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 OPTIONS NODECK,LIST,XREF,NOREL,OBJ(P)

THE LIST OF OPTIONS USED DURING THIS ASSEMBLY IS--   NODECK,LIST,XREF,NOREL,OBJ
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                              EXTERNAL SYMBOL LIST

SYMBOL    TYPE                                    VER 15, MOD 00  22/07/23  PAGE    1

#SPACK    MODULE
```

```
ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          VER 15, MOD 00  22/07/23  PAGE   2

    0000                         1 #SPACK START 0
                                 2        PRINT ON,NODATA
                                 3 *      @SYS  EXP-N
                               214+       PRINT ON
                               215 *      @FXD  EXP-N
                               620+       PRINT ON
                               621 *      @WKA  EXP-N
                               691+       PRINT ON
                               692 *      @CAN  EXP-N
                               795+       PRINT ON
                               796 *      @DIR  EXP-N
                               916+       PRINT ON
                               917 *      @SPF  EXP-N
                              1380+       PRINT ON
```

```
                      1382 ***************************************************************************
                      1383 * 5703-XM1      COPYRIGHT IBM CORP, 1970                               *
                      1384 *                  REFER TO INSTRUCTIONS ON COPYRIGHT NOTICE, 120-2083  *
                      1385 *                                                                       *
                      1386 ***************************************************************************
                      1387 *STATUS                                                                 *
                      1388 *    VERSION 1 MODIFICATION 0                                           *
                      1389 *                                                                       *
                      1390 *FUNCTION                                                               *
                      1391 *    * #PACK WILL PACK THE LIBRARY SPECIFIED BY THE ADDRESS IN $$FLIB. *
                      1392 *    * A MESSAGE IS PRINTED INDICATING THAT THE LIBRARY IS BEING        *
                      1393 *      PACKED.                                                          *
                      1394 *    * THE PACKING OPERATION IS DONE IN TWO PHASES.  #SPACK PERFORMS    *
                      1395 *      THE FIRST PART WHICH IS BUILD THE UPDATE TABLE IN THE CORE       *
                      1396 *      RESIDENT NULL DIRECTORY AND TO UPDATE THE POINTERS IN ALL THE    *
                      1397 *      DIRECTORIES.                                                     *
                      1398 *    * TO BUILD THE UPDATE TABLE THE SUM OR ALL PRECEEDING NULL SCTRS   *
                      1399 *      IS PLACED IN THE CURRENT NULL ENTRY.  AT THE END AN ADDITIONAL   *
                      1400 *      PSUEDO NULL ENTRY IS BUILT TO HOLD THE OVERALL TOTAL.            *
                      1401 *    * TO UPDATE THE DIRECTORY POINTERS.  THE POINTER IS USED AS AN     *
                      1402 *      ARGUEMENT TO SEARCH THROUGH THE READ TABLE UNTIL A NILL ENTRY    *
                      1403 *      WITH A HIGHER ADDR IS FOUND.  THE TOTAL IN THIS ENTRY IS THEN    *
                      1404 *      DECREMENTED FROM THE ARGUMENT.  AFTER EACH DIRECTORY IS UPDATED  *
                      1405 *      IT IS WRITTEN BACK TO ITS OLD LOCATION IN THE AREA.  AFTER ALL   *
                      1406 *      THE USER DIRECTORIES ARE UPDATED AND WRITTEN BACK THE PASSWORD   *
                      1407 *      DIRECTORY IS THEN UPDATED AND WRITTEN BACK.                      *
                      1408 *    * DURING THE UPDATE #SPOVL (PHASE 2) IS READ IN AND CONTROL IS     *
                      1409 *      PASSED TO #SPOVL TO PACK.                                        *
                      1410 *                                                                       *
                      1411 *ENTRY POINTS                                                           *
                      1412 *      #SPACK - ENTRY IS VIA $RLOAD.  THE CALLING ROUTINE MUST SAVE     *
                      1413 *               A DPL IN $DPLSV TO RELOAD THE ROUTINE WHEN THE PACK     *
                      1414 *               IS COMPLETED.                                          *
                      1415 *                                                                       *
                      1416 *INPUT                                                                  *
                      1417 *    * THE DISK ADDRESS OF THE LIBRARY TO BE PACKED MUST BE IN $$FLIB   *
                      1418 *                                                                       *
                      1419 *OUTPUT                                                                 *
                      1420 *    * OUTPUT FROM #SPACK IS THE UPDATED LIBRARY DIRECTORIES AND A      *
                      1421 *      WARNING MESSAGE INDICATING THE LIBRARY PACK.                     *
                      1422 *                                                                       *
                      1423 *EXTERNAL REFERENCES                                                    *
                      1424 *      $SPRNT - ENTRY TO THE SYSTEM PRINTER ROUTINE.                    *
                      1425 *      $$FLIB - LOCATION OF FILE LIBRARY DISK ADDRESS.                  *
                      1426 *      $DISKN - ENTRY TO SYSTEM DISK ROUTINE.                           *
                      1427 *      $WAITF - LOCATION OF I/O WAIT PARAMETER LIST.                    *
                      1428 *      $XRSAV - LOCATION OF @XR SAVE AREA.                              *
                      1429 *                                                                       *
                      1430 *TABLES/WORK AREAS                                                      *
                      1431 *    * NONE                                                             *
                      1432 *                                                                       *
                      1433 *ATTRIBUTES                                                             *
                      1434 *    * RELOCATABLE                                                      *
                      1435 *                                                                       *
                      1436 *CHARACTER CODE DEPENDENCY                                              *
                      1437 *    * THE OPERATION OF THIS MODULE DEPENDS UPON AS INTERNAL            *
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                        1438 *      REPRESENTATION OF THE EXTERNAL CHAR SET WHICH IS EQUIVALENT TO  *
                        1439 *      THE ONE USED AT ASSEMBLY TIME.  THE CODING HAS BEEN ARRANGED SO *
                        1440 *      THAT REDEFINITION OF CHARACTER CONSTANTS, BY REASSEMBLY, WILL   *
                        1441 *      RESULT IN A CORRECT MODULE FOR THE NEW DEFINITIONS.             *
                        1442 *                                                                      *
                        1443 *NOTES                                                                 *
                        1444 *    ERROR PROCEDURES                                                  *
                        1445 *       NONE                                                           *
                        1446 *                                                                      *
                        1447 *    REGISTER USAGE                                                    *
                        1448 *      * @BR IS USED AS A BASE REGISTER TO REFERENCE CODING IN TERMS   *
                        1449 *        OF A DISPLACEMENT.                                            *
                        1450 *      * @XR IS USED TO POINT TO THE READ TABLE.                       *
                        1451 *                                                                      *
                        1452 *    SAVED/RESTORED AREAS                                              *
                        1453 *       THE SYSTEM IO ROUTINES AND THE FIT ARE RESTORED ON EXIT.       *
                        1454 *                                                                      *
                        1455 *    MODIFICATION CONSIDERATIONS                                       *
                        1456 *       NORMAL EXIT REQUIRES THE CALLERS DPL IN $DPLSV.                *
                        1457 *                                                                      *
                        1458 *    REQUIRED MODULES                                                  *
                        1459 *       @SYSEQ - SYSTEM SOFTWARE EQUATES.                              *
                        1460 *       @FXDEQ - SYSTEM NUCLEUS EQUATES.                               *
                        1461 *       @WKAEQ - SYSTEM WORKAREA EQUATES.                              *
                        1462 *       @CANEQ - COMMON CORE ADDRESS EQUATES.                          *
                        1463 *       @DIREQ - LIBRARY DIRECTORY EQUATES.                            *
                        1464 *       DL2CD  - DISK IOCS.                                            *
                        1465 *                                                                      *
                        1466 *    OTHER                                                             *
                        1467 *       NONE                                                           *
                        1468 ************************************************************************
    0C00                1469        ORG    $$KLD3
                        1470 *      HDR    #SPACK                    PROGRAM NAME
                        1471 ************************************************************************
                        1472 *  PROGRAM HEADER FOR DISK LOAD                                        *
                        1473 ************************************************************************
                        1474 *#SSPAC EQU   X'04CC'                    DISK ADDR OF #SPACK
                        1475 *#$$SPA EQU   X'0C00'                    CORE LOAD-ADDRESS OF #SPACK
                        1476 *#SISPA EQU   004                        SECTOR CNT OF #SPACK
    0C00                1477        ORG    #$$SPA                     CORE LOAD ADDRESS
    0C00                0C00 1478 $$$$$$ EQU    *                     FIRST LOCATION IN PROGRAM
    0C00 7BE2D7C1C3D2   0C05 1479        DC     CL6'#SPACK'           PROGRAM NAME
    0C06 20             0C06 1480        DC     IL1'032'              PROGRAM NUMBER OF #SPACK
                        0C07 1481 $SPACK EQU    *                     ENTRY POINT TO PROGRAM
                        1482 *** END OF EXPANSION ***
                        0700 1483 SPANBF EQU    $$KLD2                ADDR OF NULL BUFFER
                        0806 1484 SPACK2 EQU    $$KLD2+262            ENTRY ADDR OF OVERLAY
                        0004 1485 SPAPSC EQU    X'04'                 PASSWORD DIRCTY PHYSICAL ADDR
                        0030 1486 SPAE30 EQU    X'30'                 HEX CYL VALUE
    0C07 F2 87 2F       1487        J      SPACKU                    SKIP OVER MESSAGE

                        1489 *      MTEXT @@M110=@PRETR,PATCH=015
                        1490 ************************************************************************
                        1491 * PPL'S AND TEXT FOR MESSAGE                                           *
                        1492 ************************************************************************
    0C0A C0             0C0A 1493 @@M110 DC    AL1(@PRETR)           PRINT CONTROL FUNCTION
```

```
     0C0B 1C               0C0B 1494          DC    IL1'28'                    LENGTH OF MESSAGE
     0C0C 0C0E             0C0D 1495          DC    AL(@CADDR)(@@T110)         ADDR OF MESSAGE


                          0C0E 1497 @@T110 EQU   *                            LEFT BYTE OF MESSAGE
     0C0E D3C9C2D9C1D9E840 0C29 1498          DC    CL028'LIBRARY AREA IS BEING PACKED'
                                1499 *
                                1500 * PATCH AREA FOR MESSAGES
                                1501 *
     0C2A                 0C38 1502 $$$001 DS    CL015                      MSG EXPANSION PATCH AREA
                                1503 *** END OF EXPANSION ***
                                1504 *SPACKU ENTER BASE=SPAPDT
                          0CFF 1505          USING SPAPDT,@BR               BASE ADDRESS SPECIFICATION
                          0C39 1506 SPACKU EQU   *                          MODULE ENTRY POINT
     0C39 C2 01 0CFF           1507          LA    SPAPDT,@BR                LOAD BASE REGISTER
                                1508 *** END OF EXPANSION ***
                                1509 *********************************************************************
                                1510 *          PRINT MESSAGE THAT LIBRARY AREA IS BEING PACKED AND THEN *
                                1511 *          WAIT FOR PRINTER READY BEFORE LOADING OVERLAY OVER THE   *
                                1512 *          I/O ROUTINES.                                            *
                                1513 *********************************************************************
                                1514 *        SPRNT SPAPP1                    CALL TO RETURN TO CARRIER
     0C3D C0 87 0465           1515          B     $SPRNT                    PRINT ON SYSTEM PRINTER
     0C41 0E3A            0C42 1516          DC    AL2(SPAPP1)               PPL ADDRESS
                                1517 *** END OF EXPANSION ***
     0C43 4C 01 73 06FF        1518          MVC   SPAPL1+@DSAD(@DADDR,@BR),$$FLIB
     0C48 5E 01 79 73          1519          ALC   SPAPL2+@DSAD(@DADDR,@BR),SPAPL1+@DSAD(,@BR)  DADDR PSWD
                                1520 *        DISK  SPAPL2                    READ PASSWORD DIRCTY
     0C4C C0 87 0025           1521          B     $DISKN                    PERFORM PHYSICAL DISK OP
     0C50 0D76            0C51 1522          DC    AL2(SPAPL2)               DPL ADDRESS
                                1523 *** END OF EXPANSION ***
                                1524 *        SPRNT @@M110
     0C52 C0 87 0465           1525          B     $SPRNT                    PRINT ON SYSTEM PRINTER
     0C56 0C0A            0C57 1526          DC    AL2(@@M110)               PPL ADDRESS
                                1527 *** END OF EXPANSION ***
                                1528 *        SPRNT SPAM                      CALL TO RETURN TO CARRIER
     0C58 C0 87 0465           1529          B     $SPRNT                    PRINT ON SYSTEM PRINTER
     0C5C 0E3A            0C5D 1530          DC    AL2(SPAPP1)               PPL ADDRESS
                                1531 *** END OF EXPANSION ***
                                1532 *        SPRNT $WAITF                    WAIT TO OVERLAY I/O ROUTINES
     0C5E C0 87 0465           1533          B     $SPRNT                    PRINT ON SYSTEM PRINTER
     0C62 057F            0C63 1534          DC    AL2($WAITF)               PPL ADDRESS
                                1535 *** END OF EXPANSION ***
                                1536 *        DISK  SPAPL1                    READ IN NULL DIRCTY
     0C64 C0 87 0025           1537          B     $DISKN                    PERFORM PHYSICAL DISK OP
     0C68 0D70            0C69 1538          DC    AL2(SPAPL1)               DPL ADDRESS
                                1539 *** END OF EXPANSION ***
     0C6A 35 02 03C7           1540          L     $XRSAV,@XR                PICKUP USERS XR
                                1541 *        LOADR SPAPL3                     LOAD OVERLAY
     0C6E C0 87 051A           1542          B     $LOADR                    LOAD PROGRAM AND RETURN
     0C72 0E34            0C73 1543          DC    AL2(SPAPL3)               DPL ADDRESS
                                1544 *** END OF EXPANSION ***


                                1546 *********************************************************************
                                1547 *          TEST IF NULL COUNT IS GREATER THAN ONE IF NOT NO PACK.   *
                                1548 *********************************************************************
     0C74 3D 01 0700           1549          CLI   SPANBF+##DNHC,@B1         TEST IF COUNT OVER 1
```

```
     0C78 F2 84 09              1550         JH    SPA005                      JUMP YES
                               1551 *       DISK  $WAITF                       WAIT FOR OVERLAY TO RETURN
     0C7B C0 87 0025           1552         B     $DISKN                      PERFORM PHYSICAL DISK OP
     0C7F 057F        0C80     1553         DC    AL2($WAITF)                 DPI ADDRESS
                               1554 *** END OF EXPANSION ***
     0C81 F2 87 77             1555         J     SPA035                      RETURN THROUGH SPACK2

                               1557 ************************************************************************
                               1558 *            INITIALIZE POINTER TO NULL DIRCTY AND ENTRY COUNTERS    *
                               1559 ************************************************************************
     0C84 C2 01 0CFF           1560 SPA005 LA    SPAPDT,@BR                  RESTORE BASE REGISTER
     0C88 C2 02 0700           1561        LA    SPANBF,@XR                  POINTER TO NULL DIRCTY
     0C8C 6C 00 62 00          1562        MVC   SPANCT(1,@BR),##DNHC(,@XR)  NULL ENTRY COUNT
     0C90 6C 00 54 01          1563        MVC   SPACYL(1,@BR),##DNHY(,@XR)  LIBR CYL COUNT
     0C94 E2 02 04             1564        LA    ##LNH(,@XR),@XR             BUMP TO FIRST ENTRY
     0C97 AF 01 05 05          1565        SLC   ##DNER(##LNEZ,@XR),##DNER(,@XR)   CLEAR RESERVE AREA
                               1566 ************************************************************************
                               1567 *            BUILD THE UPDATE TABLE AND PLACE THE SUM OF PREVIOUS MULL
                               1568 *            SECTORS IN RESERVE FIELD OF CURRENT
                               1569 ************************************************************************
     0C9B 5F 00 62 70          1570 SPA010 SLC   SPANCT(1,@BR),SPAC01(,@BR)  DECR ENTRY COUNT
     0C9F F2 81 0F             1571        JE    SPA020
     0CA2 AC 01 0B 05          1572        MVC   ##LNE+##DNER(##LNEZ,@XR),##DNER(,@XR)   SUM TO NEXT ENTRY
     0CA6 AE 01 0B 03          1573        ALC   ##LNE+##DNER(##LNEZ,@XR),##DNEF(,@XR)   SUM + COUNT
     0CAA E2 02 06             1574        LA    ##LNE(,@XR),@XR             BUMP ENTRY POINTER
     0CAD C0 87 0C9B           1575        B     SPA010                      BACK TO GET NEXT ENTRY

                               1577 ************************************************************************
                               1578 *            BUILD AN ADDITIONAL NULL ENTRY TO DEFINE THE END OF THE  *
                               1579 *            LIBRARY. THE ENTRY CONTAINS THE ADDRESS OF THE CYLINDER  *
                               1580 *            FOLLOWING THE LIBRARY AND THE TOTAL COUNT OF NULL SCTRS  *
                               1581 *            IN THE LIBRARY.                                          *
                               1582 ************************************************************************
     0CB1 AC 01 0B 05          1583 SPA020 MVC   ##LNE+##DNER(##LNEZ,@XR),##DNER(,@XR)   MOVE TOTAL
     0CB5 AE 01 0B 03          1584        ALC   ##LNE+##DNER(##LNEZ,@XR),##DNEF(,@XR)   ADD COUNT
     0CB9 9C 01 07 55          1585        MVC   ##LNE+##DNEA(@CADDR,@XR),SPACYL+1(,@BR)   LIBR END DADDR
                               1586 ************************************************************************
                               1587 *            MASK CONSOLE INTERRUPTS AND READ IN THE 1ST USER DIRCTY  *
                               1588 *            FOR THE SPECIFIED PASSWORD                               *
                               1589 ************************************************************************
     0CBD C2 02 03DC           1590        LA    $USRDR,@XR                  MODIFY USER DIRCTY BLK POINTER
     0CC1 D0 87 00             1591        B     SPAPDT(,@BR)                UPDATE FIRST BLOCK POINTER

     0CC4 C2 02 0F3B           1593        LA    SPAEND,@XR                  POINTER TO PASSWORD DIRCTY
     0CC8 6C 00 60 00          1594        MVC   SPACNT(,@BR),##DPHC(1,@XR)   ENTRY COUNT
     0CCC E2 02 04             1595        LA    ##LPH(,@XR),@XR             BUMP TO FIRST ENTRY
     0CCF 1C 01 0F3A 73        1596        MVC   DL2RAD(@DADDR),SPAPL1+@DSAD(,@BR)  LIBR BASE ADDR
     0CD4 6C 01 7F 09          1597 SPA030 MVC   SPAPL4+@DSAD(@DADDR,@BR),##DPEA(,@XR)  DIRCTY DADDR
                               1598 *       DSKL2 SPAPL4                      READ IN USER BLOCK
     0CD8 C0 87 0EA2           1599        B     DL2ICS                      PERFORM RELATIVE DISK OP
     0CDC 0D7C        0CDD     1600        DC    AL2(SPAPL4)                 DPL ADDRESS
                               1601 *** END OF EXPANSION ***
     0CDE D0 87 89             1602        B     SPADUP(,@BR)                GO UPDATE USER DIRCTY
     0CE1 E2 02 09             1603        LA    ##DPEA(,@XR),@XR            POINT TO DADDR FOR UPDATE
     0CE4 D0 87 00             1604        B     SPAPDT(,@BR)                GO UPDATE PASSWORD ENTRY
     0CE7 E2 02 03             1605        LA    ##LPE-##DPEA(,@XR),@XR      BUMP TO NEXT ENTRY
```

```
     0CEA 5F 00 60 70            1606          SLC   SPACNT(,@BR),SPAC01(1,@BR)  DECR PASSWORD ENTRY COUNT
     0CEE C0 01 0CD4             1607          BNE   SPA030                      BACK FOR NEXT PASSWORD
     0CF2 7C 02 77               1608          MVI   SPAPL2(,@BR),@DPUT          WRITE BACK
                                 1609 *        DISK  SPAPL2                      WRITE PASSWORD DIRCTY BACK
     0CF5 C0 87 0025             1610          B     $DISKN                      PERFORM PHYSICAL DISK OP
     0CF9 0D76           0CFA    1611          DC    AL2(SPAPL2)                 DPL ADDRESS
                                 1612 *** END OF EXPANSION ***
     0CFB C0 87 080D             1613 SPA035 B SPACK2+@HDRLN                     GO COMPRESS LIBRARY

                                 1615 ********************************************************************
                                 1616 *          SEARCH THE NULL DIRCTY FOR AN ENTRY GREATER THAN THE    *
                                 1617 *          DADDR OF THE ARGUMENT POINTED TO BY @XR. CONVERT THE     *
                                 1618 *          NULL SUM TO A RDADDR AND SUBTRACT IT FROM THE ARGUMENT   *
                                 1619 ********************************************************************
     0CFF 74 08 55               1620 SPAPDT ST SPAP30+@OP1(,@BR),@ARR     SAVE RETURN
     0D02 4C 00 57 0700          1621          MVC   SPAPCT(1,@BR),SPANBF+##DNHC  GET NULL ENTRY COUNT
     0D07 5C 01 10 66            1622          MVC   SPAP20+@DOP2(,@BR),SPAANE(@CADDR,@BR)   ENTRY CADDR
     0D0B 8D 01 00 0000          1623 SPAP20 CLC  @ZERO(@DADDR,@XR),*-*     ARGUEMENT TO ENTRY
     0D10 D0 82 1F               1624          BL    SPAP40(,@BR)               NOT LOW GO MODIFY
     0D13 5E 01 10 68            1625          ALC   SPAP20+@DOP2(,@BR),SPALNE(@CADDR,@BR)  NEXT ENTRY
     0D17 5F 00 57 70            1626          SLC   SPAPCT(1,@BR),SPAC01(,@BR)  DECR ENTRY COUNT
     0D1B D0 01 0C               1627          BNE   SPAP20(,@BR)               BACK FOR NEXT ENTRY

                                 1629 ********************************************************************
                                 1630 *          NO NULL ENTRIES BEHIND THE ARGUMENT. GET TOTAL OF NULL  *
                                 1631 *          SECTORS FROM THE ADDITIONAL ENTRY WHICH WAS MADE.        *
                                 1632 ********************************************************************
     0D1E 7C 00 3E               1633 SPAP40 MVI  SPAP50+@Q(,@BR),@ZERO     CONVERT TOTAL TO RDADDR
     0D21 5C 01 2E 10            1634          MVC   SPAP45+@DOP2(@CADDR,@BR),SPAP20+@DOP2(,@BR)  NULL ENTRY
     0D25 5E 01 2E 6A            1635          ALC   SPAP45+@DOP2(@CADDR,@BR),SPALDR(,@BR)  BUMP TO SUM
     0D29 4C 01 57 0000          1636 SPAP45 MVC  SPAPCT(@DADDR,@BR),*-*     GET NULL ENTRY TOTAL
     0D2E 5F 01 57 64            1637 SPAP46 SLC  SPAPCT(@DADDR,@BR),SPAC48(,@BR)  DECR BY A CYL
     0D32 D0 82 3D               1638          BL    SPAP50(,@BR)               GONE NEGATIVE
     0D35 5E 00 3E 70            1639          ALC   SPAP50+@Q(1,@BR),SPAC01(,@BR)  BUMP CYL. COUNT
     0D39 D0 87 2F               1640          B     SPAP46(,@BR)               BACK FOR NEXT 1/4CYL
     0D3C 7C 00 56               1641 SPAP50 MVI  SPAPCT-1(,@BR),*-*     PLUG IN CYL
     0D3F 5E 00 57 64            1642          ALC   SPAPCT(1,@BR),SPAC48(,@BR)  RESTORE SECTOR VALUE
     0D43 9F 01 00 57            1643          SLC   @ZERO(@DADDR,@XR),SPAPCT(,@BR)  DECR FROM ARGUEMENT
     0D47 BD 30 00               1644          CLI   @ZERO(,@XR),SPAE30         CHECK IF NEGATIVE
     0D4A D0 82 52               1645          BL    SPAP30(,@BR)               NO SO RETURN
     0D4D 9E 00 00 64            1646          ALC   @ZERO(1,@XR),SPAC48(,@BR)  RESTORE POSITIVE
     0D51 C0 87 0000             1647 SPAP30 B *-*                         RETURN FROM SPAPDT

                          0D53   1649 SPACYL EQU  SPAP30+@D1               2 BYTE WORKAREA.FOR LIBR END
     0D55                 0D56   1650 SPAPCT DS   CL2                      NULL ENTRY COUNT WORK AREA
     0D57                 0D57   1651 SPADCT DS   CL1                      FILENAME ENTRY COUNT
     0D58                 0D59   1652 SPAAB1 DS   CL2                      PRIMARY BUFFER CADDR
     0D5A                 0D5B   1653 SPAAB2 DS   CL2                      SECONDARY BUFFER CADDR
     0D5C                 0D5D   1654 SPAABF DS   CL2                      ACTIVE BUFFER CADDR
     0D5E                 0D5F   1655 SPACNT DS   CL2                      PASSWORD COUNT
     0D60                 0D61   1656 SPANCT DS   CL2                      SAVE AREA FOR NULL ENTRY
     0D62 0030            0D63   1657 SPAC48 DC   IL2'48'                  CYLINDER VALVE
     0D64 0705            0D65   1658 SPAANE DC   AL2(SPANBF+##LNH+##DNEA) CADDR OF FIRST ENTRY
     0D66 0006            0D67   1659 SPALNE DC   AL2(##LNE)               LENGTH OF ENTRY
     0D68 0004            0D69   1660 SPALDR DC   AL2(##DNER-##DNEA)       VALUE OF DISP TO NULL TOTAL
     0D6A 133B            0D6B   1661 SPABB1 DC   AL2(SPABF1)              ADDR OF BUFFER 1
```

```
        #SPACK - PACK THE LIBRARY


ERR LOC   OBJECT CODE     ADDR STMT SOURCE STATEMENT          VER 15, MOD 00  22/07/23  PAGE   8

     0D6C 153B            0D6D 1662 SPABB2 DC    AL2(SPABF2)              ADDR OF BUFFER 2
     0D6E 0001            0D6F 1663 SPAC01 DC    IL2'1'                   VALUE TO DECR COUNTS
                              1664 *
                              1665 *SPAPL1 DPL    FUNC=@DGET,DADDR=@ZERO,CNT=##LN,CADDR=SPANBF
                         0D70 1666 SPAPL1 EQU    *                        DISK PARAMETER LIST
     0D70 01             0D70 1667        DC     AL1(@DGET)               REQUESTED FUNCTION
     0D71 0000           0D72 1668        DC     AL2(@ZERO)               DISK ADDRESS
     0D73 01             0D73 1669        DC     AL1(##LN)                SECTOR COUNT
     0D74 0700           0D75 1670        DC     AL2(SPANBF)              BUFFER ADDRESS
                              1671 *** END OF EXPANSION ***
                              1672 *SPAPL2 DPL    FUNC=@DGET,DADDR=SPAPSC,CNT=##LP,CADDR=SPAEND
                         0D76 1673 SPAPL2 EQU    *                        DISK PARAMETER LIST
     0D76 01             0D76 1674        DC     AL1(@DGET)               REQUESTED FUNCTION
     0D77 0004           0D78 1675        DC     AL2(SPAPSC)              DISK ADDRESS
     0D79 04             0D79 1676        DC     AL1(##LP)                SECTOR COUNT
     0D7A 0F3B           0D7B 1677        DC     AL2(SPAEND)              BUFFER ADDRESS
                              1678 *** END OF EXPANSION ***
                              1679 *SPAPL4 DPL    FUNC=@DGET,DADDR=*-*,CNT=##LU,CADDR=SPABF1
                         0D7C 1680 SPAPL4 EQU    *                        DISK PARAMETER LIST
     0D7C 01             0D7C 1681        DC     AL1(@DGET)               REQUESTED FUNCTION
     0D7D 0000           0D7E 1682        DC     AL2(*-*)                 DISK ADDRESS
     0D7F 02             0D7F 1683        DC     AL1(##LU)                SECTOR COUNT
     0D80 133B           0D81 1684        DC     AL2(SPABF1)              BUFFER ADDRESS
                              1685 *** END OF EXPANSION ***
                              1686 *          DPL TO READ AND WRITE THE USER DIRCTY
                              1687 *SPADPL DPL    FUNC=*-*,DADDR=*-*,CNT=##LU,CADDR=*-*
                         0D82 1688 SPADPL EQU    *                        DISK PARAMETER LIST
     0D82 00             0D82 1689        DC     AL1(*-*)                 REQUESTED FUNCTION
     0D83 0000           0D84 1690        DC     AL2(*-*)                 DISK ADDRESS
     0D85 02             0D85 1691        DC     AL1(##LU)                SECTOR COUNT
     0D86 0000           0D87 1692        DC     AL2(*-*)                 BUFFER ADDRESS
                              1693 *** END OF EXPANSION ***

                              1695 *************************************************************************
                              1696 *            UPDATE THE USER DIRCTY BLOCKS.                             *
                              1697 *************************************************************************
     0D88 34 02 0E2F      1698 SPADUP ST    SPAD90+@OP1,@XR          SAVE INDEX
     0D8C 34 08 0E33      1699        ST     SPAD95+@OP1,@ARR         SAVE RETURN
     0D90 5C 01 5A 6C     1700        MVC    SPAAB1(@CADDR,@BR),SPABB1(,@BR)  PRIMARY BUFFER CADDR
     0D94 5C 01 5C 6E     1701        MVC    SPAAB2(@CADDR,@BR),SPABB2(,@BR)  SECONDARY BUFFER
     0D98 5C 01 5E 5A     1702        MVC    SPAABF(@CADDR,@BR),SPAAB1(,@BR)  ACTIVE BUFFER
                              1703 *SPA020 DISK  $WAITF               WAIT FOR FIRST BLOCK
     0D9C C0 87 0025      1704 SPAD20 B     $DISKN                   PERFORM PHYSICAL DISK OP
     0DA0 057F            0DA1 1705        DC     AL2($WAITF)              DPL ADDRESS
                              1706 *** END OF EXPANSION ***
     0DA2 3C 87 0E0F      1707        MVI    SPAD55+@Q,@UCB           LINK SWITCH OFF
     0DA6 75 02 5E        1708        L      SPAABF(,@BR),@XR         POINTER TO ACTIVE BUFFER
     0DA9 9D 01 03 70     1709        CLC    ##DUHB(@DADDR,@XR),SPAC01(,@BR)  TEST IF LINKED
     0DAD F2 82 15        1710        JL     SPAD30                   NOT LINKED BRANCH
     0DB0 5C 01 88 5C     1711        MVC    SPADPL+@DBFR2(@CADDR,@BR),SPAAB2(,@BR)  SECONDARY BUFFER
     0DB4 6C 01 85 03     1712        MVC    SPADPL+@DSAD(@DADDR,@BR),##DUHB(,@XR)  LINK DIRCTY DADDR
     0DB8 7C 01 83        1713        MVI    SPADPL(,@BR),@DGET       OP CODE TO READ IN DPL
                              1714 *      DSKL2 SPADPL                 CALL TO START IN NEXT DIRCTY
     0DBB C0 87 0EA2      1715        B      DL2ICS                   PERFORM RELATIVE DISK OP
     0DBF 0D82            0DC0 1716        DC     AL2(SPADPL)              DPL ADDRESS
                              1717 *** END OF EXPANSION ***
```

```
      #SPACK - PACK THE LIBRARY


ERR LOC   OBJECT CODE      ADDR STMT SOURCE STATEMENT          VER 15, MOD 00  22/07/23  PAGE    9

    0DC1 3C 80 0E0F            1718          MVI   SPAD55+@Q,@NOP          SET SWITCH LINKED ON
    0DC5 6C 00 58 04           1719 SPAD30 MVC   SPADCT(1,@BR),##DUHC(,@XR)  GET ENTRY COUNT
    0DC9 6C 01 85 01           1720          MVC   SPADPL+@DSAD(@DADDR,@BR),##DUHA(,@XR)  SAVE BLK DADDR
    0DCD E2 02 01              1721          LA    ##DUHA(,@XR),@XR         BUMP TO HEADER DADDR
    0DD0 D0 87 00              1722          B     SPAPDT(,@BR)            UPDATE HEADER DADDR
    0DD3 3D 00 0D57            1723          CLI   SPADCT,@ZERO            TEST IF DIRCTY COUNT IS ZERO
    0DD7 F2 01 10              1724          JNE   SPAD33                  NO, GO TEST IF LINKED      V1M3
    0DDA 3D 80 0E0F            1725          CLI   SPAD55+@Q,@NOP          IF UDB CONTAINING 0 ENTRIES V1M3
    0DDE F2 01 20              1726          JNE   SPAD40                  * IS NOT LINKED, GO WRITE   V1M3
    0DE1 E2 02 02              1727          LA    ##DUHB-##DUHA(,@XR),@XR  ELSE, POINT XR TO LINK ADDR V1M3
    0DE4 D0 87 00              1728          B     SPAPDT(,@BR)            UPDATE LINK DISK ADDR       V1M3
    0DE7 F2 87 17              1729          J     SPAD40                  GO WRITE MODIFIED UDB       V1M3

    0DEA 3D 80 0E0F            1731 SPAD33 CLI   SPAD55+@Q,@NOP          WAS DIRCTY LINKED
    0DEE F2 81 2F              1732          JE    SPAD60                  JUMP IF LINKED
    0DF1 E2 02 14              1733          LA    ##LUH+##DUEA-##DUHA(,@XR),@XR  BUMP TO FIRST ENTRY DADDR

    0DF4 D0 87 00              1735 SPAD35 B     SPAPDT(,@BR)            UPDATE ENTRY DADDR
    0DF7 E2 02 32              1736          LA    ##LUE(,@XR),@XR         BUMP TO NEXT ENTRY
    0DFA 5F 00 58 70           1737          SLC   SPADCT(1,@BR),SPAC01(,@BR)  DECR ENTRY COUNT
    0DFE D0 01 F5              1738          BNE   SPAD35(,@BR)            BACK FOR NEXT ENTRY

    0E01 7C 02 83              1740 SPAD40 MVI   SPADPL(,@BR),@DPUT      SET WRITE OP CODE
    0E04 5C 01 88 5E           1741          MVC   SPADPL+@DBFR2(@CADDR,@BR),SPAABF(,@BR)  ACTIVE BUFFER
                              1742 *      DSKL2 SPADPL                   WRITE DIRCTY BACK TO DISK
    0E08 C0 87 0EA2            1743          B     DL2ICS                  PERFORM RELATIVE DISK OP
    0E0C 0D82        0E0D     1744          DC    AL2(SPADPL)             DPL ADDRESS
                              1745 *** END OF EXPANSION ***

                              1747 *******************************************************************
                              1748 *         IF DIRCTY WAS LINKED SWITCH BUFFERS AND PROCESS THE     *
                              1749 *         NEXT BLOCK.                                             *
                              1750 *******************************************************************
    0E0E F2 00 1B              1751 SPAD55 JC    SPAD90,*-*              LINK SWITCH
    0E11 5C 01 5A 5C           1752          MVC   SPAAB1(@CADDR,@BR),SPAAB2(,@BR)  SWITCH BUFFERS
    0E15 5C 01 5C 5E           1753          MVC   SPAAB2(@CADDR,@BR),SPAABF(,@BR)
    0E19 5C 01 5E 5A           1754          MVC   SPAABF(@CADDR,@BR),SPAAB1(,@BR)
    0E1D D0 87 9D              1755          B     SPAD20(,@BR)            PROCESS NEXT DIRCTY

    0E20 E2 02 02              1757 SPAD60 LA    ##DUHB-##DUHA(,@XR),@XR  BUMP TO LINK DADDR
    0E23 D0 87 00              1758          B     SPAPDT(,@BR)            GO MODIFY LINK DADDR
    0E26 E2 02 12              1759          LA    ##LUH-##DUHB+##DUEA(,@XR),@XR  FIRST ENTRY DADDR
    0E29 D0 87 F5              1760          B     SPAD35(,@BR)            BACK TO UPDATE ENTRIES
    0E2C C2 02 0000            1761 SPAD90 LA    *-*,@XR                 RESTORE XR
    0E30 C0 87 0000            1762 SPAD95 B     *-*                     RETURN
```

```
      #SPACK - PACK THE LIBRARY


ERR LOC   OBJECT CODE     ADDR STMT SOURCE STATEMENT           VER 15, MOD 00  22/07/23  PAGE  10


                          1764 *SPAPL3 DPL    FUNC=@DGET,DADDR=#$SPOV,CNT=#$@SPO,CADDR=SPACK2
                     0E34 1765 SPAPL3 EQU    *                          DISK PARAMETER LIST
     0E34 01         0E34 1766        DC     AL1(@DGET)                 REQUESTED FUNCTION
     0E35 04DC       0E36 1767        DC     AL2(#$SPOV)                DISK ADDRESS
     0E37 03         0E37 1768        DC     AL1(#$@SPO)                SECTOR COUNT
     0E38 0806       0E39 1769        DC     AL2(SPACK2)                BUFFER ADDRESS
                          1770 *** END OF EXPANSION ***
                          1771 *SPAPP1 PPL    FUNC=@RETRN,CNT=@RTRNC
                     0E3A 1772 SPAPP1 EQU    *                          PPL ADDRESS
     0E3A 80         0E3A 1773        DC     AL1(@RETRN)                FUNCTION REQUESTED
     0E3B 80         0E3B 1774        DC     AL1(@RTRNC)                PRINT COUNT
     0E3C 0000       0E3D 1775        DC     AL2(*-*)                   DATA ADDRESS
                          1776 *** END OF EXPANSION ***
                          1777 *             END OF SPACKU CODING

                          1779 *        PATCH 100                      SPACKU PATCH AREA
                          1780 *********************************************************************
                          1781 *   PATCH AREA 1                                                    *
                          1782 *********************************************************************
     0E3E            0EA1 1783 $$$$$1 DS     CL100                      PATCH AREA FOR PROGRAM
                          1784 *********************************************************************
                          1785 *        $DL2P
```

DL2ICS - TWO TRACK LOGICAL IOCR

```
                        1787+*************************************************************************
                        1788+*  5703-XM1   COPYRIGHT IBM CORP 1970                              *
                        1789+*                REFER TO INSTRUCTIONS ON COPYRIGHT NOTICE. 120-2083  *
                        1790+*                                                                   *
                        1791+*************************************************************************
                        1792+*STATUS -                                                           *
                        1793+*    VERSION 1 MODIFICATION 0                                        *
                        1794+*                                                                   *
                        1795+*FUNCTION                                                           *
                        1796+*    * DL2ICS CONVERTS A RELATIVE DISK ADDRESS TO A PHYSICAL DISK    *
                        1797+*      ADDRESS AND COMBINES IT WITH A BASE ADDRESS PLACED IN DL2RAD  *
                        1798+*      BY THE CALLER.                                                *
                        1799+*    * THE RELATIVE DISK ADDRESS IS A TWO BYTE CYLINDER SECTOR COUNT *
                        1800+*      IN THE CALLERS DISK PARAMETER LIST (DPL).                     *
                        1801+*    * THE COUNT IS A CYLINDER SECTOR DISPLACEMENT FROM THE BASE     *
                        1802+*      ADDRESS PLACED IN DL2RAD                                      *
                        1803+*    * DL2ICS IS USED TO PROCESS DATA ON THE FIXED OR REMOVABLE DISK *
                        1804+*      ON EITHER DRIVE AND PROVIDES THE INTERFACE TO $DISKN.         *
                        1805+*    * THE PHYSICAL DISK ADDRESS IS PLACED IN A COPY OF THE USERS DPL *
                        1806+*      IN DL2ICS AND A CALL IS MADE TO $DISKN TO PERFORM THE REQUESTED *
                        1807+*      OPERATION.                                                    *
                        1808+*                                                                   *
                        1809+*ENTRY POINTS                                                       *
                        1810+*    * THE ENTRY IS DL2ICS. THE BASE REGISTER IS SAVED AND RESTORED  *
                        1811+*      ON RETURN. THE INDEX REGISTER IS NOT USED.                    *
                        1812+*    * THE FORMAT OF THE CALLING SEQUENCE IS AS FOLLOWS:             *
                        1813+*        B   DL2ICS                                                  *
                        1814+*        DC  AL2(PARMLT)                                             *
                        1815+*      WHERE PARMLT IS THE ADDR OF THE PARAMETER LIST TO BE PROCESSED. *
                        1816+*                                                                   *
                        1817+*INPUT                                                              *
                        1818+*    * THE INPUT IS A TWO BYTE BASE DISK ADDRESS PLACED IN           *
                        1819+*      DL2RAD AND A SIX BYTE DPL. THE SAME FORMAT AS THE DPL FOR     *
                        1820+*      $DISKN EXCEPT FOR THE DISK ADDRESS WHICH IS A RELATIVE CYLINDER *
                        1821+*      AND SECTOR DISPLACEMENT FROM THE BASE ADDRESS IN DL2RAD.      *
                        1822+*                                                                   *
                        1823+*OUTPUT                                                             *
                        1824+*    NONE.                                                          *
                        1825+*                                                                   *
                        1826+*EXTERNAL REFERENCES                                                *
                        1827+*    $DISKN - ENTRY TO PHYSICAL DISK ROUTINE IS THE SYSTEM NUCLEUS.  *
                        1828+*                                                                   *
                        1829+*EXITS, NORMAL                                                      *
                        1830+*    NORMAL - EXIT IS TO THE FIRST INSTRUCTION FOLLOWING THE POINTER *
                        1831+*    TO THE DPL. THE BASE REGISTER IS RESTORED. THE RETURN ADDRESS   *
                        1832+*    IS THE ADDRESS RECALL REGISTER (ARR) +2.                        *
                        1833+*                                                                   *
                        1834+*EXITS, ERROR                                                       *
                        1835+*    NONE                                                           *
                        1836+*                                                                   *
                        1837+*TABLES/WORK AREAS                                                  *
                        1838+*    * THE CONSTANTS AND WORK AREAS RESIDE AT THE END OF THE EXECUTABLE*
                        1839+*      CODE AND ARE REFERENCED BY A DISPLACEMENT RELATIVE TO THE VALUE *
                        1840+*      IN INDEX REGISTER 1 (@BR).                                    *
                        1841+*    * DL2SEC AND DL2SAD ARE EQUATED TO OPERAND LOCATIONS IN THE     *
                        1842+*      EXECUTABLE CODE TO ELIMINATE EXCESS WORKING STORAGE.          *
```

```
                              1843+*                                                          *
                              1844+*ATTRIBUTES                                                *
                              1845+*   * DL2ICS IS REUSABLE                                   *
                              1846+*                                                          *
                              1847+*CHARACTER CODE DEPENDENCY                                 *
                              1848+*    THE OPERATION OF THIS MODULE DOES NOT DEPEND UPON A PARTICULAR  *
                              1849+*     INTERNAL REPRESENTATION OF THE EXTERNAL CHARACTER SET.    *
                              1850+*                                                          *
                              1851+*NOTES                                                     *
                              1852+*    ERROR PROCEDURES                                      *
                              1853+*       NONE                                               *
                              1854+*                                                          *
                              1855+*    REGISTER USAGE                                        *
                              1856+*     INDEX REGISTER 1 (@BR) IS SAVED AND RESTORED. THIS REGISTER IS *
                              1857+*     USED DURING EXECUTION. REGISTER 2 (@BR) IS NOT USED.     *
                              1858+*                                                          *
                              1859+*    SAVED/RESTORED AREAS                                  *
                              1860+*       NONE                                               *
                              1861+*                                                          *
                              1862+*    MODIFICATION CONSIDERATIONS                           *
                              1863+*       NONE                                               *
                              1864+*                                                          *
                              1865+*    REQUIRED MODULES                                      *
                              1866+*     @SYSEQ - COMMON SYSTEM EQUATES.                      *
                              1867+*     @FXDEQ - SYSTEM NUCLEUS ADDRESSES AND INDICATORS VALUES EQUATES *
                              1868+*                                                          *
                              1869+*    OTHER                                                 *
                              1870+*     DL2ICS MAY BE USED TO CONVERT THE DISK ADDRESS ONLY AND NOT TO *
                              1871+*     CALL $DISKN IF THE USER MOVES A UCB CODE TO DL2SWH.     *
                              1872+*     THIS OPTION IS NOT STANDARD USAGE.                   *
                              1873+****************************************************************************
                         0EA6 1874+       USING DL2000,@BR               ESTABLISH ADDRESSABILITY
                              1875+*
                         0001 1876+DL2E01 EQU   X'01'                    FIELD LENGTH OF 1
                         0002 1877+DL2E02 EQU   X'02'                    FIELD LENGTH OF 2
                         0018 1878+DL2E18 EQU   X'18'                    HEX TRACK SECTOR COUNT
                         0060 1879+DL2E60 EQU   X'60'                    PHYSICAL SECTOR COUNT
                         0083 1880+DL2TSD EQU   X'83'                    MASK OFF TRACK SPINDLE DISK
                         007C 1881+DL2E7C EQU   X'7C'                    MASK OUT SECTOR COUNT
                         0EA2 1882+DL2ICS EQU   *                        ENTRY POINT
      0EA2 34 01 0F23         1883+       ST    DL2900+@OP1,@BR          SAVE OLD BASE
                         0EA6 1884+DL2000 EQU   *                        START PROCESSING
      0EA6 C2 01 0EA6         1885+       LA    DL2000,@BR               SET BASE ADORESS
      0EAA 76 08 8A           1886+       A     DL2C01(,@BR),@ARR        BUMP TO RIGHT BYTE OF ADDR
      0EAD 74 08 14           1887+       ST    DL2001+@DOP2(,@BR),@ARR  ADDR OF PARAM
      0EB0 76 08 8A           1888+       A     DL2C01(,@BR),@ARR        BUMP TO RETURN ADDR
      0EB3 74 08 81           1889+       ST    DL2910+@OP1(,@BR),@ARR   SAVE RETURN ADDR
                              1890+*
      0EB6 4C 01 1D 0000      1891+DL2001 MVC   DL2002+@DOP2(@DADDR,@BR),*-* SETUP ADDR OF DPL
      0EBB 5E 01 1D 8C        1892+       ALC   DL2002+@DOP2(@CADDR,@BR),DL2C05(,@BR) DUMP TO RIGHT END
      0EBF 4C 05 92 0000      1893+DL2002 MVC   DL2DPL(@DPLNG,@BR),*-*   MOVE USER DPL TO WORK AREA
      0EC4 5F 00 8F 86        1894+DL2005 SLC   DL2LST+@DSAD(DL2E01,@BR),DL2C48(,@BR) ADJUST SCTR/CYL
      0EC8 F2 82 07           1895+       JM    DL2006                   GO TO RESTORE TO CONTINUE
      0ECB 5E 00 8E 8A        1896+       ALC   DL2LST+@DCYL(DL2E01,@BR),DL2C01(,@BR) BUMP CYLINDER COUNT
      0ECF D0 87 1E           1897+       B     DL2005(,@BR)             BACK FOR NEXT CYLINDER
      0ED2 5E 00 8F 86        1898+DL2006 ALC   DL2LST+@DSAD(DL2E01,@BR),DL2C48(,@BR) RESTORE POSITIVE
```

```
                                 1899+*
                                 1900+*          GET THE LOGICAL SECTOR FROM THE DPL. THE NUMBER IS LEFT ADJUSTED
                                 1901+*          TO COMAE IT MTN THE POINTER ESTABLISHED PRIOR TO AN ENTRY.
     0ED6 5C 00 1D 8F           1902+          MVC    DL2SEC(DL2E01,@BR),DL2LST+@DSAD(,@BR) GET SECTOR NUMBER
     0EDA 7C 00 8F              1903+          MVI    DL2LST+@DSAD(,@BR),@ZERO  CLEAR SECTOR BYTE
                                 1904+*
                                 1905+*          MOVE THE RELATIVE START TO THE DFL
                                 1906+*
     0EDD 5E 01 8F 94           1907+          ALC    DL2LST+@DSAD(DL2E02,@BR),DL2RAD(,@BR) DL2RAD TO DPL
     0EE1 7D 18 1D              1908+          CLI    DL2SEC(,@BR),DL2E18       IS COUNT OVER A TRACK
     0EE4 F2 82 08              1909+          JL     DL2008                    NO GO CHANGE A PHYSICAL ADOR
     0EE7 5E 01 8F 85           1910+          ALC    DL2LST+@DSAD(DL2E02,@BR),DL2K80(,@BR) BUMP TRACK VALUE
     0EEB 5F 00 1D 88           1911+          SLC    DL2SEC(1,@BR),DL2K18(,@BR) DECR BY TRACK VALUE
     0EEF 5E 00 1D 1D           1912+DL2008 ALC    DL2SEC(1,@BR),DL2SEC(,@BR) SHIFT LEFT 1
     0EF3 5E 00 1D 1D           1913+          ALC    DL2SEC(1,@BR),DL2SEC(,@BR) SHIFT LEFT
     0EF7 5C 00 14 8F           1914+          MVC    DL2SAD(DL2E01,@BR),DL2LST+@DSAD(,@BR) GET SECTOR ADDRESS
                                 1915+*
                                 1916+*          ZERO OUT THE SECTOR COUNT AND LEAVE THE DISK. SPINDLE AND
                                 1917+*          TRACK BITS AS IS TO BE RE INSERTED AFTER THE SECTOR HAS BEEN
                                 1918+*          LOCATES.
                                 1919+*
     0EFB 7B 7C 8F              1920+          SBF    DL2LST+@DSAD(,@BR),DL2E7C TURN OFF
     0EFE 7B 83 14              1921+          SBF    DL2SAD(,@BR),DL2TSD       OFF TRACK SPINDLE DISK
     0F01 5E 00 14 1D           1922+          ALC    DL2SAD(DL2E01,@BR),DL2SEC(,@BR) COMBINE SECTOR COUNTS
     0F05 7D 60 14              1923+DL2010 CLI    DL2SAD(,@BR),DL2E60       TEST IF TRACK CROSSED
     0F08 F2 82 08              1924+          JL     DL2100
                                 1925+*
                                 1926+*          INCREMENT TRACK BIT. OVERFLOW INTO THE CYLINDER COUNT.
                                 1927+*
     0F0B 5E 01 8F 85           1928+          ALC    DL2LST+@DSAD(DL2E02,@BR),DL2K80(,@BR)
     0F0F 5F 00 14 83           1929+          SLC    DL2SAD(1,@BR),DL2K60(,@BR) DECR BY TRACK VALUE
                                 1930+*
     0F13 5E 00 8F 14           1931+DL2100 ALC    DL2LST+@DSAD(1,@BR),DL2SAD(,@BR) INSERT SECTOR COUNT
                                 1932+*
     0F17 F2 80 06              1933+DL2110 JC     DL2900,@NOP               CONVERSION SWITCH
                          0F18 1934+DL2SWH EQU    DL2110+@Q                 ADDR OF Q CODE FOR SWITCH
     0F1A C0 87 0025           1935+          B      $DISKN                    GO PROCESS I/O
     0F1E 0F33                 0F1F 1936+          DC     AL2(DL2LST)               ADDRESS OF DPL
     0F20 C2 01 0000           1937+DL2900 LA     *-*,@BR                   RESTORE CALLERS BASE
     0F24 C0 87 0000           1938+DL2910 B      *-*
                                 1939+******************************************************************
                                 1940+*        CONSTANTS
                                 1941+******************************************************************
     0F28 0060                 0F29 1942+DL2K60 DC     XL2'0060'                 SECTOR COUNT OF 24 LEFT ADJUSTD
     0F2A 0080                 0F2B 1943+DL2K80 DC     XL2'0080'                 BIT FOR INCREMENTING TRACK
     0F2C 30                   0F2C 1944+DL2C48 DC     IL1'48'                   CYLINDER VALUE FOR 1 DISK
     0F2D 0018                 0F2E 1945+DL2K18 DC     XL2'18'                   HEX SECTORS PER TRACK
     0F2F 0001                 0F30 1946+DL2C01 DC     IL2'1'                    CONSTANT FOR REGISTER MODE
     0F31 0005                 0F32 1947+DL2C05 DC     IL2'5'                    DISP TO RIGHT END OF DPL
                                 1948+******************************************************************
                                 1949+*        WORK AREA
                                 1950+******************************************************************
                          0F33 1951+DL2LST EQU    *                         LIST HIGH END
     0F33                      0F38 1952+DL2DPL DS     CL(@DPLNG)                WORKING DPL
                          0F35 1953+DL2PHY EQU    DL2LST+@DSAD              POINTER TO PHYSICAL DADDR
                          0EBA 1954+DL2SAD EQU    DL2001+@DOP2              SAVE SECTOR BYTE FROM DPI
```

```
     DL2ICS - TWO TRACK LOGICAL IOCR
```

```
                            0EC3 1955+DL2SEC EQU   DL2002+@DOP2                 WORKING SECTOR ADDRESS FIELD
    0F39                    0F3A 1956+DL2RAD DS    CL(@DADDR)                   USER RELATIVE STARTING ADDR.
                            0F3B 1957+DL2END EQU   *                            END OF DL2ICS
                                 1958+***                        END OF DL2ICS                          ***
                            0F3B 1959 SPAEND EQU   DL2END                       END OF CODING/PASSWORD BUFFER
                            133B 1960 SPABF1 EQU   DL2END+1024                  USER BLOCK 1
                            153B 1961 SPABF2 EQU   SPABF1+512                   USER BLOCK 2
                            FFFF 1962       END

TOTAL STATEMENTS IN ERROR IN THIS ASSEMBLY =      0
```

SYMBOL	LEN	VALUE	DEFN	REFERENCES					VER 15, MOD 00 22/07/23 PAGE 15
$$$$$$	001	0C00	1478						
$$$$$1	100	0EA1	1783						
$$$CMD	001	0020	0730						
$$$DAT	001	0040	0729						
$$$EPL	001	0091	0726						
$$$ERN	001	0080	0780						
$$$FUN	001	0010	0731						
$$$NLN	001	00A0	0776						
$$$STD	001	0081	0725						
$$$001	015	0C38	1502						
$$BNLN	001	0605	0706	0708					
$$CDBS	001	08C0	0756						
$$CDND	001	0666	0715						
$$CDRD	001	0890	0754	0756					
$$CKEY	001	0603	0704						
$$CKFF	001	0B3D	0736						
$$COFF	001	0B44	0735						
$$CSNS	001	209C	0765						
$$DATB	001	0BBF	0737						
$$EOSA	001	0AFE	0734						
$$ERSK	001	1C00	0775						
$$FITS	001	1D00	0783						
$$FLIB	001	06FF	0782	1518					
$$ILEN	001	0601	0700	0702	0706				
$$ILHD	001	0600	0698	0700					
$$INLN	001	0607	0713	0715	0717				
$$INND	001	06FA	0717						
$$KBDT	001	09E1	0724	0728					
$$KBSN	001	09E2	0728	0733					
$$KLD1	001	0600	0788						
$$KLD2	001	0700	0790	1483	1484				
$$KLD3	001	0C00	0792	1469					
$$LPOS	001	09EB	0733						
$$PCNT	001	07E9	0749						
$$PLYN	001	2004	0763						
$$PRES	001	0890	0722	0724	0734	0735	0736	0737	0754
$$PRFL	001	2143	0767						
$$PRNT	001	0707	0743	0744	0748	0749			
$$PRTN	001	0782	0744						
$$PSIO	001	07CE	0748						
$$PYCD	001	2200	0769						
$$PYMP	001	2000	0761	0763	0765	0767	0769		
$$SLIB	001	1C00	0778						
$$TPCD	001	0606	0708	0713					
$$UPAR	001	0602	0702	0704					
$$WSPB	001	1E00	0781						
$$XIND	001	06FF	0779	0782					
$$ZERO	001	0000	0223	0224	0226	0227	0228	0232	0761
$ABORT	001	0010	0336						
$BASIC	001	0080	0394						
$BIGCD	001	0080	0470						
$BLDPL	001	0579	0603	0605					
$BLNOE	001	0569	0593						
$BLOAD	001	0522	0584	0586	0589	0602	0603		
$BLRTN	001	0550	0592	0593					
$BRSAV	001	03C5	0281	0282					

```
$BSADR  001  0587 0608   0610
$BUFPT  001  03E3 0489   0490
$CABLD  001  04B4 0562   0563
$CAERK  001  0469 0539   0542
$CAERR  001  03CD 0287   0289
$CAIPL  001  049D 0558   0560
$CALLI  001  0008 0479
$CARDI  001  0001 0250
$CARPL  001  04A1 0560   0562
$CIENT  001  0483 0549   0550
$CIEXT  001  0480 0548   0549
$CIMSK  001  0476 0545   0548
$CISUS  001  0496 0553   0558
$CLBFR  001  0010 0437
$CMDKY  001  0008 0349
$CMODE  001  0002 0399
$CONFG  001  03DD 0462   0472
$CRPOS  001  03E2 0488   0489
$CRTAD  001  044D 0527   0528
$CRTAV  001  0002 0343
$CRTDN  001  0002 0367
$CRTIN  001  03D3 0364   0371
$CRTNO  001  0004 0346
$CRTPU  001  0004 0368
$CRTSP  001  0008 0369
$CRTUP  001  0001 0366
$CRUSH  001  0080 0475
$CSDPL  001  050E 0574   0575
$C0001  001  0464 0531   0537
$DATE   001  043A 0512   0513
$DBGUF  001  03E0 0474   0483
$DBLOK  001  0001 0424
$DFDET  001  03E8 0495   0496
$DISKN  001  0025 0226   1521  1537  1552  1610  1704  1935
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$DKSIZ  001  03D7 0449   0457  0498
$DK100  001  0001 0451
$DK200  001  0002 0452
$DK400  001  0004 0453
$DK600  001  0008 0454
$DK800  001  0010 0455
$DPLSV  001  0449 0523   0525
$DTNMB  001  0040 0270
$DTRDR  001  0040 0358
$ENDNU  001  0600 0617   0698  0722  0743  0779  0788  0790  0792
$ERDPL  001  046F 0542   0544
$ERFIL  001  0040 0297
$ERHRD  001  0004 0429
$ERKEY  001  0080 0301
$ERLOG  001  0345 0231
$ERMAD  001  0472 0544   0545
$ERPND  001  0004 0402
$ERRCT  001  03CF 0303
$ERRPG  001  03CE 0291
$ERSFL  001  0035 0296
$ERSTK  001  0030 0294
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                              CROSS REFERENCE

SYMBOL  LEN VALUE DEFN   REFERENCES                    VER 15, MOD 00  22/07/23  PAGE  17

$ER050  001  0363 0232
$ER1N2  001  0050 0299
$EXADR  001  0517 0577   0579
$EXCMD  001  0001 0331
$EXFTR  001  043B 0513   0518
$FCIND  001  0010 0409
$FDIND  001  0040 0416
$FEARR  001  0004 0224
$FEMAP  001  0588 0610   0611
$FILIB  001  03DA 0460   0461
$FITIN  001  0010 0385
$FUIND  001  0020 0414
$GUFIO  001  0583 0607   0608
$GUFIR  001  0008 0259
$HISTE  001  042E 0510   0511
$HIST1  001  0435 0511   0512
$HRDER  001  0020 0355
$INDR1  001  03D4 0371   0397
$INDR2  001  03D5 0397   0422
$INDR3  001  03D6 0422   0449
$INLNO  001  03CF 0289   0291  0303  0310
$INRPT  001  0020 0267
$IOIND  001  03D2 0338   0364
$IOPGS  001  0010 0478
$IOYES  001  0002 0253
$IPLDV  001  05FF 0614   0617
$IRKEY  001  0020 0477
$KEYBD  001  03E1 0483   0488
$KEYCD  001  03C3 0247   0281
$KEYDT  001  0040 0391
$KE090  001  00DE 0227
$KE130  001  01D5 0228
$KYBSY  001  0010 0264
$LDRTN  001  0571 0602
$LEVEL  001  03DF 0472   0474
$LIST   001  0002 0426
$LMRGN  001  03C1 0242   0244
$LNPTR  001  0080 0361
$LOADB  001  054A 0586
$LOADR  001  051A 0579   0582  1542
$LPRIO  001  03EA 0496
$LPROS  001  03E5 0491   0493
$LPRP3  001  03E4 0490   0491
$MOUNT  001  0020 0440
$MPDWN  001  0001 0340
$NEXTB  001  03E6 0493   0494
$NEXTL  001  03E7 0494   0495
$NOENB  001  0008 0432
$NOLST  001  0004 0256
$NUCBS  001  03C0 0239   0240
$NWRKF  001  0080 0445
$NWRKR  001  0040 0442
$PASWD  001  042D 0509   0510
$PAUSD  001  04BA 0563   0565
$PAUSE  001  0002 0333
$PGMDT  001  0020 0388
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SYMBOL  LEN VALUE DEFN   REFERENCES                        VER 15, MOD 00  22/07/23  PAGE  18

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$PKERT  001  0419 0507   0509
$PLST1  001  0454 0528   0529
$PLST2  001  045B 0529   0530
$PLST3  001  0462 0530   0531
$PRDEV  001  044B 0525   0527
$PRESN  001  0002 0376
$PROCI  001  0001 0373
$PRPOS  001  03C2 0244   0247
$PSDBR  001  04FA 0568
$PSDXR  001  04F2 0567   0568
$PSTEP  001  0004 0334
$PSTMT  001  0008 0335
$PTCH1  001  03F5 0498   0502
$READY  001  0080 0418
$REORD  001  0040 0476
$RLOAD  001  051E 0582   0584
$RMRGN  001  03C0 0240   0242
$RSTR   001  04D6 0565   0567  0569  0574
$RUNIT  001  0001 0312
$SFAID  001  050D 0570
$SPACK  001  0C07 1481
$SPRNT  001  0465 0537   0539  1515  1525  1529  1533
$SRTRN  001  04FE 0569   0570
$STEPT  001  0002 0313
$SWPCR  001  0511 0575   0577
$TABLN  001  03CB 0284   0287
$TFLOW  001  0008 0319
$TRACE  001  0004 0314
$TRALL  001  0010 0320
$TROVR  001  054E 0589   0592
$TRUNK  001  0080 0272
$TRVAR  001  0020 0321
$UNMSK  001  048D 0550   0553
$USRDR  001  03DC 0461   0462  1590
$VMDEF  001  0080 0325
$VOLF1  001  03FE 0504   0505
$VOLF2  001  040E 0506
$VOLID  001  03F6 0502   0503  0507
$VOLR1  001  03F6 0503   0504
$VOLR2  001  0406 0505   0506
$WAITF  001  057F 0605   0607  1534  1553  1705
$WFDEF  001  0040 0519
$WFLOK  001  0008 0382
$WFNME  001  0443 0518   0523
$WSIND  001  0004 0379
$XIND1  001  03D0 0310   0329
$XIND2  001  03D1 0329   0338
$XIND3  001  03D8 0457   0460
$XPREC  001  0040 0322
$XRSAV  001  03C7 0282   0284  1540
$ZTRAD  001  05A2 0611
$12K    001  0004 0466
$16CKY  001  0008 0468
$16K    001  0002 0465
$22IMP  001  0001 0463
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SYMBOL   LEN VALUE DEFN   REFERENCES                              VER 15, MOD 00  22/07/23  PAGE  19

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#$$#CN   001  0000 1337
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#$$#CS   001  0000 1189
#$$#DR   001  0000 0933
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#$$#FS   001  0000 1229
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#$$#PW   001  0000 1377
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#$$#SS   001  0000 1193
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#$$BOV   001  0800 1213
#$$DPR   001  0700 0949
#$$DRE   001  0889 0965
#$$DSP   001  2800 0985
#$$ECM   001  0C00 1245
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#$$INS   001  0600 0937
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#$$KCH   001  0C00 1069
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#$$KCT   001  0C00 1037
#$$KDE   001  0C00 1033
#$$KDI   001  0D00 1113
#$$KDN   001  0C00 1021
#$$KDO   001  0E00 1117
#$$KED   001  0C00 0957
#$$KEN   001  0C00 0961
#$$KEX   001  0C00 0981
#$$KGO   001  0C00 0953
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#$$KPA   001  0C00 0977
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#$$KSA	001	0C00	1053	
#$$KSE	001	0E00	1093	
#$$KSO	001	0C20	1145	
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#$$KSV	001	0980	1073	
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#$$KWI	001	0C00	1013	
#$$KWR	001	0C00	1005	
#$$LOA	001	0600	0945	
#$$MIP	001	0C00	1141	
#$$SDS	001	0C00	1253	
#$$SFF	001	0E00	1257	
#$$SFL	001	0F00	1249	
#$$SFO	001	1500	1221	
#$$SFS	001	0C00	1217	
#$$SPA	001	0C00	1057	1477
#$$SPO	001	0806	1061	
#$$SPS	001	0C00	1049	
#$$STR	001	1600	1225	
#$$TDC	001	1000	1029	
#$$TSY	001	1000	0989	
#$$TVK	001	0FC0	1165	
#$$UAL	001	0C00	1181	
#$$UAT	001	0900	1277	
#$$UCD	001	0900	1285	
#$$UCN	001	0C00	1269	
#$$UCP	001	0700	1273	
#$$UDE	001	0C00	1289	
#$$UDI	001	0C00	1293	
#$$UEX	001	0C00	1177	
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#$$UPA	001	0C00	1261	
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#$$ZL2	001	0F00	1353	
#$$ZL3	001	0C00	1357	

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#$@#PW  001  00C0 1378
#$@#RS  001  0030 1210
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#$@#SS  001  0001 1194
#$@#VU  001  0002 1154
#$@#0T  001  0018 0926
#$@#1T  001  0018 0930
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#$@DPR  001  0005 0950
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#$@DSP  001  0004 0986
#$@ECM  001  0006 1246
#$@EFK  001  0002 1266
#$@ERR  001  0003 1238
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#$@FIL  001  0009 1206
#$@FIS  001  0009 1202
#$@FML  001  0052 1334
#$@FMS  001  0052 1174
#$@GRA  001  0003 1098
#$@GUF  001  0010 1234
#$@INL  001  0010 1314
#$@INS  001  0010 0938
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#$@KCN  001  0010 1186
#$@KCT  001  0009 1038
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#$@KEN	001	0006	0962	
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#$@KGO	001	0002	0954	
#$@KHE	001	000C	1138	
#$@KKE	001	0006	1366	
#$@KLI	001	0011	1042	
#$@KLL	001	0001	1342	
#$@KLO	001	0008	1046	
#$@KME	001	0003	1026	
#$@KMO	001	0004	0970	
#$@KNA	001	0008	1082	
#$@KOV	001	0009	1002	
#$@KPA	001	0005	0978	
#$@KPO	001	000D	1066	
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#$@KRE	001	0002	1010	
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#$@KRM	001	0003	0974	
#$@KRN	001	0003	0994	
#$@KRO	001	000A	0998	
#$@KRS	001	000A	1322	
#$@KRU	001	0003	1018	
#$@KRV	001	000D	1110	
#$@KSA	001	0011	1054	
#$@KSE	001	0004	1094	
#$@KSO	001	0005	1146	
#$@KSS	001	000B	1078	
#$@KSV	001	0002	1074	
#$@KSY	001	000F	1086	
#$@KWI	001	0002	1014	
#$@KWR	001	0002	1006	
#$@LOA	001	0013	0946	
#$@MIP	001	000D	1142	
#$@SDS	001	0004	1254	
#$@SFF	001	0008	1258	
#$@SFL	001	0005	1250	
#$@SFO	001	0003	1222	
#$@SFS	001	0011	1218	
#$@SPA	001	0004	1058	
#$@SPO	001	0003	1062	1768
#$@SPS	001	0001	1050	
#$@STR	001	0002	1226	
#$@TDC	001	0003	1030	
#$@TSY	001	0003	0990	
#$@TVK	001	0001	1166	
#$@UAL	001	0011	1182	
#$@UAT	001	000C	1278	
#$@UCD	001	000B	1286	
#$@UCN	001	0009	1270	
#$@UCP	001	000F	1274	
#$@UDE	001	000E	1290	

SYMBOL	LEN	VALUE	DEFN	REFERENCES	VER 15, MOD 00 22/07/23 PAGE 23
#$@UDI	001	0008	1294		
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#$@UIN	001	000F	1282		
#$@UPA	001	0004	1262		
#$@UPO	001	0005	1330		
#$@UPT	001	0012	1326		
#$@VCR	001	0008	1122		
#$@VLO	001	0002	1158		
#$@VOD	001	0016	1162		
#$@VVM	001	0030	1170		
#$@VXI	001	0002	1150		
#$@ZDU	001	0008	1302		
#$@ZLB	001	0002	1346		
#$@ZLO	001	000C	1306		
#$@ZLV	001	0006	1362		
#$@ZL1	001	0007	1350		
#$@ZL2	001	000D	1354		
#$@ZL3	001	000A	1358		
#$@ZTR	001	0001	1298		
#$@ZUT	001	0014	1310		
#$BCOM	001	0080	0940		
#$BOLV	001	1780	1212		
#$DPRI	001	014C	0948		
#$DREA	001	0200	0964		
#$DSPL	001	0240	0984		
#$ECMA	001	1900	1244		
#$EFKE	001	1990	1264		
#$ERRP	001	18C0	1236		
#$EXMS	001	07D4	1124		
#$FILN	001	1724	1204		
#$FIST	001	1700	1200		
#$FMLN	001	1E00	1332		
#$FMST	001	0D00	1172		
#$GRAP	001	0690	1096		
#$GUFU	001	1880	1232		
#$INLN	001	1C84	1312		
#$INST	001	0020	0936		
#$KALL	001	06A4	1100		
#$KCAL	001	1CC4	1316		
#$KCHA	001	053C	1068		
#$KCND	001	0F80	1184		
#$KCTL	001	03BC	1036		
#$KDEL	001	035C	1032		
#$KDIS	001	0744	1112		
#$KDNT	001	0300	1020		
#$KDOV	001	0780	1116		
#$KEDI	001	0188	0956		
#$KENA	001	01C4	0960		
#$KEXT	001	0234	0980		
#$KGOS	001	0180	0952		
#$KHEL	001	0A30	1136		
#$KKEY	001	2100	1364		
#$KLIS	001	0400	1040		
#$KLLA	001	2004	1340		
#$KLOG	001	0444	1044		
#$KMER	001	030C	1024		

SYMBOL	LEN	VALUE	DEFN	REFERENCES
#$KMOU	001	0204	0968	
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#$KPAS	001	0220	0976	
#$KPOO	001	0508	1064	
#$KPRT	001	063C	1088	
#$KREA	001	02BC	1008	
#$KRLA	001	0700	1104	
#$KRMO	001	0214	0972	
#$KRNU	001	0280	0992	
#$KROV	001	028C	0996	
#$KRSU	001	1D24	1320	
#$KRUN	001	02CC	1016	
#$KRVL	001	0710	1108	
#$KSAV	001	0488	1052	
#$KSET	001	0680	1092	
#$KSOV	001	0AC8	1144	
#$KSSP	001	0594	1076	
#$KSVL	001	058C	1072	
#$KSYM	001	0600	1084	
#$KWID	001	02C4	1012	
#$KWRI	001	02B4	1004	
#$LOAD	001	0100	0944	
#$MIPP	001	0A80	1140	
#$SDSY	001	192C	1252	
#$SFFI	001	193C	1256	
#$SFLO	001	1918	1248	
#$SFOV	001	1844	1220	
#$SFSY	001	1800	1216	
#$SPAC	001	04CC	1056	
#$SPOV	001	04DC	1060	1767
#$SPSY	001	0484	1048	
#$STRO	001	1850	1224	
#$TDCK	001	0350	1028	
#$TSYK	001	0250	0988	
#$TVKB	001	0BAC	1164	
#$UALL	001	0F00	1180	
#$UATR	001	1A38	1276	
#$UCDI	001	1AD8	1284	
#$UCNF	001	19B8	1268	
#$UCPL	001	19DC	1272	
#$UDEL	001	1B24	1288	
#$UDIS	001	1B5C	1292	
#$UEXL	001	0EA8	1176	
#$UINI	001	1A88	1280	
#$UPAC	001	1980	1260	
#$UPOV	001	1D24	1328	
#$UPTF	001	1D5C	1324	
#$VCRT	001	07B4	1120	
#$VLOA	001	0B80	1156	
#$VODK	001	0B88	1160	
#$VVMR	001	0C00	1168	
#$VXIT	001	0B00	1148	
#$ZDUM	001	1BA4	1300	
#$ZLBM	001	2008	1344	
#$ZLOA	001	1BC4	1304	

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SYMBOL  LEN VALUE DEFN   REFERENCES                              VER 15, MOD 00  22/07/23  PAGE  25

#$ZLVR  001  20B0 1360
#$ZL1M  001  2010 1348
#$ZL2M  001  2030 1352
#$ZL3M  001  2088 1356
#$ZTRA  001  1B9C 1296
#$ZUTM  001  1C14 1308
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##DNEF  001  0003 0847   1573   1584
##DNER  001  0005 0848   1565   1565*  1572   1572*  1573*  1583   1583*  1584*  1660
##DNE1  001  0004 0845
##DNHC  001  0000 0842   1549   1562   1621
##DNHR  001  0003 0844
##DNHY  001  0001 0843   1563
##DPEA  001  0009 0820   1597   1603   1605
##DPEN  001  0007 0819
##DPER  001  000B 0821
##DPE1  001  0004 0818
##DPHC  001  0000 0816   1594
##DPHR  001  0003 0817
##DUEA  001  0009 0831   1733   1759
##DUED  001  0012 0836
##DUEF  001  000B 0832
##DUEH  001  002B 0837
##DUEI  001  000C 0833
##DUEL  001  000F 0835
##DUEN  001  0007 0830
##DUER  001  0031 0838
##DUES  001  000D 0834
##DUE1  001  000C 0829
##DUHA  001  0001 0825   1720   1721   1727   1733   1757
##DUHB  001  0003 0826   1709   1712   1727   1757
##DUHC  001  0004 0827   1719
##DUHR  001  000B 0828   1759
##LAAA  001  0002 0857
##LAHC  001  0001 0856
##LN    001  0001 0885   1669
##LNE   001  0006 0891   1572*  1573*  1574   1583*  1584*  1585*  1659
##LNEF  001  0002 0889
##LNEZ  001  0002 0890   1565   1572   1573   1583   1584
##LNH   001  0004 0888   1564   1658
##LNHY  001  0001 0886
##LNHZ  001  0002 0887
##LP    001  0004 0861   1676
##LPE   001  000C 0866   1605
##LPEN  001  0008 0863
##LPEZ  001  0002 0864
##LPH   001  0004 0865   1595
##LPHZ  001  0003 0862
##LU    001  0002 0870   1683   1691
##LUE   001  0032 0881   1736
##LUED  001  0003 0878
##LUEF  001  0002 0874
##LUEH  001  0019 0879
##LUEI  001  0001 0875
##LUEL  001  0002 0877
##LUEN  001  0008 0873
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##LUES  001  0001 0876
##LUEZ  001  0006 0880
##LUH   001  000C 0872   1733   1759
##LUHZ  001  0007 0871
##MNHM  001  002A 0914
##MPHM  001  0055 0899
##MUEG  001  0020 0906
##MUEK  001  0040 0905
##MUEO  001  0004 0909
##MUEP  001  0080 0904
##MUER  001  0008 0908
##MUEV  001  0002 0910
##MUEX  001  0010 0907
##MUHM  001  000A 0903
##RN    001  0000 0805
##RP    001  0001 0806
##R1    001  0007 0808
##R2    001  0005 0807
#@#BAD  001  0455 0645
#@#IO1  001  0459 0653
#@#IO2  001  045D 0654
#@#TAT  001  0941 0681
#@#TBA  001  09A1 0685
#@#TFS  001  0941 0679
#@#TSY  001  0941 0683
#@#VFP  001  0700 0671
#@#VLP  001  093D 0674
#@#WDB  001  050C 0666
#@#WFT  001  0500 0664
#@@#BA  001  0001 0646
#@@#IO  001  0001 0658
#@@#SC  001  0002 0655
#@@#TA  001  0010 0682
#@@#TB  001  0010 0686
#@@#TS  001  0005 0684
#@@#TW  001  0020 0680
#@@#VM  001  0100 0675
#@@#WD  001  00BD 0667
#@@#WF  001  0003 0665
#@@#04  001  0004 0657
#@@#08  001  0008 0656
#@@BOV  001  0018 0634
#@@ECM  001  0006 0648
#@@ERR  001  0003 0642
#@@GUF  001  0010 0638
#@@LDS  001  0002 0644
#@@SDS  001  0004 0640
#@@SFF  001  0008 0652
#@@SFL  001  0005 0650
#@@SFO  001  0005 0660
#@@SFS  001  0011 0636
#@@VSF  001  0010 0688
#@@VSL  001  000F 0689
#@@VTR  001  0001 0673
#@BOVL  001  0400 0633
#@ECMA  001  0481 0647
```

```
#@ERRP  001  0441 0641
#@GUFU  001  0401 0637
#@LDSV  001  044D 0643
#@SDSY  001  04AD 0639
#@SFFI  001  04BD 0651
#@SFLO  001  0499 0649
#@SFOV  001  04C4 0659
#@SFSY  001  0480 0635
#@VSFI  001  09A1 0687
#@VTRL  001  0708 0672
#@WAF1  001  0401 0632
#@WAR1  001  0400 0631
#SPACK  001  0000 0001
@@M110  001  0C0A 1493   1526
@@T110  001  0C0E 1497   1495
@ARR    001  0008 0016   1620   1699   1886* 1887   1888* 1889
@ASIGN  001  007C 0071
@ASTER  001  005C 0069
@BCRDL  001  0050 0088
@BE     001  0081 0043
@BF     001  0090 0052
@BH     001  0084 0041
@BL     001  0082 0042
@BLANK  001  0040 0065
@BM     001  0082 0054
@BNE    001  0001 0046
@BNH    001  0004 0044
@BNL    001  0002 0045
@BNM    001  0002 0057
@BNOL   001  0020 0050
@BNOZ   001  0008 0049
@BNP    001  0004 0056
@BNZ    001  0001 0058
@BOL    001  00A0 0048
@BOZ    001  0088 0047
@BP     001  0084 0053
@BR     001  0001 0013   1505   1507* 1518   1519   1519   1560* 1562   1563   1570   1570   1585   1591
                         1594   1596   1597   1602   1604   1606   1606   1608   1620   1621   1622   1622
                         1624   1625   1625   1626   1626   1627   1633   1634   1634   1635   1635   1636
                         1637   1637   1638   1639   1639   1640   1641   1642   1642   1643   1645   1646
                         1700   1700   1701   1701   1702   1702   1708   1709   1711   1711   1712   1713
                         1719   1720   1722   1728   1735   1737   1737   1738   1740   1741   1741   1752
                         1752   1753   1753   1754   1754   1755   1758   1760   1874   1883   1885* 1886
                         1887   1888   1889   1891   1892   1892   1893   1894   1894   1896   1896   1897
                         1898   1898   1902   1902   1903   1907   1907   1908   1910   1910   1911   1911
                         1912   1912   1913   1913   1914   1914   1920   1921   1922   1922   1923   1928
                         1928   1929   1929   1931   1931   1937*
@BT     001  0010 0051
@BZ     001  0081 0055
@B1     001  0001 0063   1549
@CADDR  001  0002 0142   1495   1585   1622   1625   1634   1635   1700   1701   1702   1711   1741   1752
                         1753   1754   1892
@CARDL  001  0060 0087   0715
@CHARA  001  00C1 0072
@CHARF  001  00C6 0073
@CHARR  001  00D9 0074
```

```
@CHARZ  001  00E9 0075
@CLOFF  001  0010 0094
@CLON   001  0011 0093
@COMMA  001  006B 0066
@CPLUS  001  004E 0079
@DADDR  001  0002 0140   1518  1519  1596  1597  1623  1636  1637  1643  1709  1712  1720  1891
                         1956
@DBFR1  001  0004 0129
@DBFR2  001  0005 0130   1711* 1741*
@DCALK  001  0001 0081
@DCBCY  001  0009 0115
@DCBT1  001  0050 0117
@DCNT   001  0003 0128
@DCST1  001  0040 0116
@DCTRL  001  0000 0125
@DCYL   001  0001 0126   1896*
@DD2    001  0003 0030
@DGET   001  0001 0134   1667  1674  1681  1713  1766
@DOLAR  001  005B 0068
@DOP2   001  0004 0028   1622* 1625* 1634  1634* 1635* 1887* 1891* 1892* 1954  1955
@DPLNG  001  0006 0132   1893  1952
@DPOS   001  0000 0133
@DPUT   001  0002 0135   1608  1740
@DSAD   001  0002 0127   1518* 1519  1519* 1596  1597* 1712* 1720* 1894* 1898* 1902  1903* 1907*
                         1910* 1914  1920* 1928* 1931* 1953
@DSBCY  001  0004 0106
@DSCS1  001  0000 0107
@DSIVF  001  0003 0138
@DSPIN  001  0002 0131
@DTRSZ  001  0018 0085
@DVBCY  001  0007 0108
@DVRFY  001  0031 0136
@DWAIT  001  00FF 0137
@DWBCY  001  0005 0103
@DWSIZ  001  00C0 0105
@DWTB1  001  0003 0104
@DZERO  001  00F0 0064
@D1     001  0002 0026   1649
@EOF    001  001C 0077
@EOFTC  001  0075 0162
@EOS    001  001E 0076
@FDDBC  001  0000 0195
@FDE1   001  000C 0200
@FDFNA  001  000B 0198
@FDHLN  001  0002 0208
@FDLNC  001  0002 0193
@FDNSC  001  0003 0210
@FDSD   001  0000 0206
@FLACE  001  0009 0197
@FLDBC  001  0001 0196
@FLENT  001  0004 0201
@FLFNA  001  0002 0199
@FLHLN  001  0002 0209
@FLLNC  001  0002 0194
@FLNSC  001  0001 0211
@FLSD   001  0001 0207
```

```
SYMBOL   LEN VALUE DEFN   REFERENCES                          VER 15, MOD 00  22/07/23  PAGE  29

@HDRLN   001  0007 0092   0743   1613
@IAR     001  0010 0017
@INDEX   001  0001 0156   0157
@INST3   001  0003 0032
@INST4   001  0004 0033
@INST5   001  0005 0034
@INST6   001  0006 0035
@I1IAR   001  00C0 0020
@LINSZ   001  00F4 0084   0717
@MAPEN   001  0005 0089
@MINCR   001  2000 0083
@MINUS   001  0060 0080
@NOP     001  0080 0040   1718   1725   1731   1933
@NUMBR   001  007B 0070
@OPD2    001  0004 0029
@OP1     001  0003 0027   1620*  1698*  1699*  1883*  1889*
@OP2     001  0005 0031
@PCTRL   001  0000 0149
@PDATA   001  0003 0151
@PGCSZ   001  0020 0082   0083
@PPLNG   001  0004 0148
@PRCNT   001  0001 0150
@PRETR   001  00C0 0154   1493
@PRINT   001  0040 0152   0154
@PSR     001  0004 0015
@PWAIT   001  00FF 0158
@P1IAR   001  0020 0018
@P2IAR   001  0040 0019
@Q       001  0001 0024   1633*  1639*  1707*  1718*  1725   1731   1934
@REGL    001  0002 0012
@RETRN   001  0080 0153   0154   1773
@RLDWN   001  004F 0159
@RTRNC   001  0080 0161   1774
@SBLN    001  0005 0170
@SBLNL   001  0002 0184
@SCTSZ   001  0100 0100
@SDFLN   001  0007 0090
@SDF0    001  0000 0166
@SDF1    001  0001 0167
@SDF2    001  0002 0168
@SDF3    001  0003 0169
@SECCY   001  0030 0086
@SIST    001  0001 0181
@SLASH   001  0061 0067
@SLAST   001  0002 0183
@SMIDL   001  0003 0182
@SNULL   001  0080 0173
@SONLY   001  0000 0180
@STEXT   001  0007 0172
@STYPE   001  0006 0171
@TBCNT   001  0000 0160
@TBLEF   001  0010 0155   0157
@TBLIX   001  0011 0157
@UCB     001  0087 0039   1707
@UPARW   001  005A 0078
@VADDR   001  0002 0141
```

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@VENTA   001  0056 0113
@VMDDV   001  00FE 0114
@VMFD1   001  0000 0109
@VMFD2   001  0001 0110
@VMRS3   001  0002 0112
@VMTRL   001  0001 0111
@VOLID   001  0006 0091
@VQ      001  0001 0025
@WSFIT   001  0500 0101
@WSTBL   001  0503 0102
@XR      001  0002 0014   1540* 1561* 1562  1563  1564  1564* 1565  1565  1572  1572  1573  1573
                          1574  1574* 1583  1583  1584  1584  1585  1590* 1593* 1594  1595  1595*
                          1597  1603  1603* 1605  1605* 1623  1643  1644  1646  1698  1708* 1709
                          1712  1719  1720  1721  1721* 1727  1727* 1733  1733* 1736  1736* 1757
                          1757* 1759  1759* 1761*
@ZERO    001  0000 0062   1623  1633  1643* 1644  1646* 1668  1723  1903
DL2C01   002  0F30 1946   1886  1888  1896
DL2C05   002  0F32 1947   1892
DL2C48   001  0F2C 1944   1894  1898
DL2DPL   006  0F38 1952   1893*
DL2END   001  0F3B 1957   1959  1960
DL2E01   001  0001 1876   1894  1896  1898  1902  1914  1922
DL2E02   001  0002 1877   1907  1910  1928
DL2E18   001  0018 1878   1908
DL2E60   001  0060 1879   1923
DL2E7C   001  007C 1881   1920
DL2ICS   001  0EA2 1882   1599  1715  1743
DL2K18   002  0F2E 1945   1911
DL2K60   002  0F29 1942   1929
DL2K80   002  0F2B 1943   1910  1928
DL2LST   001  0F33 1951   1894* 1896* 1898* 1902  1903* 1907* 1910* 1914  1920* 1928* 1931* 1936
                          1953
DL2PHY   001  0F35 1953
DL2RAD   002  0F3A 1956   1596* 1907
DL2SAD   005  0EBA 1954   1914* 1921* 1922* 1923  1929* 1931
DL2SEC   005  0EC3 1955   1902* 1908  1911* 1912  1912* 1913  1913* 1922
DL2SWH   003  0F18 1934
DL2TSD   001  0083 1880   1921
DL2000   001  0EA6 1884   1874  1885
DL2001   005  0EB6 1891   1887* 1954
DL2002   005  0EBF 1893   1891* 1892* 1955
DL2005   004  0EC4 1894   1897
DL2006   004  0ED2 1898   1895
DL2008   004  0EEF 1912   1909
DL2010   003  0F05 1923
DL2100   004  0F13 1931   1924
DL2110   003  0F17 1933   1934
DL2900   004  0F20 1937   1883* 1933
DL2910   004  0F24 1938   1889*
SPAABF   002  0D5D 1654   1702* 1708  1741  1753  1754*
SPAAB1   002  0D59 1652   1700* 1702  1752* 1754
SPAAB2   002  0D5B 1653   1701* 1711  1752  1753*
SPAANE   002  0D65 1658   1622
SPABB1   002  0D6B 1661   1700
SPABB2   002  0D6D 1662   1701
SPABF1   001  133B 1960   1661  1684  1961
```

```
SPABF2  001  153B 1961    1662
SPACKU  001  0C39 1506    1487
SPACK2  001  0806 1484    1613   1769
SPACNT  002  0D5F 1655    1594*  1606*
SPACYL  004  0D53 1649    1563*  1585
SPAC01  002  0D6F 1663    1570   1606   1626   1639   1709   1737
SPAC48  002  0D63 1657    1637   1642   1646
SPADCT  001  0D57 1651    1719*  1723   1737*
SPADPL  001  0D82 1688    1711*  1712*  1713*  1716   1720*  1740*  1741*  1744
SPADUP  004  0D88 1698    1602
SPAD20  004  0D9C 1704    1755
SPAD30  004  0DC5 1719    1710
SPAD33  004  0DEA 1731    1724
SPAD35  003  0DF4 1735    1738   1760
SPAD40  003  0E01 1740    1726   1729
SPAD55  003  0E0E 1751    1707*  1718*  1725   1731
SPAD60  003  0E20 1757    1732
SPAD90  004  0E2C 1761    1698*  1751
SPAD95  004  0E30 1762    1699*
SPAEND  001  0F3B 1959    1593   1677
SPAE30  001  0030 1486    1644
SPALDR  002  0D69 1660    1635
SPALNE  002  0D67 1659    1625
SPANBF  001  0700 1483    1549   1561   1621   1658   1670
SPANCT  002  0D61 1656    1562*  1570*
SPAPCT  002  0D56 1650    1621*  1626*  1636*  1637*  1641*  1642*  1643
SPAPDT  003  0CFF 1620    1505   1507   1560   1591   1604   1722   1728   1735   1758
SPAPL1  001  0D70 1666    1518*  1519   1538   1596
SPAPL2  001  0D76 1673    1519*  1522   1608*  1611
SPAPL3  001  0E34 1765    1543
SPAPL4  001  0D7C 1680    1597*  1600
SPAPP1  001  0E3A 1772    1516   1530
SPAPSC  001  0004 1485    1675
SPAP20  005  0D0B 1623    1622*  1625*  1627   1634
SPAP30  004  0D51 1647    1620*  1645   1649
SPAP40  003  0D1E 1633    1624
SPAP45  005  0D29 1636    1634*  1635*
SPAP46  004  0D2E 1637    1640
SPAP50  003  0D3C 1641    1633*  1638   1639*
SPA005  004  0C84 1560    1550
SPA010  004  0C9B 1570    1575
SPA020  004  0CB1 1583    1571
SPA030  004  0CD4 1597    1607
SPA035  004  0CFB 1613    1555
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TOTAL STATEMENTS IN ERROR IN THIS ASSEMBLY =   0

OL105 I THE CODE LENGTH OF #SPACK IS 3899 DECIMAL.
OL103 I TOTAL NUMBER OF LIBRARY SECTORS REQUIRED IS   4
         NAME-#SPACK,PACK-R1R1R1,UNIT-R1,RETAIN-P,LIBRARY-R,CATEGORY-000