    9A 002F1          MOVZBL   (R0), R1                                  ;
           52      04  AE         02    C1 002F4          ADDL3    #2, HEADER, R2                            ;
                       50         62    9A 002F9          MOVZBL   (R2), R0                                  ;
                       50         51    C2 002FC          SUBL2    R1, R0                                    ;
                       50         02    C4 002FF          MULL2    #2, R0                                    ;
                       57   04 BE41     3E 00302          MOVAW    @HEADER[R1], R7                           ; 1424
  50       00          6E         00    2C 00307          MOVC5    #0, (SP), #0, R0, (R7)                    ;
                                  67       0030C                                                             ;
```

```
                51      04   AE              01  C1 00030D              ADDL3   #1, HEADER, R1                                  ; 1425
                        50   61              9A  00312                  MOVZBL  (R1), R0
                        59   04 BE40         3E  00315                  MOVAW   @HEADER[R0], MAP_POINTER
                             04   AE         DD  0031A                  PUSHL   HEADER                                          ; 1426
                             28   AE         DD  0031D                  PUSHL   NEW_LBN
                             28   AE         DD  00320                  PUSHL   NEW_SIZE
                        0000G   CF           03  FB 00323              CALLS   #3, MAKE_POINTER
                             28   AA         D4  00328                  CLRL    40(BASE)                                        ; 1428
                                  56         DD  0032B                  PUSHL   FCB                                             ; 1429
                        0000G   CF           01  FB 0032D              CALLS   #1, ZERO_WINDOWS
                                  02         DD  00332                  PUSHL   #2                                              ; 1431
                7E      24   AE   38         A6  C3 00334              SUBL3   56(FCB), NEW_SIZE, -(SP)                        ; 1430
                52      0C   AE              3C  C1 0033A              ADDL3   #60, HEADER, R2
                                  62         DD  0033F                  PUSHL   (R2)
                        0000G   CF           03  FB 00341              CALLS   #3, CHARGE_QUOTA
                                  4B         11  00346                  BRB     27$                                             ; 1207
                50      0C   AE              08  C1 00348  24$:        ADDL3   #8, 12(SP), R0                                  ; 1441
                                  60         D4  0034D                  CLRL    (R0)
                52      0C   AE              04  C1 0034F              ADDL3   #4, 12(SP), R2                                  ; 1442
                                  62         DD  00354                  PUSHL   (R2)
                        0000G   CF           01  FB 00356              CALLS   #1, INVALIDATE
                                  53   3C     A6  D0 0035B              MOVL    60(FCB), R3                                     ; 1443
                                  52   0C     BE  D0 0035F              MOVL    @12(SP), VBN
                                       2A     11  00363                  BRB     26$
                                       02     DD  00365  25$:        PUSHL   #2                                              ; 1445
                                       01     DD  00367                  PUSHL   #1
                50                52   30     A6  C1 00369              ADDL3   48(FCB), VBN, R0
                                       FF     A0  9F 0036E              PUSHAB  -1(R0)
                        0000G   CF           03  FB 00371              CALLS   #3, READ_BLOCK
                                  54         50  D0 00376              MOVL    R0, COMP_BUFFER
                50                52   30     A6  C1 00379              ADDL3   48(FCB), VBN, R0                                ; 1446
                                       FE     A0  9F 0037E              PUSHAB  -2(R0)
                                  54         DD  00381                  PUSHL   COMP_BUFFER
                        0000G   CF           02  FB 00383              CALLS   #2, RESET_LBN
                                  54         DD  00388                  PUSHL   COMP_BUFFER                                     ; 1447
                        0000G   CF           01  FB 0038A              CALLS   #1, WRITE_BLOCK
                D2                52         53  F3 0038F  26$:        AOBLEQ  R3, VBN, 25$                                    ; 1443
                                  04   AC     DD  00393  27$:        PUSHL   DIRECTION                                       ; 1454
                                  08   AE     DD  00396                  PUSHL   HEADER
                        0000V   CF           02  FB 00399              CALLS   #2, FIX_HEADER
                                  04   AC     D5  0039E  28$:        TSTL    DIRECTION                                       ; 1463
                                       4E     15  003A1                  BLEQ    31$
                                       02     DD  003A3                  PUSHL   #2                                              ; 1466
                                       01     DD  003A5                  PUSHL   #1
                50      14   BE   30         A6  C1 003A7              ADDL3   48(FCB), @20(SP), R0
                                       FF     A0  9F 003AD              PUSHAB  -1(R0)
                        0000G   CF           03  FB 003B0              CALLS   #3, READ_BLOCK
                51      0C   AE              04  C1 003B5              ADDL3   #4, 12(SP), R1                                  ; 1467
                                  61         50  D0 003BA                  MOVL    NEW_BUFFER, (R1)
                51      0C   AE              08  C1 003BD              ADDL3   #8, 12(SP), R1                                  ; 1468
                61                5B         50  C1 003C2              ADDL3   NEW_BUFFER, REC_OFFSET, (R1)
                51      0C   AE              0C  C1 003C6              ADDL3   #12, 12(SP), R1                                 ; 1469
                                  61         D5  003CB                  TSTL    (R1)
                                       09     13  003CD                  BEQL    29$
                51      0C   AE              0C  C1 003CF              ADDL3   #12, 12(SP), R1                                 ; 1470
                61                50         58  C1 003D4              ADDL3   VER_OFFSET, NEW_BUFFER, (R1)
                        FFFF    8F           60  B1 003D8  29$:        CMPW    (END_POINT), #65535                             ; 1473
```

```
                                        09  13 003DD           BEQL    30$                                             ;
                                        50  DD 003DF           PUSHL   END_POINT                                       ; 1474
                        0000G   CF      01  FB 003E1           CALLS   #1, NEXT_REC                                    ;
                                        F0  11 003E6           BRB     29$                                             ;
                    51      0C  AE      10  C1 003E8 30$:      ADDL3   #16, 12(SP), R1                                 ; 1475
                                61  02  A0  9E 003ED           MOVAB   2(R0), (R1)                                     ;
                        0000G   CF      00  FB 003F1 31$:      CALLS   #0, RESTORE_CONTEXT                             ; 1481
                                        04  003F6               RET                                                     ; 1483

; Routine Size:  1015 bytes,    Routine Base:  $CODE$ + 0004
```

```
;  496          1484  1 ROUTINE FIX_HEADER (HEADER, DIRECTION) : L_NORM NOVALUE =
;  497          1485  1
;  498          1486  1 !++
;  499          1487  1 !
;  500          1488  1 ! FUNCTIONAL DESCRIPTION:
;  501          1489  1 !
;  502          1490  1 !       This routine updates the file header of the directory being
;  503          1491  1 !       extended or compressed, and also updates the directory FCB.
;  504          1492  1 !
;  505          1493  1 !
;  506          1494  1 ! CALLING SEQUENCE:
;  507          1495  1 !       FIX_HEADER (ARG1, ARG2)
;  508          1496  1 !
;  509          1497  1 ! INPUT PARAMETERS:
;  510          1498  1 !       ARG1: address of file header
;  511          1499  1 !       ARG2: +1 for extension
;  512          1500  1 !             -1 for compression
;  513          1501  1 !
;  514          1502  1 ! IMPLICIT INPUTS:
;  515          1503  1 !       DIR_VBN: VBN of directory being split or compressed out
;  516          1504  1 !       DIR_FCB: address of directory FCB
;  517          1505  1 !
;  518          1506  1 ! OUTPUT PARAMETERS:
;  519          1507  1 !       NONE
;  520          1508  1 !
;  521          1509  1 ! IMPLICIT OUTPUTS:
;  522          1510  1 !       NONE
;  523          1511  1 !
;  524          1512  1 ! ROUTINE VALUE:
;  525          1513  1 !       NONE
;  526          1514  1 !
;  527          1515  1 ! SIDE EFFECTS:
;  528          1516  1 !       file header updated, FCB updated
;  529          1517  1 !
;  530          1518  1 !--
;  531          1519  1
;  532          1520  2 BEGIN
;  533          1521  2
;  534          1522  2 MAP
;  535          1523  2         HEADER          : REF BBLOCK;   ! file header arg
;  536          1524  2
;  537          1525  2 BIND_COMMON;
;  538          1526  2
;  539          1527  2 EXTERNAL ROUTINE
;  540          1528  2         INIT_FCB2       : L_NORM,       ! initialize FCB
;  541          1529  2         ZERO_IDX        : L_NORM,       ! initialize directory index
;  542          1530  2         CHECKSUM        : L_NORM,       ! compute file header checksum
;  543          1531  2         WRITE_HEADER    : L_NORM;       ! write file header
;  544          1532  2
;  545          1533  2
;  546          1534  2 ! Update the end of file mark in the header and the FCB. Then adjust the
;  547          1535  2 ! directory index in the FCB. Finally checksum and write the file header.
;  548          1536  2 ! If this file header supports it, stuff the high water field to
;  549          1537  2 ! be the allocated size.
;  550          1538  2 !
;  551          1539  2
;  552          1540  2 BBLOCK [HEADER[FH2$W_RECATTR], FAT$W_EFBLKL] =
```

```
;  2          .BBLOCK [HEADER[FH2$W_RECATTR], FAT$W_EFBLKL] + .DIRECTION;
;  2
;  2  IF .HEADER [FH2$B_IDOFFSET] GEQU ($BYTEOFFSET (FH2$L_HIGHWATER)+4)/2
;  2  AND .HEADER [FH2$L_HIGHWATER] LSSU .BBLOCK [HEADER[FH2$W_RECATTR], FAT$W_EFBLKL]
;  2  THEN
;  2      HEADER [FH2$L_HIGHWATER] = .BBLOCK [HEADER[FH2$W_RECATTR], FAT$W_EFBLKL];
;  2
;  2  CLEANUP_FLAGS[CLF_NOBUILD] = 1;
;  2  KERNEL_CALL (INIT_FCB2, .DIR_FCB, .HEADER);
;  2  BBLOCK [HEADER[FH2$W_RECATTR], FAT$W_HIBLKL] = .DIR_FCB[FCB$L_FILESIZE];
;  2  KERNEL_CALL (ZERO_IDX);
;  2
;  2  CHECKSUM (.HEADER);
;  2  WRITE_HEADER ();
;  2
;  1  END;                                      ! end of routine FIX_HEADER


                                                              .EXTRN  INIT_FCB2, ZERO_IDX
                                                              .EXTRN  CHECKSUM, WRITE_HEADER

                                            0000 00000 FIX_HEADER:
                                                              .WORD   Save nothing                          ; 1484
                         50        04   AC   D0 00002         MOVL    HEADER, R0                            ; 1540
                   1E    A0        08   AC   A0 00006         ADDW2   DIRECTION, 30(R0)                     ; 1541
                         50        04   AC   D0 0000B         MOVL    HEADER, R0                            ; 1543
                         28             60   91 0000F         CMPB    (R0), #40                             ;
                                        0E   1F 00012         BLSSU   1$                                    ;
 4C   A0    1E   A0      10             00   ED 00014         CMPZV   #0, #16, 30(R0), 76(R0)               ; 1544
                                        05   1B 0001B         BLEQU   1$                                    ;
                   4C    A0        1E   A0   3C 0001D         MOVZWL  30(R0), 76(R0)                        ; 1546
                   01    AA             08   88 00022 1$:     BISB2   #8, 1(BASE)                           ; 1548
                                   04   AC   DD 00026         PUSHL   HEADER                                ; 1549
                                 00D0   CA   DD 00029         PUSHL   208(BASE)                             ;
                0000G    CF             02   FB 0002D         CALLS   #2, INIT_FCB2                         ;
                         51        04   AC   D0 00032         MOVL    HEADER, R1                            ; 1550
                         50      00D0   CA   D0 00036         MOVL    208(BASE), R0                         ;
                   1A    A1        38   A0   B0 0003B         MOVW    56(R0), 26(R1)                        ;
                0000G    CF             00   FB 00040         CALLS   #0, ZERO_IDX                          ; 1551
                                   04   AC   DD 00045         PUSHL   HEADER                                ; 1553
                0000G    CF             01   FB 00048         CALLS   #1, CHECKSUM                          ;
                0000G    CF             00   FB 0004D         CALLS   #0, WRITE_HEADER                      ; 1554
                                             04 00052         RET                                           ; 1556

; Routine Size:  83 bytes,    Routine Base:  $CODE$ + 03FB
```

```
;  570          1557  1 ROUTINE HANDLER (SIGNAL, MECHANISM) =
;  571          1558  1
;  572          1559  1 !++
;  573          1560  1 !
;  574          1561  1 ! FUNCTIONAL DESCRIPTION:
;  575          1562  1 !
;  576          1563  1 !       This routine is the condition handler for directory extension. It is
;  577          1564  1 !       enabled only during the truncate call (deallocating the old directory
;  578          1565  1 !       blocks). Normal error handling would cause the entire directory to
;  579          1566  1 !       be dropped on the floor. Since we already have a new good copy, we
;  580          1567  1 !       should forge ahead. Note that no error status is returned to the user,
;  581          1568  1 !       although we will log a system error.
;  582          1569  1 !
;  583          1570  1 !
;  584          1571  1 ! CALLING SEQUENCE:
;  585          1572  1 !       HANDLER (ARG1, ARG2)
;  586          1573  1 !
;  587          1574  1 ! INPUT PARAMETERS:
;  588          1575  1 !       ARG1: address of signal array
;  589          1576  1 !       ARG2: address of mechanism array
;  590          1577  1 !
;  591          1578  1 ! IMPLICIT INPUTS:
;  592          1579  1 !       FILE_HEADER: address of directory file header
;  593          1580  1 !
;  594          1581  1 ! OUTPUT PARAMETERS:
;  595          1582  1 !       NONE
;  596          1583  1 !
;  597          1584  1 ! IMPLICIT OUTPUTS:
;  598          1585  1 !       NONE
;  599          1586  1 !
;  600          1587  1 ! ROUTINE VALUE:
;  601          1588  1 !       SS$_RESIGNAL or none if unwind
;  602          1589  1 !
;  603          1590  1 ! SIDE EFFECTS:
;  604          1591  1 !       file header map area cleaned out
;  605          1592  1 !
;  606          1593  1 !--
;  607          1594  1
;  608          1595  2 BEGIN
;  609          1596  2
;  610          1597  2 MAP
;  611          1598  2         SIGNAL          : REF BBLOCK,   ! signal array arg
;  612          1599  2         MECHANISM       : REF BBLOCK;   ! mechanism array arg
;  613          1600  2
;  614          1601  2
;  615          1602  2 ! Check the condition code for FCP error exit. Then initialize the header's
;  616          1603  2 ! map area and unwind. On other signals we simply resignal.
;  617          1604  2 !
;  618          1605  2
;  619          1606  2 IF .SIGNAL[CHF$L_SIG_NAME] EQL SS$_CMODUSER
;  620          1607  2 THEN $UNWIND (DEPADR = MECHANISM[CHF$L_MCH_DEPTH]);
;  621          1608  2
;  622          1609  2 RETURN SS$_RESIGNAL;                    ! status is irrelevant if unwind
;  623          1610  2
;  624          1611  1 END;                                     ! end of routine handler
```

```
                                                        .EXTRN  SYS$UNWIND

                                                0000 00000 HANDLER:.WORD   Save nothing                          ; 1557
                                  50    04  AC  D0 00002          MOVL    SIGNAL, R0                           ; 1606
                        00000424  8F    04  A0  D1 00006          CMPL    4(R0), #1060                         ;
                                                0E  12 0000E          BNEQ    1$                               ;
                                                7E  D4 00010          CLRL    -(SP)                            ; 1607
                              7E      08  AC    08  C1 00012          ADDL3   #8, MECHANISM, -(SP)             ;
                        00000000G     00        02  FB 00017          CALLS   #2, SYS$UNWIND                   ;
                                  50    0918  8F  3C 0001E 1$:       MOVZWL  #2328, R0                        ; 1609
                                                04  00023          RET                                      ; 1611

; Routine Size:  36 bytes,    Routine Base:  $CODE$ + 044E

;  625          1612  1
;  626          1613  1 END
;  627          1614  0 ELUDOM



;                                       PSECT SUMMARY
;
;       Name                            Bytes                           Attributes
;
;  $CODE$                                1138  NOVEC,NOWRT,  RD ,  EXE,NOSHR,  LCL,  REL,  CON,NOPIC,ALIGN(2)



;                                   Library Statistics
;
;                                           --------- Symbols ---------       Pages       Processing
;       File                                Total     Loaded   Percent       Mapped       Time
;
;  _$255$DUA28:[SYSLIB]LIB.L32;1            18619         46         0       1000          00:01.9



;                                       COMMAND QUALIFIERS

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

; Size:          1134 code + 4 data bytes
; Run Time:        00:39.4
; Elapsed Time:    01:27.7
; Lines/CPU Min:    2459
; Lexemes/CPU-Min: 41809
; Memory Used:  394 pages
```

; Compilation Complete

SCHFCB
LIS

SNDSMB
LIS

SHFDIR
LIS

SNDERR
LIS

TRUNC
LIS

FAL

FAL
MAP

SELVOL
LIS

DAPDEF
MDL

SMALOC
LIS

SNDBAD
LIS

SWITVL
LIS

WITURN
LIS