```
C001                    ASMB,R,L
**  NO ERRORS PASS#1 **RTE ASMB 92067-16011**
```

```
C001                    ASMB,R,L
C002  00000                     NAM DVR30
C003*********************************************************************
C004*
C005*      SET N IN ASMB FOR DDC OR VERMONT MASS STORAGE DEVICE
C006*
C007*      SET Z IN ASMB FOR DATA DISC MASS STORAGE DEVICE
C008*
C009*********************************************************************
C010*
C011******       VERSION  12 / 15 / 68
C012*
C013*
C014                        ENT I.30,C.30
C015*
C016******  PROGRAM  DESCRIPTION  ******
C017*
C018*
C019*     DRIVER 30 OPERATES UNDER THE CONTROL OF THE
C020* I/O CONTROL MODULE OF THE D.O.S. EXECUTIVE
C021* THIS DRIVER IS RESPONSIBLE FOR CONTROLLING DATA
C022* TRANSMISSION WITH A 2757A TYPE DISC FILE.
C023* <30> IS THE EQUIPMENT CODE ASSIGNED TO THIS
C024* TYPE OF DEVICE. I.30 IS THE ENTRY POINT FOR
C025* THE *INITIATION* SECTION AND C.30 FOR THE
C026* *COMPLETION* SECTION.
C027*
C028*   -   THE INITIATION SECTION IS CALLED FROM I/O
C029*       CONTROL TO INITIALIZE A DISC/DMA COMBINATION
C030*       AND TO INITIATE DATA TRANSMISSION.
C031*
C032*        CALLING SEQUENCE:
C033*
C034*              - ADDRESSES OF DEVICE EQT ENTRY
C035*                SET IN "EQT1-EQT17" -
C036*              - CONTROL I/O ADDRESS OF ASSIGNED
C037*                DMA CHANNEL SET IN "CHAN".
C038*
C039*              (A) = I/O ADDRESS OF DISC(HIGH-PRIORITY)
C040*
C041*          (P)    JSB  I.30
C042*          (P+1) - RETURN -
C043*
C044*                  (A) = 0, OPERATION INITIATED, OR
C045*                  (A) = REJECT CODE:
C046*
C047*                       2, ILLEGAL CONTROL REQUEST
C048*                       3, DISC IS NOT "UP TO SPEED"
C049*                              OR IS "BUSY".
C050*
C051*   -   THE COMPLETION SECTION IS CALLED BY CENTRAL
C052*       INTERRUPT CONTROL AT THE RECOGNITION OF THE
C053*       DMA CHANNEL INTERRUPT.
C054*
C055*        CALLING SEQUENCE:
```

```
C056*
C057*          - ADDRESSES OF DEVICE EQT ENTRY
C058*             SET IN "EQT1-EQT17" -
C059*
C060*            (A) = DMA CHANNEL CONTROL I/O ADDRESS
C061*
C062*         (P)    JSB  C.30
C063*         (P+1) -- COMPLETION RETURN              --
C064*         (P+2) -- RETRY OR NEXT TRANSFER RETURN --
C065*
C066*          - COMPLETION RETURN:
C067*             (A) = 0, SUCCESSFUL COMPLETION WITH
C068*                (B) = # WORDS OR CHARS. TRANSFERRED
C069*             (A) = 3  IF PARITY OR DECODE ERROR OR ABORT
C070*                      DETECTED ON INPUT OPERATION
C071*                      OR ABORT ON WRITE OPERATION.
C072*                (B) = ADDRESS OF TRACK CONTAINING
C073*                      ERROR
C074*
C075*          - RETRY RETURN: REGISTERS MEANINGLESS
C076*
C077*
C078*   -  DATA TRANSMISSION: ALL DATA TRANSFER IS
C079*            PERFORMED UNDER DMA CHANNEL CONTROL.
C080*            NO ALTERATION IS MADE TO THE BUFFER
C081*            AREA BY THE DRIVER; THE MODE IN THE
C082*            REQUEST IS IGNORED. THE USER SPECIFIES
C083*            THE TRACK #, STARTING SECTOR # AND
C084*            THE LENGTH OF THE TRANSFER. THE DRIVER
C085*            CAUSES FULL SECTORS TO BE WRITTEN.
C086*
C087*   -  INPUT ERROR RETRY PROCEDURE: THE DRIVER ATTEMPTS
C088*            AN INPUT OPERATION TEN (10) TIMES BEFORE
C089*            TERMINATING WITH A PARITY ERROR SIGNAL
C090*            TO I/O CONTROL. THERE IS NO WRITE PARITY ERROR
C091*            DETECTION PROVIDED BY THE HARDWARE.
C092*
C093*   -  SPECIAL SYSTEM REQUESTS: A GROUP OF TRANSFERS
C094*            MAY BE SPECIFIED BY AN INTERNAL SYSTEM
C095*            REQUEST (VIA <XSIO>). THIS REQUEST HAS
C096*            THE SPECIAL FORMAT:
C097*
C098*            (EQT10,I)  CONTAINS A POINTER TO A
C099*             GROUP OF "TRIPLETS" CONTAINING THE
C100*             BUFFER ADDRESS, LENGTH AND TRACK/
C101*             SECTOR ADDRESS FOR EACH TRANSFER.
C102*             THE GROUP OF TRIPLETS IS OPEN-ENDED
C103*             AND IS TERMINATED BY A ZERO-WORD.
C104*             ALL TRANSFERS ARE MADE BEFORE A
C105*             COMPLETION RETURN TO <CIC> IS MADE.
C106*
```

```
C108*
C109*
C110*
C111  00000 000000  I.30  NOP
C112*
C113  00001 016173R       JSB SETIO    SET I/O INSTRUCTIONS FOR DISC.
C114*
C115  00002 064055        LDB .2
C116  00003 160213        LDA EQT9,I   GET REQUEST CONTROL WORD,
C117  00004 010056        AND .3        ISOLATE REQUEST CODE.
C118  00005 050056        CPA .3       ERROR IF REQUEST IS
C119  00006 026014R       JMP D01       -CONTROL-
C120  00007 064056        LDB .3
C121*
C122  00010 102500  IO1   LIA DISCC    GET DISC STATUS
C123*
C124  00011 001727        ALF,ALF      CONTINUE PROCESSING
C125  00012 002020        SSA           IF DISC IS READY
C126  00013 026016R       JMP D02       AND UP TO SPEED.
C127*
C128* REJECT REQUEST - ILLEGAL REQUEST OR DISC NOT READY
C129*  (B)=2 FOR ILLEGAL REQUEST, (B)=3 FOR NOT READY
C130*
C131  00014 060001  D01   LDA B        SET (A) = REJECT CODE
C132  00015 126000R       JMP I.30,I    RETURN TO I/O CONTROL.
C133*
C134  00016 060041  D02   LDA N10      SET ERROR RETRY COUNTER = -10
C135  00017 170220        STA EQT14,I
C136*
C137* SYSTEM ORIGINATED REQUEST
C138*
C139  00020 016116R D03   JSB SYSRQ    SET PARAMETERS
C140*
C141* CALL <SETUP> TO INITIATE DATA TRANSFER.
C142*
C143  00021 016131R D04   JSB SETUP    <TEMP1> TO <TEMP3> SET.
C144*
C145  00022 002400        CLA          (A) =0 TO MEAN OPERATION BEGUN.
C146  00023 126000R       JMP I.30,I   -RETURN TO I/O CONTROL-
```

```
C148*
C149*
C150*********  COMPLETION  SECTION  *********
C151*
C152*
C153  00024 000000  C.30  NOP
C154  00025 006400        CLB
C155  00026 076236R       STB TEMP1
C156  00027 070257        STA CHAN      SAVE DMA CHANNEL #.
C157  00030 160205        LDA EQT3,I    GET DISC HIGH PRIORITY
C158  00031 010072        AND MASK4      ADDRESS FROM EQT ENTRY.
C159  00032 016173R       JSB SETIO     SET I/O INSTRUCTIONS FOR DISC,DMA
C160*
C161  00033 102500  IO2   LIA DISCC     GET DISC STATUS. FOR READ,
C162*
C163  00034 164213        LDB EQT9,I
C164  00035 006011        SLB,RSS
C165  00036 026110R       JMP D12      -- WRITE OPERATION --
C166*
C167* CHECK FOR SUCCESSFUL COMPLETION OF READ OPERATION
C168*
C169  00037 000010        SLA
C170  00040 026033R       JMP IO2
C171  00041 012233R       AND ERRMK     CHECK FOR PARITY OR DECODE ERROR
C172  00042 002003        SZA,RSS       IF GOOD TRANSFER,
C173  00043 026055R       JMP D07        CONTINUE
C174  00044 060056        LDA .3        SET RETURN STATUS
C175  00045 072236R       STA TEMP1      = 3 FOR TRANSMISSION ERROR.
C176*
C177  00046 134220        ISZ EQT14,I   INDEX RETRY COUNTER.
C178  00047 002001        RSS            -TRY AGAIN-
C179  00050 026100R       JMP D10    ---ABORT AS UNSUCCESSFUL---
C180*
C181* RE-INITIATE INPUT OPERATION FOR ERROR RECOVERY
C182*
C183*
C184  00051 016116R D05   JSB SYSRQ     SELECT SYSTEM REQUEST PARAMETERS.
C185*
C186  00052 016131R D06   JSB SETUP     INITIATE TRANSFER
C187*
C188  00053 036024R       ISZ C.30      ADJUST RETURN TO (P+2).
C189  00054 126024R       JMP C.30,I    -RETURN AS CONTINUATION OPERATION
```

```
C191*
C192* CHECK FOR NEXT TRANSFER IN A SYSTEM REQUEST
C193*  (CONTROL HERE ON SUCCESSFUL COMPLETION)
C194*
C195  00055 160214  D07   LDA EQT10,I  COMPUTE
C196  00056 040056        ADA .3        AND ADDRESS OF NEXT CHAIN
C197  00057 170214        STA EQT10,I   SUB-REQUEST.
C198  00060 160000        LDA A,I      IF NOT END OF CHAIN, INITIATE
C199  00061 002002        SZA           NEXT OPERATION, OTHERWISE ON END
C200  00062 026051R       JMP D05       OF CHAIN GO TO COMPLETION
C201*
```

```
C203*
C204* STATUS AND TERMINATION SECTION
C205*
C206  00063 164215  D08   LDB EQT11,I  SET USER BUFFER
C207  00064 006020        SSB           LENGTH TO
C208  00065 007004        CMB,INB       POSITIVE WORD OR CHARACTER CNT.
C209*
C210  00066 102500  IO3   LIA DISCC    GET DISC STATUS.
C211*
C212  00067 010074        AND MASK1     ISOLATE AND SAVE
C213  00070 072237R       STA TEMP2     UNIT CONDITION
C214  00071 160206        LDA EQT4,I    INSERT STATUS
C215  00072 010075        AND MASK2     INTO
C216  00073 032237R       IOR TEMP2     EQT ENTRY
C217  00074 170206        STA EQT4,I    WORD 5.
C218*
C219* COMPLETION RETURN TO INTERRUPT/ I/O CONTROL
C220*
C221  00075 062236R D09   LDA TEMP1    - STATUS INDICATION -
C222  00076 106700  IO12  CLC DMAC     CLEAR  DMA  CONTROL
C223  00077 126024R       JMP C.30,I    - EXIT DRIVER -
C224*
C225* IRRECOVERABLE ERROR TERMINATION
C226*
C227  00100 164216  D10   LDB EQT12,I  SET (B) = ERROR TRACK ADDRESS
C228  00101 160214        LDA EQT10,I
C229  00102 040055        ADA .2        REMOVE SECTOR ADDRESS
C230  00103 160000        LDA A,I         FROM SYSTEM REQUEST
C231  00104 001727        ALF,ALF         PARAMETER
C232  00105 010074        AND MASK1
C233*
C234  00106 070001  D11   STA B         (B) = TRACK ADDRESS
C235  00107 026066R       JMP IO3
C236*
C237*  CHECK FOR "ABORT" DURING WRITE
C238*
C239  00110 010063  D12   AND .10       MASK ABORT BIT IN STATUS.
C240  00111 002003        SZA,RSS       GOOD TRANSFER IF
C241  00112 026055R       JMP D07         ZERO.
C242*
C243  00113 060056        LDA .3         ERROR INDICATION
C244  00114 072236R       STA TEMP1       FOR RETURN.
C245  00115 026100R       JMP D10
```

```
C247*
C248******* SUBROUTINE  SECTION *******
C249*
C250*      <SYSRQ>
C251*
C252*  PURPOSE: TO SET THE PARAMETERS OF
C253*           A DISC READ/WRITE INTO TEMP1,2,3
C254*           FOR USE BY SUBROUTINE <SETUP>.
C255*
C256*  CALLS: (P)   JSB SYSRQ
C257*         (P+1)  -RETURN- (REGISTERS MEANINGLESS)
C258*
C259*
C260*
C261  00116 000000  SYSRQ NOP
C262  00117 164214        LDB EQT10,I  (B) = ADDR OF CURRENT CHAIN
C263  00120 160001        LDA B,I      -TEMP1-
C264  00121 072236R       STA TEMP1      = BUFFER ADDRESS.
C265  00122 006004        INB
C266  00123 160001        LDA B,I      -TEMP2-
C267  00124 072237R       STA TEMP2      = BUFFER LENGTH
C268  00125 006004        INB
C269  00126 160001        LDA B,I      -TEMP3-
C270  00127 072240R       STA TEMP3      = TRACK/SECTOR ADDRESS.
C271  00130 125116R       JMP SYSRQ,I
C272*
C273*
```

```
C275* SUBROUTINE: <SETUP>
C276*
C277* PURPOSE: TO CONSTRUCT THE DISC AND DMA
C278*          CONTROL WORDS DEFINING THE
C279*          READ/WRITE OPERATION AND TO
C280*          INITIATE THE DATA TRANSFER.
C281*
C282* CALL:    -TEMP1 - TEMP3- SET BY SUBROUTINE
C283*
C284*    (P)       JSB  SETUP
C285*    (P+1)     -RETURN-  OPERATION INITIATED
C286*
C287  00131 000000  SETUP NOP
C288  00132 006400        CLB           SET FOR READ
C289  00133 160213        LDA EQT9,I    GET REQUEST CONTROL WORD.
C290  00134 002011        SLA,RSS       IF WRITE REQUEST,
C291  00135 066231R       LDB MSIGN      SET 15=1 FOR DISC WRITE.
C292  00136 062240R       LDA TEMP3     GET TRACK/SECTOR ADDRESS
C293  00137 030001        IOR B          AND SET READ/WRITE BIT.
C294  00140 072240R       STA TEMP3     SET  DISC CONTROL WORD
C295  00141 062237R       LDA TEMP2     GET BUFFER LENGTH.
C296  00142 002020        SSA           IF IN CHARACTERS,
C297  00143 001100        ARS            SET NEGATIVE WORDS.
C298  00144 002021        SSA,RSS       SET WORD COUNT
C299  00145 003004        CMA,INA        NEGATIVE.
C300  00146 002003        SZA,RSS       IF WORD COUNT = 0, SET
C301  00147 062230R       LDA MASK3      FOR 1 SECTOR TRANSFER.
C302  00150 006020        SSB           IF WRITE OPERATION,
C303  00151 012230R       AND MASK3      SET TO WIRTE LAST FULL SECTOR.
C304  00152 072237R       STA TEMP2     SAVE DMA WORD COUNT.
C305*
C306  00153 062232R       LDA DMACW     COMBINE DISC HIGH-PRIORITY ADDR
C307  00154 032241R       IOR DISCH      WITH BIT 13 = 1 FOR CLC AT END.
C308*
C309  00155 102600  I04   OTA DMAC      ASSIGN DMA TO DISC.
C310*
C311  00156 106700  I05   CLC DMAM      SET DMA FOR *MAR*.
C312  00157 062236R       LDA TEMP1     GET STARTING BUFFER.
C313  00160 006021        SSB,RSS       IF READ REQUEST, SET DMA DIREC-
C314  00161 032231R       IOR MSIGN      TION TO WRITE IN MEMORY
C315*
C316  00162 102600  I06   OTA DMAM      SET * MAR * IN DMA.
C317  00163 102700  I07   STC DMAM      SET DMA FOR *WCR*.
C318*
C319  00164 062237R       LDA TEMP2     GET WORD COUNT FOR TRANSFER.
C320*
C321  00165 102600  I08   OTA DMAM      SET  * WCR * IN DMA.
C322*
C323  00166 062240R       LDA TEMP3     GET TRACK/SECTOR/DIRECTION.
C324                      IFN
C325                      CLB
C326                      RRL 1
C327                      RBL
C328                      RRL 7
C329                      RAL
```

< DRIVER 50 * STATUS SECTION * >

```
C330                        RRL 7
C331                        STB A
C332                        XIF
C333*
C334  00167 102600  I09     OTA DISCC     SET DISC CONTROL WORD.
C335*
C336  00170 102700  I010    STC DMAC      ---- START   DMA   ----
C337  00171 102700  I011    STC DISCD     ---- START   DISC  ----
C338*
C339  00172 126131R         JMP SETUP,I     - EXIT -
```

```
C341*
C342* SUBROUTINE: <SETIO>
C343*
C344*  PURPOSE:  TO SET THE I/O INSTRUCTIONS IN
C345*            THE DRIVER TO REFERENCE THE HIGH AND
C346*            LOW PRIORITY DISC ADDRESSES AND
C347*            THE 2 DMA CHANNEL ADDRESSES.
C348*
C349*  CALL:     (A) = HIGH PRIORITY DISC ADDRESS
C350*            <CHAN> = I/O ADDRESS OF DMA CHANNEL
C351*
C352*        (P)       JSB  SETIO
C353*        (P+1)     - RETURN -
C354*
C355*         ON RETURN, -DISCH- CONTAINS I/O ADDRESS
C356*          OF DISC *DATA* ADDRESS.
C357*
C358*
C359  00173 000000  SETIO NOP
C360  00174 072241R       STA DISCH    SAVE DISC  *DATA* ADDRESS
C361  00175 032242R       IOR STC
C362  00176 072171R       STA IO11     SET  STC  DISC DATA ADDRESS
C363*
C364  00177 062243R       LDA LIA      SET
C365  00200 032241R       IOR DISCH         LIA  DISC COMMAND ADDRESS
C366  00201 002004        INA
C367  00202 072010R       STA IO1
C368  00203 072033R       STA IO2
C369  00204 072066R       STA IO3
C370*
C371  00205 040067        ADA .100     SET
C372  00206 072167R       STA IO9           OTA  DISC COMMAND ADDRESS
C373*
C374  00207 012230R       AND MASK3    SET
C375  00210 030257        IOR CHAN          OTA  DMA  CHANNEL ADDRESS
C376  00211 072155R       STA IO4
C377*
C378  00212 042234R       ADA .1100    SET
C379  00213 072170R       STA IO10          STC  DMA  CHANNEL ADDRESS
C380*
C381  00214 060257        LDA CHAN     GET ADDRESS OF *MAR,WCR*
C382  00215 040047        ADA N4        OF DMA CHANNEL (I.E., 2 OR 3)
C383  00216 032244R       IOR OTA      SET
C384  00217 072162R       STA IO6           OTA  DMA  MAR/WCR
C385  00220 072165R       STA IO8
C386*
C387  00221 040067        ADA .100     SET
C388  00222 072163R       STA IO7        STC  DMA  MAC/WCR
C389*
C390  00223 042235R       ADA .4000    SET
C391  00224 072156R       STA IO5        CLC  DMA  MAR/WCR
C392  00225 040057        ADA .4       SET
C393  00226 072076R       STA IO12       CLC  DMA  CHANNEL ADDRESS
C394*
C395  00227 126173R       JMP SETIO,I
```

```
C397*
C398* CONSTANT AND VARIABLE STORAGE AREA
C399*
C400  00000          A      EQU 0          DEFINE SYMBOLIC REFERENCE FOR
C401  00001          B      EQU 1           A AND B REGISTERS.
C402*
C403  00230 177700   MASK3  OCT 177700
C404  00231 100000   MSIGN  OCT 100000
C405  00232 020000   DMACW  OCT 20000     CLC BIT FOR END OF DMA OPERATION
C406*
C407  00233 000032   ERRMK  OCT 32       PARITY, DECODE AND ABORT MASK
C408*
C409  00234 001100   .1100  OCT 1100
C410  00235 004000   .4000  OCT 4000
C411*
C412  00236 000000   TEMP1  NOP
C413  00237 000000   TEMP2  NOP
C414  00240 000000   TEMP3  NOP
C415*
C416  00241 000000   DISCH  NOP          -HIGH PRIORITY DISC DATA ADDRESS-
C417*
C418  00000          DMAC   EQU 0          DMA  CHANNEL ADDRESS
C419  00000          DMAM   EQU 0          DMA  MAR/WCR ADDRESS
C420  00000          DISCC  EQU 0          DISC  COMMAND ADDRESS
C421  00000          DISCD  EQU 0          DISC  DATA ADDRESS
C422*
C423  00242 102700   STC    STC 0
C424  00243 102500   LIA    LIA 0
C425  00244 102600   OTA    OTA 0
```

```
C427*
C428*** SYSTEM BASE PAGE  COMMUNICATION  AREA ***
C429*
C430  00053          ..     EQU 53B
C431  00041          N10    EQU ..-10
C432  00047          N4     EQU ..-4
C433  00051          N2     EQU ..-2
C434  00055          .2     EQU ..+2
C435  00056          .3     EQU ..+3
C436  00057          .4     EQU ..+4
C437  00063          .10    EQU ..+8
C438  00067          .100   EQU ..+12
C439  00072          MASK4  EQU ..+15
C440  00074          MASK1  EQU ..+17
C441  00075          MASK2  EQU ..+18
C442  00100          .      EQU 100B
C443*
C444*
C445* I/O MODULE/DRIVER COMMUNICATION
C446*
C447  00203          EQT1   EQU .+67
C448  00204          EQT2   EQU .+68
C449  00205          EQT3   EQU .+69
C450  00206          EQT4   EQU .+70
C451  00207          EQT5   EQU .+71
C452  00210          EQT6   EQU .+72
C453  00211          EQT7   EQU .+73
C454  00212          EQT8   EQU .+74
C455  00213          EQT9   EQU .+75
C456  00214          EQT10  EQU .+76
C457  00215          EQT11  EQU .+77
C458  00216          EQT12  EQU .+78
C459  00217          EQT13  EQU .+79
C460  00220          EQT14  EQU .+80
C461  00221          EQT15  EQU .+81
C462  00222          EQT16  EQU .+82
C463  00223          EQT17  EQU .+83
C464*
C465  00257          CHAN   EQU .+111    CURRENT DMA CHANNEL #
C466*
C467                        END
**  NO ERRORS *TOTAL **RTE ASMB 92067-16011**
```

```
0001                    ASMB,R,L,N
**  NO ERRORS PASS#1 **RTE ASMB 92067-16011**
```

```
C001                    ASMB,R,L,N
C002  00000                     NAM DVR30
C003*********************************************************************
C004*
C005*      SET N IN ASMB FOR DDC OR VERMONT MASS STORAGE DEVICE
C006*
C007*      SET Z IN ASMB FOR DATA DISC MASS STORAGE DEVICE
C008*
C009*********************************************************************
C010*
C011******       VERSION  12 / 15 / 68
C012*
C013*
C014                        ENT I.30,C.30
C015*
C016******  PROGRAM  DESCRIPTION  ******
C017*
C018*
C019*    DRIVER 30 OPERATES UNDER THE CONTROL OF THE
C020* I/O CONTROL MODULE OF THE D.O.S. EXECUTIVE
C021* THIS DRIVER IS RESPONSIBLE FOR CONTROLLING DATA
C022* TRANSMISSION WITH A 2757A TYPE DISC FILE.
C023* <30> IS THE EQUIPMENT CODE ASSIGNED TO THIS
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C026* *COMPLETION* SECTION.
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C028*   -  THE INITIATION SECTION IS CALLED FROM I/O
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C030*      AND TO INITIATE DATA TRANSMISSION.
C031*
C032*       CALLING SEQUENCE:
C033*
C034*            - ADDRESSES OF DEVICE EQT ENTRY
C035*              SET IN "EQT1-EQT17" -
C036*            - CONTROL I/O ADDRESS OF ASSIGNED
C037*              DMA CHANNEL SET IN "CHAN".
C038*
C039*            (A) = I/O ADDRESS OF DISC(HIGH-PRIORITY)
C040*
C041*         (P)    JSB  I.30
C042*         (P+1) - RETURN -
C043*
C044*                 (A) = 0, OPERATION INITIATED, OR
C045*                 (A) = REJECT CODE:
C046*
C047*                      2, ILLEGAL CONTROL REQUEST
C048*                      3, DISC IS NOT "UP TO SPEED"
C049*                            OR IS "BUSY".
C050*
C051*   -  THE COMPLETION SECTION IS CALLED BY CENTRAL
C052*      INTERRUPT CONTROL AT THE RECOGNITION OF THE
C053*      DMA CHANNEL INTERRUPT.
C054*
C055*       CALLING SEQUENCE:
```

```
C056*
C057*          - ADDRESSES OF DEVICE EQT ENTRY
C058*             SET IN "EQT1-EQT17" -
C059*
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C061*
C062*         (P)    JSB  C.30
C063*         (P+1) -- COMPLETION RETURN              --
C064*         (P+2) -- RETRY OR NEXT TRANSFER RETURN --
C065*
C066*          - COMPLETION RETURN:
C067*             (A) = 0, SUCCESSFUL COMPLETION WITH
C068*                (B) = # WORDS OR CHARS. TRANSFERRED
C069*             (A) = 3  IF PARITY OR DECODE ERROR OR ABORT
C070*                      DETECTED ON INPUT OPERATION
C071*                      OR ABORT ON WRITE OPERATION.
C072*                (B) = ADDRESS OF TRACK CONTAINING
C073*                      ERROR
C074*
C075*          - RETRY RETURN: REGISTERS MEANINGLESS
C076*
C077*
C078*   -  DATA TRANSMISSION: ALL DATA TRANSFER IS
C079*            PERFORMED UNDER DMA CHANNEL CONTROL.
C080*            NO ALTERATION IS MADE TO THE BUFFER
C081*            AREA BY THE DRIVER; THE MODE IN THE
C082*            REQUEST IS IGNORED. THE USER SPECIFIES
C083*            THE TRACK #, STARTING SECTOR # AND
C084*            THE LENGTH OF THE TRANSFER. THE DRIVER
C085*            CAUSES FULL SECTORS TO BE WRITTEN.
C086*
C087*   -  INPUT ERROR RETRY PROCEDURE: THE DRIVER ATTEMPTS
C088*            AN INPUT OPERATION TEN (10) TIMES BEFORE
C089*            TERMINATING WITH A PARITY ERROR SIGNAL
C090*            TO I/O CONTROL. THERE IS NO WRITE PARITY ERROR
C091*            DETECTION PROVIDED BY THE HARDWARE.
C092*
C093*   -  SPECIAL SYSTEM REQUESTS: A GROUP OF TRANSFERS
C094*            MAY BE SPECIFIED BY AN INTERNAL SYSTEM
C095*            REQUEST (VIA <XSIO>). THIS REQUEST HAS
C096*            THE SPECIAL FORMAT:
C097*
C098*            (EQT10,I)  CONTAINS A POINTER TO A
C099*             GROUP OF "TRIPLETS" CONTAINING THE
C100*             BUFFER ADDRESS, LENGTH AND TRACK/
C101*             SECTOR ADDRESS FOR EACH TRANSFER.
C102*             THE GROUP OF TRIPLETS IS OPEN-ENDED
C103*             AND IS TERMINATED BY A ZERO-WORD.
C104*             ALL TRANSFERS ARE MADE BEFORE A
C105*             COMPLETION RETURN TO <CIC> IS MADE.
C106*
```

```
C108*
C109*
C110*
C111  00000 000000  I.30  NOP
C112*
C113  00001 016202R       JSB SETIO    SET I/O INSTRUCTIONS FOR DISC.
C114*
C115  00002 064055        LDB .2
C116  00003 160213        LDA EQT9,I   GET REQUEST CONTROL WORD,
C117  00004 010056        AND .3        ISOLATE REQUEST CODE.
C118  00005 050056        CPA .3       ERROR IF REQUEST IS
C119  00006 026014R       JMP D01       -CONTROL-
C120  00007 064056        LDB .3
C121*
C122  00010 102500  I01   LIA DISCC    GET DISC STATUS
C123*
C124  00011 001727        ALF,ALF      CONTINUE PROCESSING
C125  00012 002020        SSA           IF DISC IS READY
C126  00013 026016R       JMP D02       AND UP TO SPEED.
C127*
C128* REJECT REQUEST - ILLEGAL REQUEST OR DISC NOT READY
C129*  (B)=2 FOR ILLEGAL REQUEST, (B)=3 FOR NOT READY
C130*
C131  00014 060001  D01   LDA B        SET (A) = REJECT CODE
C132  00015 126000R       JMP I.30,I    RETURN TO I/O CONTROL.
C133*
C134  00016 060041  D02   LDA N10      SET ERROR RETRY COUNTER = -10
C135  00017 170220        STA EQT14,I
C136*
C137* SYSTEM ORIGINATED REQUEST
C138*
C139  00020 016116R D03   JSB SYSRQ    SET PARAMETERS
C140*
C141* CALL <SETUP> TO INITIATE DATA TRANSFER.
C142*
C143  00021 016131R D04   JSB SETUP    <TEMP1> TO <TEMP3> SET.
C144*
C145  00022 002400        CLA          (A) =0 TO MEAN OPERATION BEGUN.
C146  00023 126000R       JMP I.30,I   -RETURN TO I/O CONTROL-
```

```
C108*
C109*
C110*
C111  00000 000000  I.30  NOP
C112*
C113  00001 016202R       JSB SETIO    SET I/O INSTRUCTIONS FOR DISC.
C114*
C115  00002 064055        LDB .2
C116  00003 160213        LDA EQT9,I   GET REQUEST CONTROL WORD,
C117  00004 010056        AND .3        ISOLATE REQUEST CODE.
C118  00005 050056        CPA .3       ERROR IF REQUEST IS
C119  00006 026014R       JMP D01       -CONTROL-
C120  00007 064056        LDB .3
C121*
C122  00010 102500  I01   LIA DISCC    GET DISC STATUS
C123*
C124  00011 001727        ALF,ALF      CONTINUE PROCESSING
C125  00012 002020        SSA           IF DISC IS READY
C126  00013 026016R       JMP D02       AND UP TO SPEED.
C127*
C128* REJECT REQUEST - ILLEGAL REQUEST OR DISC NOT READY
C129*  (B)=2 FOR ILLEGAL REQUEST, (B)=3 FOR NOT READY
C130*
C131  00014 060001  D01   LDA B        SET (A) = REJECT CODE
C132  00015 126000R       JMP I.30,I    RETURN TO I/O CONTROL.
C133*
C134  00016 060041  D02   LDA N10      SET ERROR RETRY COUNTER = -10
C135  00017 170220        STA EQT14,I
C136*
C137* SYSTEM ORIGINATED REQUEST
C138*
C139  00020 016116R D03   JSB SYSRQ    SET PARAMETERS
C140*
C141* CALL <SETUP> TO INITIATE DATA TRANSFER.
C142*
C143  00021 016131R D04   JSB SETUP    <TEMP1> TO <TEMP3> SET.
C144*
C145  00022 002400        CLA          (A) =0 TO MEAN OPERATION BEGUN.
C146  00023 126000R       JMP I.30,I   -RETURN TO I/O CONTROL-
```

```
C148*
C149*
C150********* COMPLETION SECTION *********
C151*
C152*
C153  00024 000000  C.30  NOP
C154  00025 006400        CLB
C155  00026 076245R       STB TEMP1
C156  00027 070257        STA CHAN      SAVE DMA CHANNEL #.
C157  00030 160205        LDA EQT3,I    GET DISC HIGH PRIORITY
C158  00031 010072        AND MASK4      ADDRESS FROM EQT ENTRY.
C159  00032 016202R       JSB SETIO     SET I/O INSTRUCTIONS FOR DISC,DMA
C160*
C161  00033 102500  I02   LIA DISCC     GET DISC STATUS. FOR READ,
C162*
C163  00034 164213        LDB EQT9,I
C164  00035 006011        SLB,RSS
C165  00036 026110R       JMP D12      -- WRITE OPERATION --
C166*
C167* CHECK FOR SUCCESSFUL COMPLETION OF READ OPERATION
C168*
C169  00037 000010        SLA
C170  00040 026033R       JMP I02
C171  00041 012242R       AND ERRMK     CHECK FOR PARITY OR DECODE ERROR
C172  00042 002003        SZA,RSS       IF GOOD TRANSFER,
C173  00043 026055R       JMP D07        CONTINUE
C174  00044 060056        LDA .3        SET RETURN STATUS
C175  00045 072245R       STA TEMP1      = 3 FOR TRANSMISSION ERROR.
C176*
C177  00046 134220        ISZ EQT14,I   INDEX RETRY COUNTER.
C178  00047 002001        RSS            -TRY AGAIN-
C179  00050 026100R       JMP D10    ---ABORT AS UNSUCCESSFUL---
C180*
C181* RE-INITIATE INPUT OPERATION FOR ERROR RECOVERY
C182*
C183*
C184  00051 016116R D05   JSB SYSRQ     SELECT SYSTEM REQUEST PARAMETERS.
C185*
C186  00052 016131R D06   JSB SETUP     INITIATE TRANSFER
C187*
C188  00053 036024R       ISZ C.30      ADJUST RETURN TO (P+2).
C189  00054 126024R       JMP C.30,I    -RETURN AS CONTINUATION OPERATION
```

```
C191*
C192* CHECK FOR NEXT TRANSFER IN A SYSTEM REQUEST
C193*  (CONTROL HERE ON SUCCESSFUL COMPLETION)
C194*
C195  00055 160214  D07    LDA EQT10,I  COMPUTE
C196  00056 040056         ADA .3        AND ADDRESS OF NEXT CHAIN
C197  00057 170214         STA EQT10,I   SUB-REQUEST.
C198  00060 160000         LDA A,I      IF NOT END OF CHAIN, INITIATE
C199  00061 002002         SZA           NEXT OPERATION, OTHERWISE ON END
C200  00062 026051R        JMP D05        OF CHAIN GO TO COMPLETION
C201*
```

```
C203*
C204* STATUS AND TERMINATION SECTION
C205*
C206  00063 164215  D08   LDB EQT11,I  SET USER BUFFER
C207  00064 006020        SSB           LENGTH TO
C208  00065 007004        CMB,INB       POSITIVE WORD OR CHARACTER CNT.
C209*
C210  00066 102500  I03   LIA DISCC    GET DISC STATUS.
C211*
C212  00067 010074        AND MASK1     ISOLATE AND SAVE
C213  00070 072246R       STA TEMP2     UNIT CONDITION
C214  00071 160206        LDA EQT4,I    INSERT STATUS
C215  00072 010075        AND MASK2     INTO
C216  00073 032246R       IOR TEMP2     EQT ENTRY
C217  00074 170206        STA EQT4,I    WORD 5.
C218*
C219* COMPLETION RETURN TO INTERRUPT/ I/O CONTROL
C220*
C221  00075 062245R D09   LDA TEMP1    - STATUS INDICATION -
C222  00076 105700  I012  CLC DMAC     CLEAR  DMA  CONTROL
C223  00077 126024R       JMP C.30,I    - EXIT DRIVER -
C224*
C225* IRRECOVERABLE ERROR TERMINATION
C226*
C227  00100 164216  D10   LDB EQT12,I  SET (B) = ERROR TRACK ADDRESS
C228  00101 160214        LDA EQT10,I
C229  00102 040055        ADA .2        REMOVE SECTOR ADDRESS
C230  00103 160000        LDA A,I         FROM SYSTEM REQUEST
C231  00104 001727        ALF,ALF         PARAMETER
C232  00105 010074        AND MASK1
C233*
C234  00106 070001  D11   STA B         (B) = TRACK ADDRESS
C235  00107 026066R       JMP I03
C236*
C237*  CHECK FOR "ABORT" DURING WRITE
C238*
C239  00110 010063  D12   AND .10       MASK ABORT BIT IN STATUS.
C240  00111 002003        SZA,RSS       GOOD TRANSFER IF
C241  00112 026055R       JMP D07         ZERO.
C242*
C243  00113 060056        LDA .3         ERROR INDICATION
C244  00114 072245R       STA TEMP1       FOR RETURN.
C245  00115 026100R       JMP D10
```

```
C247*
C248******* SUBROUTINE  SECTION *******
C249*
C250*      <SYSRQ>
C251*
C252*  PURPOSE: TO SET THE PARAMETERS OF
C253*           A DISC READ/WRITE INTO TEMP1,2,3
C254*           FOR USE BY SUBROUTINE <SETUP>.
C255*
C256*  CALLS: (P)   JSB SYSRQ
C257*         (P+1)  -RETURN- (REGISTERS MEANINGLESS)
C258*
C259*
C260*
C261  00116 000000  SYSRQ NOP
C262  00117 164214        LDB EQT10,I   (B) = ADDR OF CURRENT CHAIN
C263  00120 160001        LDA B,I       -TEMP1-
C264  00121 072245R       STA TEMP1       = BUFFER ADDRESS.
C265  00122 006004        INB
C266  00123 160001        LDA B,I       -TEMP2-
C267  00124 072246R       STA TEMP2       = BUFFER LENGTH
C268  00125 006004        INB
C269  00126 160001        LDA B,I       -TEMP3-
C270  00127 072247R       STA TEMP3       = TRACK/SECTOR ADDRESS.
C271  00130 126116R       JMP SYSRQ,I
C272*
C273*
```

```
C275* SUBROUTINE: <SETUP>
C276*
C277* PURPOSE: TO CONSTRUCT THE DISC AND DMA
C278*          CONTROL WORDS DEFINING THE
C279*          READ/WRITE OPERATION AND TO
C280*          INITIATE THE DATA TRANSFER.
C281*
C282* CALL:    -TEMP1 - TEMP3- SET BY SUBROUTINE
C283*
C284*     (P)       JSB  SETUP
C285*     (P+1)     -RETURN-  OPERATION INITIATED
C286*
C287  00131 000000  SETUP NOP
C288  00132 006400        CLB            SET FOR READ
C289  00133 160213        LDA EQT9,I     GET REQUEST CONTROL WORD.
C290  00134 002011        SLA,RSS        IF WRITE REQUEST,
C291  00135 066240R       LDB MSIGN       SET 15=1 FOR DISC WRITE.
C292  00136 062247R       LDA TEMP3      GET TRACK/SECTOR ADDRESS
C293  00137 030001        IOR B           AND SET READ/WRITE BIT.
C294  00140 072247R       STA TEMP3      SET  DISC CONTROL WORD
C295  00141 062246R       LDA TEMP2      GET BUFFER LENGTH.
C296  00142 002020        SSA            IF IN CHARACTERS,
C297  00143 001100        ARS             SET NEGATIVE WORDS.
C298  00144 002021        SSA,RSS        SET WORD COUNT
C299  00145 003004        CMA,INA         NEGATIVE.
C300  00146 002003        SZA,RSS        IF WORD COUNT = 0, SET
C301  00147 062237R       LDA MASK3       FOR 1 SECTOR TRANSFER.
C302  00150 006020        SSB            IF WRITE OPERATION,
C303  00151 012237R       AND MASK3       SET TO WIRTE LAST FULL SECTOR.
C304  00152 072246R       STA TEMP2      SAVE DMA WORD COUNT.
C305*
C306  00153 062241R       LDA DMACW      COMBINE DISC HIGH-PRIORITY ADDR
C307  00154 032250R       IOR DISCH       WITH BIT 13 = 1 FOR CLC AT END.
C308*
C309  00155 102600  IO4   OTA DMAC       ASSIGN DMA TO DISC.
C310*
C311  00156 106700  IO5   CLC DMAM       SET DMA FOR *MAR*.
C312  00157 062245R       LDA TEMP1      GET STARTING BUFFER.
C313  00160 006021        SSB,RSS        IF READ REQUEST, SET DMA DIREC-
C314  00161 032240R       IOR MSIGN       TION TO WRITE IN MEMORY
C315*
C316  00162 102600  IO6   OTA DMAM       SET * MAR * IN DMA.
C317  00163 102700  IO7   STC DMAM       SET DMA FOR *WCR*.
C318*
C319  00164 062246R       LDA TEMP2      GET WORD COUNT FOR TRANSFER.
C320*
C321  00165 102600  IO8   OTA DMAM       SET  * WCR * IN DMA.
C322*
C323  00166 062247R       LDA TEMP3      GET TRACK/SECTOR/DIRECTION.
C324                      IFN
C325  00167 006400        CLB
C326  00170 100101        RRL 1
C327  00171 005200        RBL
C328  00172 100107        RRL 7
C329  00173 001200        RAL
```

< DRIVER 30 * STATUS SECTION * >

```
C330  00174 100107        RRL 7
C331  00175 074000        STB A
C332                      XIF
C333*
C334  00176 102600  I09   OTA DISCC    SET DISC CONTROL WORD.
C335*
C336  00177 102700  I010  STC DMAC     ---- START   DMA   ----
C337  00200 102700  I011  STC DISCD    ---- START   DISC  ----
C338*
C339  00201 126131R       JMP SETUP,I    - EXIT -
```

```
C341*
C342* SUBROUTINE: <SETIO>
C343*
C344*  PURPOSE:  TO SET THE I/O INSTRUCTIONS IN
C345*            THE DRIVER TO REFERENCE THE HIGH AND
C346*            LOW PRIORITY DISC ADDRESSES AND
C347*            THE 2 DMA CHANNEL ADDRESSES.
C348*
C349*  CALL:     (A) = HIGH PRIORITY DISC ADDRESS
C350*            <CHAN> = I/O ADDRESS OF DMA CHANNEL
C351*
C352*        (P)       JSB  SETIO
C353*        (P+1)     - RETURN -
C354*
C355*         ON RETURN, -DISCH- CONTAINS I/O ADDRESS
C356*          OF DISC *DATA* ADDRESS.
C357*
C358*
C359  00202 000000  SETIO NOP
C360  00203 072250R       STA DISCH     SAVE DISC  *DATA* ADDRESS
C361  00204 032251R       IOR STC
C362  00205 072200R       STA IO11      SET  STC  DISC DATA ADDRESS
C363*
C364  00206 062252R       LDA LIA       SET
C365  00207 032250R       IOR DISCH          LIA  DISC COMMAND ADDRESS
C366  00210 002004        INA
C367  00211 072010R       STA IO1
C368  00212 072033R       STA IO2
C369  00213 072066R       STA IO3
C370*
C371  00214 040067        ADA .100      SET
C372  00215 072176R       STA IO9            OTA  DISC COMMAND ADDRESS
C373*
C374  00216 012237R       AND MASK3     SET
C375  00217 030257        IOR CHAN           OTA  DMA  CHANNEL ADDRESS
C376  00220 072155R       STA IO4
C377*
C378  00221 042243R       ADA .1100     SET
C379  00222 072177R       STA IO10           STC  DMA  CHANNEL ADDRESS
C380*
C381  00223 060257        LDA CHAN      GET ADDRESS OF *MAR,WCR*
C382  00224 040047        ADA N4         OF DMA CHANNEL (I.E., 2 OR 3)
C383  00225 032253R       IOR OTA       SET
C384  00226 072162R       STA IO6            OTA  DMA  MAR/WCR
C385  00227 072165R       STA IO8
C386*
C387  00230 040067        ADA .100      SET
C388  00231 072163R       STA IO7          STC  DMA  MAC/WCR
C389*
C390  00232 042244R       ADA .4000     SET
C391  00233 072156R       STA IO5          CLC  DMA  MAR/WCR
C392  00234 040057        ADA .4        SET
C393  00235 072076R       STA IO12         CLC  DMA  CHANNEL ADDRESS
C394*
C395  00236 126202R       JMP SETIO,I
```

```
C397*
C398* CONSTANT AND VARIABLE STORAGE AREA
C399*
C400  00000          A      EQU 0          DEFINE SYMBOLIC REFERENCE FOR
C401  00001          B      EQU 1           A AND B REGISTERS.
C402*
C403  00237 177700   MASK3  OCT 177700
C404  00240 100000   MSIGN  OCT 100000
C405  00241 020000   DMACW  OCT 20000     CLC BIT FOR END OF DMA OPERATION
C406*
C407  00242 000032   ERRMK  OCT 32       PARITY, DECODE AND ABORT MASK
C408*
C409  00243 001100   .1100  OCT 1100
C410  00244 004000   .4000  OCT 4000
C411*
C412  00245 000000   TEMP1  NOP
C413  00246 000000   TEMP2  NOP
C414  00247 000000   TEMP3  NOP
C415*
C416  00250 000000   DISCH  NOP          -HIGH PRIORITY DISC DATA ADDRESS-
C417*
C418  00000          DMAC   EQU 0          DMA  CHANNEL ADDRESS
C419  00000          DMAM   EQU 0          DMA  MAR/WCR ADDRESS
C420  00000          DISCC  EQU 0          DISC  COMMAND ADDRESS
C421  00000          DISCD  EQU 0          DISC  DATA ADDRESS
C422*
C423  00251 102700   STC    STC 0
C424  00252 102500   LIA    LIA 0
C425  00253 102600   OTA    OTA 0
```

```
C427*
C428*** SYSTEM BASE PAGE  COMMUNICATION  AREA ***
C429*
C430  00053          ..     EQU 53B
C431  00041          N10    EQU ..-10
C432  00047          N4     EQU ..-4
C433  00051          N2     EQU ..-2
C434  00055          .2     EQU ..+2
C435  00056          .3     EQU ..+3
C436  00057          .4     EQU ..+4
C437  00063          .10    EQU ..+8
C438  00067          .100   EQU ..+12
C439  00072          MASK4  EQU ..+15
C440  00074          MASK1  EQU ..+17
C441  00075          MASK2  EQU ..+18
C442  00100          .      EQU 100B
C443*
C444*
C445* I/O MODULE/DRIVER COMMUNICATION
C446*
C447  00203          EQT1   EQU .+67
C448  00204          EQT2   EQU .+68
C449  00205          EQT3   EQU .+69
C450  00206          EQT4   EQU .+70
C451  00207          EQT5   EQU .+71
C452  00210          EQT6   EQU .+72
C453  00211          EQT7   EQU .+73
C454  00212          EQT8   EQU .+74
C455  00213          EQT9   EQU .+75
C456  00214          EQT10  EQU .+76
C457  00215          EQT11  EQU .+77
C458  00216          EQT12  EQU .+78
C459  00217          EQT13  EQU .+79
C460  00220          EQT14  EQU .+80
C461  00221          EQT15  EQU .+81
C462  00222          EQT16  EQU .+82
C463  00223          EQT17  EQU .+83
C464*
C465  00257          CHAN   EQU .+111    CURRENT DMA CHANNEL #
C466*
C467                        END
**  NO ERRORS *TOTAL **RTE ASMB 92067-16011**
```