```
// LOG 1403
// FORMS LINES-66
*
*** CLEAR THE WORK PACK
*
// LOAD $DELET,F1
// RUN
// FORMAT PACK-F2F2F2,UNIT-F2
// REMOVE PACK-F2F2F2,UNIT-F2,LABEL-VTOC
// END
```

```
 @1 CT@EJ    I               $DELET01
PROGRAM END
```

```
*
*** RUN THE ASSEMBLER
*
// LOAD $CGDRV,R2
*/ SWITCH 10000000
// COMPILE OBJECT-R1
// FILE NAME-$SOURCE,PACK-F2F2F2,UNIT-F2,RETAIN-S,TRACKS-30
// FILE NAME-$WORK,PACK-F2F2F2,UNIT-F2,RETAIN-S,TRACKS-30
// FILE NAME-$WORK2,PACK-F2F2F2,UNIT-F2,RETAIN-S,TRACKS-30
// RUN
```

EXTERNAL SYMBOL LIST

SYMBOL TYPE S/3 ASSEMBLER 13/07/07 PAGE 1

```
$@DE12   MODULE
NIDISK   ENTRY
DISKOP   ENTRY
IODEQ    ENTRY
RTNARR   ENTRY
DKOP45   ENTRY
TRSK44   ENTRY
TRSK45   ENTRY
TRDT44   ENTRY
TRDT45   ENTRY
TROP44   ENTRY
TROP45   ENTRY
DSOUT    ENTRY
RETN     ENTRY
LIOSAV   EXTRN
NST1RT   EXTRN
NDATRS   EXTRN
QONE     EXTRN
NSPOSC   EXTRN
IOENQ    EXTRN
NMIOOE   EXTRN
LIOCON   EXTRN
SIOTAB   EXTRN
ZRO      EXTRN
DIODQ2   EXTRN
GETIOB   EXTRN
DDAREA   EXTRN
SIOCT    EXTRN
KEYDTA   EXTRN
QTWO     EXTRN
QUEPTR   EXTRN
INDK44   EXTRN
FREE@    EXTRN
WKFCSD   EXTRN
WKFCSN   EXTRN
WKSECT   EXTRN
WKFCYL   EXTRN
WKFLAG   EXTRN
DCFADR   EXTRN
ONE      EXTRN
RECAL    EXTRN
RECALB   EXTRN
CYLADD   EXTRN
NXTCYL   EXTRN
ADRETN   EXTRN
QPTR45   EXTRN
SAVR2    EXTRN
D44BSY   EXTRN
D45BSY   EXTRN
STAT67   EXTRN
NIQERP   EXTRN
ADEXIT   EXTRN
TCBSAV   EXTRN
PMRSAV   EXTRN
```

```
      $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4

ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          S/3 ASSEMBLER  13/07/07  PAGE   2

    0000                         2 $@DE12 START 0
                                 3 *      LEVEL 05
                                 4 ************************************************************************
                                 5 *                                                                      *
                                 6 *     NAME:  '$@DE12'  DISK IOS R1,F1,R2,F2,D1,D2,D3,D4'               *
                                 7 *                                                                      *
                                 8 *     FUNCTION:     1. PERFORMS PHYSICAL DISK I/O OPERATIONS:          *
                                 9 *                        SEEK, READ, WRITE, SCAN, VERIFY               *
                                10 *                     2. HANDLES SEEK AND OP END INTERRUPTS            *
                                11 *                     3. PERFORMS ERROR RECOVERY FOR DISK ERRORS       *
                                12 *                     4. DEQUEUES I/O REQUEST FOR ANY DEVICE           *
                                13 *                                                                      *
                                14 *     INPUT:             ADDRESS FO DISK IOB IS IN REGISTER 1          *
                                15 *                                                                      *
                                16 *     OUTPUT:            REQUESTED OPERATION IS QUEUED FOR EXECUTION /  *
                                17 *                        OR COMPLETED                                  *
                                18 *     ENTRY POINTS:      NIDISK - ENTRY FROM IL0                       *
                                19 *                        DISKOP - LEVEL 5 OP END INTERRUPT             *
                                20 *                                                                      *
                                21 *     EXITS:          1. RETURN TO CALLING PGM VIA EXIT IN DISPATCHER  *
                                22 *                     2. TO $$DLOG TO RECORD DISK ERRORS               *
                                23 *                                                                      *
                                24 *     COMMON AREAS:      DISK IOB, DISK QUEUES AND WORK AREA           *
                                25 *                                                                      *
                                26 *     TABLES:            NONE                                          *
                                27 *                                                                      *
                                28 *     CORE REQUIREMENTS:                                               *
                                29 *                                                                      *
                                30 *        CHARACTER CODE DEPENDENCY: A                                  *
                                31 *                                                                      *
                                32 * CHANGE ACTIVITY - $@DE12                                             *
                                33 *                                                                      *
                                34 *     RELEASE 02                                                       *
                                35 * @01-APAR/S304809- TEST INVALID; SUPER IOB, DUBL BUFRING              *
                                36 * @02-INCI/ES205  - EOC, PERM ERROR ON NEXT SEEK                       *
                                37 * @03-APAR/S304952- CORRECT INFO FOR OBR RECORDS                       *
                                38 * @04-INCI/ES242  - ADD TRACE ENTRIES                                  *
                                39 * @05-XXXXXXXXXXX- 5444 DUMP RDY DURING SIO BY OTHER OTHER LEVEL      *
                                40 * @06-APAR/S305296- CORRECT ERROR HANDELING IN ALT. TRACK RTN.         *
                                41 * @07-APAR/S305498- > 64K BIT BEING SET OFF WHEN ABOVE 64K (ERP)       *
                                42 * @08-APAR/S207816- CORRECT ERROR HANDLING FOR SEEK OPERATION.         *
                                43 * @09-XXXXXXXXXXX- BYPASS EXTRN-1 PROBLEM WITH CCP ASSEMBLER          *
                                44 *                                                                      *
                                45 ************************************************************************
```

```
       $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4
ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          S/3 ASSEMBLER  13/07/07  PAGE   3
                          0004   47        ENTRY NIDISK
                          0042   48        ENTRY DISKOP
                          0569   49        ENTRY IODEQ
                          0001   50        EXTRN LIOSAV
                          0002   51        EXTRN NST1RT
                          0003   52        EXTRN NDATRS
                          0004   53        EXTRN QONE
                          0005   54        EXTRN NSPOSC
                          0006   55        EXTRN IOENQ
                          0007   56        EXTRN NMIOOE
                          0008   57        EXTRN LIOCON
                          0009   58        EXTRN SIOTAB
                          000A   59        EXTRN ZRO
                          021D   60        ENTRY RTNARR
                          0593   61        ENTRY DKOP45
                          000B   62        EXTRN DIODQ2
                          000C   63        EXTRN GETIOB
                          000D   64        EXTRN DDAREA
                          000E   65        EXTRN SIOCT
                          000F   66        EXTRN KEYDTA
                          0010   67        EXTRN QTWO
                          0011   68        EXTRN QUEPTR
                          0012   69        EXTRN INDK44
                          0013   70        EXTRN FREE@
                          0366   71        ENTRY TRSK44                    SEEK SIO 5444.              @04
                          02E7   72        ENTRY TRSK45                    SEEK SIO 5445.              @04
                          0510   73        ENTRY TRDT44                    DATA SIO 5444.              @04
                          04BA   74        ENTRY TRDT45                    DATA SIO 5445.              @04
                          0065   75        ENTRY TROP44                    OP-END FOR 5444.            @04
                          05B6   76        ENTRY TROP45                    OP-END FOR 5445.            @04
                          0562   77        ENTRY DSOUT
                          0014   78        EXTRN WKFCSD                    DATA LENGTH (5445 ONLY)
                          0015   79        EXTRN WKFCSN                    NUMBER OF CYL OR SECT.
                          0016   80        EXTRN WKSECT                    SECTOR
                          0017   81        EXTRN WKFCYL                    CYLINDER
                          0018   82        EXTRN WKFLAG                    FLAG BITS
                          0019   83        EXTRN DCFADR
                          001A   84        EXTRN ONE
                          001B   85        EXTRN RECAL
                          001C   86        EXTRN RECALB
                          001D   87        EXTRN CYLADD
                          001E   88        EXTRN NXTCYL
                          001F   89        EXTRN ADRETN
                          0020   90        EXTRN QPTR45
                          0021   91        EXTRN SAVR2
                          0022   92        EXTRN D44BSY
                          0023   93        EXTRN D45BSY
                          0024   94        EXTRN STAT67
                          0025   95        EXTRN NIQERP
                          021A   96        ENTRY RETN
                          0026   97        EXTRN ADEXIT
                          0027   98        EXTRN TCBSAV
                          0028   99        EXTRN PMRSAV(3)
```

```
      $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4
ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          S/3 ASSEMBLER  13/07/07  PAGE   4
    0000 C4C5F1F2         0003  101        DC    CL4'DE12'
                          0004  103 NIDISK EQU   *                          ENTER FROM EXIO ROUTINE
    0004 7C 00 12               104        MVI   IOBWRK(,1),NULL            SET FLAG TO SEEK PENDING
    0007 7C 00 0F               105        MVI   IOBERR(,1),NULL            INDICATE NO ERRORS FOUND
    000A 7B 18 13               106        SBF   IOBFL2(,1),X'18'           ASSURE DISK BITS ARE ZERO
    000D F4 30 09               107        CCP   X'09',X'30' ######
    0010 0C 01 043E 0026        108        MVC   SAVARR+3(2),ADEXIT         ASSURE RETURN FROM DSCOMM EXIT
    0016 F4 30 69               109        CCP   X'69',X'30' ######
    0019 B8 20 15               110        TBN   QSTATS(,2),X'20'           SEE IF QUEUE BUSY
    001C F2 10 A2               111        JT    GOEXIT                     YES - EXIT
    001F B8 40 15               112        TBN   QSTATS(,2),X'40'           SEE IF QUEUE HELD
    0022 F2 90 09               113        JF    EXECIT                     NO - CONTINUE
    0025 78 40 13               114        TBN   IOBFL2(,1),X'40'           SEE IF SUPER IOB
    0028 F2 10 13               115        JT    GOATTN                     YES - GO EXECUTE COMMAND     @01
    002B F2 87 93               116        J     GOEXIT                     NO - EXIT INTERRUPT LEVEL
    002E B8 80 15               117 EXECIT TBN   QSTATS(,2),X'80'           SEE IF EXER REQUEST
    0031 BB 80 15               118        SBF   QSTATS(,2),X'80'           SET OFF FLAG
    0034 F2 10 07               119        JT    GOATTN                     GO EXECUTE REQUEST           @01
    0037 AD 01 01 03            120        CLC   FIRST@(2,2),LAST@(,2)      SEE IF THIS IOB IS 1ST ON QUEUE
    003B F2 01 83               121        JNE   GOEXIT                     NO - GET OUT                 @01
    003E C0 87 0240             122 GOATTN B     ATTNO                      YES - GO SET UP SEEK COMMAND @01
```

```
      $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4

ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          S/3 ASSEMBLER  13/07/07  PAGE   5
                            124 ***************************************************************
                            125 *      5444 OP-END INTERRUPT HANDELING ROUTINE                *
                            126 ***************************************************************

                       0042 128 DISKOP EQU   *                        OP-END INTERRUPT ENTRY POINT
    0042 F4 30 09           129        CCP   X'09',X'30' ######
    0045 0C 01 021D 001F    130        MVC   RETN+3(2),ADRETN         SET UP RETURN
    004B 30 A3 0012         131        SNS   INDK44,X'A3'             STORE 5444 INTERRUPT STATUS
    004F 38 04 0012         132        TBN   INDK44,X'04'             SEE IF DATA OP END INTERRUPT
    0053 F2 90 17           133        JF    SKEND                    SEEK END INTERRUPT OCCURRED
    0056 F3 A4 84           134        SIO   X'84',X'A4'              SET UP RESET DATA OP END
    0059 3B 01 0022         135        SBF   D44BSY,X'01'             RESET 5444 BUSY BIT
    005D 35 02 0011         136        L     QUEPTR,XR2               PIONT AT LAST QUEUE USED
    0061 C0 87 000C         137        B     GETIOB                   GO LOAD TRANSLATE TABLE
                       0065 138 TROP44 EQU   *
    0065 C0 87 006A         139        B     *+5                         BRANCH TO TRACE IF ACTIVE
    0069 F5                 140        DC    AL1(245)                    TRACE TYPE
    006A F2 87 20           141        J     SETSNS                   GO SET UP SENSE
    006D C2 02 0004         142 SKEND  LA    QONE,XR2                 GET ADDRESS OF SPINDLE 1 QUEUE
    0071 38 10 0012         143        TBN   INDK44,X'10'             SEE IF SEEK 1 INTERRUPT
    0075 F2 90 06           144        JF    NXTINT                   NO - JUMP
    0078 F3 A4 C0           145        SIO   X'C0',X'A4'              SET UP RESET OF SEEK 1 INTERRUPT
    007B F2 87 07           146        J     GET                      GET IOB ADDRESS
    007E F3 A4 A0           147 NXTINT SIO   X'A0',X'A4'              SET UP RESET OF SEEK 2 INTERRUPT
    0081 C2 02 0010         148        LA    QTWO,XR2                 GET ADDRESS OF SPINDLE 2 QUEUE
    0085 C0 87 000C         149 GET    B     GETIOB                   GO GET FIRST IOB ON QUEUE
    0089 C0 87 043F         150        B     SEEKS1                   SEE IF DATA XFER IS TO BE STARTED

    008D F4 30 29           152 SETSNS CCP   X'29',X'30' ######
    0090 18 00 009E 07      153        MZZ   SNS44+1,IOBQB(,1)        SET UP Q BYTE OF SENSE STATUS
    0095 18 00 00A1 07      154        MZZ   TST44+1,IOBQB(,1)        SET UP Q BYTE FOR TIO ERROR
    009A F4 30 69           155        CCP   X'69',X'30' ######
    009D 70 A2 0D           156 SNS44  SNS   IOBSNS(,1),SNSDS1        SENSE FOR BYTES 0,1 OF DEB STAT
    00A0 C1 A0 061E         157 TST44  TIO   DIODER,ERROR             ANY ERRORS ?
    00A4 79 01 07           158 DTOPND TBF   IOBQB(,1),WRITOP         #   WAS LAST OPERATION
    00A7 79 40 0E           159        TBF   IOBFLG(,1),NOVER         #   IS VERIFICATION DESIRED ?
    00AA F2 90 18           160        JF    DSDONE                   NO - NO VERIFY NECESSARY
    00AD 7B F0 12           161        SBF   IOBWRK(,1),SKSTRT+DCMPLT+DTPND+DXFRST
    00B0 9C 01 14 08        162        MVC   SAVEOP(2,2),IOBRB(,1)    SAVE THIS OP'S Q AND R BYTES
    00B4 7B 06 07           163        SBF   IOBQB(,1),SETOFF         SET BITS 5 & 6 OF Q BYTE OFF
    00B7 7A 01 07           164        SBN   IOBQB(,1),READ           SET Q BYTE TO READ
    00BA 7A 03 08           165        SBN   IOBRB(,1),VERIFY         SET R BYTE TO VERIFY
    00BD C0 87 021E         166 RETRY  B     DSCOMN                   GO START SEEK FOR VERIFY
    00C1 C0 87 021A         167 GOEXIT B     RETN                     GO RESET INTERRUPT LEVEL 5   @01
```

```
                                169 ********************************************************************
                                170 *      EXIT ROUTINE-GOOD COMPLETION                                *
                                171 ********************************************************************
    00C5 7A 40 12               172 DSDONE SBN   IOBWRK(,1),DCMPLT         INDICATE SUCCESSFUL OPERATION
    00C8 78 C0 07               173        TBN   IOBQB(,1),X'C0'           SEE IF 5445
    00CB F2 90 07               174        JF    SCAN44                    NO
    00CE C1 C3 00E8             175        TIO   SCAN45,X'C3'              TEST FOR 5445 SCAN HIT
    00D2 F2 87 04               176        J     TESSCN                    GO SEE IFD SCAN WAS REQUESTED
    00D5 C1 A4 00F9             177 SCAN44 TIO   DSMOVE,SCNHIT             WAS SCAN FND COND SET IN PREV OP
    00D9 78 03 07               178 TESSCN TBN   IOBQB(,1),SCAN            WAS THIS OPER A SCAN ?
    00DC F2 90 28               179        JF    DSVER                     NO - JUMP
    00DF 7A 02 12               180        SBN   IOBWRK(,1),SCNTFD         INDICATE SCAN WAS NOT FOUND
    00E2 78 C0 07               181        TBN   IOBQB(,1),X'C0'           SEE IF 5445
    00E5 F2 90 11               182        JF    DSMOVE                    GO CHECK FOR SCAN EQUAL
    00E8 6C 00 14 1E            183 SCAN45 MVC   IOBCC(1,1),COUNT+2(,2)    MOVE CYLINDER INTO IOB
    00EC 6C 01 16 21            184        MVC   IOBR(2,1),COUNT+5(,2)     MOVE HEAD AND RECORD INTO IOB
    00F0 78 02 0D               185        TBN   IOBSNS(,1),X'02'          CHECK FOR SCAN EQUAL
    00F3 F2 90 11               186        JF    DSNEQU                    SCAN NOT EQUAL
    00F6 F2 87 0B               187        J     SETEQU                    SCAN EQUAL
    00F9 4C 01 16 0016          188 DSMOVE MVC   IOBSB(2,1),WKSECT         MOVE LAST C/S INTO IOB
    00FE 78 80 0D               189        TBN   IOBSNS(,1),SCANEQ         WAS SCAN EQUAL FOUND ?
    0101 F2 90 03               190        JF    DSNEQU                    NO - JUMP
    0104 7A 04 12               191 SETEQU SBN   IOBWRK(,1),HITEQU         YES - INDICATE SCAN EQUAL
                          0107  192 DSNEQU EQU   *
                          0107  193 DSVER  EQU   *
    0107 78 03 08               194        TBN   IOBRB(,1),VERIFY          VERIFY REQUESTED ?
    010A F2 90 04               195        JF    DSIDEN                    NO - JUMP
    010D 6C 01 08 14            196        MVC   IOBRB(2,1),SAVEOP(,2)     RESTORE OROG OP AND Q
                          0111  197 DSIDEN EQU   *
    0111 78 C0 07               198        TBN   IOBQB(,1),X'C0'           SEE IF 5445
    0114 F2 10 13               199        JT    DSDQ45                    YES - GO DEQUEUE 5445 IOB
    0117 7D 01 08               200        CLI   IOBRB(,1),IDENOP          DOES R BYTE INDICATE IDENT OP ?
    011A 79 02 07               201        TBF   IOBQB(,1),WRITE           WAS IT A READ IDENTIFIER OP ?
    011D F2 96 05               202        JC    DSDQUE,X'96'              NO - JUMP
    0120 4C 02 1D 0016          203        MVC   RDIDSB(3,1),WKSECT        MOVE ID INTO IOB
                          0125  204 DSDQUE EQU   *
    0125 8C 01 12 0016          205        MVC   PHYSCS(2,2),WKSECT        MOVE LAST CYL/SECT INTO QUEUE
    012A 7B B8 12               206 DSDQ45 SBF   IOBWRK(,1),X'B8'          SET OFF IOS PARTIAL COMPL BITS
    012D 75 02 12               207        L     IOBWRK(,1),XR2            LOAD COMPLETION CODE INTO REG 2
    0130 78 20 0E               208        TBN   IOBFLG(,1),NOLOG          IS NO ERROR LOGGING SPECIFIED ?
    0133 F2 10 09               209        JT    GOPOST                    YES - GO POST
    0136 79 01 12               210        TBF   IOBWRK(,1),PERM           DID A PERM I/O ERROR OCCUR ?
    0139 79 FF 0F               211        TBF   IOBERR(,1),255            DID A PERM I/O ERROR OCCUR ?
    013C F2 90 04               212        JF    NOPOST              YES - DO THE POST, DLOG WILL POST IOB
    013F C0 87 0005             213 GOPOST B     NSPOSC                    BRANCH TO POST ROUTINE
    0143 35 02 0011             214 NOPOST L     QUEPTR,XR2                LOAD ADDRESS OF QUEUE
    0147 79 03 07               215        TBF   IOBQB(,1),X'03'           SEEK ONLY COMMAND ?
    014A F2 90 04               216        JF    SK44                      NO - JUMP
    014D 35 02 0021             217        L     SAVR2,XR2                 LOAD ADDRESS OF QUEUE
    0151 6C 01 0D 0D            218 SK44   MVC   IOBSNS(2,1),QSENSE(,2)    RESTORE SENSE INFO FROM QUEUE
    0155 78 C0 07               219        TBN   IOBQB(,1),X'C0'           SEE IF 5445
    0158 F2 90 2A               220        JF    MOVE44                    NO - JUMP
    015B 35 02 0020             221        L     QPTR45,XR2                LOAD ADDRESS OF 5445 QUEUE
    015F 79 03 07               222        TBF   IOBQB(,1),X'03'           5445 SEEK ONLY COMMAND ?
    0162 F2 90 04               223        JF    DQATTN                    NO - JUMP
    0165 35 02 0021             224        L     SAVR2,XR2                 LOAD ADDRESS OF 5445 QUEUE
```

```
      $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4
ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          S/3 ASSEMBLER  13/07/07  PAGE   7
                                226 *      HANDLE I/O ATTENTION CONDITION
    0169 C0 87 0569               227 DQATTN B     IODEQ                     GO DEQUEUE IOB
    016D 6C 03 06 21              228        MVC   IOBCHN(4,1),COUNT+5(,2)   MOVE IN CYLINDER, HEAD & RECORD
    0171 6C 01 0D 0D              229        MVC   IOBSNS(2,1),QSENSE(,2)    RESTORE SENSE INFO FROM QUEUE
    0175 7D 02 08                 230        CLI   IOBRB(,1),X'02'           SEE IF READ CKD
    0178 79 02 07                 231        TBF   IOBQB(,1),X'02'           SEE IF READ CKD
    017B F2 96 10                 232        JC    EXTLOG,X'96'              YES - JUMP
    017E 6C 09 27 25              233        MVC   IOBNUM(10,1),COUNT+9(,2)  MOVE IN COUNT TO IOB
    0182 F2 87 09                 234        J     EXTLOG                    JUMP AROUND 5444 MOVE
    0185 C0 87 0569               235 MOVE44 B     IODEQ                     GO DEQUEUE IOB
    0189 4C 01 06 0016            236        MVC   IOBCHN(2,1),WKSECT        MOVE C/S WHERE COMPLETED IN IOB
                         018E     237 DSNOSN EQU   *
    018E BB 28 15                 238 EXTLOG SBF   QSTATS(,2),X'28'          SET OFF QUEUE BUSY BIT
    0191 79 20 0E                 239        TBF   IOBFLG(,1),NOLOG          IS NO ERROR LOGGING SPECIFIED ?
    0194 F2 90 61                 240        JF    QEMPT                     YES - CHECK OTHER QUEUES
    0197 79 01 12                 241        TBF   IOBWRK(,1),PERM           DID PERM I/O ERROR OCCUR ?
    019A 79 FF 0F                 242        TBF   IOBERR(,1),255            DID PERM I/O ERROR OCCUR ?
    019D F2 90 03                 243        JF    DLOGIT                    NO - NO LOGGING IS NECESSARY
    01A0 F2 87 55                 244 SWITCH J     QEMPT                     BRANCH TO NO DLOG, NO-OP IF DLOG
    01A3 F4 30 09                 245 DLOGIT CCP   X'09',X'30' ######
    01A6 3C 87 01A1               246        MVI   SWITCH+1,X'87'            RESET TO JUMP
    01AA F4 30 69                 247        CCP   X'69',X'30' ######
    01AD 1C 01 0027 11            248        MVC   TCBSAV(2),IOBTCB(,1)      SET IOB FOR QUEUE ERP
    01B2 C0 87 0025               249        B     NIQERP                    QUEUE ON ERROR TASK QUEUE
    01B6 34 02 0021               250        ST    SAVR2,XR2                 SAVE POINTER TO QUEUE IN ERROR
    01BA 8D 01 0F 0021            251 SEARCH CLC   NXTQUE(,2),SAVR2(2)       SEE IF DONE CHECKING QUEUES
    01BF F2 01 28                 252        JNE   CHKQUE                    NO - GO CHECK QUEUES
    01C2 78 01 12                 253        TBN   IOBWRK(,1),PRMERR         PERMANENT ERROR ?
    01C5 F2 90 19                 254        JF    TEMERR                    NO - GO EXIT
    01C8 35 02 0021               255        L     SAVR2,XR2                 POINT TO QUEUE IN ERROR
    01CC BD 00 00                 256        CLI   QFIRST-3(,2),X'00'        SEE IF QUEUE IN ERROR
    01CF F2 81 48                 257        JE    RETN                      YES - EXIT
    01D2 C0 87 0996               258        B     SUPIOB                    GO PUT SUPER IOB ON TOP OF QUEUE
    01D6 35 02 0021               259        L     SAVR2,XR2                 POINT TO QUEUE IN ERROR
    01DA C0 87 021E               260        B     DSCOMN                    GO SEE IF ANY SUPER IOB TO START
    01DE F2 87 39                 261        J     RETN                      EXIT
    01E1 78 40 0C                 262 TEMERR TBN   IOBSNS-1(,1),X'40'        SEE IF I/O ATTENTION
    01E4 F2 10 33                 263        JT    RETN                      YES - EXIT
    01E7 F2 87 18                 264        J     STRNXT                    TEMP ERROR GO START NEXT ON QUE
    01EA B5 02 0F                 265 CHKQUE L     NXTQUE(,2),XR2            POINT TO NEXT QUEUE
    01ED BD 00 00                 266        CLI   QFIRST-3(,2),X'00'        SEE IF QUEUE IS EMPTY
    01F0 C0 01 021E               267        BNE   DSCOMN                    NO - GO START NEXT REQUEST
    01F4 C0 87 01BA               268        B     SEARCH                    CONTINUE

                         01F8     270 QEMPT  EQU   *
    01F8 F4 30 09                 271        CCP   X'09',X'30' ######
    01FB 3C 87 01A1               272        MVI   SWITCH+1,X'87'            RESET SWITCH
    01FF F4 30 69                 273        CCP   X'69',X'30' ######
    0202 2C 01 0021 0F            274 STRNXT MVC   SAVR2(2),NXTQUE(,2)       STORE @ OF NEXT QUE IN SAVE AREA
    0207 B5 02 0F                 275 NEXQUE L     NXTQUE(,2),XR2            POINT TO NEXT QUEUE
    020A BD 00 00                 276        CLI   QFIRST-3(,2),X'00'        IS THE QUEUE EMPTY ?
    020D C0 01 021E               277        BNE   DSCOMN                    NO - START PROCESSING NEXT REQ.
    0211 8D 01 0F 0021            278        CLC   NXTQUE(,2),SAVR2(2)       SEE IF ALL QUEUES ARE CHECKED
    0216 C0 01 0207               279        BNE   NEXQUE                    NO - CONTINUE
    021A C0 87 0000               280 RETN   B     *-*                       SET UP IL0 EXIT OR IL5 EXIT
                         021D     281 RTNARR EQU   *-1                       RETURN SAVE FROM EXIO
```

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                          021E  283 DSCOMN EQU   *
    021E F4 30 09               284        CCP   X'09',X'30' ######
    0221 34 08 043E             285        ST    SAVARR+3,ARR              STORE ARR AT RETURN
    0225 F4 30 69               286        CCP   X'69',X'30' ######
    0228 79 80 12               287        TBF   IOBWRK(,1),SKSTRT         IS SEEK ALREADY STARTED (EOC)
    022B C0 90 021A             288        BF    RETN                      YES - EXIT
    022F C0 87 000C             289        B     GETIOB                    GO LOAD TRANSLATE TABLE
    0233 B8 40 15               290        TBN   QSTATS(,2),X'40'          SEE IF QUEUE IS HELD
    0236 F2 90 07               291        JF    ATTNO                     NO - CONTINUE
    0239 78 40 13               292        TBN   IOBFL2(,1),X'40'          SEE IF SUPER IOB
    023C C0 90 043B             293        BF    SAVARR                    RETURN
                          0240  294 ATTNO  EQU   *
    0240 BA 20 15               295        SBN   QSTATS(,2),X'20'          SET QUEUE BUSY BIT
    0243 78 C0 07               296        TBN   IOBQB(,1),X'C0'           SEE IF 5445
    0246 C0 90 035E             297        BF    SEEK44                    NO - BRANCH
    024A 38 01 0023             298        TBN   D45BSY,X'01'              SEE IF BUSY
    024E C0 10 021A             299        BT    RETN                      YES - EXIT
    0252 78 80 13               300 TSTCYL TBN   IOBFL2(,1),X'80'          SEE IF END OF CYLINDER
    0255 7B 80 13               301        SBF   IOBFL2(,1),X'80'          RESET EOC
    0258 F2 10 21               302        JT    GOSEEK                    GO INITIATE SEEK
    025B 78 01 13               303        TBN   IOBFL2(,1),X'01'          SEE IF COUNT AT END OF IOB
    025E F2 90 07               304        JF    CONTIN                    NO - JUMP
    0261 9C 09 25 27            305        MVC   COUNT+9(10,2),IOBNUM(,1)  MOVE FULL COUNT
    0265 F2 87 14               306        J     GOSEEK                    GO INITIATE SEEK
    0268 9C 00 1E 14            307 CONTIN MVC   COUNT+2(1,2),IOBCC(,1)    CYLINDER
    026C 9C 01 21 16            308        MVC   COUNT+5(2,2),IOBR(,1)     HEAD, RECORD
    0270 9C 00 25 17            309        MVC   COUNT+9(1,2),IOBN(,1)     NR OF RECORDS-1
    0274 8C 02 24 000F          310        MVC   COUNT+8(3,2),KEYDTA       DEFAULT KEY AND DATA LENGTH
    0279 BC 00 1C               311        MVI   COUNT(,2),X'00'           SET FLAG
    027C B1 C6 35               312 GOSEEK LIO   DFCA45(,2),X'C6'          LOAD DCCR
    027F 7A 80 12               313        SBN   IOBWRK(,1),SKSTRT         SET SEEK STARTED BIT
    0282 78 02 13               314        TBN   IOBFL2(,1),X'02'          TEST FOR NO SEEK
    0285 F2 10 14               315        JT    CKRCL                     JUMP AROUND LIO OF DDCR
    0288 AD 00 10 1E            316        CLC   LASTSK(,2),COUNT+2(1,2)   SEE IF ON SAME CYLINDER
    028C F2 01 17               317        JNE   NONSEK                    NO - GO SEEK NEEDED
    028F F4 30 09               318        CCP   X'09',X'30' ######
    0292 3C 80 030E             319        MVI   LABL+1,X'80'              SET NO-OP IN BRANCH INSTRUCTION
    0296 F4 30 69               320        CCP   X'69',X'30' ######
    0299 F2 87 0A               321        J     NONSEK                    GO HEAD SWITCH IF POSSIBLE
    029C 79 F0 0F               322 CKRCL  TBF   IOBERR(,1),X'F0'          ANY RECALS
    029F C0 10 043F             323        BT    SEEKS1                    YES - DO NOT SEEK
    02A3 B1 C6 19               324        LIO   ADHA(,2),X'C6'            LOAD DDCR
    02A6 F4 30 29               325 NONSEK CCP   X'29',X'30' ######
    02A9 1C 00 02ED 07          326        MVC   SEEK45+1(1),IOBQB(,1)     SET UP DRIVE FOR SEEK
    02AE 3B 07 02ED             327        SBF   SEEK45+1,X'07'            SET BITS TO SEEK
    02B2 F4 30 09               328        CCP   X'09',X'30' ######
    02B5 0C 00 02E1 02ED        329        MVC   SNSERR+1(1),SEEK45+1      SET UP Q BYTE FOR SENSE
    02BB 0C 00 02E4 02ED        330        MVC   TS45ER+1(1),SEEK45+1      SET Q BYTE FOR TIO ERRORS
    02C1 0C 00 02FA 02ED        331        MVC   SNSNOP+1(1),SEEK45+1      SET UP Q BYTE FOR SENSE
    02C7 0C 00 02D2 02ED        332        MVC   CHSNS+1(1),SEEK45+1       SET UP TO SENSE              @03
    02CD 3A 05 02D2             333        SBN   CHSNS+1,X'05'             CAR AND HAR TO GET           @03
    02D1 B0 C5 12               334 CHSNS  SNS   PHYSCS(,2),X'C5'          ARRIVED AT HOME ADDRESS      @03
    02D4 F2 80 15               335 NOTST  JC    SEEK45,X'80'              BRANCH IF END OF CYLINDER
    02D7 F4 30 69               336        CCP   X'69',X'30' ######
    02DA 78 20 0E               337        TBN   IOBFLG(,1),X'20'          SEE IF NO LOG
    02DD F2 10 0C               338        JT    SEEK45                    YES - JUMP
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      $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4

ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          S/3 ASSEMBLER  13/07/07  PAGE   9

    02E0 70 C0 0D              339 SNSERR SNS   IOBSNS(,1),X'C0'          SENSE STATUS
    02E3 C1 C0 061E            340 TS45ER TIO   DIODER,X'C0'              SEE IF NOT READY
                         02E7  341 TRSK45 EQU   *
    02E7 C0 87 02EC            342        B     *+5                          BRANCH TO TRACE IF ACTIVE
    02EB F8              02EB  343        DC    AL1(248)                     TRACE TYPE
    02EC F3 C0 00              344 SEEK45 SIO   X'00',X'C0'               SEEK DRIVE 1
    02EF F4 30 09              345        CCP   X'09',X'30' ######
    02F2 3C 80 02D5            346        MVI   NOTST+1,X'80'               RESET
    02F6 F4 30 69              347        CCP   X'69',X'30' ######
    02F9 70 C0 0D              348 SNSNOP SNS   IOBSNS(,1),X'C0'          SENSE STATUS
    02FC 78 02 0C              349        TBN   IOBSNS-1(,1),X'02'          SEE IF SENSE NO-OPED
    02FF F2 90 07              350        JF    SEEKOK                      NO - JUMP
    0302 F3 C4 84              351        SIO   X'84',X'C4'                 RESET OP END INT CAUSED BY ERR
    0305 C0 87 0326            352        B     SRSSK                       GO RESET POSSIBLE SEEK       @08
                               353 *                                        INTERRUPT AND GO TO ERP      @08
    0309 AC 00 10 1E           354 SEEKOK MVC   LASTSK(1,2),COUNT+2(,2)   SET LAST SEEK
    030D C0 87 021A            355 LABL   B     RETN                        EXIT
    0311 F4 30 09              356        CCP   X'09',X'30' ######
    0314 3C 87 030E            357        MVI   LABL+1,X'87'                RESET NO - OP BRANCH
    0318 0C 00 0323 02ED       358        MVC   TSTIO+1,SEEK45+1(1)         SET Q CODE FOR TIO BUSY
    031E 3A 01 0323            359        SBN   TSTIO+1,X'01'               SET TEST FOR SEEK BUSY
    0322 C1 00 0322            360 TSTIO  TIO   TSTIO,X'00'                 TIO SEEK BUSY
    0326 F4 30 09              361 SRSSK  CCP   X'09',X'30' ######                                      @08
    0329 3C C0 0350            362        MVI   RSTSK+2,X'C0'               SET UP RESET D1 SEEK INTR.
    032D 39 18 02ED            363        TBF   SEEK45+1,X'18'              SEE IF D1 SEEK               @08
    0331 F2 10 1A              364        JT    RSTSK                       YES
    0334 3C A0 0350            365        MVI   RSTSK+2,X'A0'               SET UP RESET D2 SEEK INTR.
    0338 39 10 02ED            366        TBF   SEEK45+1,X'10'              SEE IF D2 SEEK               @08
    033C F2 10 0F              367        JT    RSTSK                       YES
    033F 3C 90 0350            368        MVI   RSTSK+2,X'90'               SET UP RESET D3 SEEK INTR.
    0343 39 08 02ED            369        TBF   SEEK45+1,X'08'              SEE IF D3 SEEK               @08
    0347 F2 10 04              370        JT    RSTSK                       YES
    034A 3C 88 0350            371        MVI   RSTSK+2,X'88'               SET UP RESET D4 SSEK INTR
    034E F3 C4 00              372 RSTSK  SIO   X'00',X'C4'                 ABSORB SEEK INTERRUPT
    0351 F4 30 69              373        CCP   X'69',X'30' ######
    0354 78 02 0C              374        TBN   IOBSNS-1(,1),X'02'          WAS BR TO SEEK EXECUTED ?    @08
    0357 C0 10 061E            375        BT    DIODER                      YES - GO TO ERP ROUTINE      @08
    035B F2 87 E1              376        J     SEEKS1                      SEE IF DATA CAN BE STARTED
    035E 38 01 0022            377 SEEK44 TBN   D44BSY,X'01'                SEE IF 5444 BUSY
    0362 C0 10 021A            378        BT    RETN                        YES - EXIT
                         0366  379 TRSK44 EQU   *
    0366 C0 87 036B            380        B     *+5                          BRANCH TO TRACE IF ACTIVE
    036A F8              036A  381        DC    AL1(248)                     TRACE TYPE
    036B 9C 02 0B 17           382        MVC   QNBYTE(3,2),IOBNB(,1)     PUT THIS CSN IN SAVE AREA Q END
    036F BC 00 08              383        MVI   QFBYTE(,2),NULL           INSURE FLAG BYTE OF ZERO
    0372 2C 02 0016 0A         384        MVC   WKSECT(3),QSBYTE(,2)      PUT THIS OP&S FCS TO DCF
    0377 9D 00 10 15           385        CLC   LASTSK(1,2),IOBCB(,1)     SEE IF ON SAME CYLINDER
    037B F2 01 5A              386        JNE   DSDIFF                      NO - JUMP
    037E 3C 00 0015            387        MVI   WKFCSN,X'00'                NULL SEEK N BYTE
    0382 31 A6 0019            388        LIO   DCFADR,INDFCR               LOAD DFCR
    0386 F4 30 29              389        CCP   X'29',X'30' ######
    0389 18 00 03AC 07         390        MZZ   STSENS+1,IOBQB(,1)        SET UP SENSE Q BYTE
    038E 18 00 03A9 07         391        MZZ   NOINT+1,IOBQB(,1)         SET UP Q BYTE FOR NO TRACK SEEK
    0393 18 00 03A5 07         392        MZZ   TSER44+1,IOBQB(,1)        SET UP Q BYTE FOR TIO ERROR
    0398 F4 30 69              393        CCP   X'69',X'30' ######
    039B 79 20 0E              394        TBF   IOBFLG(,1),X'20'            SET IF NO LOG
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      $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4

ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          S/3 ASSEMBLER  13/07/07  PAGE  10

    039E 78 10 07              395        TBN   IOBQB(,1),X'10'           SEE IF R1 OR F1 REQUEST
    03A1 F2 90 04              396        JF    NOINT                     YES
    03A4 C1 A0 061E            397 TSER44 TIO   DIODER,X'A0'              TEST FOR NOT READY
    03A8 F3 A0 00              398 NOINT  SIO   X'00',X'A0'              ISSUE FAKE SEEK
    03AB 70 A2 0D              399 STSENS SNS   IOBSNS(,1),X'A2'          SENSE STATUS
    03AE 78 10 0D              400        TBN   IOBSNS(,1),X'10'          SEE IF SEEK IS BUSY
    03B1 C0 10 03AB            401        BT    STSENS                    YES
    03B5 F4 30 09              402        CCP   X'09',X'30' ######
    03B8 3C 40 03D1            403        MVI   RELSE+2,X'40'             SET UP RESET OP SPINDLE 1 INT
    03BC F4 30 69              404        CCP   X'69',X'30' ######
    03BF 78 10 07              405        TBN   IOBQB(,1),X'10'           SEE IF SPINDLE 2 REQUEST
    03C2 F2 90 0A              406        JF    RELSE                     NO - JUMP
    03C5 F4 30 09              407        CCP   X'09',X'30' ######
    03C8 3C 20 03D1            408        MVI   RELSE+2,X'20'             SET UP RESET OP SPINDLE 2 INT
    03CC F4 30 69              409        CCP   X'69',X'30' ######
    03CF F3 A4 40              410 RELSE  SIO   X'40',X'A4'              RELEASE SEEK INTERRUPT
    03D2 7A 80 12              411        SBN   IOBWRK(,1),SKSTRT         SET SEEK COMPLETE
    03D5 F2 87 67              412        J     SEEKS1                    GO START DATA OPERATION
    03D8 2C 00 0015 10         413 DSDIFF MVC   WKFCSN(1),LASTSK(,2)      CALCULATE SEEK NR OF CYLINDRS
    03DD 3B 03 0016            414        SBF   WKSECT,DIRECT             ASSURE DIRECTION BIT IS ZERO
    03E1 0F 00 0014 0017       415        SLC   WKFCSD(1),WKFCYL          CALC SEEK DIFFERENCE
    03E7 F2 02 0F              416        JNL   DSPLUS                    DIFFERENCE IS POSITIVE
    03EA 0C 00 0014 0017       417        MVC   WKFCSD(1),WKFCYL          MOVE C INTO D OF DCF
    03F0 2F 00 0014 10         418        SLC   WKFCSD(1),LASTSK(,2)      SUB LAST SEEK C ADDR FROM NEW C
    03F5 3A 01 0016            419        SBN   WKSECT,FORWRD             SET DIRECTION BIT TO FORWARD
                       03F9    420 DSPLUS EQU   *
    03F9 F4 30 29              421        CCP   X'29',X'30' ######
    03FC 31 A6 0019            422        LIO   DCFADR,INDFCR             LOAD DFCR WITH PTR TO DCF
    0400 18 00 0423 07         423        MZZ   DSP2+1,IOBQB(,1)          SET UP SPINDLE FOR SEEK
    0405 18 00 041F 07         424        MZZ   SPNTST+1,IOBQB(,1)        SET UP TIO NOT READY
    040A 18 00 042D 07         425        MZZ   TSIOER+1,IOBQB(,1)        SET UP TIO AFTER SEEK
    040F F2 80 10              426 JMPEOC JC    DSP2,X'80'                BRANCH IF EOC
    0412 F4 30 69              427        CCP   X'69',X'30' ######
    0415 79 20 0E              428        TBF   IOBFLG(,1),X'20'          SEE IF NO DLOG
    0418 78 10 07              429        TBN   IOBQB(,1),X'10'           SEE IF R1 OR F1 REQUEST
    041B F2 90 04              430        JF    DSP2                      YES
    041E C1 A0 061E            431 SPNTST TIO   DIODER,X'A0'              TEST FOR NOT READY
    0422 F3 00 00              432 DSP2   SIO   X'00',X'00'              SEEK SPINDLE
    0425 F4 30 09              433        CCP   X'09',X'30' ######
    0428 3C 80 0410            434        MVI   JMPEOC+1,X'80'            RESET EOC JUMP
    042C C1 A0 061E            435 TSIOER TIO   DIODER,X'A0'              TEST FOR NO-OP DUE TO SEEK ERR
    0430 F4 30 69              436        CCP   X'69',X'30' ######
    0433 8C 00 10 0017         437        MVC   LASTSK(1,2),WKFCYL        SAVE THIS CYCLINDER NUMBER
    0438 7A 80 12              438        SBN   IOBWRK(,1),SKSTRT         INDICATE SEEK HAS BEEN STARTED
    043B C0 87 0000            439 SAVARR B     *-*                       RETURN ON ARR

    043F 78 C0 07              441 SEEKS1 TBN   IOBQB(,1),X'C0'           SEE IF 5445 ?
    0442 F2 90 0A              442        JF    ATT44                     NO - JUMP
    0445 38 01 0023            443        TBN   D45BSY,X'01'              SEE IF 5445 BUSY
    0449 F2 90 14              444        JF    ANYDAT                    CONTINUE IF 5445 NOT BUSY
    044C F2 87 07              445        J     BSYRSD                    GO SEE IF BUSY DUE TO RESIDUALS
    044F 38 01 0022            446 ATT44  TBN   D44BSY,X'01'              SEE IF 5444 BUSY
    0453 F2 90 0A              447        JF    ANYDAT                    NO - CONTINUE
    0456 B8 08 15              448 BSYRSD TBN   QSTATS(,2),X'08'          SEE IF BUSY BECAUSE OF RESIDUALS
    0459 BB 08 15              449        SBF   QSTATS(,2),X'08'          RESET
    045C C0 90 021A            450        BF    RETN                      BUSY - EXIT
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    0460 79 03 07              451 ANYDAT TBF   IOBQB(,1),SEEK            SEEK ONLY COMMAND ?
    0463 34 02 0021            452        ST    SAVR2,XR2                 SAVE QUEUE POINTER
    0467 C0 10 00C5            453        BT    DSDONE                    YES - SET UP GOOD COMPLETION
                               454 * !!!! TBN   IOBWRK(,1),SKSTRT         HAS DATA TRANSFER BEEN STARTED ?
    046B F2 87 04              455        J     DSDATA                !!!! BYPASS FOR WAIT AFTER SEEK PROB.
    046E C0 10 021A            456        BT    RETN                      YES - EXIT

                         0472  458 DSDATA EQU   *
    0472 78 C0 07              459        TBN   IOBQB(,1),X'C0'           SEE IF 5445 ?
    0475 F2 90 69              460        JF    DATA44                    NO - JUMP
    0478 C0 87 0008            461        B     LIOCON                    GO TO LIO TRANSLATE ROUTINE
    047C 31 C4 0001            462        LIO   LIOSAV,X'C4'              LOAD ADDRESS OF DATA INTO DDDR
    0480 78 20 13              463        TBN   IOBFL2(,1),X'20'          MULTI TRACK OPERATION ?
    0483 7B 20 13              464        SBF   IOBFL2(,1),X'20'          RESET
    0486 F2 90 07              465        JF    TESALT                    NU MULTI TRACK TO OR FROM ALT
    0489 F4 30 00              466 CCPSET CCP   #,X'30'     ######        SET PMR FOR RESIDUAL
    048C 31 C4 000D            467        LIO   DDAREA,X'C4'           LOAD DDDR FROM RESIDUAL SAVE AREA
    0490 F4 30 69              468 TESALT CCP   X'69',X'30' ######        INSURE I/O > 64K BIT OFF IN PMR
    0493 78 01 0E              469        TBN   IOBFLG(,1),X'01'          SEE IF ALTERNATE TRACK
    0496 7B 01 0E              470        SBF   IOBFLG(,1),X'01'          RESET
    0499 F2 90 04              471        JF    DSSKIP                    GO START OPERATION
    049C AC 03 20 2A           472        MVC   COUNT+4(4,2),HAFLD+4(,2)  MOVE IN LOGICAL ADDRESS
    04A0 F4 30 29              473 DSSKIP CCP   X'29',X'30' ######
    04A3 1C 01 04C1 08         474        MVC   START+2(2),IOBRB(,1)      MOVE Q AND R BYTE INTO SIO
    04A8 F4 30 69              475        CCP   X'69',X'30' ######
    04AB 7D 02 08              476        CLI   IOBRB(,1),X'02'           SEE IF READ CKD
    04AE F2 01 06              477        JNE   LOADIO                    GO DO LIO OF DDCR
    04B1 78 02 07              478        TBN   IOBQB(,1),X'02'           SEE IF READ CKD
    04B4 F2 90 08              479        JF    START                     GO START I/O
    04B7 B1 C6 35              480 LOADIO LIO   DFCA45(,2),X'C6'          LOAD DDCR
                         04BA  481 TRDT45 EQU   *
    04BA C0 87 04BF            482        B     *+5                          BRANCH TO TRACE IF ACTIVE
    04BE F8              04BE  483        DC    AL1(248)                     TRACE TYPE
    04BF F3 00 00              484 START  SIO   #,#                       START 5445 I/O OPERATION
    04C2 3A 01 0023            485        SBN   D45BSY,X'01'              SET 5445 BUSY BIT
    04C6 7B 04 13              486        SBF   IOBFL2(,1),X'04'          SET OFF NO LIO INDICATOR
    04C9 F4 30 09              487        CCP   X'09',X'30' ######
    04CC 34 02 0020            488        ST    QPTR45,XR2                STORE QUEUE OF LAST DATA XFER
    04D0 34 02 055D            489        ST    SAVXR2+3,XR2              SAVE QUEUE POINTER
    04D4 F4 30 69              490        CCP   X'69',X'30' ######
    04D7 7A 30 12              491        SBN   IOBWRK(,1),DTPND+DXFRST   INDICATE OPERATION STARTED
    04DA C2 02 000E            492        LA    SIOCT,2                   POINT TO SIO TABLE
    04DE F2 87 53              493        J     UPDATE                    GO UPDATE SIO COUNTERS
                         04E1  494 DATA44 EQU   *
    04E1 2C 03 0015 0B         495        MVC   WKFCSN(4),QNBYTE(,2)      SET UP CSN FOR START I/O
    04E6 78 10 0E              496        TBN   IOBFLG(,1),WRITID         IS THIS A WRITE ID REQUEST ?
    04E9 F2 90 05              497        JF    DSCHEK                    NO - JUMP
    04EC 1C 02 0016 1A         498        MVC   WKSECT(3),WRIDSB(,1)      MOVE ID FCS BYTES TO DCF
    04F1 C0 87 0008            499 DSCHEK B     LIOCON                    GO DO TRANSLATE ON IOB
    04F5 31 A4 0001            500        LIO   LIOSAV,INDFDR             LOAD ADDR OF DATA INTO DFDR
    04F9 78 04 13              501        TBN   IOBFL2(,1),NOLIO          CHECK IF LOAD I/O DFDR DESIRED
    04FC F2 90 06              502        JF    SKLIO                     NO - JUMP AROUND
    04FF F4 30 00              503 CCP44  CCP   #,X'30'     ######     INSURE PROPER > 64K SETTING IN PMR
    0502 71 A4 0D              504        LIO   IOBSNS(,1),X'A4'           LOAD 5444 DFDR FROM RESIDUAL
    0505 F4 30 29              505 SKLIO  CCP   X'29',X'30' ######
    0508 1C 01 0517 08         506        MVC   DS88+2(2),IOBRB(,1)       MOVE Q AND R BYTE INTO SIO
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    050D F4 30 69               507        CCP   X'69',X'30' ######
                          0510  508 TRDT44 EQU   *
    0510 C0 87 0515             509        B     *+5                        BRANCH TO TRACE IF ACTIVE
    0514 F8                   0514  510        DC    AL1(248)                   TRACE TYPE
    0515 F3 00 00               511 DS88   SIO   #,#                      START 5444 I/O OPERATION
    0518 3A 01 0022             512        SBN   D44BSY,X'01'             SET 5444 BUSY BIT
    051C 7A 30 12               513        SBN   IOBWRK(,1),DTPND+DXFRST  INDICATE OPERATION STARTED
    051F 7B 04 13               514        SBF   IOBFL2(,1),NOLIO         TURN OFF NO LOAD I/O DFDR FLAG
    0522 34 02 0011             515        ST    QUEPTR,XR2               STORE LAST DISK QUEUE
                          0002  516        DROP  2
    0526 F4 30 09               517        CCP   X'09',X'30' ######
    0529 34 02 055D             518        ST    SAVXR2+3,XR2             SAVE QUEUE POINTER
    052D F4 30 69               519        CCP   X'69',X'30' ######
    0530 C2 02 0009             520        LA    SIOTAB,2                 GET POINTER TO START I/O TABLE
    0534 78 10 07               521 UPDATE TBN   IOBQB(,1),X'10'          SEE IF SPINDLE 2
    0537 F2 90 03               522        JF    DSA                      NO - JUMP
    053A E2 02 10               523        LA    16(,2),2                 POINT TO SPINDLE 2 COUNTERS
    053D 78 08 07               524 DSA    TBN   IOBQB(,1),X'08'          IS THIS SIO FOR FIXED PACK ?
    0540 F2 90 03               525        JF    DSWRIT                   NO - JUMP
    0543 E2 02 08               526        LA    8(,2),2                  POINT REG 2 TO FIXED PACK COUNTERS
    0546 79 01 07               527 DSWRIT TBF   IOBQB(,1),WRITOP         IS THIS SIO A WRITE ?
    0549 F2 10 09               528        JT    DSA00                    YES
    054C 78 03 08               529        TBN   IOBRB(,1),VERIFY         IS THIS SIO A VERIFY ?
    054F F2 10 08               530        JT    SAVXR2                   YES
    0552 E2 02 04               531        LA    4(,2),2                  POINT REG2 TO NON-WRITE COUNTER
    0555 8E 03 03 001A          532 DSA00  ALC   3(4,2),ONE               ADD THIS START I/O TO COUNTER
    055A C2 02 0000             533 SAVXR2 LA    *-*,XR2                  RESTORE QUEUE POINTER
    055E C0 87 021A             534        B     RETN                     RETURN
                          0562  535 DSOUT  EQU   *
    0562 F4 30 68               536        CCP   X'68',X'30' ######       SET MASK INTERRUPTS BIT OFF
    0565 C0 87 0007             537        B     NMIOOE                   EXIT INTERRUPT LEVEL 5
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      $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4
ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          S/3 ASSEMBLER  13/07/07  PAGE  13
                            539 ***************************************************************
                            540 *      CLOSED SUBROUTINE TO DEQUEUE IOB'S                     *
                            541 ***************************************************************

                       0569  543 IODEQ  EQU   *                          DATA OP-END INT ENTRY POINT
    0569 F4 30 09           544         CCP   X'09',X'30' ######
    056C 34 08 0592         545         ST    RETURN+3,ARR               SAVE RETURN ADDRESS
    0570 34 01 058E         546         ST    RSTXR1+3,XR1               SAVE REGISTER 1
    0574 F4 30 69           547         CCP   X'69',X'30' ######
    0577 B5 01 01           548         L     FIRST@(,2),XR1             POINT TO FIRST TABLE ELEMENT
    057A 9C 01 01 01        549         MVC   FIRST@(2,2),NEXT@(,1)      DEQUEUE IOB
    057E 7C 00 02           550         MVI   TCB@-1(,1),X'00'           SET TCB@ EQUAL TO ZERO
    0581 BD 00 00           551         CLI   FIRST@-1(,2),X'00'         IS THE QUEUE EMPTY
    0584 F2 01 04           552         JNE   RSTXR1                     NO - JUMP
    0587 AC 01 03 01        553         MVC   LAST@(2,2),FIRST@(,2)      REINITIALIZE QUEUE
    058B C2 01 0000         554 RSTXR1  LA    *-*,XR1                    RESTORE REGISTER 1
    058F C0 87 0000         555 RETURN  B     *-*                        RETURN TO CALLER
                       0001  556 FIRST@  EQU   X'01'
                       0003  557 LAST@   EQU   X'03'
                       0001  558 NEXT@   EQU   X'01'
                       0003  559 TCB@    EQU   X'03'
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                                561 ***************************************************************
                                562 *      5445 OP-END INTERRUPT HANDLING ROUTINE                 *
                                563 ***************************************************************

                          0593  565 DKOP45 EQU   *                       5445 OP-END INT ENTRY POINT
    0593 F4 30 09               566         CCP   X'09',X'30' ######      INSURE I/O > 64K BIT OFF IN PMR
    0596 0C 01 021D 001F        567         MVC   RETN+3,ADRETN(2)        SET UP RETURN ADDR
    059C 30 C0 0012             568         SNS   INDK44,X'C0'            SENSE INTERRUPT STATUS
    05A0 38 08 0012             569         TBN   INDK44,X'08'            SEE IF DATA OP END INTERRUPT
    05A4 F2 90 3A               570         JF    SKND45                  NO
    05A7 F3 C4 84               571         SIO   X'84',X'C4'             RESET DATA OP END INTERRUPT
    05AA 3B 01 0023             572         SBF   D45BSY,X'01'            RESET 5445 BUSY BIT
    05AE 35 02 0020             573         L     QPTR45,XR2              SET REG 2 AT LAST DATA OP QUEUE
    05B2 C0 87 000C             574         B     GETIOB                  GET FIRST IOB ON QUEUE
                          05B6  575 TROP45 EQU   *
    05B6 C0 87 05BB             576         B     *+5                        BRANCH TO TRACE IF ACTIVE
    05BA F5                05BA 577         DC    AL1(245)                   TRACE TYPE
    05BB F4 30 29               578         CCP   X'29',X'30' ######
    05BE 1C 00 05CB 07          579         MVC   TEST1+1(1),IOBQB(,1)    SET UP Q BYTE FOR SENSE ERRORS
    05C3 3B 07 05CB             580         SBF   TEST1+1,X'07'           SET Q BYTE
    05C7 F4 30 69               581         CCP   X'69',X'30' ######
    05CA 70 C0 0D               582 TEST1   SNS   IOBSNS(,1),X'C0'        STORE STATUS
    05CD F4 30 09               583         CCP   X'09',X'30' ######      INSURE I/O > 64K BIT OFF IN PMR
    05D0 0C 00 05DA 05CB        584         MVC   TEST2+1(1),TEST1+1      SET UP TIO ERRORS
    05D6 F4 30 69               585         CCP   X'69',X'30' ######
    05D9 C1 C0 061E             586 TEST2   TIO   DIODER,X'C0'            TEST FOR NOT READY/ERRORS
    05DD C0 87 00A4             587         B     DTOPND                  NO ERRORS
    05E1 C2 02 000B             588 SKND45  LA    DIODQ2,XR2              POINT TO D1 QUEUE
    05E5 38 20 0012             589         TBN   INDK44,X'20'            SEE IF SEEK D1 COMPLETE
    05E9 F2 90 06               590         JF    S45D2                   NO - GO CHECK D2
    05EC F3 C4 C0               591         SIO   X'C0',X'C4'             SET UP RESET D1 SEEK INTERRUPT
    05EF F2 87 28               592         J     GOGET                   GET IOB
    05F2 B5 02 0F               593 S45D2   L     NXTQUE(,2),XR2          POINT TO D2 QUEUE
    05F5 38 10 0012             594         TBN   INDK44,X'10'            SEE IF SEEK D2 COMPLETE
    05F9 F2 90 06               595         JF    S45D3                   NO - GO CHECK D3
    05FC F3 C4 A0               596         SIO   X'A0',X'C4'             SET UP RESET D2 SEEK INTERRUPT
    05FF F2 87 18               597         J     GOGET                   GET IOB
    0602 B5 02 0F               598 S45D3   L     NXTQUE(,2),XR2          POINT TO D3 QUEUE
    0605 B0 C1 17               599         SNS   INT45(,2),X'C1'         SENSE BYTES 2 AND 3
    0608 B8 C1 16               600         TBN   INT45-1(,2),X'C1'       SEE IF SEEK D3 COMPLETE
    060B F2 90 06               601         JF    S45D4                   NO - GO CHECK D4
    060E F3 C4 90               602         SIO   X'90',X'C4'             SET UP RESET D3 SEEK INTERRUPT
    0611 F2 87 06               603         J     GOGET                   GET IOB
    0614 B5 02 0F               604 S45D4   L     NXTQUE(,2),XR2          POINT TO D4 QUEUE
    0617 F3 C4 88               605         SIO   X'88',X'C4'             SET UP RESET D4 SEEK INTERRUPT
    061A C0 87 0085             606 GOGET   B     GET                     D4 SEEK INTERRUPT
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ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          S/3 ASSEMBLER  13/07/07  PAGE  15

                           608 ************************************************************
                           609 *      ERROR RECOVERY PROCEDURES                           *
                           610 ************************************************************

                     061E  612 DIODER EQU   *
    061E F4 30 69          613        CCP   X'69',X'30' ######
    0621 7C 02 09          614        MVI   IOBEID(,1),X'02'          SET UP ID FOR DLOG
    0624 78 C0 07          615        TBN   IOBQB(,1),X'C0'           SEE IF 5445
    0627 C0 90 07EE        616        BF    ERP44
    062B 79 FF 0F          617        TBF   IOBERR(,1),X'FF'          ANY ERRORS ?
    062E F2 90 04          618        JF    GOTEST                    YES
    0631 9C 01 0D 0D       619        MVC   QSENSE(2,2),IOBSNS(,1)    MOVE SENSE BYTES INTO QUEUE
                     0635  620 GOTEST EQU   *
    0635 34 02 0020        621        ST    QPTR45,XR2                STORE POINTER TO QUEUE
    0639 F4 30 09          622        CCP   X'09',X'30' ######
    063C 30 C4 000D        623        SNS   DDAREA,X'C4'              SAVE RESIDUAL DDDR
    0640 3E 40 0028        624        SCP   PMRSAV,X'40'              SAVE PMR
    0644 0C 00 048B 0028   625        MVC   CCPSET+2(1),PMRSAV        SET PMR FOR RESIDUAL
    064A F4 30 29          626        CCP   X'29',X'30' ######                                  @03
    064D 1C 00 065E 07     627        MVC   CAHRSN+1(1),IOBQB(,1)     SET UP TO                 @03
    0652 3B 07 065E        628        SBF   CAHRSN+1,X'07'            SENSE CAR, HAR            @03
    0656 3A 05 065E        629        SBN   CAHRSN+1,X'05'            TO ARRIVE AT HOME ADDRESS  @03
    065A F4 30 69          630        CCP   X'69',X'30' ######        INSURE > 64K BIT OFF IN PMR  @03
    065D B0 C5 09          631 CAHRSN SNS   QCHR(,2),X'C5'            SENSE CAR, HAR
    0660 34 02 0021        632        ST    SAVR2,XR2                 SAVE REGISTER 2
    0664 35 02 0011        633        L     SYSC@,XR2                 GET POINTER TO SYSCOM
    0668 B8 10 2F          634        TBN   NCCONF(,2),X'10'          SEE IF D3 OR D4 ARE SUPPORTED
    066B F2 90 0B          635        JF    SNDRV1                    DO NOT SENSE FOR D3
    066E 30 03 0024        636        SNS   STAT67,X'03'              SENSE BYTES 6, 7 FOR D3
    0672 38 01 0024        637        TBN   STAT67,X'01'              SEE IF START/STOP SW ON FOR D3
    0676 F2 90 24          638        JF    ATTNIO                    NO - SCHEDULE I/O ATTN MESSAGE
    0679 30 C3 0024        639 SNDRV1 SNS   STAT67,X'C3'              SENSE BYTES 6, 7 FOR D1
    067D 38 01 0024        640        TBN   STAT67,X'01'              SEE IF START/STOP SW ON FOR D1
    0681 F2 90 19          641        JF    ATTNIO                    NO - SCHEDULE I/O ATTN MESSAGE
    0684 35 02 0021        642        L     SAVR2,XR2                 RESTORE REGISTER 2
    0688 7B 20 13          643        SBF   IOBFL2(,1),X'20'          INSURE NO LIO OF DDDR IS OFF
                     068B  644 OUT    EQU   *                         CONTINUE
    068B 79 BD 0C          645 CARHAR TBF   IOBSNS-1(,1),X'BD'        TRKOVL,MAM,DC,NRF,OVRN,EQ CHK ?
    068E F2 90 A4          646        JF    DEACT4                    YES - GO TO ACTION 4
    0691 79 80 0D          647        TBF   IOBSNS(,1),X'80'          DISK DRIVE FILE ERROR
    0694 F2 90 2B          648        JF    DEACT6                    YES - GO TO ACTION 6
    0697 78 04 0D          649        TBN   IOBSNS(,1),X'04'          END OF CYLINDER ?
    069A F2 10 6C          650        JT    DEACT5                    YES - GO TO ACTION 5
    069D 35 02 0021        651 ATTNIO L     SAVR2,XR2                 RESTORE REGISTER 2
    06A1 78 20 0E          652        TBN   IOBFLG(,1),X'20'          SEE IF NO LOG
    06A4 F2 90 04          653        JF    DCSWIT                    NO
    06A7 C0 87 0983        654        B     DEACT1                    GO INDICATE PERM ERROR
    06AB F4 30 09          655 DCSWIT CCP   X'09',X'30' ######
    06AE 3C 80 01A1        656        MVI   SWITCH+1,X'80'            SET SWITCH TO CALL LOG
    06B2 F4 30 69          657        CCP   X'69',X'30' ######
    06B5 7A 40 0C          658        SBN   IOBSNS-1(,1),X'40'        SET ON I/O ATTENTION BIT
    06B8 BA 40 15          659        SBN   QSTATS(,2),X'40'          SET QUEUE HELD BIT
    06BB BA 40 0C          660        SBN   QSENSE-1(,2),X'40'        SET ON I/O ATTENTION BIT
    06BE C0 87 0169        661        B     DQATTN                    GO SCHEDULE ERP FOR I/O ATTN MSG
                     06C2  662 DEACT6 EQU   *
    06C2 F4 30 49          663        CCP   X'49',X'30' ######
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    06C5 4E 00 0F 08CF          664        ALC   IOBERR(,1),SIXTN          BUMP ENTRY BY 16
    06CA F4 30 69               665        CCP   X'69',X'30' ######
    06CD C0 A0 0983             666 DACT6A BOL   DEACT1                    GO INDICATE PERM ERROR
    06D1 78 C0 07               667        TBN   IOBQB(,1),X'C0'          SEE IF 5445
    06D4 C0 90 08D5             668        BF    ACT644                    NO - BRANCH
    06D8 F4 30 29               669        CCP   X'29',X'30' ######
    06DB 1C 00 06E5 07          670        MVC   RECLB+1(1),IOBQB(,1)      SET UP CORRECT DRIVE FOR RECAL.
    06E0 3B 07 06E5             671        SBF   RECLB+1,X'07'             INSURE RECAL Q BYTE
    06E4 F3 C0 01               672 RECLB  SIO   X'01',X'C0'               ISSUE A RECALIBRATE
    06E7 F4 30 09               673        CCP   X'09',X'30' ######
    06EA 0C 00 06FB 06E5        674        MVC   TESTIO+1(1),RECLB+1       SET UP WAIT ON SEEK BUSY
    06F0 3A 01 06FB             675        SBN   TESTIO+1,X'01'            SET BUSY Q CODE
    06F4 F4 30 69               676        CCP   X'69',X'30' ######
    06F7 7C 00 10               677        MVI   LASTSK(,1),X'00'          SET LAST SEEK TO CYL 0
    06FA C1 C1 06FA             678 TESTIO TIO   *,X'C1'                    WAIT ON BUSY
    06FE F3 C4 F8               679        SIO   X'F8',X'C4'               RESET SEEK OP END INT FOR RECAL
    0701 3B 01 0023             680        SBF   D45BSY,X'01'              SET 5445 BUSY OFF
    0705 C0 87 096C             681        B     DESET                     GO RETRY
                          0709  682 DEACT5 EQU   *                         END OF CYL 5445
    0709 BD 01 1C               683        CLI   COUNT(,2),X'01'           SEE IF ON ALT
    070C F2 01 06               684        JNE   ADCYL                     NO - TRUE EOC
    070F BD 13 20               685        CLI   COUNT+4(,2),X'13'         SEE IF REALLY END OF LOGICAL CYL
    0712 F2 04 9E               686        JNH   ENDALT                    NO - END OF ALTERNATE CYLINDER ?
    0715 8E 02 20 001D          687 ADCYL  ALC   COUNT+4(3,2),CYLADD       BUMP DISK ADDRESS X'00FFEC'
    071A 7A A0 13               688        SBN   IOBFL2(,1),X'A0'          SET FLAG FOR END OF CYLINDER
                                689 *                                      AND SET NO LIO OF DDDR
    071D 7B B0 12               690        SBF   IOBWRK(,1),X'B0'          RESET PARTIAL COMPLETION CODE
    0720 3A 01 0023             691        SBN   D45BSY,X'01'              SET 5445 BUSY
    0724 BA 08 15               692        SBN   QSTATS(,2),X'08'          SET BUSY BECAUSE OF RESIDUALS
    0727 F4 30 09               693        CCP   X'09',X'30' ######
    072A 3C 87 02D5             694        MVI   NOTST+1,X'87'             JUMP AROUND TEST FOR ERRORS
    072E F4 30 69               695        CCP   X'69',X'30' ######        INSURE > 64K BIT OFF IN PMR
    0731 C0 87 0252             696        B     TSTCYL                    GO EXECUTE REQUEST
                          0735  697 DEACT4 EQU   *                         ACTION 4 ON 5445
    0735 78 80 0E               698        TBN   IOBFLG(,1),X'80'          NO ERP
    0738 C0 10 0983             699        BT    DEACT1                    GO SET PERM ERROR
    073C B1 C6 19               700        LIO   ADHA(,2),X'C6'            LOAD DDCR
    073F B1 C4 1B               701        LIO   ADR0(,2),X'C4'            LOAD DDCR
    0742 B0 C1 0B               702        SNS   SNS23(,2),X'C1'           SENSE BYTES 2 AND 3
    0745 F4 30 09               703        CCP   X'09',X'30' ######
    0748 3C C0 07A3             704        MVI   ERRORS+1,X'C0'            SET UP Q FOR ERROR TEST
    074C 3C C1 0796             705        MVI   STRT+1,X'C1'              SET UP Q D1 SIO
    0750 F4 30 69               706        CCP   X'69',X'30' ######
    0753 79 18 07               707        TBF   IOBQB(,1),X'18'           SEE IF DRIVE 1
    0756 F2 10 3C               708        JT    STRT                      YES
    0759 B0 C9 0B               709        SNS   SNS23(,2),X'C9'           SENSE BYTES 2 AND 3
    075C F4 30 09               710        CCP   X'09',X'30' ######
    075F 3C C8 07A3             711        MVI   ERRORS+1,X'C8'            SET UP Q FOR ERROR TEST
    0763 3C C9 0796             712        MVI   STRT+1,X'C9'              SET UP Q D2 SIO
    0767 F4 30 69               713        CCP   X'69',X'30' ######
    076A 79 08 07               714        TBF   IOBQB(,1),X'08'           SEE IF DRIVE 2
    076D F2 10 25               715        JT    STRT                      YES
    0770 B0 D1 0B               716        SNS   SNS23(,2),X'D1'           SENSE BYTES 2 AND 3
    0773 F4 30 09               717        CCP   X'09',X'30' ######
    0776 3C D0 07A3             718        MVI   ERRORS+1,X'D0'            SET UP Q FOR ERROR TEST
    077A 3C D1 0796             719        MVI   STRT+1,X'D1'              SET UP Q D3 SIO
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    077E F4 30 69               720        CCP   X'69',X'30' ######
    0781 79 10 07               721        TBF   IOBQB(,1),X'10'           SEE IF DRIVE 3
    0784 F2 10 0E               722        JT    STRT                       YES
    0787 B0 D9 0B               723        SNS   SNS23(,2),X'D9'            SENSE BYTES 2 AND 3
    078A F4 30 09               724        CCP   X'09',X'30' ######
    078D 3C D8 07A3             725        MVI   ERRORS+1,X'D8'             SET UP Q FOR ERROR TEST
    0791 3C D9 0796             726        MVI   STRT+1,X'D9'               SET UP Q D4 SIO
    0795 F3 00 01               727 STRT   SIO   X'01',X'00'                ISSUE READ HA AND R0 COMMAND
    0798 C1 C2 0798             728        TIO   *,X'C2'                    WAIT ON BUSY
    079C F3 C4 84               729        SIO   X'84',X'C4'                RESET OP END INT FOR READ HA&R0
    079F F4 30 69               730        CCP   X'69',X'30' ######
    07A2 C1 C0 06C2             731 ERRORS TIO   DEACT6,X'C0'               TEST FOR ERRORS              @06
    07A6 78 02 13               732        TBN   IOBFL2(,1),X'02'           SEE IF NO SEEK COMMAND
    07A9 C0 10 08C6             733        BT    DEACT7                     YES - GO RETRY
    07AD B8 01 1C               734        TBN   COUNT(,2),X'01'            SEE IF ALT TRACK
    07B0 F2 90 15               735        JF    DE5554                     NO - JUMP
    07B3 AD 03 20 2F            736 ENDALT CLC   COUNT+4(4,2),ROFLD+4(,2)   SEE IF ON SAME ALT TRACK
    07B7 C0 81 08C6             737        BE    DEACT7                     YES - RETRY
    07BB BC 00 1C               738        MVI   COUNT(,2),X'00'            SET FLAG TO 00
    07BE BD 13 20               739        CLI   COUNT+4(,2),X'13'          SEE IF END OF LOGICAL CYLINDER
    07C1 F2 04 19               740        JNH   DE5557                     NO - CONTINUE
    07C4 C0 87 0715             741        B     ADCYL                      GO TO END OF CYLINDER ACTION
    07C8 AC 00 1C 2B            742 DE5554 MVC   COUNT(1,2),ROFLD(,2)       SET FLAG
    07CC AD 00 28 2D            743        CLC   HAFLD+2(1,2),ROFLD+2(,2)   SEE IF CYL SAME
    07D0 F2 81 F3               744        JE    DEACT7                     YES - GO RETRY
    07D3 BC 01 1C               745        MVI   COUNT(,2),X'01'            SET FLAG TO INDICATE ON ALT TRK
    07D6 AC 03 20 2F            746        MVC   COUNT+4(4,2),ROFLD+4(,2)   SET CYL AND HEAD
    07DA 7A 01 0E               747        SBN   IOBFLG(,1),X'01'           SET FLAG TO INDICATE ON ALT TRK
    07DD 7A 20 13               748 DE5557 SBN   IOBFL2(,1),X'20'           SET LIO DDDR FROM RESIDUAL DDDR
    07E0 7B B0 12               749        SBF   IOBWRK(,1),X'B0'           RESET COMPLETION CODE
    07E3 3A 01 0023             750        SBN   D45BSY,X'01'               SET 5445 BUSY
    07E7 BA 08 15               751        SBN   QSTATS(,2),X'08'           SET BUSY BECAUSE OF RESIDUALS
    07EA C0 87 027C             752        B     GOSEEK                     GO SEEK
    07EE F3 A4 02               753 ERP44  SIO   X'02',X'A4'               DISABLE 5444 INTERRUPTS
    07F1 F4 30 29               754        CCP   X'29',X'30' ######
    07F4 2C 00 087A 0B          755        MVC   DECLI,QNBYTE(1,2)          SAVE ORIGINAL N BYTE
    07F9 18 00 0802 07          756        MZZ   SN44ST+1,IOBQB(,1)         SET UP Q FOR SENSE STATUS
    07FE F4 30 69               757        CCP   X'69',X'30' ######
    0801 70 A2 0D               758 SN44ST SNS   IOBSNS(,1),X'A2'           SENSE STATUS
    0804 9C 01 0D 0D            759        MVC   QSENSE(2,2),IOBSNS(,1)     SAVE SENSE INFO ON QUEUE
    0808 78 10 0C               760        TBN   IOBSNS-1(,1),EQPCK         EQUIPMENT CHECK ?
    080B C0 10 095A             761        BT    DEACT2                     YES - DO ACTION 2
                                762 *
                                763 *      THE FOLLOWING TEST/JUMP HAS BEEN CHANGED FROM JUMP TO DEACT8
                                764 *      BECAUSE OF INVALID END OF CYLINDER INDICATIONS
                                765 *
    080F 79 40 0C               766        TBF   IOBSNS-1(,1),INTREQ        INTERVENTION REQUIRED ?
    0812 F2 10 14               767        JT    CHKERR                     NO - GO CHECK FOR OTHER ERRORS
    0815 F3 A4 80               768        SIO   X'80',X'A4'                ENABLE INTERRUPTS
    0818 78 20 0E               769        TBN   IOBFLG(,1),X'20'           NO LOGGING                   @05
    081B F2 10 A8               770        JT    DEACT7                     YES - DRIVE WAS READY AT SIO
                                771 *                                       TIME THEN DROPPED, GO TO RESTART
    081E F4 30 09               772        CCP   X'09',X'30' ######
    0821 3C 80 01A1             773        MVI   SWITCH+1,X'80'             SET SWITCH TO GET TO ERP TASK
    0825 C0 87 0185             774        B     MOVE44                     GO DEQUEUE IOB
    0829 8C 03 0B 0014          775 CHKERR MVC   QNBYTE(4,2),WKFCSD         SAVE RESIDUAL FCSN
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    082E 79 0C 0C               776        TBF   IOBSNS-1(,1),NORECF+DATACK  NO RECORD FOUND OR DATA CK ?
    0831 79 04 0D               777        TBF   IOBSNS(,1),OVERUN          OVERUN ?
    0834 F2 90 0A               778        JF    ACT444                     YES - DO ACTION 4
    0837 79 81 0C               779        TBF   IOBSNS-1(,1),SEEKCK+IONOP SEEK CK OR NOOP ?
    083A C0 90 06C2             780        BF    DEACT6                     YES - DO ACTION 6
    083E F2 87 C5               781        J     ACT544                     END OF CYLINDER, DO ACTION 5

                                783 *            ACTION 4

                         0841   785 ACT444 EQU   *
    0841 78 80 0E               786        TBN   IOBFLG(,1),NOERP
    0844 C0 10 0983             787        BT    DEACT1

                                789 *            CODE TO DO READ IDENTIFIER OPERATION

    0848 F4 30 29               791        CCP   X'29',X'30' ######
    084B 1C 00 0859 07          792        MVC   DERDIT+1,IOBQB(1,1)       MOVE PACK ADDR INTO SIO
    0850 3B 02 0859             793        SBF   DERDIT+1,RDIDOF           SET Q BIT 14 OFF FOR READ ID
    0854 3A 01 0859             794        SBN   DERDIT+1,RDIDON           SET Q BIT 15 ON FOR READ ID
                         0858   795 DERDIT EQU   *
    0858 F3 A0 01               796        SIO   1,RDIDQ                   ISSUE READ IDENTIFIER COMMAND
    085B F4 30 69               797        CCP   X'69',X'30' ######
                         085E   798 DEBUSY EQU   *
    085E C1 A2 085E             799        TIO   DEBUSY,BUSY               OPERATION COMPLETE YET ?
    0862 C1 A0 08C6             800        TIO   DEACT7,ERROR              YES - TEST FOR ERROR
    0866 70 A4 0D               801        SNS   IOBSNS(,1),X'A4'          SENSE DFDR
    0869 3E 40 0028             802        SCP   PMRSAV,X'40'              SAVE PMR
    086D F4 30 09               803        CCP   X'09',X'30' ######
    0870 0C 00 0501 0028        804        MVC   CCP44+2(1),PMRSAV         SET PMR FOR RESIDUAL
    0876 F4 30 69               805        CCP   X'69',X'30' ######
                         087A   806 DECLI  EQU   *+1
    0879 BD 00 0B               807        CLI   QNBYTE(,2),#              LAST OP EVR STARTED ?
    087C F2 81 1D               808        JE    DE4A                      NO
    087F 79 02 07               809        TBF   IOBQB(,1),WRITE           WAS LAST OP WRITE OR SCAN
    0882 F2 90 12               810        JF    DE48                      NO - DO NOT ALTER DFDR
                                811 * ADD CHECKING FOR ABOVE 64K  ######
    0885 4F 00 0C 001A          812        SLC   IOBSNS-1(1,1),ONE         DECREMENT DFDR BY X'0100'
    088A F2 02 0A               813        JNL   DE48                      IF 010000  = DFDR  = 0100FF  @07
    088D F4 30 09               814        CCP   X'09',X'30' ######
    0890 3B 04 0501             815        SBF   CCP44+2,X'04'             SET OFF> 64K BIT IN PMR
    0894 F4 30 69               816        CCP   X'69',X'30' ######
                         0897   817 DE48   EQU   *
    0897 8E 00 0B 001A          818        ALC   QNBYTE(1,2),ONE           RESET N FOR PROPER VALUE
                         089C   819 DE4A   EQU   *
    089C 3D 01 0018             820        CLI   WKFLAG,ALTER              OR ALTERNATE TRACK ?
    08A0 F2 84 15               821        JH    DE4455
    08A3 B9 28 0C               822        TBF   QSENSE-1(,2),MADMRK+DATACK
    08A6 B9 04 0D               823        TBF   QSENSE(,2),OVERUN
    08A9 F2 92 1A               824        JC    DEACT7,X'92'              YES - GO RE-CALIBRATE
    08AC 78 10 13               825        TBN   IOBFL2(,1),X'10'          # END OF ALTERNATE ?
    08AF B9 7F 0A               826        TBF   QSBYTE(,2),X'7F'          .
    08B2 F2 10 7C               827        JT    DEALT5                    YES - GO SEEK TO NEXT TRACK
    08B5 F2 81 0E               828        JE    DEACT7                    NO - (NOT DEFECT) RECALIBRATE
                         08B8   829 DE4455 EQU   *
    08B8 BC 01 08               830        MVI   QFBYTE(,2),ALTER          SET FLAG BYTE TO ALTERNATE
    08BB 7A 10 13               831        SBN   IOBFL2(,1),X'10'          SET FLAG BYTE TO ALTERNATE
```

```
    08BE 8C 01 12 0016          832        MVC   PHYSCS(2,2),WKSECT        SAVE PHYSICAL CS IN QUEUE
    08C3 F2 87 76               833        J     DEDEF5                    GO SEEK ALTERNATE

                                835 *            ACTION 7   RETRY ORIGINAL OPERATION

                          08C6  837 DEACT7 EQU   *
    08C6 4E 00 0F 001A          838        ALC   IOBERR(1,1),ONE           BUMP RETRY COUNT
    08CB 79 0F 0F               839        TBF   IOBERR(,1),X'0F'          MOD 16 RETRY
                          08CF  840 SIXTN  EQU   *+1
    08CE C0 10 06CD             841        BT    DACT6A                    YES - GO RESEEK
    08D2 F2 87 97               842        J     DESET                     NO - GO RESTART
                          08D5  843 ACT644 EQU   *
    08D5 AF 02 12 12            844        SLC   PHYSCS(3,2),PHYSCS(,2)    SET UP RECALIBRATE
    08D9 31 A6 001B             845        LIO   RECAL,X'A6'
    08DD F4 30 29               846        CCP   X'29',X'30' ######
    08E0 18 00 08E6 07          847        MZZ   DESKAA+1,IOBQB(,1)        SET UP Q FOR RECAL
    08E5 F3 A0 00               848 DESKAA SIO   0,X'A0'
    08E8 1C 00 08F6 07          849        MVC   DESKAB+1(1),IOBQB(,1)     SET UP Q FOR READ ID
    08ED 3B 07 08F6             850        SBF   DESKAB+1,X'07'
    08F1 3A 01 08F6             851        SBN   DESKAB+1,X'01'
    08F5 F3 A1 01               852 DESKAB SIO   1,X'A1'                   START A READ ID TO SET BUSY
    08F8 C1 A2 08F8             853        TIO   *,X'A2'                   WAIT FOR OP COMPLETE
    08FC F4 30 69               854        CCP   X'69',X'30' ######
    08FF 3B 01 0022             855        SBF   D44BSY,X'01'              SET 5444 BUSY OFF            @02
    0903 F2 87 66               856        J     DESET

                                858 *            ACTION 5   END OF CYLINDER AND ALTERNATE TRACKS

                          0906  860 ACT544 EQU   *                         END OF CYLINDER
                                861 ************************************************************
                                862 *      CHECK FOR TRUE END OF CYLINDER - AVOID HARDWARE PROBLEM       *
                                863 ************************************************************
    0906 70 A4 0D               864        SNS   IOBSNS(,1),INDFDR         SENSE FOR DFDR
    0909 3E 40 0028             865        SCP   PMRSAV,X'40'              SAVE PMR
    090D F4 30 09               866        CCP   X'09',X'30' ######
    0910 0C 00 0501 0028        867        MVC   CCP44+2(1),PMRSAV         SET PMR FOR RESIDUAL
    0916 F4 30 69               868        CCP   X'69',X'30' ######        INSURE > 64K BIT OFF IN PMR
    0919 5D 00 0D 0B            869        CLC   IOBSNS(,1),IOBDAT(1,1)    SAME MOD 256 ?
    091D C0 01 08C6             870        BNE   DEACT7                    NO - RESTART THE REQUEST
    0921 B8 5C 0A               871        TBN   QSBYTE(,2),X'5C'          SECTOR BYTE ON A TRACK BOUNDARY
    0924 C0 01 08C6             872        BNE   DEACT7                    NO - RESTART THE REQUEST

    0928 8E 01 0A 001E          874        ALC   QSBYTE(2,2),NXTCYL        SET UP FOR SEEK TO NEXT CYL
    092D AC 01 12 0A            875        MVC   PHYSCS(2,2),QSBYTE(,2)    UPDATE PHYSICAL CYL/SECT

                          0931  877 DEALT5 EQU   *                         END OF ALTERNATE TRACK
    0931 BB 03 08               878        SBF   QFBYTE(,2),ALTER+DEFECT   SET OFF ALT TRACK BITS
    0934 2C 03 0014 0B          879        MVC   WKFCSD,QNBYTE(4,2)        DCF FLAG BYTE TO NORMAL TRACK
    0939 7B 10 13               880        SBF   IOBFL2(,1),X'10'          SET OFF ALTERNATE TRACK IND

                          093C  882 DEDEF5 EQU   *                         SEEK TO ALTERNATE TRACK

    093C 7B 80 12               884        SBF   IOBWRK(,1),SKSTRT         STE - RESET COMPLETION CODE
    093F 7A 04 13               885        SBN   IOBFL2(,1),NOLIO          SET NO LOAD I/O DFDR FLAG
    0942 3A 01 0022             886        SBN   D44BSY,X'01'              SET 5444 BUSY
    0946 BA 08 15               887        SBN   QSTATS(,2),X'08'          SET BUSY BECAUSE OF RESIDUALS
```

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    0949 F3 A4 80               888        SIO   X'80',X'A4'               ENABLE FOR INTERRUPTS
    094C F4 30 09               889        CCP   X'09',X'30' ######
    094F 3C 87 0410             890        MVI   JMPEOC+1,X'87'            SET TO IGNORE TEST FOR ERRORS
    0953 F4 30 69               891        CCP   X'69',X'30' ######
    0956 C0 87 03D8             892        B     DSDIFF                    GO BACK TO MAINLINE CODE

                                894 *            ACTION 2

                         095A   896 DEACT2 EQU   *
    095A F4 30 29               897        CCP   X'29',X'30' ######
    095D 18 00 0966 07          898        MZZ   DESENS+1,IOBQB(,1)        SET UP Q FOR SENSE
    0962 F4 30 69               899        CCP   X'69',X'30' ######
    0965 B0 A3 17               900 DESENS SNS   INT44(,2),SNSDS2          PUT BYTES 2&3 DEV STAT IN QUEUE
    0968 C0 87 08C6             901        B     DEACT7                    GO RETRY OPERATION
                                902 *
                                903 *** STE SET UP ROUTINE FOR INDICATING UNSAFE CONDITION ***
                                904 *
                         096C   905 DESET  EQU   *
    096C 7B 04 13               906        SBF   IOBFL2(,1),NOLIO          SET OFF NO LIO INDICATOR
    096F 7B B2 12               907        SBF   IOBWRK(,1),SKSTRT+DTPND+DXFRST+SCNTFD  SET FL TO SCHEDULED
    0972 78 03 08               908        TBN   IOBRB(,1),VERIFY
    0975 F2 90 04               909        JF    DESET2
    0978 6C 01 08 14            910        MVC   IOBRB(2,1),SAVEOP(,2)
                         097C   911 DESET2 EQU   *
    097C F3 A4 80               912        SIO   X'80',X'A4'               ENABLE 5444 INTERRUPTS
    097F C0 87 00BD             913        B     RETRY                     GO RETRY ORIGINAL OPERATION

                                915 *            ACTION 1

                         0983   917 DEACT1 EQU   *
    0983 7A 41 12               918        SBN   IOBWRK(,1),PRMERR+DCMPLT  PERM ERROR
    0986 F3 A4 80               919        SIO   X'80',X'A4'               ENABLE 5444 INTERRUPTS
    0989 78 20 0E               920        TBN   IOBFLG(,1),X'20'          SET IF NO LOG
    098C F2 10 03               921        JT    NOHOLD                    YES
    098F BA 40 15               922        SBN   QSTATS(,2),X'40'          SET ON QUEUE HOLD BIT
    0992 C0 87 0107             923 NOHOLD B     DSVER                     DEQUEUE THIS SINGLE IOB
                         0996   924 SUPIOB EQU   *
    0996 F4 30 09               925        CCP   X'09',X'30' ######
    0999 34 08 09DE             926        ST    GOBACK+3,ARR              SAVE RETURN ADDRESS
    099D 2C 01 09F1 03          927        MVC   QUESAV(2),LAST(,2)        SET LAST ELEMENT POINTER
    09A2 B5 01 01               928        L     FIRST(,2),XR1             POINT TO FIRST QUEUE ELEMENT
    09A5 34 01 09C1             929        ST    TABSPR+3,XR1              STORE PLACE TO REPOSITION
    09A9 34 01 09BD             930        ST    POINTS+3,XR1              SAVE CURRENT ELEMENT LOCATION
    09AD C0 87 000C             931 LOOP   B     GETIOB                    GET IOB
    09B1 78 40 13               932        TBN   IOBFL2(,1),X'40'          SEE IF SUPER IOB
    09B4 F4 30 09               933        CCP   X'09',X'30' ######
    09B7 F2 90 1B               934        JF    GETNXT                    GO GET NEXT ELEMENT
    09BA C2 02 0000             935 POINTS LA    *-*,XR2                   GET CURRENT ELEMENT ADDRESS
    09BE C2 01 0000             936 TABSPR LA    *-*,XR1                   GET REPOSITION ELEMENT
    09C2 1C 03 09EF 05          937        MVC   TCBIOB(4),EIOB(,1)        SAVE TCB & IOB
    09C7 6C 03 05 05            938        MVC   EIOB(4,1),EIOB(,2)        REPOSITION SUPER IOB ELEMENT
    09CB 8C 03 05 09EF          939        MVC   EIOB(4,2),TCBIOB          REPLACE TCB, IOB IN NEW ELEMENT
    09D0 1C 01 09C1 01          940        MVC   TABSPR+3(2),ECHN(,1)      SET UP NEXT PLACE TO REPOSITION
    09D5 0D 01 09BD 09F1        941 GETNXT CLC   POINTS+3(2),QUESAV        SEE IF DONE CHECKING
    09DB C0 81 0000             942 GOBACK BE    *-*                       YES - RETURN
    09DF 35 02 09BD             943        L     POINTS+3,XR2              POINT TO CURRENT ELEMENT
```

```
ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          S/3 ASSEMBLER  13/07/07  PAGE  21

    09E3 2C 01 09BD 01          944        MVC   POINTS+3(2),ECHN(,2)      BUMP TO NEXT ELEMENT
    09E8 C0 87 09AD             945        B     LOOP                       RETURN TO CHECK ROUTINE
    09EC 00000000         09EF  946 TCBIOB DC    XL4'00000000'              SAVE FOR TCB@ AND IOB@
    09F0 0000             09F1  947 QUESAV DC    XL2'0000'                  SAVE FOR LAST QUEUE POINTER
                          0001  948 FIRST  EQU   1                          FIRST IOQE ON QUEUE
                          0003  949 LAST   EQU   3                          LAST IOQE ON QUEUE
                          0001  950 ECHN   EQU   1                          CHAIN FIELD ON IOQE
                          0003  951 ETCB   EQU   3                          TCB ADDRESS IN IOQE
                          0005  952 EIOB   EQU   5                          IOB ADDRESS IN IOQE
                          0002  953        DROP  2



                          0011  955 SYSC@  EQU   X'0011'                   SYSCOM ADDRESS
                          0003  956 SCAN   EQU   X'03'
                          0003  957 VERIFY EQU   X'03'
                          0002  958 WRITE  EQU   X'02'
                          0002  959 DEFECT EQU   X'02'
                          0001  960 RDIDON EQU   X'01'
                          0002  961 RDIDOF EQU   X'02'
                          00A0  962 ERROR  EQU   X'A0'
```

```
      $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4
ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT          S/3 ASSEMBLER  13/07/07  PAGE  22
                           964 ********************************************************************
                           965 *      IOB   COMMON EQUATES FOR ALL DEVICES                        *
                           966 ********************************************************************

                          0000  968 IOBECB EQU   0                   WAIT/POST BYTE - BYTE 1 OF ECB
                          0001  969 IOBCOM EQU   1                   COMPLETION CODE - BYTE 2 OF ECB
                          0002  970 IOBCMP EQU   2                   COMPLETION CODE - BYTE 3 OF ECB
                          0006  971 IOBCHN EQU   6                   IOB CHAIN POINTER
                          0007  972 IOBQB  EQU   7                   Q-BYTE OF SIO
                          0008  973 IOBRB  EQU   8                   R-BYTE OF SIO
                          0009  974 IOBEID EQU   9                   ERP MODULE DISPLACEMENT ID
                          000B  975 IOBDAT EQU   11                  DATA (LIO) ADDRESS
                          000D  976 IOBSNS EQU   13                  SENSE AREA
                          000E  977 IOBFLG EQU   14                  FLAG BITS
                          000F  978 IOBERR EQU   15                  ERROR COUNTS
                          0011  979 IOBTCB EQU   17                  TCB ADDRESS

                                981 *      EQUATES FOR DISK (5444 AND 5445)
                          0012  982 IOBWRK EQU   18                  IOS PARTIAL COMPLETION CODE
                          0013  983 IOBFL2 EQU   19                  5445 SECOND FLAG BYTE
                          0014  984 IOBCC  EQU   20                  5445 CYLINDER; 5444 NOT USED
                          0015  985 IOBHH  EQU   21                  5445 HEAD
                          0016  986 IOBR   EQU   22                  5445 RECORD
                          0017  987 IOBN   EQU   23                  5445 NUMBER OF RECORDS (-1) TO BE
                          0019  988 IOBDAD EQU   25                  PTR TO 5445 10 BYTE DISK ADDRESS
                          001B  989 IOBDCH EQU   27                  DATA MGMT CHAIN POINTER
                          001D  990 IOBDTF EQU   29                  ADDRESS OF ASSOCIATED DTF
                                991 *              OPERATED UPON
                         0015  992 IOBCB  EQU   21                   5444 CYLINDER
                         0016  993 IOBSB  EQU   22                   5444 SECTOR
                         0017  994 IOBNB  EQU   23                   5444 NUMBER OF RECORDS (-1)
                         0018  995 WRIDFB EQU   24
                         0019  996 WRIDCB EQU   25
                         001A  997 WRIDSB EQU   26
                         001B  998 RDIDFB EQU   27
                         001C  999 RDIDCB EQU   28
                         001D 1000 RDIDSB EQU   29
                              1001 *      THE FOLLOWING EQUATES ARE FOR THOSE PROGRAMS WHO USE READ
                              1002 *      OR WRITE HA AND R0 COUNT OR WRITE COUNT KEY DATA COMMANDS.
                              1003 *      FIELD MUST IMMEDIATELY FOLLOW IOB IF USING THESE EQUATES.
                         001E 1004 IOBF   EQU   30                   5445 FLAG BYTE IN DDCF
                         0020 1005 IOBCYL EQU   32                   5445 CYLINDER ADDRESS IN DDCF
                         0022 1006 IOBHD  EQU   34                   5445 HEAD IN DDCF
                         0023 1007 IOBREC EQU   35                   5445 RECORD IN DDCF
                         0024 1008 IOBKEY EQU   36                   5445 KEY LENGTH IN DDCF
                         0026 1009 IOBDTA EQU   38                   5445 DATA LENGTH IN DDCF
                         0027 1010 IOBNUM EQU   39                   5445 NUMBER OF RECORDS (-1)

                              1012 *      OFFSETS FOR DISK QUEUE
                         0003 1013 QFIRST EQU   3                    @ LAST IOB ON QUEUE
                         0007 1014 QLAST  EQU   7                    @ FIRST IOB ON QUEUE
                         0008 1015 QFBYTE EQU   8                    F BYTE FOR DISK OPERATION
                         0009 1016 QCBYTE EQU   9                    C BYTE FOR DISK OPERATION
                         000A 1017 QSBYTE EQU   10                   S BYTE FOR DISK OPERATION
                         000B 1018 QNBYTE EQU   11                   N BYTE FOR DISK OPERATION
                         000D 1019 QSENSE EQU   13                   SENSE INFO SAVE AREA
```

```
      $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4
ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT           S/3 ASSEMBLER  13/07/07  PAGE  23
                          000F 1020 NXTQUE EQU   15                  @ NEXT SPINDLE'S QUEUE
                          0010 1021 LASTSK EQU   16                  SAVE FOR LAST LOGICAL CYL.#
                          0012 1022 PHYSCS EQU   18                  PHYSICAL C/S SAVE AREA
                          0012 1023 ADDIAG EQU   18                  WIN ADDRESS OF DIAGNOSTIC SENSE AREA
                          0014 1024 SAVEOP EQU   20                  SAVE FOR Q/R DURING VERIFY
                          0015 1025 QSTATS EQU   SAVEOP+1            DRIVE STATUS
                          0017 1026 INT44  EQU   23                  INTERRUPT STATUS
                               1027 *      5445 DISK QUEUE OFFSETS
                          000B 1028 SNS23  EQU   11
                          0009 1029 SNSCH  EQU   9
                          0019 1030 ADHA   EQU   25
                          001B 1031 ADR0   EQU   27
                          001C 1032 COUNT  EQU   28
                          0026 1033 HAFLD  EQU   38
                          002B 1034 ROFLD  EQU   43
                          0035 1035 DFCA45 EQU   53
                          0036 1036 DGSNS  EQU   54                  3340 START OF READ DIAG SENSE AREA
                          0017 1037 INT45  EQU   23
                          0014 1038 QSAVOP EQU   SAVEOP              SAVE AREA FOR 5445 Q/R BYTES
                          0014 1039 QDR    EQU   QSAVOP
                          0025 1040 QCOUNT EQU   COUNT+9             COUNT FIELD
                          000C 1041 QSNS0  EQU   12                  SENSE BYTE 0
                          000D 1042 QSNS1  EQU   13                  SENSE BYTE 1
                          000A 1043 QSNS2  EQU   10                  SENSE BYTE 2
                          000B 1044 QSNS3  EQU   11                  SENSE BYTE 3
                          0009 1045 QCHR   EQU   9                   SENSE CAR HAR
                          002A 1046 QHA    EQU   HAFLD+4             HOME ADDRESS FIELD
                          0033 1047 QR0CNT EQU   ROFLD+8             R0 COUNT FIELD
                          0039 1048 QSIORS EQU   QR0CNT+6            SIO READS AND SCAN COUNTER
                          0039 1049 QSIOWT EQU   QSIORS              SIO WRITE COUNTER

                               1051 ***    BYTE 0 ERROR INDICATORS

                          0080 1053 IONOP  EQU   X'80'
                          0040 1054 INTREQ EQU   X'40'
                          0020 1055 MADMRK EQU   X'20'
                          0010 1056 EQPCK  EQU   X'10'
                          0008 1057 DATACK EQU   X'08'
                          0004 1058 NORECF EQU   X'04'
                          0002 1059 TRKCCK EQU   X'02'
                          0001 1060 SEEKCK EQU   X'01'

                               1062 ***    BYTE 1 ERROR INDICATORS

                          0080 1064 SCANEQ EQU   X'80'
                          0040 1065 CYLZRO EQU   X'40'
                          0020 1066 ENDCYL EQU   X'20'
                          0010 1067 SKBUSY EQU   X'10'
                          0008 1068 HUNCYL EQU   X'08'
                          0004 1069 OVERUN EQU   X'04'
                          0002 1070 STATA  EQU   X'02'
                          0001 1071 STATB  EQU   X'01'

                               1073 ***    IOBCMP - COMPLETION CODE INDICATORS

                          0080 1075 SKSTRT EQU   X'80'
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      $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4
ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT           S/3 ASSEMBLER  13/07/07  PAGE  24
                          0040 1076 DCMPLT EQU   X'40'
                          0020 1077 DTPND  EQU   X'20'
                          0010 1078 DXFRST EQU   X'10'
                          0008 1079 WAIT   EQU   X'08'
                          0004 1080 HITEQU EQU   X'04'
                          0002 1081 SCNTFD EQU   X'02'
                          0001 1082 PRMERR EQU   X'01'
                          00F0 1083 SKDL   EQU   X'F0'

                               1085 ***    IOBFLG - FLAG BITS

                          0080 1087 NOERP  EQU   X'80'
                          0040 1088 NOVER  EQU   X'40'
                          0020 1089 NOLOG  EQU   X'20'
                          0010 1090 WRITID EQU   X'10'
                          0008 1091 NODTF  EQU   X'08'
                          0004 1092 NOLIO  EQU   X'04'
                          0002 1093 EQUIP  EQU   X'02'
                          0001 1094 ALTRK  EQU   X'01'

                          00A0 1096 RDIDQ  EQU   X'A0'
```

```
      $@DE12 DISK IOS R1,F1,R2,F2,D1,D2,D3,D4
ERR LOC  OBJECT CODE      ADDR STMT SOURCE STATEMENT           S/3 ASSEMBLER  13/07/07  PAGE  25
                            1098 ***************************************************************
                            1099 *      EQUATES NEEDED FOR CLEAN ASSEMBLY                      *
                            1100 ***************************************************************

                       0001 1102 XR1    EQU   1
                       0002 1103 XR2    EQU   2
                       0008 1104 ARR    EQU   8
                       002F 1105 NCCONF EQU   47                5445/3340 & TAPE CONFIGURATION
                            1106 *
                       0000 1107 #      EQU   0
                       0001 1108 ALTER  EQU   X'01'
                       0003 1109 DIRECT EQU   X'03'
                       0001 1110 FORWRD EQU   X'01'
                       0001 1111 IDENOP EQU   X'01'
                       0007 1112 LAST3  EQU   X'07'
                       0000 1113 NORMAL EQU   X'00'
                       0000 1114 NULL   EQU   X'00'
                       0001 1115 READ   EQU   X'01'
                       00F0 1116 SCHED  EQU   X'F0'
                       0006 1117 SETOFF EQU   X'06'
                       00A2 1118 BUSY   EQU   X'A2'
                       00A4 1119 INDFDR EQU   X'A4'
                       00A6 1120 INDFCR EQU   X'A6'
                       00A2 1121 SNSDS1 EQU   X'A2'
                       00A3 1122 SNSDS2 EQU   X'A3'
                       0003 1123 SEEK   EQU   X'03'
                       00A4 1124 SCNHIT EQU   X'A4'
                       0001 1125 WRITOP EQU   X'01'
                       0040 1126 OPDONE EQU   X'40'
                       0016 1127 NOERR  EQU   X'16'
                       0001 1128 PERM   EQU   X'01'
                       0004 1129 PRM    EQU   X'04'
                       00A0 1130 STSEEK EQU   X'A0'
                            1131 *
                       FFFF 1132        END
```

```
$@DE12  001  0000 0002
#       001  0000 1107   0466  0484  0484  0503  0511  0511  0807
ACT444  001  0841 0785   0778
ACT544  001  0906 0860   0781
ACT644  001  08D5 0843   0668
ADCYL   005  0715 0687   0684  0741
ADDIAG  001  0012 1023
ADEXIT  001  0026 0097   0108
ADHA    001  0019 1030   0324  0700
ADRETN  001  001F 0089   0130  0567
ADR0    001  001B 1031   0701
ALTER   001  0001 1108   0820  0830  0878
ALTRK   001  0001 1094
ANYDAT  003  0460 0451   0444  0447
ARR     001  0008 1104   0285  0545  0926
ATTNIO  004  069D 0651   0638  0641
ATTNO   001  0240 0294   0122  0291
ATT44   004  044F 0446   0442
BSYRSD  003  0456 0448   0445
BUSY    001  00A2 1118   0799
CAHRSN  003  065D 0631   0627* 0628* 0629*
CARHAR  003  068B 0645
CCPSET  003  0489 0466   0625*
CCP44   003  04FF 0503   0804* 0815* 0867*
CHKERR  005  0829 0775   0767
CHKQUE  003  01EA 0265   0252
CHSNS   003  02D1 0334   0332* 0333*
CKRCL   003  029C 0322   0315
CONTIN  004  0268 0307   0304
COUNT   001  001C 1032   0183  0184  0228  0233  0305* 0307* 0308* 0309* 0310* 0311* 0316  0354
                         0472* 0683  0685  0687* 0734  0736  0738* 0739  0742* 0745* 0746* 1040
CYLADD  001  001D 0087   0687
CYLZRO  001  0040 1065
DACT6A  004  06CD 0666   0841
DATACK  001  0008 1057   0776  0822
DATA44  001  04E1 0494   0460
DCFADR  001  0019 0083   0388  0422
DCMPLT  001  0040 1076   0161  0172  0918
DCSWIT  003  06AB 0655   0653
DDAREA  001  000D 0064   0467  0623
DEACT1  001  0983 0917   0654  0666  0699  0787
DEACT2  001  095A 0896   0761
DEACT4  001  0735 0697   0646
DEACT5  001  0709 0682   0650
DEACT6  001  06C2 0662   0648  0731  0780
DEACT7  001  08C6 0837   0733  0737  0744  0770  0800  0824  0828  0870  0872  0901
DEALT5  001  0931 0877   0827
DEBUSY  001  085E 0798   0799
DECLI   001  087A 0806   0755*
DEDEF5  001  093C 0882   0833
DEFECT  001  0002 0959   0878
DERDIT  001  0858 0795   0792* 0793* 0794*
DESENS  003  0965 0900   0898*
DESET   001  096C 0905   0681  0842  0856
DESET2  001  097C 0911   0909
DESKAA  003  08E5 0848   0847*
```

```
DESKAB  003  08F5 0852   0849* 0850* 0851*
DE4A    001  089C 0819   0808
DE4455  001  08B8 0829   0821
DE48    001  0897 0817   0810  0813
DE5554  004  07C8 0742   0735
DE5557  003  07DD 0748   0740
DFCA45  001  0035 1035   0312  0480
DGSNS   001  0036 1036
DIODER  001  061E 0612   0157  0340  0375  0397  0431  0435  0586
DIODQ2  001  000B 0062   0588
DIRECT  001  0003 1109   0414
DISKOP  001  0042 0128   0048
DKOP45  001  0593 0565   0061
DLOGIT  003  01A3 0245   0243
DQATTN  004  0169 0227   0223  0661
DSA     003  053D 0524   0522
DSA00   005  0555 0532   0528
DSCHEK  004  04F1 0499   0497
DSCOMN  001  021E 0283   0166  0260  0267  0277
DSDATA  001  0472 0458   0455
DSDIFF  005  03D8 0413   0386  0892
DSDONE  003  00C5 0172   0160  0453
DSDQUE  001  0125 0204   0202
DSDQ45  003  012A 0206   0199
DSIDEN  001  0111 0197   0195
DSMOVE  005  00F9 0188   0177  0182
DSNEQU  001  0107 0192   0186  0190
DSNOSN  001  018E 0237
DSOUT   001  0562 0535   0077
DSPLUS  001  03F9 0420   0416
DSP2    003  0422 0432   0423* 0426  0430
DSSKIP  003  04A0 0473   0471
DSVER   001  0107 0193   0179  0923
DSWRIT  003  0546 0527   0525
DS88    003  0515 0511   0506*
DTOPND  003  00A4 0158   0587
DTPND   001  0020 1077   0161  0491  0513  0907
DXFRST  001  0010 1078   0161  0491  0513  0907
D44BSY  001  0022 0092   0135* 0377  0446  0512* 0855* 0886*
D45BSY  001  0023 0093   0298  0443  0485* 0572* 0680* 0691* 0750*
ECHN    001  0001 0950   0940  0944
EIOB    001  0005 0952   0937  0938  0938* 0939*
ENDALT  004  07B3 0736   0686
ENDCYL  001  0020 1066
EQPCK   001  0010 1056   0760
EQUIP   001  0002 1093
ERP44   003  07EE 0753   0616
ERROR   001  00A0 0962   0157  0800
ERRORS  004  07A2 0731   0704* 0711* 0718* 0725*
ETCB    001  0003 0951
EXECIT  003  002E 0117   0113
EXTLOG  003  018E 0238   0232  0234
FIRST   001  0001 0948   0928
FIRST@  001  0001 0556   0120  0548  0549* 0551  0553
FORWRD  001  0001 1110   0419
FREE@   001  0013 0070
```

CROSS REFERENCE


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SYMBOL   LEN VALUE DEFN   REFERENCES
GET      004  0085 0149   0146  0606
GETIOB   001  000C 0063   0137  0149  0289  0574  0931
GETNXT   006  09D5 0941   0934
GOATTN   004  003E 0122   0115  0119
GOBACK   004  09DB 0942   0926*
GOEXIT   004  00C1 0167   0111  0116  0121
GOGET    004  061A 0606   0592  0597  0603
GOPOST   004  013F 0213   0209
GOSEEK   003  027C 0312   0302  0306  0752
GOTEST   001  0635 0620   0618
HAFLD    001  0026 1033   0472  0743  1046
HITEQU   001  0004 1080   0191
HUNCYL   001  0008 1068
IDENOP   001  0001 1111   0200
INDFCR   001  00A6 1120   0388  0422
INDFDR   001  00A4 1119   0500  0864
INDK44   001  0012 0069   0131  0132  0143  0568  0569  0589  0594
INTREQ   001  0040 1054   0766
INT44    001  0017 1026   0900
INT45    001  0017 1037   0599  0600
IOBCB    001  0015 0992   0385
IOBCC    001  0014 0984   0183* 0307
IOBCHN   001  0006 0971   0228* 0236*
IOBCMP   001  0002 0970
IOBCOM   001  0001 0969
IOBCYL   001  0020 1005
IOBDAD   001  0019 0988
IOBDAT   001  000B 0975   0869
IOBDCH   001  001B 0989
IOBDTA   001  0026 1009
IOBDTF   001  001D 0990
IOBECB   001  0000 0968
IOBEID   001  0009 0974   0614*
IOBERR   001  000F 0978   0105* 0211  0242  0322  0617  0664* 0838* 0839
IOBF     001  001E 1004
IOBFLG   001  000E 0977   0159  0208  0239  0337  0394  0428  0469  0470* 0496  0652  0698  0747*
                          0769  0786  0920
IOBFL2   001  0013 0983   0106* 0114  0292  0300  0301* 0303  0314  0463  0464* 0486* 0501  0514*
                          0643* 0688* 0732  0748* 0825  0831* 0880* 0885* 0906* 0932
IOBHD    001  0022 1006
IOBHH    001  0015 0985
IOBKEY   001  0024 1008
IOBN     001  0017 0987   0309
IOBNB    001  0017 0994   0382
IOBNUM   001  0027 1010   0233* 0305
IOBQB    001  0007 0972   0153  0154  0158  0163* 0164* 0173  0178  0181  0198  0201  0215  0219
                          0222  0231  0296  0326  0390  0391  0392  0395  0405  0423  0424  0425
                          0429  0441  0451  0459  0478  0521  0524  0527  0579  0615  0627  0667
                          0670  0707  0714  0721  0756  0792  0809  0847  0849  0898
IOBR     001  0016 0986   0184* 0308
IOBRB    001  0008 0973   0162  0165* 0194  0196* 0200  0230  0474  0476  0506  0529  0908  0910*
IOBREC   001  0023 1007
IOBSB    001  0016 0993   0188*
IOBSNS   001  000D 0976   0156  0185  0189  0218* 0229* 0262  0339  0348  0349  0374  0399  0400
                          0504  0582  0619  0645  0647  0649  0658* 0758  0759  0760  0766  0776
                          0777  0779  0801  0812* 0864  0869
```

CROSS REFERENCE

SYMBOL	LEN	VALUE	DEFN	REFERENCES
IOBTCB	001	0011	0979	0248
IOBWRK	001	0012	0982	0104* 0161* 0172* 0180* 0191* 0206* 0207 0210 0241 0253 0287 0313* 0411* 0438* 0491* 0513* 0690* 0749* 0884* 0907* 0918*
IODEQ	001	0569	0543	0049 0227 0235
IOENQ	001	0006	0055	
IONOP	001	0080	1053	0779
JMPEOC	003	040F	0426	0434* 0890*
KEYDTA	001	000F	0066	0310
LABL	004	030D	0355	0319* 0357*
LAST	001	0003	0949	0927
LAST@	001	0003	0557	0120 0553*
LASTSK	001	0010	1021	0316 0354* 0385 0413 0418 0437* 0677*
LAST3	001	0007	1112	
LIOCON	001	0008	0057	0461 0499
LIOSAV	001	0001	0050	0462 0500
LOADIO	003	04B7	0480	0477
LOOP	004	09AD	0931	0945
MADMRK	001	0020	1055	0822
MOVE44	004	0185	0235	0220 0774
NCCONF	001	002F	1105	0634
NDATRS	001	0003	0052	
NEXQUE	003	0207	0275	0279
NEXT@	001	0001	0558	0549
NIDISK	001	0004	0103	0047
NIQERP	001	0025	0095	0249
NMIOOE	001	0007	0056	0537
NODTF	001	0008	1091	
NOERP	001	0080	1087	0786
NOERR	001	0016	1127	
NOHOLD	004	0992	0923	0921
NOINT	003	03A8	0398	0391* 0396
NOLIO	001	0004	1092	0501 0514 0885 0906
NOLOG	001	0020	1089	0208 0239
NONSEK	003	02A6	0325	0317 0321
NOPOST	004	0143	0214	0212
NORECF	001	0004	1058	0776
NORMAL	001	0000	1113	
NOTST	003	02D4	0335	0346* 0694*
NOVER	001	0040	1088	0159
NSPOSC	001	0005	0054	0213
NST1RT	001	0002	0051	
NULL	001	0000	1114	0104 0105 0383
NXTCYL	001	001E	0088	0874
NXTINT	003	007E	0147	0144
NXTQUE	001	000F	1020	0251 0265 0274 0275 0278 0593 0598 0604
ONE	001	001A	0084	0532 0812 0818 0838
OPDONE	001	0040	1126	
OUT	001	068B	0644	
OVERUN	001	0004	1069	0777 0823
PERM	001	0001	1128	0210 0241
PHYSCS	001	0012	1022	0205* 0334 0832* 0844 0844* 0875*
PMRSAV	001	0028	0099	0624* 0625 0802* 0804 0865* 0867
POINTS	004	09BA	0935	0930* 0941 0943 0944*
PRM	001	0004	1129	
PRMERR	001	0001	1082	0253 0918
QCBYTE	001	0009	1016	

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QCHR    001  0009 1045  0631
QCOUNT  001  0025 1040
QDR     001  0014 1039
QEMPT   001  01F8 0270  0240  0244
QFBYTE  001  0008 1015  0383* 0830* 0878*
QFIRST  001  0003 1013  0256  0266  0276
QHA     001  002A 1046
QLAST   001  0007 1014
QNBYTE  001  000B 1018  0382* 0495  0755  0775* 0807  0818* 0879
QONE    001  0004 0053  0142
QPTR45  001  0020 0090  0221  0488* 0573  0621*
QR0CNT  001  0033 1047  1048
QSAVOP  001  0014 1038  1039
QSBYTE  001  000A 1017  0384  0826  0871  0874* 0875
QSENSE  001  000D 1019  0218  0229  0619* 0660* 0759* 0822  0823
QSIORS  001  0039 1048  1049
QSIOWT  001  0039 1049
QSNS0   001  000C 1041
QSNS1   001  000D 1042
QSNS2   001  000A 1043
QSNS3   001  000B 1044
QSTATS  001  0015 1025  0110  0112  0117  0118* 0238* 0290  0295* 0448  0449* 0659* 0692* 0751*
                        0887* 0922*
QTWO    001  0010 0067  0148
QUEPTR  001  0011 0068  0136  0214  0515*
QUESAV  002  09F1 0947  0927* 0941
RDIDCB  001  001C 0999
RDIDFB  001  001B 0998
RDIDOF  001  0002 0961  0793
RDIDON  001  0001 0960  0794
RDIDQ   001  00A0 1096  0796
RDIDSB  001  001D 1000  0203*
READ    001  0001 1115  0164
RECAL   001  001B 0085  0845
RECALB  001  001C 0086
RECLB   003  06E4 0672  0670* 0671* 0674
RELSE   003  03CF 0410  0403* 0406  0408*
RETN    004  021A 0280  0096  0130* 0167  0257  0261  0263  0288  0299  0355  0378  0450  0456
                        0534  0567*
RETRY   004  00BD 0166  0913
RETURN  004  058F 0555  0545*
ROFLD   001  002B 1034  0736  0742  0743  0746  1047
RSTSK   003  034E 0372  0362* 0364  0365* 0367  0368* 0370  0371*
RSTXR1  004  058B 0554  0546* 0552
RTNARR  001  021D 0281  0060
SAVARR  004  043B 0439  0108* 0285* 0293
SAVEOP  001  0014 1024  0162* 0196  0910  1025  1038
SAVR2   001  0021 0091  0217  0224  0250* 0251  0255  0259  0274* 0278  0452* 0632* 0642  0651
SAVXR2  004  055A 0533  0489* 0518* 0530
SCAN    001  0003 0956  0178
SCANEQ  001  0080 1064  0189
SCAN44  004  00D5 0177  0174
SCAN45  004  00E8 0183  0175
SCHED   001  00F0 1116
SCNHIT  001  00A4 1124  0177
SCNTFD  001  0002 1081  0180  0907
```

CROSS REFERENCE


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SEARCH  005  01BA 0251   0268
SEEK    001  0003 1123   0451
SEEKCK  001  0001 1060   0779
SEEKOK  004  0309 0354   0350
SEEKS1  003  043F 0441   0150  0323  0376  0412
SEEK44  004  035E 0377   0297
SEEK45  003  02EC 0344   0326* 0327* 0329  0330  0331  0332  0335  0338  0358  0363  0366  0369
SETEQU  003  0104 0191   0187
SETOFF  001  0006 1117   0163
SETSNS  003  008D 0152   0141
SIOCT   001  000E 0065   0492
SIOTAB  001  0009 0058   0520
SIXTN   001  08CF 0840   0664
SKBUSY  001  0010 1067
SKDL    001  00F0 1083
SKEND   004  006D 0142   0133
SKLIO   003  0505 0505   0502
SKND45  004  05E1 0588   0570
SKSTRT  001  0080 1075   0161  0287  0313  0411  0438  0884  0907
SK44    004  0151 0218   0216
SNDRV1  004  0679 0639   0635
SNSCH   001  0009 1029
SNSDS1  001  00A2 1121   0156
SNSDS2  001  00A3 1122   0900
SNSERR  003  02E0 0339   0329*
SNSNOP  003  02F9 0348   0331*
SNS23   001  000B 1028   0702  0709  0716  0723
SNS44   003  009D 0156   0153*
SN44ST  003  0801 0758   0756*
SPNTST  004  041E 0431   0424*
SRSSK   003  0326 0361   0352
START   003  04BF 0484   0474* 0479
STATA   001  0002 1070
STATB   001  0001 1071
STAT67  001  0024 0094   0636  0637  0639  0640
STRNXT  005  0202 0274   0264
STRT    003  0795 0727   0705* 0708  0712* 0715  0719* 0722  0726*
STSEEK  001  00A0 1130
STSENS  003  03AB 0399   0390* 0401
SUPIOB  001  0996 0924   0258
SWITCH  003  01A0 0244   0246* 0272* 0656* 0773*
SYSC@   001  0011 0955   0633
S45D2   003  05F2 0593   0590
S45D3   003  0602 0598   0595
S45D4   003  0614 0604   0601
TABSPR  004  09BE 0936   0929* 0940*
TCB@    001  0003 0559   0550*
TCBIOB  004  09EF 0946   0937* 0939
TCBSAV  001  0027 0098   0248*
TEMERR  003  01E1 0262   0254
TESALT  003  0490 0468   0465
TESSCN  003  00D9 0178   0176
TESTIO  004  06FA 0678   0674* 0675*
TEST1   003  05CA 0582   0579* 0580* 0584
TEST2   004  05D9 0586   0584*
TRDT44  001  0510 0508   0073
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TRDT45  001  04BA 0481   0074
TRKCCK  001  0002 1059
TROP44  001  0065 0138   0075
TROP45  001  05B6 0575   0076
TRSK44  001  0366 0379   0071
TRSK45  001  02E7 0341   0072
TSER44  004  03A4 0397   0392*
TSIOER  004  042C 0435   0425*
TSTCYL  003  0252 0300   0696
TSTIO   004  0322 0360   0358* 0359* 0360
TST44   004  00A0 0157   0154*
TS45ER  004  02E3 0340   0330*
UPDATE  003  0534 0521   0493
VERIFY  001  0003 0957   0165  0194  0529  0908
WAIT    001  0008 1079
WKFCSD  001  0014 0078   0415* 0417* 0418* 0775  0879*
WKFCSN  001  0015 0079   0387* 0413* 0495*
WKFCYL  001  0017 0081   0415  0417  0437
WKFLAG  001  0018 0082   0820
WKSECT  001  0016 0080   0188  0203  0205  0236  0384* 0414* 0419* 0498* 0832
WRIDCB  001  0019 0996
WRIDFB  001  0018 0995
WRIDSB  001  001A 0997   0498
WRITE   001  0002 0958   0201  0809
WRITID  001  0010 1090   0496
WRITOP  001  0001 1125   0158  0527
XR1     001  0001 1102   0546  0548* 0554* 0928* 0929  0930  0936*
XR2     001  0002 1103   0136* 0142* 0148* 0207* 0214* 0217* 0221* 0224* 0250  0255* 0259* 0265*
                         0275* 0452  0488  0489  0515  0518  0533* 0573* 0588* 0593* 0598* 0604*
                         0621  0632  0633* 0642* 0651* 0935* 0943*
ZRO     001  000A 0059

TOTAL STATEMENTS IN ERROR IN THIS ASSEMBLY---      0

OL103 I  TOTAL NUMBER OF LIBRARY SECTORS REQUIRED IS   15
         NAME-$@DE12,PACK-PID001,UNIT-R1,RETAIN-P,LIBRARY-R,CATEGORY-000
OL105 I  THE CODE LENGTH OF $@DE12 IS  2546 DECIMAL.
```

```
 @1 CT@EJ    I               $CGDRV01
PROGRAM END
```

```
*
1
PROGRAM END
```