```
                        2
                        3
                        4  ***     TEST17  -  FLOPPY DISK DIAGNOSTIC.
                        5  *
                        6  *         J. G. L.,  11/11/77
                        7  *
                        8  *       FOR HEATH COMPANY
                        9  *       COPYRIGHT HEATH COMPANY, 1977, 1979
                       10  *
                       11  *              G. C.,      78/09   Maintenence release
                       12  *                          79/04   Renamed *TEST* from *TEST17*
                       13  *              W. Z.,      80/07   Renamed *TEST17* from *TEST*
                       14  *                                  Features added.
                       15  *
                       16
                       17  ***     TEST17  -  FLOPPY DISK DIAGNOSTIC.
                       18  *
                       19  *       THIS DIAGNOSTIC RUNS STAND ALONE, AFTER BEING LOADED VIA
                       20  *       HOS. NO HOS OVERLAY ROUTINES ARE USED, AND TEST EXITS TO
                       21  *       THE ROM BOOT.
                       22  *
                       23  *       THE USER IS GIVEN THESE OPTIONS:
                       24  *
                       25  *       D - PERFORM GENERAL DRIVE DIAGNOSTIC
                       26  *       M - PERFORM MEDIA CHECK
                       27  *       S - PERFORM SEEK TIME CHECK
                       28  *       E - EXIT AND RE-BOOT THE OPERATING SYSTEM
                       29  *       T - DRIVE SPEED TOLERANCE
                       30  *       C - CLEAN DRIVE HEAD                                  /071080/
                       31  *       A - ALIGN DRIVE HEAD
                       32  *       R - HARDCOPY REPORT                                   /071080/
                       33  *       U - UNIT SELECT
                       34  *
                       35  *       ANY DIAGNOSTIC CAN BE ABORTED PREMATURELY VIA A CTL-C.
                       36
                       37
                       38
000.001                39  .DEBUG. EQU     1               NOT IN DEBUG MODE
```

```
                        41
000,000                 42          XTEXT   MTR
```

```
                        45X **      MTR - PAM/8 EQUIVALENCES.
                        46X *
                        47X *       THIS DECK CONTAINS SYMBOLIC DEFINITIONS USED TO
                        48X *       MAKE USE OF THE PAM/8 CODE AND CONTROL BYTES.


                        50X **      IO PORTS
                        51X
    000.360             52X IP.PAD  EQU     360Q            PAD INPUT PORT
    000.360             53X OP.CTL  EQU     360Q            CONTROL OUTPUT PORT
    000.360             54X OP.DIG  EQU     360Q            DIGIT SELECT OUTPUT PORT
    000.361             55X OP.SEG  EQU     361Q            SEGMENT SELECT OUTPUT PORT
    000.362             56X IP.CON  EQU     362Q            H-88/H-89/HA-8-8 Configuration  /80.07.sc/
    000.362             57X OP2.CTL EQU     362Q            H-88/H-89/HA-8-8 Control Port   /80.07.sc/


                        59X **      FRONT PANEL CONTROL BITS.                               /80.07.sc/
                        60X *
                        61X *       CB.*  set in OP.CTL
                        62X *       CB2.* set in OP2.CTL
                        63X *
                        64X
    000.020             65X CB.SSI  EQU     00010000B       SINGLE STEP INTERRUPT
    000.040             66X CB.MTL  EQU     00100000B       MONITOR LIGHT
    000.100             67X CB.CLI  EQU     01000000B       CLOCK INTERRUPT ENABLE
    000.200             68X CB.SPK  EQU     10000000B       SPEAKER ENABLE
                        69X
    000.001             70X CB2.SSI EQU     00000001B       Single Step Interrupt
    000.002             71X CB2.CLI EQU     00000010B       Clock Interrupt Enable
    000.040             72X CB2.ORG EQU     00100000B       ORG 0 Select
    000.100             73X CB2.SID EQU     01000000B       Side 1 Select


                        75X **      Secondary Control Bits
                        76X


                        78X **      MONITOR MODE FLAGS.
                        79X
    000.000             80X DM.MR   EQU     0               MEMORY READ
    000.001             81X DM.MW   EQU     1               MEMORY WRITE
    000.002             82X DM.RR   EQU     2               REGISTER READ
    000.003             83X DM.RW   EQU     3               REGISTER WRITE
```

```
                        85X **      USER OPTION BITS.
                        86X *
                        87X *       THESE BITS ARE SET IN CELL .MFLAG.
                        88X
    000.200             89X UO.HLT  EQU     10000000B       DISABLE HALT PROCESSING
    000.100             90X UO.NFR  EQU     CB.CLI          NO REFRESH OF FRONT PANEL
    000.002             91X UO.DDU  EQU     00000010B       DISABLE DISPLAY UPDATE
    000.001             92X UO.CLK  EQU     00000001B       ALLOW PRIVATE INTERRUPT PROCESSING


                        94X **      MONITOR IDENTIFICATION FLAGS
                        95X *
                        96X *       THESE BYTES IDENTIFY THE ROM MONITOR.
                        97X *       THEY ARE THE VARIOUS VALUES OF LOCATION .IDENT
                        98X
    000.021             99X M.PAM8  EQU     021Q            'LX1' INSTRUCTION AT 000.000 IN PAM-8
    000.303            100X M.FOX   EQU     303Q            'JMP' INSTRUCTION AT 000.000 IN FOX ROM


                       102X **      Confisuration Flass                                 /80.07.sc/
                       103X *
                       104X *       These bits are read in IP.CON.
                       105X *
                       106X
    000.003            107X CN.174M EQU     00000011B       Port 174Q Device-Type Mask
    000.014            108X CN.170M EQU     00001100B       Port 170Q Device-Type Mask
    000.020            109X CN.PRI  EQU     00010000B       Primary/Secondary:  1=>primary == 170Q
    000.040            110X CN.MEM  EQU     00100000B       Memory Test/Normal Switch:  0=>Test; 1=>Normal
    000.100            111X CN.BAU  EQU     01000000B       Baud Rate:  0=>9600; 1=>19,200
    000.200            112X CN.ABO  EQU     10000000B       Auto-Boot:  1=>Auto-Boot
                       113X
    000.000            114X CND.H17 EQU     00B             H-17 Disk,              Valid only in CN.174M
    000.000            115X CND.ND1 EQU     00B             No Device Installed,    Valid only in CN.170M
    000.001            116X CND.H47 EQU     01B             H-47 Disk


                       118X **      ROUTINE ENTRY POINTS.
                       119X *
                       120X
    000.000            121X .IDENT  EQU     0000A           IDENTIFICATION LOCATION
    000.053            122X .DLY    EQU     0053A           DELAY
    001.267            123X .LOAD   EQU     1267A           TAPE LOAD
    001.374            124X .DUMP   EQU     1374A           TAPE DUMP
    002.136            125X .ALARM  EQU     2136A           ALARM ROUTINE
    002.140            126X .HORN   EQU     2140A           HORN
    002.172            127X .CTC    EQU     2172A           CHECK TAPE CHECKSUM
    002.205            128X .TPERR  EQU     2205A           TAPE ERROR ROUTINE
    002.264            129X .PCHL   EQU     2264A           PCHL INSTRUCTION
    002.265            130X .SRS    EQU     2265A           SCAN RECORD START
    002.325            131X .RNP    EQU     2325A           READ NEXT PAIR
    002.331            132X .RNB    EQU     2331A           READ NEXT BYTE
```

```
002.347            133X .CRC    EQU     2347A          CRC-16 CALCULATOR
003.017            134X .WNP    EQU     3017A          WRITE NEXT PAIR
003.024            135X .WNB    EQU     3024A          WRITE NEXT BYTE
003.122            136X .DOD    EQU     3122A          DECODE FOR OCTAL DISPLAY
003.260            137X .RCK    EQU     3260A          READ CONSOLE KEYSET
003.356            138X .DODA   EQU     3356A          SEGMENT CODE TABLE


                   140X **      RAM CELLS USED BY H8MTR.
                   141X *
                   142X
040.000            143X .START  EQU     40000A         START DUMP ADDRESS
040.002            144X .IOWRK  EQU     40002A         IN OR OUT INSTRUCTION
040.005            145X .REGI   EQU     40005A         DISPLAYED REGISTER INDEX
040.006            146X .DSPROT EQU     40006A         PERIOD FLAG BYTE
040.007            147X .DSPMOD EQU     40007A         DISPLAY MODE
040.010            148X .MFLAG  EQU     40010A         USER OPTION BYTE
040.011            149X .CTLFLG EQU     40011A         PANEL CONTROL BYTE
040.013            150X .ALEDS  EQU     40013A         ABUSS LEDS
040.021            151X .DLEDS  EQU     40021A         DBUSS LEDS
040.024            152X .ABUSS  EQU     40024A         ABUSS REGISTER
040.027            153X .CRCSUM EQU     40027A         CRCSUM WORD
040.031            154X .TPERRX EQU     40031A         TAPE ERROR EXIT VECTOR
040.033            155X .TICCNT EQU     40033A         CLOCK TICK COUNTER
040.035            156X .REGPTR EQU     40035A         REGISTER POINTER
040.037            157X .UIVEC  EQU     40037A         USER INTERRUPT VECTORS
040.064            158X .NMIRET EQU     40064A         H88/H89 NMI Return Address      /80.07.sc/
040.066            159X .CTL2FL EQU     40066A         OP2.CTL Control Byte            /80.07.sc/
000.000            160          XTEXT   ASCII


                   162X **      ASCII CHARACTER EQUIVALENCES.
                   163X
000.015            164X CR      EQU     13             CARRIAGE RETURN
000.012            165X LF      EQU     10             LINE FEED
000.200            166X NULL    EQU     200Q           PAD CHARACTER
000.000            167X NUL2    EQU     0
000.007            168X BELL    EQU     7              BELL CHARACTER
000.177            169X RUBOUT  EQU     177Q
000.010            170X BKSP    EQU     10Q            CTL-H
000.026            171X C.SYN   EQU     26Q            SYNC
000.002            172X C.STX   EQU     2              STX
000.047            173X QUOTE   EQU     47Q
000.011            174X TAB     EQU     11Q
000.033            175X ESC     EQU     33Q
000.012            176X NL      EQU     12Q            NEW LINE (HDOS SYSTEMS)
000.212            177X ENL     EQU     NL+200Q        NL + END-OF-LINE-FLAG
000.014            178X FF      EQU     14Q            FORM FEED
000.001            179X CTLA    EQU     01Q            CTL-A
000.002            180X CTLB    EQU     02Q            CTL-B
000.003            181X CTLC    EQU     03Q            CTL-C
000.004            182X CTLD    EQU     04Q            CTL-D
000.017            183X CTLO    EQU     17Q            CTL-O
000.020            184X CTLP    EQU     20Q            CTL-P
000.021            185X CTLQ    EQU     21Q            CTL-Q
```

```
000.023                 186X CTLS   EQU     23Q             CTL-S
000.032                 187X CTLZ   EQU     32Q             CTL-Z
000.000                 188         XTEXT   H17DEF

                        190X **     H17 CONTROL INFORMATION.
                        191X
000.177                 192X DF.DC  EQU     07FH            DISK CONTROL PORT
                        193X
000.001                 194X DF.HD  EQU     00000001B       HOLE DETECT
000.002                 195X DF.T0  EQU     00000010B       TRACK 0 DETECT
000.004                 196X DF.WP  EQU     00000100B       WRITE PROTECT
000.010                 197X DF.SD  EQU     00001000B       SYNC DETECT
                        198X
000.001                 199X DF.WG  EQU     00000001B       WRITE GATE ENABLE
000.002                 200X DF.DS0 EQU     00000010B       DRIVE SELECT 0
000.004                 201X DF.DS1 EQU     00000100B       DRIVE SELECT 1
000.010                 202X DF.DS2 EQU     00001000B       DRIVE SELECT 2
000.020                 203X DF.MO  EQU     00010000B       MOTOR ON (BOTH DRIVES)
000.040                 204X DF.DI  EQU     00100000B       DIRECTION (0=OUT)
000.100                 205X DF.ST  EQU     01000000B       STEP COMMAND (ACTIVE HIGH)
000.200                 206X DF.WR  EQU     10000000B       WRITE ENABLE RAM
                        207X
                        208X
                        209X
                        210X *      Drives other than Wansco's need a delay after write before step
                        211X
000.173                 212X H17SDL EQU     900/15*1024/500+1       H17 step delay, 900 mic sec /80.06.sc/
                        213X *                                      =.900/15*2.048
                        214X
                        215X
                        216X
                        217X **     DISK UART PORTS AND CONTROL FLAGS.
                        218X
000.174                 219X UP.DP  EQU     07CH            DATA PORT
000.175                 220X UP.FC  EQU     07DH            FILL CHARACTER
000.175                 221X UP.ST  EQU     07DH            STATUS FLAGS
000.176                 222X UP.SC  EQU     07EH            SYN CHARACTER (OUTPUT)
000.176                 223X UP.SR  EQU     07EH            SYNC RESET (INPUT)
                        224X
000.001                 225X UF.RDA EQU     00000001B       RECEIVE DATA AVAILABLE
000.002                 226X UF.ROR EQU     00000010B       RECEIVER OVERRUN
000.004                 227X UF.RPE EQU     00000100B       RECEIVER PARITY ERROR
000.100                 228X UF.FCT EQU     01000000B       FILL CHAR TRANSMITTED
000.200                 229X UF.TBM EQU     10000000B       TRANSMITTER BUFFER EMPTY
                        230X
                        231X
                        232X
                        233X **     CHARACTER DEFINITIONS.
                        234X
000.375                 235X C.DSYN EQU     0FDH            PREFIX SYNC CHARACTER
000.000                 236         XTEXT   DIRDEF
```

```
                        238X **     DIRECTORY ENTRY FORMAT.
                        239X
        000.000         240X        ORG     0
                        241X
                        242X
        000.377         243X DF.EMP EQU     377Q            FLAGS ENTRY EMPTY
        000.376         244X DF.CLR EQU     376Q            FLAGS ENTRY EMPTY, REST OF DIR ALSO CLEAR
                        245X
        000.000         246X DIR.NAM DS     8               NAME
        000.010         247X DIR.EXT DS     3               EXTENSION
        000.013         248X DIR.PRO DS     1               PROJECT
        000.014         249X DIR.VER DS     1               VERSION
        000.015         250X DIRIDL EQU     *               FILE IDENTIFICATION LENGTH
                        251X
        000.015         252X DIR.CLU DS     1               CLUSTER FACTOR
        000.016         253X DIR.FLG DS     1               FLAGS
        000.017         254X        DS      1               RESERVED
        000.020         255X DIR.FGN DS     1               FIRST GROUP NUMBER
        000.021         256X DIR.LGN DS     1               LAST GROUP NUMBER
        000.022         257X DIR.LSI DS     1               LAST SECTOR INDEX (IN LAST GROUP)
        000.023         258X DIR.CRD DS     2               CREATION DATE
        000.025         259X DIR.ALD DS     2               LAST ALTERATION DATE
                        260X
        000.027         261X DIRELEN EQU    *               DIRECTORY ENTRY LENGTH
        000.027         262         XTEXT   DDFDEF


                        264X **     DIRECTORY DEVICE FORMAT DEFINITION.                 /80.09.SC/
                        265X *
                        266X *      Modified:       Sep-80
                        267X *                       No longer require 2 sectors per group
                        268X *                       Reserved Group Table dynamically allocated
                        269X *
                        270X
        000.000         271X        ORG     0
                        272X
        000.000         273X DDF.BOO DS     9               2K BOOT PROGRAM
        000.011         274X DDF.BOL EQU    *               LENGTH OF BOOT
        000.011         275X DDF.LAB DS     1               LABEL SECTOR
        000.012         276X DDF.USR DS     0               BEGINNING OF OPEN SPACE
        000.012         277         XTEXT   LABDEF


                        279X **     DISK LABEL SECTOR FORMATS.
                        280X
        000.000         281X        ORG     0
        000.000         282X LAB.SER DS     1               SERIAL NUMBER OF VOLUME
        000.001         283X LAB.IND DS     2               INITIALIZATION DATE
        000.003         284X LAB.DIS DS     2               SECTOR NUMBER OF 1ST DIRECTORY SECTOR
        000.005         285X LAB.GRT DS     2               INDEX OF GRT SECTOR
        000.007         286X LAB.SPG DS     1               SECTORS PER GROUP
                        287X
        000.000         288X LAB.DAT EQU    0               DATA VOLUME ONLY
        000.001         289X LAB.SYS EQU    1               SYSTEM VOLUME
```

```
000.002                290X LAB.NOD EQU     2              => LAB.NOD MEANS VOLUME HAS NO DIRECTORY
                       291X
000.010                292X LAB.VLT DS      1              VOLUME TYPE
000.011                293X LAB.VER DS      1              VERSION OF INIT17 THAT INITED DISK
                       294X
000.012                295X LAB.RGT DS      2              RGT sector number                  /80.06.sc/
                       296X
000.014                297X LAB.VPR EQU     *              Volume dependant data              /80.05.sc/
000.014                298X LAB.SIZ DS      2               Volume Size (Bytes/256)           /80.05.sc/
000.016                299X LAB.PSS DS      2               Physical Sector Size              /80.05.sc/
000.020                300X LAB.VFL DS      1               Volume dependant Flags            /80.09.sc/
000.001                301X VFL.NSD EQU     00000001B        Number of Sides:  1 => 2         /80.09.sc/
000.005                302X LAB.VPL EQU     *-LAB.VPR      Length of volume dependant data    /80.05.sc/
                       303X
000.000                304X         ERRMI   5-LAB.VPL                                         /80.05.sc/
000.021                305X         DS      5-LAB.VPL      Reserved                           /80.05.sc/
                       306X
000.021                307X LAB.LAB DS      60             LABEL
000.074                308X LAB.LBL EQU     *-LAB.LAB      LABEL LENGTH
000.115                309X         DS      2              Reserved for 0 bytes               /80.09.sc/
                       310X
000.117                311X LAB.AUX EQU     *              Auxiliary Data                     /80.09.sc/
000.117                312X LAB.SPT DS      1               Sectors per Track                 /80.09.sc/
000.001                313X LAB.AXL EQU     *-LAB.AUX      Length of Aux. Data                /80.09.sc/
000.120                314          XTEXT   OVLDEF


                       316X **      OVERLAY TABLE ENTRYS.
                       317X
000.000                318X         ORG     0
                       319X
000.000                320X OVL.COD DS      2              FIRST SECTOR OF OVERLAY CODE
000.002                321X OVL.SIZ DS      2              OVERLAY SIZE
000.004                322X OVL.ENT DS      2              OVERLAY ENTRY POINT
000.006                323X OVL.FLB DS      1              OVERLAY FLAG BYTE
000.007                324X         DS      1              DUMMY BYTE TO ROUND TABLE SIZE UP TO 8
000.010                325X OVL.ENS EQU     *              OVERLAY ENTRY SIZE
                       326X
                       327X *       OVERLAY INDICES
                       328X
000.000                329X         ORG     0
                       330X
000.000                331X OVL0    DS      1
000.001                332X OVL1    DS      1
000.002                333          XTEXT   DDDEF
```

```
                        335X **     DEVICE DRIVER COMMUNICATION FLAGS.
                        336X *
                        337X
000.000                 338X        ORG     0
                        339X
000.000                 340X DC.REA DS      1           READ
000.001                 341X DC.WRI DS      1           WRITE
000.002                 342X DC.RER DS      1           READ REGARDLESS
000.003                 343X DC.OPR DS      1           OPEN FOR READ
000.004                 344X DC.OPW DS      1           OPEN FOR WRITE
000.005                 345X DC.OPU DS      1           OPEN FOR UPDATE
000.006                 346X DC.CLO DS      1           CLOSE
000.007                 347X DC.ABT DS      1           ABORT
000.010                 348X DC.MOU DS      1           MOUNT DEVICE
000.011                 349X DC.LOD DS      1           LOAD DEVICE DRIVER
000.012                 350X DC.RDY DS      1           Device Ready                    /80.04.GC/
000.013                 351X DC.MAX DS      1           MAXIMUM ENTRY INDEX
000.014                 352         XTEXT   HOSEQU


                        354X **     HDOS SYSTEM EQUIVALENCES.
                        355X *
                        356X
024.000                 357X S.GRT0 EQU     24000A      SYSTEM AREA FOR  GRT0
025.000                 358X S.GRT1 EQU     25000A      SYSTEM AREA FOR  GRT1
026.000                 359X S.GRT2 EQU     26000A      SYSTEM AREA FOR  GRT2
                        360X
030.000                 361X ROMBOOT EQU    30000A      ROM BOOT ENTRY
                        362X
040.100                 363X        ORG     40100A      FREE SPACE FROM PAM-8
                        364X
040.100                 365X        DS      8           JUMP TO SYSTEM EXIT
040.110                 366X D.CON  DS      16          DISK CONSTANTS
040.130                 367X SYDD   EQU     *           SYSTEM DISK ENTRY POINT
040.130                 368X D.VEC  DS      24*3        SYSTEM ROM ENTRY VECTORS
040.240                 369X D.RAM  DS      31          SYSTEM ROM WORK AREA
040.277                 370X S.VAL  DS      36          SYSTEM VALUES
040.343                 371X S.INT  DS      115         SYSTEM INTERNAL WORK AREAS
041.126                 372X        DS      16
041.146                 373X S.SOVR DS      2           STACK OVERFLOW WARNING
041.150                 374X        DS      42200A-*    SYSTEM STACK
001.032                 375X STACKL EQU     *-S.SOVR    STACK SIZE
                        376X
042.200                 377X STACK  EQU     *           LWA+1 SYSTEM STACK
042.200                 378X USERFWA EQU    *           USER FWA
042.200                 379         XTEXT   EDCON
```

```
                    381X **     D.CON DETAILED EQUIVALENCES.
                    382X *
                    383X *      HOSEQU MUST BE MODIFIED WHEN THIS TABLE IS MODIFIED.
                    384X
040.110             385X        ORG     D.CON
                    386X
040.110             387X D.XITA DS      2           SEE SYSTEM ROM FOR DESCRIPTION
040.112             388X D.WRITA DS     1
040.113             389X D.WRITB DS     1
040.114             390X D.WRITC DS     1
040.115             391X D.MAIA DS      1
040.116             392X D.LPSA DS      1
040.117             393X D.SDPA DS      1
040.120             394X D.SDPB DS      1
040.121             395X D.STSA DS      1
040.122             396X D.STSB DS      1
040.123             397X D.WHDA DS      1
040.124             398X D.WNHA DS      1
040.125             399X D.WSCA DS      1
                    400X
040.126             401X D.ERTS DS      2           TRACK AND SECTOR OF LAST DISK ERRORS
040.130             402         XTEXT   EDVEC


                    404X **     JMP VECTORS FOR ROM CODE
                    405X *
                    406X *      SEE DISK ROM FOR ADDRESSES
                    407X *
                    408X *      HOSEQU MUST BE ALTERED WHEN THIS TABLE IS ALTERED.
                    409X
040.130             410X        ORG     D.VEC
                    411X
040.130             412X D.SYDD DS      3           JMP  R.SYDD (MUST BE FIRST)
040.133             413X D.MOUNT DS     3           JMP  R.MOUNT
040.136             414X D.XOK  DS      3           JMP  R.XOK
040.141             415X D.ABORT DS     3           JMP  R.ABORT
040.144             416X D.XIT  DS      3           JMP  R.XIT
040.147             417X D.READ DS      3           JMP  R.READ
040.152             418X D.READR DS     3           JMP  R.READR
040.155             419X D.WRITE DS     3           JMP  R.WRITE
040.160             420X D.CDE  DS      3           JMP  R.CDE
040.163             421X D.DTS  DS      3           JMP  R.DTS
040.166             422X D.SDT  DS      3           JMP  R.SDT
040.171             423X D.MAI  DS      3           JMP  R.MAI
040.174             424X D.MAO  DS      3           JMP  R.MAO
040.177             425X D.LPS  DS      3           JMP  R.LPS
040.202             426X D.RDB  DS      3           JMP  R.RDB
040.205             427X D.SDP  DS      3           JMP  R.SDP
040.210             428X D.STS  DS      3           JMP  R.STS
040.213             429X D.STZ  DS      3           JMP  R.STZ
040.216             430X D.UDLY DS      3           JMP  R.UDLY
040.221             431X D.WSC  DS      3           JMP  R.WSC
040.224             432X D.WSP  DS      3           JMP  R.WSP
040.227             433X D.WNB  DS      3           JMP  R.WNB
```

```
040.232                434X D.ERRT   DS      3               JMP  R.ERRT
040.235                435X D.DLY    DS      3               JMP  R.DLY
040.240                436           XTEXT   EDRAM

                       438X **       EDRAM - DISK RAM WORKAREA DEFINITION.
                       439X *
                       440X *        ZEROED UPON BOOTING UP.
                       441X *
                       442X *        HOSEQU MUST BE CHANGED WHEN THIS DECK IS CHANGED.
                       443X
                       444X
040.240                445X          ORG     D.RAM
                       446X
040.240                447X D.TT     DS      1               TARGET TRACK (CURRENT OPERATION)
040.241                448X D.TS     DS      1               TARGET SECTOR (CURRENT OPERATION)
                       449X
040.242                450X D.DVCTL  DS      1               DEVICE CONTROL BYTE
                       451X
040.243                452X D.DLYMO  DS      1               MOTOR ON DELAY COUNT
040.244                453X D.DLYHS  DS      1               HEAD SETTLE DELAY COUNTER
                       454X
040.245                455X D.TRKPT  DS      2               ADDRESS IN D.DRVTB FOR TRACK NUMBER
040.247                456X D.VOLPT  DS      2               ADDRESS IN D.DRVTB FOR VOLUME NUMBER
                       457X
040.251                458X D.DRVTB  DS      2*4             TRACK NUMBER AND VOLUME NUMBER FOR 4 DRIVES
                       459X
040.261                460X D.HECNT  DS      1               HARD ERROR COUNT
040.262                461X D.SECNT  DS      2               SOFT ERROR COUNT
040.264                462X D.OECNT  DS      1               OPERATION ERROR COUNT
                       463X
                       464X *        GLOBAL DISK ERROR COUNTERS
                       465X
040.265                466X D.ERR    DS      0               BEGINNING OF ERROR BLOCK
040.265                467X D.E.MDS  DS      1               MISSING DATA SYNC
040.266                468X D.E.HSY  DS      1               MISSING HEADER SYNC
040.267                469X D.E.CHK  DS      1               DATA CHECKSUM
040.270                470X D.E.HCK  DS      1               HEADER CHECKSUM
040.271                471X D.E.VOL  DS      1               WRONG VOLUME NUMBER
040.272                472X D.E.TRK  DS      1               BAD TRACK SEEK
040.273                473X D.ERRL   DS      0               LIMIT OF ERROR COUNTERS
                       474X
                       475X *        I/O OPERATION COUNTS
                       476X
040.273                477X D.OPR    DS      2
040.275                478X D.OPW    DS      2
                       479X
000.037                480X D.RAML   EQU     *-D.RAM
040.277                481           XTEXT   ESVAL
```

```
                        483X **      S.VAL - SYSTEM VALUE DEFINTIONS.
                        484X *
                        485X *       THESE VALUES ARE SET AND MAINTAINED BY THE SYSTEM.
                        486X *
                        487X *       THE DECK HOSEQU MUST BE MODIFIED WHEN THIS IS MODIFIED.
                        488X
                        489X
040.277                 490X         ORG     S.VAL
                        491X
040.277                 492X S.DATE  DS      9               SYSTEM DATE (IN ASCII)
040.310                 493X S.DATC  DS      2               CODED DATE
040.312                 494X S.TIME  DS      4               TIME FROM MIDNIGHT (IN TICS)
040.316                 495X S.HIMEM DS      2               HARDWARE HIGH MEMORY ADRESS+1
                        496X
040.320                 497X S.SYSM  DS      2               FWA RESIDENT SYSTEM
                        498X
040.322                 499X S.USRM  DS      2               LWA USER MEMORY
                        500X
040.324                 501X S.OMAX  DS      2               MAX OVERLAY SIZE FOR SYSTEM
                        502X
                        503X
                        504X **      THE FOLLOWING FIVE CELLS SHOULD BE MODIFIED/READ ONLY VIA THE ,CONSL SYSCALL
                        505X
000.200                 506X CSL.ECH EQU     10000000B       SUPPRESS ECHO
000.004                 507X CSL.RAW EQU     00000100B       Raw Mode I/O                    /80.09.sc/
000.002                 508X CSL.WRP EQU     00000010B       WRAP LINES AT WIDTH
000.001                 509X CSL.CHR EQU     00000001B       OPERATE IN CHARACTER MODE
                        510X
000.000                 511X I.CSLMD EQU     0               S.CSLMD IS FIRST BYTE
040.326                 512X S.CSLMD DS      1               CONSOLE MODE
                        513X
000.200                 514X CTP.BKS EQU     10000000B       TERMINAL PROCESSES BACKSPACES
000.100                 515X CTP.FF  EQU     01000000B       Terminal Processes Form-Feed    /80.09.sc/
000.040                 516X CTP.ML1 EQU     00100000B       MAP LOWER CASE TO UPPER ON INPUT
000.020                 517X CTP.MLO EQU     00010000B       MAP LOWER CASE TO UPPER ON OUTPUT
000.010                 518X CTP.2SB EQU     00001000B       TERMINAL NEEDS TWO STOP BITS
000.002                 519X CTP.BKM EQU     00000010B       MAP BKSP (UPON INPUT) TO RUBOUT
000.001                 520X CTP.TAB EQU     00000001B       TERMINAL SUPPORTS TAB CHARACTERS
                        521X
000.001                 522X I.CONTY EQU     1               S.CONTY IS 2ND BYTE
000.000                 523X         ERRNZ   *-S.CSLMD-I.CONTY
040.327                 524X S.CONTY DS      1               CONSOLE TYPE FLAGS
000.002                 525X I.CUSOR EQU     2               S.CUSOR IS 3RD BYTE
000.000                 526X         ERRNZ   *-S.CSLMD-I.CUSOR
040.330                 527X S.CUSOR DS      1               CURRENT CURSOR POSITION
000.003                 528X I.CONWI EQU     3               S.CONWI IS 4TH BYTE
000.000                 529X         ERRNZ   *-S.CSLMD-I.CONWI
040.331                 530X S.CONWI DS      1               CONSOLE WIDTH
                        531X
000.001                 532X CO.FLG  EQU     00000001B       CTL-O FLAG
000.200                 533X CS.FLG  EQU     10000000B       CTL-S FLAG
                        534X
000.004                 535X I.CONFL EQU     4               S.CONFL IS 5TH BYTE
000.000                 536X         ERRNZ   *-S.CSLMD-I.CONFL
040.332                 537X S.CONFL DS      1               CONSOLE FLAGS
                        538X
```

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040.333                 539X S.CAADR DS      2              ADDRESS FOR ABORT PROCESSING (>256 IF VALID)
040.335                 540X S.CCTAB DS      6              ADDR FOR CTL-A, CTL-B, CTL-C PROCESSING
040.343                 541          XTEXT   ABSDEF

                        543X **      ABS FORMAT EQUIVALENCES.
                        544X
000.000                 545X         ORG     0
                        546X
000.000                 547X ABS.ID  DS      1              377Q = BINARY FILE FLAG
000.001                 548X         DS      1              FILE TYPE (FT.ABS)
000.002                 549X ABS.LDA DS      2              LOAD ADDRESS
000.004                 550X ABS.LEN DS      2              LENGTH OF ENTIRE RECORD
000.006                 551X ABS.ENT DS      2              ENTRY POINT
                        552X
000.010                 553X ABS.COD DS      0              CODE STARTS HERE
000.010                 554          XTEXT   FILDEF

                        556X **      FILDEF - FILE TYPE DEFINITIONS.
                        557X *
                        558X *       DB      377Q,FT.XXX
                        559X
                        560X
000.000                 561X FT.ABS  EQU     0              ABSOLUTE BINARY
000.001                 562X FT.PIC  EQU     1              POSITION INDEPENDANT CODE
000.002                 563X FT.REL  EQU     2              RELOCATABLE CODE
000.003                 564X FT.BAC  EQU     3              COMPILED BASIC CODE
000.010                 565          XTEXT   DEVDEF

                        567X **      DEVICE TABLE ENTRYS.
                        568X
000.000                 569X         ORG     0
                        570X
000.000                 571X DEV.NAM DS      2              DEVICE NAME
000.000                 572X DV.EL   EQU     00000000B      END OF DEVICE LIST FLAG
000.001                 573X DV.NU   EQU     00000001B      DEVICE ENTRY NOT IN USE
                        574X
000.002                 575X DEV.RES DS      1              DRIVER RESIDENSE CODE
000.001                 576X DR.IM   EQU     00000001B      DRIVER IN MEMORY
000.002                 577X DR.PR   EQU     00000010B      DRIVER PERMINANTLY RESIDENT
                        578X
000.003                 579X DEV.JMP DS      1              JMP TO PROCESSOR
000.004                 580X DEV.DDA DS      2              DRIVER ADDRESS
000.006                 581X DEV.FLG DS      1              FLAG BYTE
000.001                 582X DT.DD   EQU     00000001B      DIRECTORY DEVICE
000.002                 583X DT.CR   EQU     00000010B      CAPABLE OF READ OPERATION
000.004                 584X DT.CW   EQU     00000100B      CAPABLE OF WRITE OPERATION
000.010                 585X DT.RN   EQU     00001000B      Capable of random access        /80.02.sc/
000.020                 586X DT.CH   EQU     00010000B      Capable of Character mode       /80.02.sc/
```

```
                    587X
000.007             588X DEV.MUM DS      1          MOUNTED UNIT MASK
000.010             589X DEV.MNU DS      1          MAXIMUM NUMBER OF UNITS
000.011             590X DEV.UNT DS      2          ADDRESS OF UNIT SPECIFIC DATA TABLE
                    591X
000.013             592X DEV.DVL DS      2          DRIVER BYTE LENGTH
000.015             593X DEV.DVG DS      1          DRIVER ROUTINE GROUP ADDRESS
                    594X
000.016             595X DEVELEN EQU     *          DEVICE TABLE ENTRY LENGTH


                    597X **      UNIT SPECIFIC DEVICE DATA TABLE ENTRIES
                    598X
000.000             599X         ORG     0
                    600X
000.000             601X UNT.FLG DS      1          UNIT SPECIFIC  *DEV.FLG*
000.001             602X UNT.SPG DS      1          Sectors Per Group              /80.04.GC/
000.002             603X UNT.GRT DS      2          ADDRESS OF GROUP RESERVATION TABLE (IF DT.DD)
000.004             604X UNT.GTS DS      2          GRT SECTOR NUMBER
000.006             605X UNT.DIS DS      2          DIRECTORY FIRST SECTOR NUMBER
                    606X
000.010             607X UNT.SIZ EQU     *          SIZE OF UNIT SPECIFIC DATA TABLE PER UNIT
000.010             608          XTEXT   ESINT


                    610X **      S.INT - SYSTEM INTERNAL WORKAREA DEFINITIONS,
                    611X *
                    612X *       THESE CELLS ARE REFERENCED BY OVERLAYS AND MAIN CODE, AND
                    613X *       MUST THEREFORE RESIDE IN FIXED LOW MEMORY.
                    614X
                    615X
040.343             616X         ORG     S.INT
                    617X
                    618X **      CONSOLE STATUS FLAGS
                    619X
040.343             620X S.CDB   DS      1          CONSOLE DESCRIPTOR BYTE
000.000             621X CDB.H85 EQU     00000000B
000.001             622X CDB.H84 EQU     00000001B  =0 IF H8-5, =1 IF H8-4
040.344             623X S.BAUD  DS      2          [0-14]  H8-4 BAUD RATE, =0 IF H8-5
                    624X *                          [15]    =1 IF BAUD RATE => 2 STOP BITS
                    625X
                    626X **      TABLE ADDRESS WORDS
                    627X
040.346             628X S.DLINK DS      2          ADDRESS OF DATA IN HDOS CODE
040.350             629X S.OFWA  DS      2          FWA  OVERLAY  TABLE
040.352             630X S.CFWA  DS      2          FWA  CHANNEL  TABLE
040.354             631X S.DFWA  DS      2          FWA  DEVICE   TABLE
040.356             632X S.RFWA  DS      2          FWA  RESIDENT HDOS CODE
                    633X
                    634X **      DEVICE DRIVER DELAYED LOAD FLAGS
                    635X
040.360             636X S.DDLDA DS      2          DRIVER LOAD ADDRESS (HIGH BYTE=0 IF NO LOAD PENDING)
```

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040.362                637X S.DDLEN DS      2              CODE LENGTH IN BYTES
040.364                638X S.DDGRP DS      1              GROUP NUMBER FOR DRIVER
040.365                639X         DS      1              HOLD PLACE
                       640X *S.DDSEC        DS      2              SECTOR NUMBER FOR DRIVER ( * OBSOLETE ! * )
040.366                641X S.DDDTA DS      2              DEVICE'S ADDRESS IN DEVLST +DEV.RES
040.370                642X S.DDOPC DS      1              OPEN OPCODE PENDEDING
                       643X
                       644X **      OVERLAY MANAGEMENT FLAGS
                       645X
000.001                646X OVL.IN  EQU     00000001B      IN MEMORY
000.002                647X OVL.RES EQU     00000010B      PERMINANTLY RESIDENT
000.014                648X OVL.NUM EQU     00001100B      OVERLAY NUMBER MASK
000.200                649X OVL.UCS EQU     10000000B      USER CODE SWAPPED FOR OVERLAY
                       650X
040.371                651X S.OVLFL DS      1              OVERLAY FLAG
040.372                652X S.UCSF  DS      2              FWA SWAPPED USER CODE
040.374                653X S.UCSL  DS      2              LENGTH SWAPPED USER CODE
040.376                654X S.OVLS  DS      2              SIZE OF OVERLAY CODE
041.000                655X S.OVLE  DS      2              ENTRY POINT OF OVERLAY CODE
                       656X
041.002                657X S.SSN   DS      2              SWAP AREA SECTOR NUMBER
041.004                658X S.OSN   DS      2              OVERLAY SECTOR NUMBER
                       659X
                       660X *       SYSCALL PROCESSING WORK AREAS
                       661X
041.006                662X S.CACC  DS      1              (ACC) UPON SYSCALL
041.007                663X S.CODE  DS      1              SYSCALL INDEX IN PROGRESS
                       664X
                       665X *       JUMPS TO ROUTINES IN RESIDENT HDOS CODE
                       666X
041.010                667X S.JUMPS DS      0              START OF DUMP VECTORS
041.010                668X S.SUD   DS      3              JUMP TO STAND-IN DEVICE DRIVER
041.013                669X S.FASER DS      3              JUMP TO FATSERR (FATAL SYSTEM ERROR)
041.016                670X S.DIREA DS      3              JUMP TO DIREAD (DISK FILE READ)
041.021                671X S.FCI   DS      3              JUMP TO FCI (FETCH CHANNEL INFO)
041.024                672X S.SCI   DS      3              JUMP TO SCI (STORE CHANNEL INFO)
041.027                673X S.GUP   DS      3              JUMP TO GUP (GET UNIT POINTER)
                       674X
041.032                675X S.MOUNT DS      1              <>0 IF THE SYSTEM DISK IS MOUNTED
041.033                676X S.DCS   DS      1              DEFAULT CLUSTER SIZE-1
                       677X
041.034                678X S.BOOTF DS      1              BOOT FLAGS
000.001                679X BOOT.P  EQU     00000001B      EXECUTE PROLOGUE UPON BOOTUP
                       680X
                       681X *       STACK VALUE SAVED FOR OVERLAY SYSCALLS
                       682X
041.035                683X S.OVSTK DS      2              VALUE OF SP UPON SYSCALLS USING OVERLAY
                       684X
041.037                685X         DS      1              RESERVED
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                        687X **     ACTIVE I/O AREA.
                        688X *
                        689X *      THE AIO.XXX AREA CONTAINS INFORMATION ABOUT THE I/O OPERATION
                        690X *      CURRENTLY BEING PERFORMED. THE INFORMATION IS OBTAINED FROM
                        691X *      THE CHANNEL TABLE, AND WILL BE RESTORED THERE WHEN DONE.
                        692X *
                        693X *      NORMALLY, THE AIO.XXX INFORMATION WOULD BE OBTAINED DIRECTLY
                        694X *      FROM VARIOUS SYSTEM TABLES VIA POINTER REGISTERS. SINCE THE
                        695X *      8080 HAS NO GOOD INDEXED ADDRESSING, THE DATA IS MANUALLY
                        696X *      COPIED INTO THE AIO.XXX CELLS BEFORE PROCESSING, AND
                        697X *      BACKDATED AFTER PROCESSING.
                        698X
041.040                 699X AIO.VEC DS     3           JUMP INSTRUCTION
041.041                 700X AIO.DDA EQU    *-2         DEVICE DRIVER ADDRESS
041.043                 701X AIO.FLG DS     1           FLAG BYTE
041.044                 702X AIO.GRT DS     2           ADDRESS OF GROUP RESERV TABLE
041.046                 703X AIO.SPG DS     1           SECTORS PER GROUP
041.047                 704X AIO.CGN DS     1           CURRENT GROUP NUMBER
041.050                 705X AIO.CSI DS     1           CURRENT SECTOR INDEX
041.051                 706X AIO.LGN DS     1           LAST GROUP NUMBER
041.052                 707X AIO.LSI DS     1           LAST SECTOR INDEX
041.053                 708X AIO.DTA DS     2           DEVICE TABLE ADDRESS
041.055                 709X AIO.DES DS     2           DIRECTORY SECTOR
041.057                 710X AIO.DEV DS     2           DEVICE CODE
041.061                 711X AIO.UNI DS     1           UNIT NUMBER (0-9)
                        712X
041.062                 713X AIO.DIR DS     DIRELEN     DIRECTORY ENTRY
                        714X
041.111                 715X AIO.CNT DS     1           SECTOR COUNT
041.112                 716X AIO.EOM DS     1           END OF MEDIA FLAG
041.113                 717X AIO.EOF DS     1           END OF FILE FLAG
041.114                 718X AIO.TFP DS     2           TEMP FILE POINTERS
041.116                 719X AIO.CHA DS     2           ADDRESS OF CHANNEL BLOCK (IOC.DDA)


041.120                 721X S.BDA   DS     1           Boot Device Address (Setup by ROM) /80.09.sc/
041.121                 722X S.SCR   DS     2           SYSTEM SCRATCH AREA ADDRESS
041.123                 723          XTEXT  ECDEF


                        725X **     ERROR CODE DEFINITIONS.
                        726X
000.000                 727X         ORG    0
000.000                 728X         DS     1           NO ERROR #0
000.001                 729X EC.EOF  DS     1           END OF FILE
000.002                 730X EC.EOM  DS     1           END OF MEDIA
000.003                 731X EC.ILC  DS     1           ILLEGAL SYSCALL CODE
000.004                 732X EC.CNA  DS     1           CHANNEL NOT AVAILABLE
000.005                 733X EC.DNS  DS     1           DEVICE NOT SUITABLE
000.006                 734X EC.IDN  DS     1           ILLEGAL DEVICE NAME
000.007                 735X EC.IFN  DS     1           ILLEGAL FILE NAME
000.010                 736X EC.NRD  DS     1           NO ROOM FOR DEVICE DRIVER
000.011                 737X EC.FNO  DS     1           CHANNEL NOT OPEN
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000.012                 738X EC.ILR  DS      1               ILLEGAL REQUEST
000.013                 739X EC.FUC  DS      1               FILE USAGE CONFLICT
000.014                 740X EC.FNF  DS      1               FILE NAME NOT FOUND
000.015                 741X EC.UND  DS      1               UNKNOWN DEVICE
000.016                 742X EC.ICN  DS      1               ILLEGAL CHANNEL NUMBER
000.017                 743X EC.DIF  DS      1               DIRECTORY FULL
000.020                 744X EC.IFC  DS      1               ILLEGAL FILE CONTENTS
000.021                 745X EC.NEM  DS      1               NOT ENOUGH MEMORY
000.022                 746X EC.RF   DS      1               READ FAILURE
000.023                 747X EC.WF   DS      1               WRITE FAILURE
000.024                 748X EC.WPV  DS      1               WRITE PROTECTION VIOLATION
000.025                 749X EC.WP   DS      1               DISK WRITE PROTECTED
000.026                 750X EC.FAP  DS      1               FILE ALREADY PRESENT
000.027                 751X EC.DDA  DS      1               DEVICE DRIVER ABORT
000.030                 752X EC.FL   DS      1               FILE LOCKED
000.031                 753X EC.FAO  DS      1               FILE ALREADY OPEN
000.032                 754X EC.IS   DS      1               ILLEGAL SWITCH
000.033                 755X EC.UUN  DS      1               UNKNOWN UNIT NUMBER
000.034                 756X EC.FNR  DS      1               FILE NAME REQUIRED
000.035                 757X EC.DIW  DS      1               DEVICE IS NOT WRITABLE (OR WRITE LOCKED)
000.036                 758X EC.UNA  DS      1               UNIT NOT AVAILABLE
000.037                 759X EC.ILV  DS      1               ILLEGAL VALUE
000.040                 760X EC.ILO  DS      1               ILLEGAL OPTION
000.041                 761X EC.VPM  DS      1               VOLUME PRESENTLY MOUNTED ON DEVICE
000.042                 762X EC.NVM  DS      1               NO VOLUME PRESENTLY MOUNTED
000.043                 763X EC.FOD  DS      1               FILE OPEN ON DEVICE
000.044                 764X EC.NPM  DS      1               NO PROVISIONS MADE FOR REMOUNTING MORE DISKS
000.045                 765X EC.DNI  DS      1               DISK NOT INITIALIZED
000.046                 766X EC.DNR  DS      1               DISK IS NOT READABLE
000.047                 767X EC.DSC  DS      1               DISK STRUCTURE IS CORRUPT
000.050                 768X EC.NCV  DS      1               NOT CORRECT VERSION OF HDOS
000.051                 769X EC.NOS  DS      1               NO OPERATING SYSTEM MOUNTED
000.052                 770X EC.IOI  DS      1               ILLEGAL OVERLAY INDEX
000.053                 771X EC.OTL  DS      1               OVERLAY TO LARGE
000.054                 772          XTEXT   HOSDEF

                        774X **      HOSDEF - DEFINE HOS PARAMETER.
                        775X *
                        776X
                        777X
000.040                 778X VERS    EQU     2*16+0          VERSION 2.0
                        779X
000.377                 780X SYSCALL EQU     377Q            SYSCALL INSTRUCTION
                        781X
                        782X
000.000                 783X         ORG     0
                        784X
                        785X *       RESIDENT FUNCTIONS
                        786X
000.000                 787X .EXIT   DS      1               EXIT (MUST BE FIRST)
000.001                 788X .SCIN   DS      1               SCIN
000.002                 789X .SCOUT  DS      1               SCOUT
000.003                 790X .PRINT  DS      1               PRINT
000.004                 791X .READ   DS      1               READ
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000.005                 792X .WRITE  DS      1               WRITE
000.006                 793X .CONSL  DS      1               SET/CLEAR CONSOLE OPTIONS
000.007                 794X .CLRCO  DS      1               CLEAR CONSOLE BUFFER
000.010                 795X .LOADO  DS      1               LOAD AN OVERLAY
000.011                 796X .VERS   DS      1               RETURN HDOS VERSION NUMBER
000.012                 797X .SYSRES DS      1               PRECEDING FUNCTIONS ARE RESIDENT
                        798X
                        799X
                        800X *       *HDOSOVL0.SYS*  FUNCTIONS
                        801X
000.040                 802X         ORG     40A
                        803X
000.040                 804X .LINK   DS      1               LINK  (MUST BE FIRST)
000.041                 805X .CTLC   DS      1               CTL-C
000.042                 806X .OPENR  DS      1               OPENR
000.043                 807X .OPENW  DS      1               OPENW
000.044                 808X .OPENU  DS      1               OPENU
000.045                 809X .OPENC  DS      1               OPENC
000.046                 810X .CLOSE  DS      1               CLOSE
000.047                 811X .POSIT  DS      1               POSITION
000.050                 812X .DELET  DS      1               DELETE
000.051                 813X .RENAM  DS      1               RENAME
000.052                 814X .SETTP  DS      1               SETTOP
000.053                 815X .DECODE DS      1               NAME DECODE
000.054                 816X .NAME   DS      1               GET FILE NAME FROM CHANNEL
000.055                 817X .CLEAR  DS      1               CLEAR CHAN
000.056                 818X .CLEARA DS      1               CLEAR ALL CHANS
000.057                 819X .ERROR  DS      1               LOOKUP ERROR
000.060                 820X .CHFLG  DS      1               CHANGE FLAGS
000.061                 821X .DISMT  DS      1               FLAG SYSTEM DISK DISMOUNTED
000.062                 822X .LOADD  DS      1               LOAD DEVICE DRIVER
000.063                 823X .OPEN   DS      1               Parametrized Open
                        824X
                        825X
                        826X *       *HDOSOVL1.SYS*  FUNCTIONS
                        827X
000.200                 828X         ORG     200Q
                        829X
000.200                 830X .MOUNT  DS      1               MOUNT  (MUST BE FIRST)
000.201                 831X .DMOUN  DS      1               DISMOUNT
000.202                 832X .MONMS  DS      1               MOUNT/NO MESSAGE
000.203                 833X .DMNMS  DS      1               DISMOUNT/NO MESSAGE
000.204                 834X .RESET  DS      1               RESET = DISMOUNT/MOUNT OF UNIT
000.205                 835X .CLEAN  DS      1               Clean device
000.206                 836X .DAD    DS      1               Dismount All Disks              /80.08.sc/
000.207                 837          XTEXT   FBDEF                                           /071080/
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                        839X **     FILE BLOCK DEFINITIONS.
                        840X
000.000                 841X        ORG     0
000.000                 842X FB.CHA DS      1               CHANNEL NUMBER
000.001                 843X FB.FLG DS      1               FLAGS
000.002                 844X FB.FWA DS      2               BUFFER FWA
000.004                 845X FB.PTR DS      2               BUFFER POINTER
000.006                 846X FB.LIM DS      2               LIMIT OF DATA IN BUFFER (READ OPERATIONS)
000.010                 847X FB.LWA DS      2               LWA OF BUFFER
000.012                 848X FB.NAM DS      4+8+4+1         NAME OF FILE
000.021                 849X FB.NAML EQU    *-FB.NAM
000.033                 850X FBENL  EQU     *               ENTRY LENGTH
000.033                 851         XTEXT   IOCDEF                                          /071080/

                        853X **     I/O CHANNEL DEFINITIONS.
                        854X
000.000                 855X        ORG     0
                        856X
000.000                 857X IOC.LNK DS     2               ADDRESS OF NEXT CHANNEL, =0 IF LAST
000.002                 858X IOC.DDA DS     2               THREAD JUMP TO DEVICE DRIVER (V1A DEV TABLE)
                        859X
000.004                 860X IOC.FLG DS     1               FILE TYPE FLAGS
000.001                 861X FT.DD  EQU     00000001B       =1 IF DIRECTORY DEVICE
000.002                 862X FT.OR  EQU     00000010B       =1 IF OPEN FOR READ
000.004                 863X FT.OW  EQU     00000100B       =1 IF OPEN FOR WRITE
000.010                 864X FT.OU  EQU     00001000B       =1 IF OPEN FOR UPDATE
000.020                 865X FT.OC  EQU     00010000B       =1 IF OPEN FOR CHARACTER MODE   /80.02.GC/
000.003                 866X IOC.SQL EQU    *-IOC.DDA       LENGTH OF INFO FOR SEQUENTIAL FILE (FROM IOC)
                        867X
000.005                 868X IOC.GRT DS     2               ADDRESS OF GROUP RESERVATION TABLE
000.007                 869X IOC.SPG DS     1               SECTORS PER GROUP, THIS DEVICE
000.010                 870X IOC.CGN DS     1               CURRENT GROUP NUMBER
000.011                 871X IOC.CSI DS     1               CURRENT SECTOR INDEX (IN CURRENT GROUP)
000.012                 872X IOC.LGN DS     1               LAST GROUP NUMBER
000.013                 873X IOC.LSI DS     1               LAST SECTOR INDEX (IN LAST GROUP)
000.010                 874X IOC.DRL EQU    *-IOC.FLG       LENGTH OF INFO NORMALLY COPIED BACK TO
                        875X *                              THE CHANNEL TABLE
000.014                 876X IOC.DTA DS     2               DEVICE TABLE ADDRESS FOR THIS DEVICE
000.016                 877X IOC.DES DS     2               SECTOR NUMBER OF DIRECTORY ENTRY
000.020                 878X IOC.DEV DS     2               DEVICE CODE
000.022                 879X IOC.UNI DS     1               UNIT NUMBER (0-9)
000.021                 880X IOC.DIL EQU    *-IOC.DDA       LENGTH OF INFO FOR DIRECTORY FILE (FROM IOC)
                        881X
000.023                 882X IOC.DIR DS     DIRELEN         DIRECTORY ENTRY
                        883X
000.052                 884X IOCELEN EQU    *               IOC ENTRY LENGTH
                        885X
000.001                 886X IOCCTD EQU     1               INDEX OF USER CHANNEL #0 IN CHANTAB (FIRST = 0)
000.052                 887         XTEXT   HDSROM                                          *072180*
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                        889X **       HDOS H17 ROM ENTRY POINTS.
    031,253             890X          ORG     31253A
                        891X *DWRITE  EQU     *                   Obsolete                /80.04.sc/
    031,253             892X          DS      31256A-31253A
                        893X *DREAD   EQU     *                   Obsolete                /80.04.sc/
    031,256             894X          DS      31275A-31256A
    031,275             895X S.READ   EQU     *
    031,275             896X          DS      31321A-31266A
    031,330             897X S.WRITE  EQU     *
    031,330             898X          DS      31325A-31311A
    031,344             899X ERR.FND  EQU     *
    031,344             900X          DS      31331A-31325A
    031,350             901X ERR.ILR  EQU     *
    031,350             902X          DS      31335A-31331A
    031,354             903X CFF      EQU     *
    031,354             904X          DS      31363A-31335A
    032,002             905X DCA      EQU     *
    032,002             906X          DS      32114A-31363A
    032,133             907X FFB      EQU     *
    032,133             908X          DS      32166A-32114A
    032,205             909X FFL      EQU     *
    032,205             910X          DS      32204A-32166A
                        911X *LDD     EQU     *
    032,223             912X          DS      32372A-32204A+1
    033,012             913X LDD      EQU     *
    033,012             914X          DS      33135A-33002A
    033,145             915X PDI      EQU     *
    033,145             916X          DS      33154A-33124A
    033,175             917X REL.     EQU     *
    033,175             918X          DS      33156A-33154A
    033,177             919X REL      EQU     *
    033,177             920X          DS      33212A-33156A
    033,233             921X TFE      EQU     *
    033,233             922X          DS      33232A-33206A
    033,257             923X RUC      EQU     *
                        924X
    037,132             925X BOOTA    EQU     37132A          Boot Vectors            /80.06.sc/
    000,130             926X BOOTAL   EQU     00130A          Length of boot vectors  /80.06.sc/
                        927X
    034,031             928X CLOCK    EQU     34031A          Clock vector            /80.06.SC/
                        929
    042,170             930           ORG     USERFWA-ABS.COM
    042,170  377 000    931           DB      377Q,F1.ABS
    042,172  200 042    932           DW      USERFWA         LOAD ADDR
    042,174  137 037    933           DW      MEML-USERFWA    SIZE
    042,176  200 042    934           DW      TEST            ENTRY
                        935
```

```
                        938  **      TEST17
                        939  *
                        940  *       TEST RUNS AN EXTENSIVE TEST ON A HDOS MINI-FLOPPY DISK.
                        941  *
                        942
                        943
042.200                 944  TEST    EQU     *
                        945
042.200  076 000       946          MVI     A,OVL0                                  /072080/
042.202  377 010       947          DB      SYSCALL,.LOADO
042.204  076 001       948          MVI     A,OVL1
042.206  377 010       949          DB      SYSCALL,.LOADO                          /072080/
                        950
042.210  041 070 110    951          LXI     H,RMEML                 ENOUGH MEMORY   /071080/
042.213  377 052       952          DB      SYSCALL,.SETTP            TO GET STARTED
042.215  322 226 042    953          JNC     TEST0                   BR IF YES
042.220  076 021       954          MVI     A,EC.NEM                NOT ENOUGH MEMORY
042.222  067           955          STC
042.223  303 315 044    956          JMP     ERROR
                        957
042.226                 958  TEST0   EQU     *                                       /071080/
042.226  377 011       959          DB      SYSCALL,.VERS
042.230  332 240 042    960          JC      TEST1           NO VERSION SYSTEM CALL
042.233  376 040       961          CPI     VERS
042.235  312 246 042    962          JZ      TEST2           IS CORRECT VERSION OF HDOS
042.240  076 050       963  TEST1   MVI     A,EC.NCV        NOT CORRECT VERSION OF HDOS
042.242  067           964          STC
042.243  303 315 044    965          JMP     ERROR
                        966
042.246  076 377       967  TEST2   MVI     A,377Q
042.250  377 055       968          DB      SYSCALL,.CLEAR  CLEAR THE CHANNEL THAT WE CAME IN ON
042.252  257           969          XRA     A
042.253  062 326 040    970          STA     S.CSLMD         SET CONSOLE MODE
042.256  062 007 040    971          STA     .DSPMOD         DISPLAY MEMORY
042.261  363           972          DI
042.262  072 010 040    973          LDA     .MFLAG
042.265  346 275       974          ANI     377Q-U0.DDU-U0.NHR
042.267  062 010 040    975          STA     .MFLAG          ALLOW DISPLAY
042.272  373           976          EI
                        977
                        978  *       DISMOUNT SYSTEM DISKS
                        979
042.273  315 165 101    980          CALL    $DOS            DISMOUNT OPERATING SYSTEM
042.276  332 315 044    981          JC      ERROR
                        982
                        983  *       INITIALIZE H17 DRIVER.                          /072180/
                        984
042.301  076 011       985          MVI     A,DC.LOD
042.303  315 105 072    986          CALL    DDRV
042.306  072 115 040    987          LDA     D.MAIA          SAVE
042.311  062 011 102    988          STA     MAIA              STEP TIME
                        989
                        990  *       REQUEST UNIT TO BE USED.                        /072180/
                        991
042.314                 992  MOUNT   EQU     *               ENTRY HERE TO MOUNT NEW DISK
042.314  041 314 042    993          LXI     H,MOUNT
```

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042.317  076 003        994          MVI     A,CTLC
042.321  377 041        995          DB      SYSCALL,.CTLC   SETUP CTL-C PROCESSING
042.323  315 061 063    996          CALL    DUN             DETERMINE UNIT NUMBER TO WORK OVER
                        997
                        998  *       SETUP USE OF READ ROUTINE
                        999
042.326  052 033 040   1000          LHLD    .TICCNT
042.331  042 334 101   1001          SHLD    RSEED
042.334  041 000 000   1002          LXI     H,0
042.337  042 007 102   1003          SHLD    PASS            SET PASS NUMBER
                       1004
                       1005  *       ZERO ERROR COUNTERS
                       1006
042.342  041 000 000   1007          LXI     H,0
042.345  042 265 040   1008          SHLD    D.ERR
042.350  042 267 040   1009          SHLD    D.ERR+2
042.353  042 271 040   1010          SHLD    D.ERR+4
                       1011
                       1012  *       START TESTS
                       1013
042.356                1014  RESTART EQU     *                                       *071080*
042.356  041 356 042   1015          LXI     H,RESTART
042.361  076 003       1016          MVI     A,CTLC
042.363  377 041       1017          DB      SYSCALL,.CTLC   SET CTL-C PROCESSING
042.365  061 200 042   1018          LXI     SP,STACK        RESET STACK
042.370  041 356 042   1019          LXI     H,RESTART
042.373  345           1020          PUSH    H               SET *RETURN ADDRESS*
042.374  072 011 102   1021          LDA     MAIA
042.377  062 115 040   1022          STA     D.MAIA          RESET SEEK TIME
043.002  076 377       1023          MVI     A,377Q
043.004  062 006 040   1024          STA     .DSPROT         OFF FP PERIODS
043.007  076 201       1025          MVI     A,UO.CLK+UO.HLT
043.011  062 010 040   1026          STA     .MFLAG          ENABLE CLOCK INTERRUPTS
043.014  076 007       1027          MVI     A,DC.ABT
043.016  315 105 072   1028          CALL    DDRV            ABORT DISK              *071080*
043.021  377 007       1029          DB      SYSCALL,.CLRCO  CLEAR CONSOLE
043.023  315 136 031   1030          CALL    $TYPTX
043.026  012 106 165   1031          DB      NL,'Functions Available:',NL,NL         /072380/
043.055  124 040 055   1032          DB      'T - Display Drive Rotational Speed     '
043.124  125 040 055   1033          DB      'U - Select Another Drive Unit',NL
043.162  104 040 055   1034          DB      'D - General Drive Checkout             '
043.231  103 040 055   1035          DB      'C - Clean Drive Head',NL
043.256  115 040 055   1036          DB      'M - Media Check (Sector Validity)      '
043.325  101 040 055   1037          DB      'A - Align Drive Head',NL
043.352  123 040 055   1038          DB      'S - Perform Seek Time Checkout         '
044.021  122 040 055   1039          DB      'R - Hardcopy Report',NL
044.045  105 040 055   1040          DB      'E - Exit to Boot Program',NL
044.076  012 103 124   1041          DB      NL,'CTRL-C Cancels the Test in Progress.',ENL   /072380/
044.144  315 331 075   1042          CALL    $CCO            CLEAR CTL-O
044.147  315 136 031   1043          CALL    $TYPTX
044.152  040 117 160   1044          DB      ' Option:',' '+2000
044.163  041 014 103   1045          LXI     H,LINE
044.166  315 030 076   1046          CALL    $RTL.           READ LINE IN UPPER CASE
044.171  176           1047          MOV     A,M
044.172  247           1048          ANA     A
044.173  312 356 042   1049          JZ      RESTART         NO GOOD REPLY
```

```
044.176  041 272 044  1050          LXI     H,DIAGA
044.201  315 075 076  1051          CALL    $TBLS           FIND IN TABLE
044.204  312 244 044  1052          JE      DIAG2
044.207  315 136 031  1053          CALL    $TYPTX
044.212  007 111 114  1054          DB      BELL,'ILLEGAL OPTION!',' '+2000
044.233  072 014 103  1055          LDA     LINE
044.236  315 134 076  1056          CALL    $WCHAR
044.241  303 356 042  1057          JMP     RESTART
                      1058
                      1059  *       PERFORM DIAGNOSTIC
                      1060
044.244              1061  DIAG2   EQU     *                                       *071080*
044.244  176        1062          MOV     A,M             (A) = INDEX
044.245  315 061 031  1063          CALL    $TJMP
044.250  205 053     1064          DW      DRIVE           DRIVE DIAGNOSTIC
044.252  141 054     1065          DW      MEDIA           MEDIA CHECK
044.254  346 055     1066          DW      SEEK            SEEK TEST
044.256  346 044     1067          DW      EXIT            EXIT DIAGNOSTIC
044.260  156 051     1068          DW      TIME            TIMING TEST
044.262  314 042     1069          DW      MOUNT           SELECT NEW DRIVE
044.264  354 044     1070          DW      CLEAN           CLEAN HEAD              /071080/
044.266  223 045     1071          DW      ALIGN           ALIGN HEAD
044.270  251 046     1072          DW      REPORT          HARDCOPY REPORT         /071080/
                      1073
                      1074
044.272  104 000     1075  DIAGA   DB      'D',0
044.274  115 001     1076          DB      'M',1
044.276  123 002     1077          DB      'S',2
044.300  105 003     1078          DB      'E',3
044.302  124 004     1079          DB      'T',4
044.304  125 005     1080          DB      'U',5
044.306  103 006     1081          DB      'C',6                                   /071080/
044.310  101 007     1082          DB      'A',7
044.312  122 010     1083          DB      'R',8                                   /071080/
044.314  000         1084          DB      0


                      1086  **      ERROR - DISK ERROR OCCURRED BEFORE DISKS DISMOUNTED.
                      1087  *
                      1088
                      1089
044.315  365         1090  ERROR   PUSH    PSW             SAVE CODE
044.316  315 331 075  1091          CALL    $CCO
044.321  315 136 031  1092          CALL    $TYPTX
044.324  012 007 105  1093          DB      NL,BELL,'ERROR =',' '+2000
044.336  046 007     1094          MVI     H,BELL
044.340  361         1095          POP     PSW
044.341  377 057     1096          DB      SYSCALL,.ERROR
044.343  303 346 044  1097          JMP     EXIT
```

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                                1099  **      EXIT - EXIT DIAGNOSTIC.
                                1100  *
                                1101  *       GIVE HIM TIME TO INSERT A DISK, THEN BOOT.
                                1102
                                1103
          044.346               1104  EXIT    EQU     *                                       /071080/
          044.346  315 255 047  1105          CALL    RPT8            CLOSE HARDCOPY DEVICE   /071080/
          044.351  257          1106          XRA     A
          044.352  377 000      1107          DB      SYSCALL,.EXIT   LET *HDOS* TAKE CARE OF THE ERROR STUFF
```

```
                        1110  ***     CLEAN - CLEAN DRIVE HEAD.
                        1111  *
                        1112
044.354                 1113  CLEAN   EQU     *
044.354  315 331 075   1114          CALL    $CCO
044.357  315 136 031   1115          CALL    $TYPTX
044.362  012 115 141   1116          DB      NL,'Make sure that a Cleaning Diskette is '
045.031  151 156 163   1117          DB      'inserted in drive',' '+80H
045.053  072 336 101   1118          LDA     UNIT
045.056  306 060       1119          ADI     '0'
045.060  315 134 076   1120          CALL    $WCHAR
045.063  315 136 031   1121          CALL    $TYPTX
045.066  056 012 110   1122          DB      '.',NL,'Hit return when ready',7,'?'+80H
045.116                 1123  CLN0    EQU     *
045.116  315 126 076   1124          CALL    $RCHAR
045.121  376 012       1125          CPI     NL
045.123  302 116 045   1126          JNZ     CLN0
045.126  257           1127          XRA     A
045.127  062 013 102   1128          STA     INTDSK          FLAG INITIALIZED DISK NOT MOUNTED
                        1129
                        1130  *       SET CTL-C TO ABORT.
                        1131
045.132  076 003       1132          MVI     A,CTLC
045.134  041 213 045   1133          LXI     H,CLN4
045.137  377 041       1134          DB      SYSCALL+.CTLC
                        1135
                        1136  *       START DRIVE AND SWEEP HEAD FROM TRACK 0 TO TRACK N
                        1137  *       FOR 30 SECONDS.
                        1138
045.141  076 007       1139          MVI     A,DC.ABT
045.143  315 105 072   1140          CALL    DDRV            START DRIVE AT TRACK 0
045.146  072 336 101   1141          LDA     UNIT            GET UNIT #
045.151  062 061 041   1142          STA     AIO.UNI
045.154  315 205 040   1143          CALL    D.SDP           SELECT UNIT
045.157  076 120       1144          MVI     A,40*2
045.161  062 243 040   1145          STA     D.DLYMO         SET MOTOR TURN OFF FOR 40 SEC
045.164                 1146  CLN3    EQU     *
045.164  373           1147          EI                      INSURE INTERRUPTS ENABLED
045.165  072 243 040   1148          LDA     D.DLYMO
045.170  376 024       1149          CPI     10*2
045.172  332 213 045   1150          JC      CLN4            BR IF 30 SEC UP
045.175  072 240 040   1151          LDA     D.TT            ALTERNATE
045.200  356 047       1152          XRI     39                BETWEEN
045.202  062 240 040   1153          STA     D.TT                TRACK 0
045.205  315 166 040   1154          CALL    D.SDT                 AND TRACK N
045.210  303 164 045   1155          JMP     CLN3
                        1156
045.213                 1157  CLN4    EQU     *
045.213  076 007       1158          MVI     A,DC.ABT
045.215  315 105 072   1159          CALL    DDRV
045.220  303 356 042   1160          JMP     RESTART
```

```
                        1163  ***     ALIGN - ALIGN DRIVE HEAD.
                        1164  *
                        1165
045.223                 1166  ALIGN   EQU     *
045.223  315 331 075   1167          CALL    $CCO
045.226  315 136 031   1168          CALL    $TYPTX
045.231  012 115 141   1169          DB      NL,'Make sure that an Alignment Diskette is '
045.302  151 156 163   1170          DB      'inserted in drive',' '+80H
045.324  072 336 101   1171          LDA     UNIT
045.327  306 060       1172          ADI     '0'
045.331  315 134 076   1173          CALL    $WCHAR
045.334  315 136 031   1174          CALL    $TYPTX
045.337  056 012 110   1175          DB      '.',NL,'Hit return when ready','?'+80H
045.367                 1176  ALN$    EQU     *
045.367  315 126 076   1177          CALL    $RCHAR
045.372  376 012       1178          CPI     NL
045.374  302 367 045   1179          JNZ     ALN$
                        1180
045.377  257           1181          XRA     A
046.000  062 013 102   1182          STA     INITDSK         FLAG INITIALIZED DISK NOT MOUNTED
046.003  076 007       1183          MVI     A,DC.ABT
046.005  315 105 072   1184          CALL    DDRV            MOVE HEAD TO TRACK 0 AND ABORT
                        1185
                        1186  *       ASK FOR WHICH TRACK TO POSITION HEAD TO.
                        1187
046.010                 1188  ALN0    EQU     *
046.010  257           1189          XRA     A
046.011  062 250 046   1190          STA     ALNB            CLEAR FLAG
046.014  076 003       1191          MVI     A,CTLC          CTL-C IN RESPONSE TO QUESTION
046.016  041 356 042   1192          LXI     H,RESTART       RESULTS IN TERMINATION
046.021  377 041       1193          DB      SYSCALL,.CTLC       OF ALIGNMENT REQUEST
                        1194
046.023                 1195  ALN0.5  EQU     *
046.023  315 331 075   1196          CALL    $CCO
046.026  315 136 031   1197          CALL    $TYPTX
046.031  012 105 116   1198          DB      NL,'ENTER TRACK # <0>?',' '+80H
046.055  076 003       1199          MVI     A,3
046.057  041 014 103   1200          LXI     H,LINE
046.062  315 260 073   1201          CALL    $ETL.           INPUT VALUE
046.065  332 023 046   1202          JC      ALN0.5          BR IF TOO MANY CHARACTERS
046.070  056 000       1203          MVI     L,0             ASSUME DEFAULT
046.072  075           1204          DCR     A
046.073  312 107 046   1205          JZ      ALN0.7          BR IF DEFAULT REQUESTED
046.076  041 014 103   1206          LXI     H,LINE
046.101  315 125 101   1207          CALL    $PDD            CONVERT CHARACTER TO DECIMAL
046.104  332 023 046   1208          JC      ALN0.5          BR IF ERRONEOUS
046.107                 1209  ALN0.7  EQU     *
046.107  175           1210          MOV     A,L
046.110  376 050       1211          CPI     39+1
046.112  322 023 046   1212          JNC     ALN0.5          BR IF TRACK # TOO LARGE
046.115  062 247 046   1213          STA     ALNA            SAVE FOR LATER
                        1214
                        1215  *       POSITION HEAD AND KEEP LOADED.
                        1216
046.120  072 336 101   1217          LDA     UNIT
046.123  062 061 041   1218          STA     AIO.UNI
```

```
046.126  315 205 040  1219          CALL    D.SDP
046.131  072 247 046  1220          LDA     ALNA
046.134  062 240 040  1221          STA     D.TT
046.137  247          1222          ANA     A
046.140  365          1223          PUSH    PSW
046.141  314 213 040  1224          CZ      D.STZ           USE TRACK 0 SENSOR FOR TRACK # 0
046.144  361          1225          POP     PSW
046.145  304 166 040  1226          CNZ     D.SDT           USE STEPS FOR OTHER TRACKS
                      1227
046.150  076 003      1228          MVI     A,CTLC          CTL-C ONCE AT DESIRED TRACC
046.152  041 241 046  1229          LXI     H,ALN4            MEANS USER WANTS TO
046.155  377 041      1230          DB      SYSCALL,.CTLC       REQUEST ANOTHER TRACK
                      1231
046.157  315 136 031  1232          CALL    $TYPTX
046.162  103 124 114  1233          DB      'CTL-C TO REQUEST ANOTHER TRACK',ENL
                      1234
046.221  373          1235          EI                      INSURE INTERRUPTS ENABLED
046.222  041 243 040  1236          LXI     H,D.DLYMO
046.225              1237  ALN3    EQU     *
046.225  066 377      1238          MVI     M,0FFH          DON'T LET MOTOR TIME OUT
046.227  072 250 046  1239          LDA     ALNB
046.232  247          1240          ANA     A
046.233  302 010 046  1241          JNZ     ALN0            USER WANTS TO REQUEST ANOTHER TRACK
046.236  303 225 046  1242          JMP     ALN3
                      1243
                      1244  *       SET FLAG TO INDICATE USER WANTS ANOTHER TRACK.
                      1245
046.241              1246  ALN4    EQU     *
046.241  076 001      1247          MVI     A,1
046.243  062 250 046  1248          STA     ALNB
046.246  311          1249          RET
                      1250
046.247              1251  ALNA    DS      1               SAVE SLOT FOR TRACK NUMBER
046.250              1252  ALNB    DS      1               FLAG := <>0 USER WANTS ANOTHER TRACK
```

```
                                1255  ***     REPORT - PRODUCE HARD COPY REPORT.
                                1256  *
                                1257
046.251                         1258  REPORT  EQU     *
                                1259
                                1260  *       CLOSE PRESENT HARDCOPY OUTPUT IF THERE IS ANY.
                                1261
046.251  315 255 047           1262          CALL    RPT8
                                1263
                                1264  *       ASK USER IF HE WANTS HARDCOPY OPTION TURNED ON/OFF.
                                1265
046.254  315 331 075           1266          CALL    $CCO
046.257  315 136 031           1267          CALL    $TYPTX
046.262  012 110 141           1268          DB      NL,'Hardcopy Report Option (ON/OFF) <OFF>?',' '+80H
046.332  076 004               1269          MVI     A,4
046.334  041 014 103           1270          LXI     H,LINE
046.337  315 260 073           1271          CALL    $ETL.
046.342  041 014 103           1272          LXI     H,LINE
046.345  315 377 075           1273          CALL    $MLU
046.350  041 014 103           1274          LXI     H,LINE
046.353  176                   1275          MOV     A,M
046.354  376 117               1276          CPI     'O'
046.356  300                   1277          RNZ
046.357  043                   1278          INX     H
046.360  176                   1279          MOV     A,M
046.361  376 116               1280          CPI     'N'
046.363  300                   1281          RNZ
046.364  043                   1282          INX     H
046.365  176                   1283          MOV     A,M
046.366  247                   1284          ANA     A
046.367  300                   1285          RNZ                     RETURN IF REPLY IS NOT 'ON'
                                1286
                                1287  *       GET HARDCOPY DEVICE NAME.
                                1288
046.370                         1289  RPT1    EQU     *
046.370  315 136 031           1290          CALL    $TYPTX
046.373  012 105 156           1291          DB      NL,'Enter Hardcopy Device Name <LP:>?',' '+80H
047.036  076 005               1292          MVI     A,5
047.040  041 014 103           1293          LXI     H,LINE
047.043  315 260 073           1294          CALL    $ETL.
047.046  332 370 046           1295          JC      RPT1            TOO MANY CHARACTERS
047.051  041 014 103           1296          LXI     H,LINE
047.054  315 377 075           1297          CALL    $MLU
047.057  001 151 051           1298          LXI     B,RPTG
047.062  021 146 051           1299          LXI     D,RPTF
047.065  041 014 103           1300          LXI     H,LINE
047.070  315 367 100           1301          CALL    DDS
047.073  332 370 046           1302          JC      RPT1            NOT A VALID DEVICE NAME SYNTAX
                                1303
                                1304  *       OPEN NEW HARDCOPY DEVICE.
                                1305
047.076  072 153 051           1306          LDA     RPTG+2          CONVERT UNIT NUMBER
047.101  306 060               1307          ADI     '0'               FROM
047.103  062 153 051           1308          STA     RPTG+2              BINARY TO CHARACTER
047.106  315 354 075           1309          CALL    $MOVEL          MOVE DEVICE NAME TO FILE BLOCK
047.111  005 000 151           1310          DW      5,RPTG,RPTD+FB.NAM
```

```
                                1311
047.117  041 113 050            1312            LXI     H,RPTD
047.122  315 025 077            1313            CALL    $FOPEW.         OPEN
047.125  332 300 047            1314            JC      RPT9            BR IF ERROR
                                1315
                                1316  *         REQUEST TITLE FOR TEST OUTPUT.
                                1317
047.130  076 040                1318            MVI     A,' '
047.132  001 062 000            1319            LXI     B,RPTA1L
047.135  041 373 047            1320            LXI     H,RPTA1
047.140  315 341 073            1321            CALL    FILL            BLANK FILL
047.143  315 136 031            1322            CALL    $TYPTX
047.146  105 156 164            1323            DB      'Enter Title for Test Hardcopy Report',NL,'?'+80H
047.214  076 062                1324            MVI     A,RPTA1L
047.216  041 373 047            1325            LXI     H,RPTA1
047.221  315 271 073            1326            CALL    $ETL
047.224  315 354 075            1327            CALL    $MOVEL
047.227  011 000 277            1328            DW      9,S.DATE,RPTA2  MOVE TODAY'S DATE TO HEADING
                                1329
                                1330  *         SET FLAG TO INDICATE HARDCOPY REPORT TO BE PRODUCED.
                                1331
047.235  076 001                1332            MVI     A,1
047.237  062 112 050            1333            STA     RPTC
                                1334
047.242  062 124 074            1335            STA     FNPA            SET FLAG FOR FNP
047.245  257                    1336            XRA     A
047.246  062 306 074            1337            STA     WRTLA           INIT LINE COUNTER
047.251  062 111 050            1338            STA     RPTB            INIT PAGE COUNTER
047.254  311                    1339            RET
                                1340
                                1341  *         CLOSE HARDCOPY DEVICE.
                                1342
047.255                         1343  RPT8      EQU     *
047.255  072 112 050            1344            LDA     RPTC
047.260  247                    1345            ANA     A
047.261  310                    1346            RZ                      NOT IN USE
047.262  315 107 074            1347            CALL    FNP.            FORCE NEW PAGE W/O HEADING
047.265  041 113 050            1348            LXI     H,RPTD
047.270  315 144 077            1349            CALL    $FCLO.          CLOSE
047.273  257                    1350            XRA     A
047.274  062 112 050            1351            STA     RPTC            INDICATE HARDCOPY DEVICE NOT IN USE
047.277  311                    1352            RET
                                1353
                                1354  *         ERROR ON OPENING HARDCOPY OUTPUT DEVICE.
                                1355
047.300                         1356  RPT9      EQU     *
047.300  315 136 031            1357            CALL    $TYPTX
047.303  012 007 125            1358            DB      NL,BELL,'Unable to Open Hardcopy Device'
047.343  012 122 145            1359            DB      NL,'Report Request Denied',ENL
047.372  311                    1360            RET
                                1361
047.373                         1362  RPTA      DS      0               HEADING
047.373                         1363  RPTA1     DS      50                TITLE
000.062                         1364  RPTA1L    EQU     *-RPTA1
050.055  040 040 040            1365            DB      '   '
050.062                         1366  RPTA2     DS      9                 TODAY'S DATE
```

```
050.073  040 040 040  1367          DB      '    '
050.100  120 101 107  1368          DB      'PAGE '
050.105               1369  RPTA3   DS      2               PAGE NUMBER
050.107  012 012       1370          DB      NL,NL
000.116               1371  RPTAL   EQU     *-RPTA
050.111  000          1372  RPTB    DB      0               PAGE COUNTER
050.112  000          1373  RPTC    DB      0               FLAG := <>0 PRODUCE HARDCOPY OUTPUT
050.113               1374  RPTD    DS      0               HARDCOPY FILE BLOCK
050.113  001          1375          DB      1                 CHANNEL # 1
050.114  000          1376          DB      0                 FLAGS
050.115  146 050      1377          DW      RPTE
050.117  146 050      1378          DW      RPTE
050.121  146 050      1379          DW      RPTE
050.123  146 051      1380          DW      RPTE+RPTEL
050.125               1381          DS      FB.NAML           HARDCOPY FILENAME (DEVICE)
000.000               1382          ERRNZ   *-RPTD-FBENL
050.146               1383  RPTE    DS      256             HARDCOPY BUFFER
001.000               1384  RPTEL   EQU     *-RPTE
051.146  114 120 060  1385  RPTF    DB      'LP0'           DEFAULT HARDCOPY DEVICE
051.151  104 104 116  1386  RPTG    DB      'DDN:',0                                        /071080/
```

```
                                1389  ***     TIME - SHOW DRIVE TIMING.
                                1390  *
                                1391  *       TIME
                                1392
                                1393
                                1394
036.271                         1395  R.WNH   EQU     36271A
036.235                         1396  R.WHD   EQU     36235A
                                1397
051.156                         1398  TIME    EQU     *
051.156  315 270 064           1399          CALL    RID             REQUIRE INITIALIZED DISK        /071080/
                                1400
051.161  257                    1401          XRA     A
051.162  062 057 053            1402          STA     TIMEC           CLEAR FLAG
051.165  076 003                1403          MVI     A,CTLC
051.167  041 010 052            1404          LXI     H,TIME5
051.172  377 041                1405          DB      SYSCALL,.CTLC   ON CTL-C GO PRINT FINAL SPEED
                                1406
051.174                         1407  TIMEO   EQU     *                                       /071080/
051.174  076 007                1408          MVI     A,DC.ABT
051.176  315 105 072            1409          CALL    DDRV            START DRIVE             *071080*
051.201  072 336 101            1410          LDA     UNIT            (A) = UNIT NUMBER
051.204  107                    1411          MOV     B,A                                     /79.11.GC/
051.205  004                    1412          INR     B                                       /79.11.GC/
051.206  257                    1413          XRA     A                                       /79.11.GC/
051.207  315 312 075            1414          CALL    BITS
000.000                         1415          ERRNZ   DF.DS0-2
000.000                         1416          ERRNZ   DF.DS1-4
000.000                         1417          ERRNZ   DF.DS2-8                               /79.11.GC/
051.212  366 020                1418          ORI     DF.MO
051.214  062 242 040            1419          STA     D.DVCTL         SELECT UNIT
051.217  323 177                1420          OUT     DP.DC           SELECT UNIT
                                1421
051.221  363                    1422          DI
                                1423
                                1424  *       WAIT FOR TRAILING EDGE OF HOLE
                                1425
051.222  315 235 036            1426          CALL    R.WHD
051.225  315 271 036            1427          CALL    R.WNH           WAIT FOR NO HOLE
                                1428
051.230  001 000 000            1429          LXI     B,0
051.233  026 013                1430          MVI     D,11
051.235  003                    1431  TIME1   INX     B
051.236  034                    1432          INR     E               DUMMY STATEMENT FOR Z-80/8080 COMPATABILITY
051.237  035                    1433          DCR     E               SAME AS ABOVE           *071080*
051.240  333 177                1434          IN      DP.DC
000.000                         1435          ERRNZ   DF.HD-1
051.242  037                    1436          RAR
051.243  322 235 051            1437          JNC     TIME1
051.246  003                    1438  TIME2   INX     B
051.247  034                    1439          INR     E               DUMMY STATEMENT FOR Z-80/8080 COMPATABILITY
051.250  035                    1440          DCR     E               SAME AS ABOVE           *071080*
051.251  333 177                1441          IN      DP.DC
000.000                         1442          ERRNZ   DF.HD-1
051.253  037                    1443          RAR
051.254  332 246 051            1444          JC      TIME2
```

```
051.257  025           1445          DCR     D
051.260  302 235 051   1446          JNZ     TIME1
051.263  373           1447          EI
                       1448
                       1449
                       1450  *       COMPUTE DISPLAY FOR TIME
                       1451
051.264  072 010 040   1452          LDA     .MFLAG                          /071080/
051.267  366 002       1453          ORI     UO.DDU
051.271  062 010 040   1454          STA     .MFLAG                          /071080/
051.274  041 014 052   1455          LXI     H,TIMEA-2
051.277  043           1456  TIME3   INX     H
051.300  043           1457          INX     H
051.301  136           1458          MOV     E,M
051.302  043           1459          INX     H
051.303  126           1460          MOV     D,M
051.304  043           1461          INX     H               (DE) = TEST VALUE
051.305  173           1462          MOV     A,E
051.306  221           1463          SUB     C
051.307  172           1464          MOV     A,D
051.310  230           1465          SBB     B
051.311  322 277 051   1466          JNC     TIME3           NOT THERE YET
                       1467
                       1468  *       DISPLAY ON FRONT PANEL
                       1469
051.314  345           1470          PUSH    H               SAVE TABLE POINTER
051.315  176           1471          MOV     A,M
051.316  021 013 040   1472          LXI     D,.ALEDS
051.321  345           1473          PUSH    H
051.322  315 060 053   1474          CALL    D2H             DECODE 2 HEX DIGITS
051.325  341           1475          POP     H
051.326  043           1476          INX     H
051.327  176           1477          MOV     A,M
051.330  315 060 053   1478          CALL    D2H             DECODE 2 HEX DIGITS
051.333  076 377       1479          MVI     A,377Q
051.335  022           1480          STAX    D
051.336  023           1481          INX     D
051.337  022           1482          STAX    D
051.340  023           1483          INX     D
051.341  022           1484          STAX    D
051.342  023           1485          INX     D
051.343  022           1486          STAX    D
051.344  023           1487          INX     D
051.345  022           1488          STAX    D
051.346  023           1489          INX     D
051.347  072 013 040   1490          LDA     .ALEDS
051.352  346 177       1491          ANI     177Q            REMOVE DP
051.354  062 013 040   1492          STA     .ALEDS
051.357  341           1493          POP     H
                       1494
                       1495  *       DISPLAY ON CONSOLE
                       1496
051.360  315 107 053   1497          CALL    THD             TYPE HEX DIGITS
                       1498
051.363  076 377       1499          MVI     A,255
051.365  315 053 000   1500          CALL    .DLY            WAIT WITH DISPLAY
```

```
051.370  072 057 053  1501          LDA     TIMEC                                   /0710807
051.373  247          1502          ANA     A
051.374  312 174 051  1503          JZ      TIMEO           TRY AGAIN               /0710807
                      1504
                      1505  *       DISPLAY FINAL SPEED ON HARDCOPY DEVICE.
                      1506
051.377  041 016 053  1507          LXI     H,TIMEB
052.002  315 171 074  1508          CALL    WRTL
                      1509
052.005  303 356 042  1510          JMP     RESTART
                      1511
                      1512  *       ON CTL-C SET FLAG TO PRINT FINAL DRIVE SPEED.
                      1513
052.010              1514  TIME5   EQU     *
052.010  076 001      1515          MVI     A,1
052.012  062 057 053  1516          STA     TIMEC
052.015  311          1517          RET
```

```
                        1519  **      TIMEA   -  TIME TABLE
                        1520  *
                        1521  *       THIS IS A TABLE OF TIMES AND THEIR ASSOCIATED DRIVE TOLERANCES.
                        1522  *       THE LOOP IS KLUDGED SO AS TO BE THE SAME TIME FOR BOTH Z-80'S AND
                        1523  *       8080'S, HENCE IT WORKS ON H89'S AS WELL AS H8'S.  THE DATA FOR THE
                        1524  *       TABLE IS COMPUTED BY THE PROGRAM SPDTAB.BAS.  THE TIMING FOR THE
                        1525  *       LOOP IS AS FOLLOWS:
                        1526  *
                        1527  *               CODE                    8080            Z-80
                        1528  *               ----                    ----            ----
                        1529  *
                        1530  *       1       INX     B               5               6
                        1531  *               INR     E               5               4
                        1532  *               DCR     E               5               4
                        1533  *               IN      DP.DC           10              11
                        1534  *               RAR                     4               4
                        1535  *               JNC     1               10              10
                        1536  *                                       ----            ----
                        1537  *                                       39              39
                        1538  *
                        1539  *       THIS LOOP IS ESSENTIALLY REPEATED TWICE, THUS ONE ARRIVES AT THE
                        1540  *       FOLLOWING COMPUTATIONS:
                        1541  *
                        1542  *               INDEX = (200*2048*1000)/(I*39),
                        1543  *
                        1544  *       WHERE I=0982 FOR .982, I=1000 FOR 1.000, ETC.
                        1545  *
                        1546
 052.016                1547  TIMEA   EQU     *
 052.016  377 377       1548          DW      377377A
 052.020  011 150       1549          DB      09H,68H         CATCH HIGH END OF SCALE
                        1550
 052.022  126 052       1551          DW      10838
 052.024  011 151       1552          DB      09H,69H         0.969
                        1553
 052.026  113 052       1554          DW      10827
 052.030  011 160       1555          DB      09H,70H         0.970
                        1556
 052.032  100 052       1557          DW      10816
 052.034  011 161       1558          DB      09H,71H         0.971
                        1559
 052.036  065 052       1560          DW      10805
 052.040  011 162       1561          DB      09H,72H         0.972
                        1562
 052.042  052 052       1563          DW      10794
 052.044  011 163       1564          DB      09H,73H         0.973
                        1565
 052.046  036 052       1566          DW      10782
 052.050  011 164       1567          DB      09H,74H         0.974
                        1568
 052.052  023 052       1569          DW      10771
 052.054  011 165       1570          DB      09H,75H         0.975
```

```
052.056  010 052      1572          DW      10760
052.060  011 166      1573          DB      09H,76H         0.976
                       1574
052.062  375 051      1575          DW      10749
052.064  011 167      1576          DB      09H,77H         0.977
                       1577
052.066  362 051      1578          DW      10738
052.070  011 170      1579          DB      09H,78H         0.978
                       1580
052.072  347 051      1581          DW      10727
052.074  011 171      1582          DB      09H,79H         0.979
                       1583
052.076  334 051      1584          DW      10716
052.100  011 200      1585          DB      09H,80H         0.980
                       1586
052.102  321 051      1587          DW      10705
052.104  011 201      1588          DB      09H,81H         0.981
                       1589
052.106  307 051      1590          DW      10695
052.110  011 202      1591          DB      09H,82H         0.982
                       1592
052.112  274 051      1593          DW      10684
052.114  011 203      1594          DB      09H,83H         0.983
                       1595
052.116  261 051      1596          DW      10673
052.120  011 204      1597          DB      09H,84H         0.984
                       1598
052.122  246 051      1599          DW      10662
052.124  011 205      1600          DB      09H,85H         0.985
                       1601
052.126  233 051      1602          DW      10651
052.130  011 206      1603          DB      09H,86H         0.986
                       1604
052.132  220 051      1605          DW      10640
052.134  011 207      1606          DB      09H,87H         0.987
                       1607
052.136  206 051      1608          DW      10630
052.140  011 210      1609          DB      09H,88H         0.988
                       1610
052.142  173 051      1611          DW      10619
052.144  011 211      1612          DB      09H,89H         0.989
                       1613
052.146  160 051      1614          DW      10608
052.150  011 220      1615          DB      09H,90H         0.990
```

```
052.152  145 051      1617          DW      10597
052.154  011 221      1618          DB      09H,91H         0.991
                       1619
052.156  133 051      1620          DW      10587
052.160  011 222      1621          DB      09H,92H         0.992
                       1622
052.162  120 051      1623          DW      10576
052.164  011 223      1624          DB      09H,93H         0.993
                       1625
052.166  105 051      1626          DW      10565
052.170  011 224      1627          DB      09H,94H         0.994
                       1628
052.172  073 051      1629          DW      10555
052.174  011 225      1630          DB      09H,95H         0.995
                       1631
052.176  060 051      1632          DW      10544
052.200  011 226      1633          DB      09H,96H         0.996
                       1634
052.202  046 051      1635          DW      10534
052.204  011 227      1636          DB      09H,97H         0.997
                       1637
052.206  033 051      1638          DW      10523
052.210  011 230      1639          DB      09H,98H         0.998
                       1640
052.212  021 051      1641          DW      10513
052.214  011 231      1642          DB      09H,99H         0.999
                       1643
052.216  006 051      1644          DW      10502
052.220  020 000      1645          DB      10H,00H         1.000
                       1646
052.222  374 050      1647          DW      10492
052.224  020 001      1648          DB      10H,01H         1.001
                       1649
052.226  361 050      1650          DW      10481
052.230  020 002      1651          DB      10H,02H         1.002
                       1652
052.232  347 050      1653          DW      10471
052.234  020 003      1654          DB      10H,03H         1.003
                       1655
052.236  334 050      1656          DW      10460
052.240  020 004      1657          DB      10H,04H         1.004
                       1658
052.242  322 050      1659          DW      10450
052.244  020 005      1660          DB      10H,05H         1.005
                       1661
052.246  307 050      1662          DW      10439
052.250  020 006      1663          DB      10H,06H         1.006
                       1664
052.252  275 050      1665          DW      10429
052.254  020 007      1666          DB      10H,07H         1.007
                       1667
052.256  263 050      1668          DW      10419
052.260  020 010      1669          DB      10H,08H         1.008
                       1670
052.262  250 050      1671          DW      10408
052.264  020 011      1672          DB      10H,09H         1.009
```

```
                                1673
052.266  236 050       1674          DW      10398
052.270  020 020       1675          DB      10H,10H         1.010
```

```
052.272  224 050        1677            DW      10388
052.274  020 021        1678            DB      10H,11H         1.011
                        1679
052.276  212 050        1680            DW      103/8
052.300  020 022        1681            DB      10H,12H         1.012
                        1682
052.302  177 050        1683            DW      10367
052.304  020 023        1684            DB      10H,13H         1.013
                        1685
052.306  165 050        1686            DW      10357
052.310  020 024        1687            DB      10H,14H         1.014
                        1688
052.312  153 050        1689            DW      10347
052.314  020 025        1690            DB      10H,15H         1.015
                        1691
052.316  141 050        1692            DW      10337
052.320  020 026        1693            DB      10H,16H         1.016
                        1694
052.322  127 050        1695            DW      10327
052.324  020 027        1696            DB      10H,17H         1.017
                        1697
052.326  114 050        1698            DW      10316
052.330  020 030        1699            DB      10H,18H         1.018
                        1700
052.332  102 050        1701            DW      10306
052.334  020 031        1702            DB      10H,19H         1.019
                        1703
052.336  070 050        1704            DW      10296
052.340  020 040        1705            DB      10H,20H         1.020
                        1706
052.342  056 050        1707            DW      10286
052.344  020 041        1708            DB      10H,21H         1.021
                        1709
052.346  044 050        1710            DW      10276
052.350  020 042        1711            DB      10H,22H         1.022
                        1712
052.352  032 050        1713            DW      10266
052.354  020 043        1714            DB      10H,23H         1.023
                        1715
052.356  020 050        1716            DW      10256
052.360  020 044        1717            DB      10H,24H         1.024
                        1718
052.362  006 050        1719            DW      10246
052.364  020 045        1720            DB      10H,25H         1.025
                        1721
052.366  374 047        1722            DW      10236
052.370  020 046        1723            DB      10H,26H         1.026
                        1724
052.372  362 047        1725            DW      10226
052.374  020 047        1726            DB      10H,27H         1.027
                        1727
052.376  350 047        1728            DW      10216
053.000  020 050        1729            DB      10H,28H         1.028
                        1730
053.002  336 047        1731            DW      10206
053.004  020 051        1732            DB      10H,29H         1.029
```

```
                                1733
053.006  324 047               1734            DW      10196
053.010  020 060               1735            DB      10H,30H         1.030
                                1736
053.012  000 000               1737            DW      000000A
053.014  020 062               1738            DB      10H,32H         CATCH LOW END OF SCALE
                                1739
                                1740  *         HARDCOPY DRIVE SPEED OUTPUT LINE.                       /071080/
                                1741
053.016                         1742  TIMEB     DS      0
053.016  012 104 162          1743            DB      NL,'Drive Speed for Unit '
053.044                         1744  TIMEB1    DS      1
053.045  040 075 040          1745            DB      ' = '
053.050                         1746  TIMEB2    DS      5
053.055  012 200               1747            DB      NL,80H
                                1748
053.057  000                   1749  TIMEC     DB      0               FLAG != <>0 PRINT SPEED         /071080/

                                1751  **        D2H - DECODE 2 HEX DIGITS
                                1752  *
                                1753  *         ENTRY   (A) = 2 HEX DIGITS
                                1754  *                 (DE) = ADDRESS FOR DISPLAY PATTERN
                                1755  *         EXIT    (DE) = (DE)+2
                                1756  *         USES    NONE
                                1757
                                1758
053.060  365                   1759  D2H       PUSH    PSW
053.061  037                   1760            RAR
053.062  037                   1761            RAR
053.063  037                   1762            RAR
053.064  037                   1763            RAR
053.065  315 071 053           1764            CALL    D2H1
053.070  361                   1765            POP     PSW
053.071  346 017               1766  D2H1      ANI     17Q
053.073  041 356 003           1767            LXI     H,.DUDA
053.076  315 101 030           1768            CALL    $DADA.
053.101  176                   1769            MOV     A,M
053.102  366 200               1770            ORI     200Q
053.104  022                   1771            STAX    D
053.105  023                   1772            INX     D
053.106  311                   1773            RET

                                1775  **        THD     -  TYPE HEX DIGITS
                                1776  *
                                1777  *         TYPE THE DRIVE SPEED ON THE CONSOLE
                                1778  *
                                1779  *         ENTRY   (HL)    = POINTER TO TABLE ENTRY
                                1780  *
                                1781
053.107  176                   1782  THD       MOV     A,M
053.110  346 360               1783            ANI     11110000B       MASK OUT HIGH ORDER NIBLE
```

```
053.112  017          1784          RRC
053.113  017          1785          RRC
053.114  017          1786          RRC
053.115  017          1787          RRC
053.116  315 200 053  1788          CALL    THD.            OUTPUT HIGH ORDER DIGIT
053.121  062 050 053  1789          STA     TIMEB2                                  *071080*
                      1790
053.124  076 056      1791          MVI     A,'.'
053.126  377 002      1792          DB      SYSCALL,.SCOUT  OUTPUT DECIMAL POINT
053.130  062 051 053  1793          STA     TIMEB2+1                                *071080*
                      1794
053.133  176          1795          MOV     A,M
053.134  346 017      1796          ANI     00001111B       MASK OUT LOW ORDER NIBLE
053.136  315 200 053  1797          CALL    THD.
053.141  062 052 053  1798          STA     TIMEB2+2                                *071080*
                      1799
053.144  043          1800          INX     H
053.145  176          1801          MOV     A,M
053.146  346 360      1802          ANI     11110000B       MASK OUT HIGH ORDER NIBLE
053.150  017          1803          RRC
053.151  017          1804          RRC
053.152  017          1805          RRC
053.153  017          1806          RRC
053.154  315 200 053  1807          CALL    THD.
053.157  062 053 053  1808          STA     TIMEB2+3                                *071080*
053.162  176          1809          MOV     A,M
053.163  346 017      1810          ANI     00001111B       MASK OUT LOW ORDER NIBLE
053.165  315 200 053  1811          CALL    THD.
053.170  062 054 053  1812          STA     TIMEB2+4                                *071080*
                      1813
053.173  076 012      1814          MVI     A,NL
053.175  377 002      1815          DB      SYSCALL,.SCOUT  OUTPUT NEW LINE
053.177  311          1816          RET
                      1817
053.200  306 060      1818  THD.    ADI     '0'
053.202  377 002      1819          DB      SYSCALL,.SCOUT  OUTPUT THE CHARACTER TO THE CONSOLE
053.204  311          1820          RET
```

```
                                1824  ***     DRIVE - PERFORM GENERAL DRIVE TESTS
                                1825  *
                                1826  *       DRIVE PERFORMS A GENERAL DRIVE DIAGNOSTIC BY
                                1827  *       A SERIES OF 7 TESTS:
                                1828  *
                                1829  *       A) WRITE ALL ZEROS
                                1830  *       B) READ ALL ZEROS
                                1831  *       C) WRITE ALL ONES
                                1832  *       D) READ ALL ONES
                                1833  *       E) WRITE ID PATTERN
                                1834  *       F) READ ID PATTERN
                                1835  *       G) RANDOM READ/WRITE TEST
                                1836  *
                                1837  *       BEFORE EACH TEST IS STARTED, ITS LETTER IS TYPED. IF A SIGNIFICANT
                                1838  *       NUMBER OF ERRORS OCCURRS DURING THAT PASS, THE NUMBER IS TYPED AS
                                1839  *       HHH/SSS, WHERE HHH = HARD ERROR COUNT, AND SSS = SOFT ERROR
                                1840  *       COUNT.
                                1841  *
                                1842  *       ENTRY   NONE
                                1843  *       EXIT    TO RESTART VIA CTL-C
                                1844  *       USES    ALL
                                1845
                                1846
        053.205                 1847  DRIVE   EQU     *
                                1848
                                1849  *       READ AND ZAP DISK LABEL SECTOR.                         /101080/
                                1850
        053.205  315 076 065    1851          CALL    RL
        053.210  315 353 065    1852          CALL    ZL                                              /101080/
                                1853
                                1854  *       SET CTL-C TO ABORT TESTS AND JUMP TO RESTART.           /071080/
                                1855
        053.213  076 003        1856          MVI     A,CTLC
        053.215  041 350 053    1857          LXI     H,TEST5
        053.220  377 041        1858          DB      SYSCALL,.CTLC
                                1859
        053.222  041 052 054    1860          LXI     H,DRIVEA
        053.225  315 127 074    1861          CALL    PMSG                                            /071080/
        053.230  257            1862          XRA     A
        053.231  062 007 102    1863          STA     PASS            CLEAR PASS NUMBER
        053.234  315 217 071    1864  DRIVE1  CALL    CEC             CLEAR ERROR COUNTS
        053.237  041 240 040    1865          LXI     H,D.TT
        053.242  042 024 040    1866          SHLD    .ABUSS          SET TRACK ON DISPLAY
        053.245  315 360 053    1867          CALL    TESTA           WRITE A'S
        053.250  315 266 071    1868          CALL    PSE             PRINT SIGNIFICAT ERRORS
        053.253  315 370 053    1869          CALL    TESTB
        053.256  315 266 071    1870          CALL    PSE
        053.261  315 002 054    1871          CALL    TESTC
        053.264  315 266 071    1872          CALL    PSE
        053.267  315 013 054    1873          CALL    TESTD
        053.272  315 266 071    1874          CALL    PSE
        053.275  315 025 054    1875          CALL    TESTE
        053.300  315 266 071    1876          CALL    PSE
        053.303  315 034 054    1877          CALL    TESTF
        053.306  315 266 071    1878          CALL    PSE
        053.311  315 043 054    1879          CALL    TESTG
```

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053.314  315 266 071  1880          CALL    PSE
053.317  041 007 102  1881          LXI     H,PASS
053.322  064          1882          INR     M
053.323  176          1883          MOV     A,M
053.324  376 004      1884          CPI     4
053.326  306 060      1885          ADI     '0'
053.330  365          1886          PUSH    PSW             SAVE CODE
053.331  062 136 054  1887          STA     DRIVEB1                          /071080/
053.334  041 121 054  1888          LXI     H,DRIVEB
053.337  315 127 074  1889          CALL    PMSG            TYPE/PRINT MSG   /071080/
053.342  361          1890          POP     PSW
053.343  376 063      1891          CPI     '3'
053.345  302 234 053  1892          JNE     DRIVE1
                      1893
                      1894  *       ABORT TEST.                              /071080/
                      1895
053.350               1896  TEST5   EQU     *
053.350  076 007      1897          MVI     A,DC.ABT
053.352  315 105 072  1898          CALL    DDRV
                      1899
053.355  303 356 042  1900          JMP     RESTART                          /071080/


                      1902  **      TESTA - WRITE ALL ZEROS
                      1903  *
                      1904
053.360               1905  TESTA   EQU     *                                /071080/
053.360  315 150 074  1906          CALL    PMSG.                            /071080/
053.363  301          1907          DB      'A'+200Q
053.364  257          1908          XRA     A
053.365  303 330 066  1909          JMP     WCP             WRITE CONSTANT PATTERN


                      1911  **      TESTB - READ ALL ZEROS
                      1912
053.370               1913  TESTB   EQU     *                                /071080/
053.370  315 150 074  1914          CALL    PMSG.                            /071080/
053.373  302          1915          DB      'B'+200Q
053.374  041 000 000  1916          LXI     H,0
053.377  303 134 066  1917          JMP     CCP             CHECK FOR CONSTANT PATTERN


                      1919  **      TESTC - WRITE ALL ONES
                      1920
054.002               1921  TESTC   EQU     *                                /071080/
054.002  315 150 074  1922          CALL    PMSG.                            /071080/
054.005  303          1923          DB      'C'+200Q
054.006  076 377      1924          MVI     A,377Q
054.010  303 330 066  1925          JMP     WCP             WRITE CONSTANT PATTERN
```

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                                1927  **      TESTD - READ ALL ONES
                                1928
054.013                         1929  TESTD   EQU     *                                       /071080/
054.013  315 150 074            1930          CALL    PMSG.                                   /071080/
054.016  304                    1931          DB      'D'+2000
054.017  041 377 377            1932          LXI     H,377377A
054.022  303 134 066            1933          JMP     CCP             CHECK FOR CONSTANT PATTERN

                                1935  **      TESTE - WRITE ID PATTERN
                                1936
054.025                         1937  TESTE   EQU     *                                       /071080/
054.025  315 150 074            1938          CALL    PMSG.                                   /071080/
054.030  305                    1939          DB      'E'+2000
054.031  303 005 071            1940          JMP     WIP             WRITE ID PATTERN

                                1942  **      TESTF - READ ID PATTERN
                                1943
054.034                         1944  TESTF   EQU     *                                       /071080/
054.034  315 150 074            1945          CALL    PMSG.                                   /071080/
054.037  306                    1946          DB      'F'+2000
054.040  303 045 071            1947          JMP     CIP             CHECK ID PATTERN

                                1949  **      TESTG - RANDOM SEEK TEST
                                1950
                                1951
054.043                         1952  TESTG   EQU     *                                       /071080/
054.043  315 150 074            1953          CALL    PMSG.                                   /071080/
054.046  307                    1954          DB      'G'+2000
054.047  303 006 067            1955          JMP     RRT             RANDOM READ/WRITE TEST
                                1956
054.052                         1957  DRIVEA  DS      0                                       /071080/
054.052  012 063 040            1958          DB      NL,'3 Pass General Drive Test for Unit '
054.116                         1959  DRIVEA1 DS      1
054.117  012 200                1960          DB      NL,80H
054.121                         1961  DRIVEB  DS      0
054.121  040 105 156            1962          DB      ' End of Pass '
054.136                         1963  DRIVEB1 DS      1
054.137  012 200                1964          DB      NL,80H                                  /071080/
```

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                                1968  **      MEDIA - CHECK SECTOR VALIDITY.
                                1969  *
                                1970  *       MEDIA CHECKS ALL SECTORS ON TRACKS 1 THROUGH 39
                                1971  *       (TRACK 0 IS OMITTED).
                                1972  *
                                1973  *       EACH TRACK IS WRITTEN WITH ALL ZEROS, ALL ONES, THEN A FENCE PATTERN.
                                1974  *
                                1975  *       FOR EACH WRITE AND READ OPERATION, THE SOFT AND HARDERROR COUNT
                                1976  *       IS ACCUMULATED FOR THAT SECTOR. AT THE END OF THE PASS, ANY SECTORS
                                1977  *       WITH HARD ERRORS, OR ANY SECTORS WITH TOO MANY SOFT ERRORS
                                1978  *       ARE REPORTED BAD.
                                1979  *
                                1980  *       ENTRY   NONE
                                1981  *       EXIT    NONE
                                1982  *       USES    ALL
                                1983
054.141                         1984  MEDIA   EQU     *
                                1985
                                1986  *       READ AND ZAP DISK LABEL SECTOR.                          /101080/
                                1987
054.141  315 076 065           1988          CALL    RL
054.144  315 353 065           1989          CALL    ZL                                                 /101080/
                                1990
                                1991  *       SET CTRL-C TO ABORT AND JUMP TO RESTART.                  /071080/
                                1992
054.147  076 003               1993          MVI     A,CTLC
054.151  041 323 054           1994          LXI     H,MEDIA8
054.154  377 041               1995          DB      SYSCALL+.CTLC                                      /071080/
                                1996
054.156  001 014 003           1997          LXI     B,390*2
054.161  041 054 103           1998          LXI     H,SECERR
054.164  257                   1999          XRA     A
054.165  062 363 054           2000          STA     MEDIAA          CLEAR BAD SECTOR COUNT
054.170  066 000               2001  MEDIA1  MVI     M,0
054.172  043                   2002          INX     H
054.173  013                   2003          DCX     B
054.174  170                   2004          MOV     A,B
054.175  261                   2005          ORA     C
054.176  302 170 054           2006          JNZ     MEDIA1          CLEAR ERROR TABLE
054.201  076 001               2007          MVI     A,1
054.203  062 025 040           2008          STA     .ABUSS+1        SET PASS
054.206  257                   2009          XRA     A
054.207  315 073 055           2010          CALL    CSV             CHECK SECTOR VALIDTY WITH OS
054.212  041 025 040           2011          LXI     H,.ABUSS+1
054.215  064                   2012          INR     M
054.216  076 377               2013          MVI     A,377Q
054.220  315 073 055           2014          CALL    CSV             CHECK SECTOR VALIDITY WITH 1'S
054.223  041 025 040           2015          LXI     H,.ABUSS+1
054.226  064                   2016          INR     M
054.227  076 125               2017          MVI     A,125Q
054.231  315 073 055           2018          CALL    CSV             CHECK VALIDITY WITH 01010101B
                                2019
                                2020  *       REPORT BADDIES
                                2021
054.234  041 364 054           2022          LXI     H,MEDIAB                                           /071080/
054.237  315 171 074           2023          CALL    WRTL                                               /071080/
```

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                        2024
054.242  001 012 000    2025          LXI     B,10
054.245  021 054 103    2026          LXI     D,SECERR
054.250  041 206 001    2027          LXI     H,390           (HL) = SECTOR COUNT
054.253  032            2028  MEDIA2  LDAX    D               SEE IF HARD ERRORS
054.254  023            2029          INX     D
054.255  247            2030          ANA     A
054.256  302 264 054    2031          JNZ     MEDIA3          MUST REPORT
054.261  032            2032          LDAX    D
054.262  376 012        2033          CPI     10
054.264  324 333 054    2034  MEDIA3  CNC     MEDIA10         REPORT ERROR IF TOO MANY, OR HARD ERRORS
054.267  023            2035          INX     D               POINT TO NEXT SECTOR'S BYTES
054.270  003            2036          INX     B               INCREMENT SECTOR NUMBER
054.271  053            2037          DCX     H               DECREMENT COUNT LEFT
054.272  174            2038          MOV     A,H
054.273  265            2039          ORA     L
054.274  302 253 054    2040          JNZ     MEDIA2          MORE TO REPORT
                        2041
                        2042  *       SUMMARY MESSAGE
                        2043
054.277  072 363 054    2044          LDA     MEDIAA                                  /071080/
054.302  117            2045          MOV     C,A
054.303  006 000        2046          MVI     B,0
054.305  041 016 055    2047          LXI     H,MEDIAC1
054.310  076 003        2048          MVI     A,3
054.312  315 137 076    2049          CALL    $UDDN
054.315  041 015 055    2050          LXI     H,MEDIAC
054.320  315 127 074    2051          CALL    PMSG
                        2052
                        2053  *       ABORT TEST.
                        2054
054.323                 2055  MEDIA8  EQU     *
054.323  076 007        2056          MVI     A,DC.ABT
054.325  315 105 072    2057          CALL    DDRV
                        2058
054.330  303 356 042    2059          JMP     RESTART


                        2061  **      REPORT ERROR
                        2062  *
                        2063  *       (BC) = SECTOR NUMBER
                        2064  *       USES    NONE
                        2065
                        2066
054.333  315 054 031    2067  MEDIA10 CALL    $SAVALL
054.336  076 003        2068          MVI     A,3
054.340  041 056 055    2069          LXI     H,MEDIAD1
054.343  315 137 076    2070          CALL    $UDDN
054.346  041 047 055    2071          LXI     H,MEDIAD
054.351  315 127 074    2072          CALL    PMSG                                    /071080/
054.354  041 363 054    2073          LXI     H,MEDIAA
054.357  064            2074          INR     M               COUNT BAD SECTOR
054.360  303 047 031    2075          JMP     $RSTALL         RESTORE AND EXIT
                        2076
054.363  000            2077  MEDIAA  DB      0               ERROR COUNT
```

```
054.364                 2078  MEDIAB  DS      0                                       /071080/
054.364 012 115 145     2079          DB      NL,'Media Check for Unit '
055.012                 2080  MEDIAB1 DS      1
055.013 012 200         2081          DB      NL,80H
055.015                 2082  MEDIAC  DS      0
055.015 012             2083          DB      NL
055.016                 2084  MEDIAC1 DS      3
055.021 040 102 141     2085          DB      ' Bad Sectors Located',NL,80H
055.047                 2086  MEDIAD  DS      0
055.047 123 145 143     2087          DB      'Sector '
055.056                 2088  MEDIAD1 DS      3
055.061 040 151 163     2089          DB      ' is Bad.',NL,80H                       /071080/


                        2091  **      CSV - CHECK SECTOR VALIDITY.
                        2092  *
                        2093  *       CSV CHECKS A DISK VOLUME FOR VALIDITY OVER THE
                        2094  *       PATTERN.
                        2095  *
                        2096  *       THE GIVEN BYTE IS WRITTEN TO EACH SECTOR, THEN READ BACK.
                        2097  *
                        2098  *       ANY ERRORS ARE RECORDED IN 'SECERR'.
                        2099  *
                        2100  *       TO AVOID LOST REVS, THE FOLLOWING SEQUENCE IS USED IN READING
                        2101  *       WRITEING SECTORS ON A TRACK
                        2102  *
                        2103  *       0 3 6 9 2 5 8 1 4 7
                        2104  *
                        2105  *       AFTER EACH ACCESS, THE HARD AND SOFT ERROR COUNTS ARE UPDATED.
                        2106  *
                        2107  *       ENTRY   (A) = PATTERN
                        2108  *       EXIT    NONE
                        2109  *       USES    ALL
                        2110
                        2111
055.073 041 070 106     2112  CSV     LXI     H,SECBUF
055.076 021 070 107     2113          LXI     D,SECBUF2
055.101 006 000         2114          MVI     B,0             (B) = COUNT
                        2115
                        2116  *       SET PATTERN TO READ/WRITE, AND PATTERN TO CHECK
                        2117
055.103 167             2118  CSV1    MOV     M,A
055.104 022             2119          STAX    D               TWO COPIES
055.105 043             2120          INX     H
055.106 023             2121          INX     D
055.107 005             2122          DCR     B
055.110 302 103 055     2123          JNZ     CSV1
                        2124
                        2125  *       TRY WRITE
                        2126
055.113 076 001         2127          MVI     A,DC.WRI
055.115 315 122 055     2128          CALL    CSV2            DO IT
055.120 076 000         2129          MVI     A,DC.REA
                        2130  *       JMP     CSV2            DO READ AND EXIT
```

```
                                2132  **      CSV2 - READ/WRITE PASS
                                2133  *
                                2134
                                2135
055.122  062 332 055           2136  CSV2    STA     CSVA            SET CODE
055.125  346 001               2137          ANI     1               (A) = 1 IFF WRITE
055.127  057                   2138          CMA
055.130  062 006 040           2139          STA     .DSPROT         SET ROTATING PERIODS IF WRITTING
055.133  041 012 000           2140          LXI     H,10
055.136  257                   2141          XRA     A
055.137  062 024 040           2142          STA     .ABUSS          CLEAR TRACK NUMBER
                                2143
                                2144  *       NEW TRACK
                                2145
055.142  021 024 040           2146  CSV3    LXI     D,.ABUSS
055.145  032                   2147          LDAX    D
055.146  074                   2148          INR     A
055.147  022                   2149          STAX    D               UPDATE DISPLAY
055.150  021 333 055           2150          LXI     D,CSVB          (DE) = POINTER TO SECTOR NUMBER
                                2151
                                2152  *       READ OR WRITE A SECTOR
                                2153
055.153  315 217 071           2154  CSV4    CALL    CEC             CLEAR ERROR COUNTS
055.156  032                   2155          LDAX    D
055.157  247                   2156          ANA     A
055.160  372 314 055           2157          JM      CSV10           NO MORE THIS TRACK
055.163  345                   2158          PUSH    H
055.164  325                   2159          PUSH    D
055.165  315 101 030           2160          CALL    $DATA           (HL) = SECTOR NUMBER TO READ/WRITE
055.170  021 070 106           2161          LXI     D,SECBUF
055.173  001 000 001           2162          LXI     B,256
055.176  072 332 055           2163          LDA     CSVA            (A) = COMMAND
055.201  345                   2164          PUSH    H               SAVE SECTOR NUMBER
055.202  315 105 072           2165          CALL    DDRV            DO IO                           *071080*
055.205  365                   2166          PUSH    PSW             SAVE CODE
                                2167
                                2168  *       PROPIGATE HARD AND SOFT ERROR COUNTS
                                2169
055.206  072 263 040           2170  CSV5    LDA     D.SECNT+1
055.211  247                   2171          ANA     A
055.212  312 220 055           2172          JZ      CSV6            LESS THAN 256 SOFT ERRORS
055.215  062 261 040           2173          STA     D.HECNT         TREAT AS HARD ERROR
                                2174
                                2175  *       SEE IF DATA IS OK
                                2176
055.220  016 000               2177  CSV6    MVI     C,0
055.222  021 070 106           2178          LXI     D,SECBUF
055.225  041 070 107           2179          LXI     H,SECBUF2
055.230  361                   2180          POP     PSW             (A) = RESPONSE FROM DDRV
055.231  332 252 055           2181          JC      CSV7            HARD ERROR
055.234  315 060 030           2182          CALL    $COMP
055.237  312 252 055           2183          JE      CSV7            IS OK
055.242  315 260 071           2184          CALL    IERR1           GOT PAST INTERNAL CHECKSUM
055.245  076 001               2185          MVI     A,1
055.247  062 261 040           2186          STA     D.HECNT         FLAG AS HARD ERROR
055.252  341                   2187  CSV7    POP     H               (HL) = SECTOR NUMBER
```

```
055.253  051          2188          DAD     H               (HL) = 2*SECTOR NUMBER
055.254  021 030 103  2189          LXI     D,SECERR-20
055.257  031          2190          DAD     D
055.260  072 261 040  2191          LDA     D.HECNT
055.263  206          2192          ADD     M               ADD HARD ERRORS
055.264  167          2193          MOV     M,A             REPLACE COUNT
055.265  322 272 055  2194          JNC     CSV8
055.270  066 001      2195          MVI     M,1             OVERFLOWED
055.272  043          2196  CSV8    INX     H
055.273  072 262 040  2197          LDA     D.SECNT
055.276  206          2198          ADD     M
055.277  167          2199          MOV     M,A             ADD SOFT ERROR COUNT
055.300  322 306 055  2200          JNC     CSV9
055.303  053          2201          DCX     H
055.304  066 001      2202          MVI     M,1             OVERFLOWED, TREAT AS HARD ERROR
055.306  321          2203  CSV9    POP     D               (DE) = SECTOR TABLE POINTER
055.307  341          2204          POP     H               (HL) = SECTOR NUMBER FOR THIS TRACK
055.310  023          2205          INX     D
055.311  303 153 055  2206          JMP     CSV4            DO ANOTHER
                      2207
                      2208  *       ALL DONE FOR THIS TRACK. TRY NEXT
                      2209
055.314  001 012 000  2210  CSV10   LXI     B,10
055.317  011          2211          DAD     B
055.320  021 220 001  2212          LXI     D,400
055.323  315 216 030  2213          CALL    $CDEHL
055.326  302 142 055  2214          JNE     CSV3            NOT DONE YET
055.331  311          2215          RET                     ALL DONE
                      2216
055.332  000          2217  CSVA    DB      0               READ/WRITE CODE
055.333  000 005 001  2218  CSVB    DB      0,5,1,6,2,7,3,8,4,9,200Q        SEQUENCE FOR SECTOR READ/WRITE
```

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                                2222  ***     SEEK - PERFORM SEEK TEST.
                                2223  *
                                2224  *       TRY SEEKING AT FASTER AND FASTER SPEEDS LOOKING FOR ERRORS
                                2225
                                2226
055.346                         2227  SEEK    EQU     *
                                2228
                                2229  *       READ DISK LABEL SECTOR.                                 /071080/
                                2230
055.346  315 076 065           2231          CALL    RL                                              /071080/
                                2232
055.351  315 136 031           2233          CALL    $TYPTX
055.354  123 145 145           2234          DB      'Seek Timing Test: see the manual before running this test.'
056.046  012 212               2235          DB      NL,ENL
056.050  315 136 031           2236          CALL    $TYPTX
056.053  012 012               2237          DB      NL,NL
056.055  011 052 052           2238          DB      TAB,'**********************************************************',NL
056.144  011 052 052           2239          DB      TAB,'**********************************************************',NL
056.233  011 052 052           2240          DB      TAB,'**                                                      **',NL
056.322  011 052 052           2241          DB      TAB,'**    Note:                                             **',NL
057.011  011 052 052           2242          DB      TAB,'**          The floppy disk drives are spec-    **',NL
057.100  011 052 052           2243          DB      TAB,'**      ified to step at 30 milliseconds  per  **',NL
057.167  011 052 052           2244          DB      TAB,'**      track by their manufacturer.            **',NL
057.256  011 052 052           2245          DB      TAB,'**                                              **',NL
057.345  011 052 052           2246          DB      TAB,'**          Occasionally, drives may step       **',NL
060.034  011 052 052           2247          DB      TAB,'**      faster,  and this test determines the   **',NL
060.123  011 052 052           2248          DB      TAB,'**      minimum step time for your particular   **',NL
060.212  011 052 052           2249          DB      TAB,'**      drive.  However, Heath does not guar-   **',NL
060.301  011 052 052           2250          DB      TAB,'**      antee that any drive will step faster   **',NL
060.370  011 052 052           2251          DB      TAB,'**      than 30 milliseconds per track.         **',NL
061.057  011 052 052           2252          DB      TAB,'**                                              **',NL
061.146  011 052 052           2253          DB      TAB,'**********************************************************',NL
061.235  011 052 052           2254          DB      TAB,'**********************************************************',NL
061.324  012 012 212           2255          DB      NL,NL,ENL
061.327  315 136 031           2256          CALL    $TYPTX
061.332  120 162 157           2257          DB      'Proceed (Yes/No)?',' '+2000
061.354  315 237 071           2258          CALL    CYR
061.357  302 356 042           2259          JNE     RESTART
061.362  041 032 063           2260          LXI     H,SEEKH                                         /071080/
061.365  315 171 074           2261          CALL    WRTL
                                2262
                                2263  *       REQEUEST STARTING STEP TIME.  DEFAULT IS 34 MIL. SEC.
                                2264
000.001                         2265          IF      1
                                2266  SEEK0   EQU     *
                                2267          CALL    $CCO
                                2268          CALL    $TYPTX
                                2269          DB      'Enter Starting Step Time (8-36) <36> ?',' '+80H
                                2270          MVI     A,3
                                2271          LXI     H,LINE
                                2272          CALL    $ETL
                                2273          JC      SEEK0
                                2274          MVI     L,36
                                2275          DCR     A
                                2276          JZ      SEEK0.5
                                2277          LXI     H,LINE
```

```
                        2278            CALL    $PDD
                        2279            JC      SEEK0
                        2280  SEEK0.5   EQU     *
                        2281            MOV     A,L
                        2282            CPI     8
                        2283            JC      SEEK0
                        2284            CPI     36+1
                        2285            JNC     SEEK0
                        2286            SUI     2
                        2287            ELSE
061.370  076 042       2288            MVI     A,34
                        2289            ENDIF
061.372  074           2290            INR     A
061.373  346 376       2291            ANI     0FEH
061.375  062 334 062   2292            STA     SEEKE                                   /071080/
                        2293
                        2294  *         TRY A NEW SPEED
                        2295
062.000  365           2296  SEEK1     PUSH    PSW             SAVE NEW SPEED
062.001  376 004       2297            CPI     4
062.003  312 110 062   2298            JE      SEEK3           DONT TRY THIS FAST
062.006  006 000       2299            MVI     B,0
062.010  247           2300            ANA     A               CLEAR CARRY
062.011  017           2301            RRC
062.012  062 115 040   2302            STA     D.MAIA          SET SEEK TIME
062.015  041 210 062   2303            LXI     H,SEEKB
062.020  207           2304            ADD     A               (A) = SEEK TIME
062.021  306 002       2305            ADI     2               TELL HIM SLOWER THAN WE REALLY TRIED
062.023  117           2306            MOV     C,A             (BC) = SPEED
062.024  076 002       2307            MVI     A,2
062.026  315 137 076   2308            CALL    $UDDN           SET SPEED IN MESSAGE
062.031  041 200 062   2309            LXI     H,SEEKA
062.034  315 127 074   2310            CALL    PMSG            TYPE/PRINT ATTEMPTING SPEED     *071080*
062.037  041 240 040   2311            LXI     H,D.IT
062.042  042 024 040   2312            SHLD    .ABUSS          SET DISPLAY FOR USER
062.045  315 217 071   2313            CALL    CEC             CLEAR ERROR COUNTS
062.050  315 067 071   2314            CALL    EAM             EXERCISE ARM MOVEMENTS
062.053  072 261 040   2315            LDA     D.HECNT
062.056  247           2316            ANA     A
062.057  302 110 062   2317            JNZ     SEEK3           ERRORS
062.062  052 262 040   2318            LHLD    D.SECNT
062.065  021 370 377   2319            LXI     D,-8
062.070  031           2320            DAD     D
062.071  332 110 062   2321            JC      SEEK3           TOO MANY SOFT ERRORS
                        2322
                        2323  *         GOT THROUGH THIS PASS OK, TRY ANOTHER
                        2324
062.074  315 150 074   2325            CALL    PMSG,                                   *071080*
062.077  117 153 241   2326            DB      'Ok',7+2000
062.102  361           2327            POP     PSW
062.103  326 002       2328            SUI     2
062.105  303 000 062   2329            JMP     SEEK1           TRY AGAIN
                        2330
                        2331  *         DIDNT MAKE IT THIS PASS, GIVE HIM THE FINAL RESULTS
                        2332
062.110                 2333  SEEK3     EQU     *                                       /071080/
```

```
062.110  072 334 062  2334           LDA     SEEKE
062.113  107          2335           MOV     B,A                                  /071080/
062.114  361          2336           POP     PSW             (A) = SPEED
062.115  270          2337           CMP     B                                    /071080/
062.116  312 152 062  2338           JZ      SEEK4           FAILED ON INITIAL PASS /071080/
062.121  306 004      2339           ADI     4
062.123  117          2340           MOV     C,A
062.124  006 000      2341           MVI     B,0
062.126  062 115 040  2342           STA     D.MAIA          SET SPEED
062.131  041 300 062  2343           LXI     H,SEEKD
062.134  076 002      2344           MVI     A,2             2 DIGIT RESULT
062.136  315 137 076  2345           CALL    $UDDN
062.141  041 244 062  2346           LXI     H,SEEKC
062.144  315 127 074  2347           CALL    PMSG            TYPE/PRINT RESULT    *071080*
062.147  303 356 042  2348           JMP     RESTART
                      2349
                      2350  *        FAILED ON INITIAL PASS.                      /071080/
                      2351
062.152               2352  SEEK4    EQU     *
062.152  306 002      2353           ADI     2
062.154  117          2354           MOV     C,A
062.155  006 000      2355           MVI     B,0
062.157  041 376 062  2356           LXI     H,SEEKG
062.162  076 002      2357           MVI     A,2             2 DIGIT RESULT
062.164  315 137 076  2358           CALL    $UDDN
062.167  041 335 062  2359           LXI     H,SEEKF
062.172  315 127 074  2360           CALL    PMSG            TYPE/PRINT FAIL MSG
062.175  303 356 042  2361           JMP     RESTART                              /071080/
                      2362
062.200  012 124 162  2363  SEEKA    DB      NL,'Trying '
062.210  116 116 040  2364  SEEKB    DB      'NN milliseconds per track -',' '+200Q
062.244  012 104 162  2365  SEEKC    DB      NL,'Drive performs reliably at '
062.300  116 116 040  2366  SEEKD    DB      'NN milliseconds per track.',NL,80H
062.334               2367  SEEKE    DS      1               SAVE INITIAL STEP RATE /071080/
062.335  012 104 162  2368  SEEKF    DB      NL,'Drive failed on initial pass at '
062.376  116 116 040  2369  SEEKG    DB      'NN milliseconds per track.',NL,80H
063.032               2370  SEEKH    DS      0
063.032  012 123 145  2371           DB      NL,'Seek Test for Unit '
063.056               2372  SEEKH1   DS      1
063.057  012 200      2373           DB      NL,80H                               /071080/
```

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                                2377  **      DUN - DETERMINE UNIT NUMBER.
                                2378  *
                                2379  *       DUN DISCOVERS THE UNIT NUMBER TO DIAGNOSE, AFTER SUITABLE
                                2380  *       REDUNDANT WARNINGS.
                                2381  *
                                2382  *       ENTRY   NONE
                                2383  *       EXIT    TO CALLER WITH UNIT = NUMBER IF OK
                                2384  *               TO SYSTEM IF USER CHICKENS OUT
                                2385  *       USES    ALL
                                2386
                                2387
063.061 315 136 031             2388  DUN     CALL    $TYPTX
063.064 012 011 011             2389          DB      NL,TAB,TAB,TAB,'    ','TEST17'
063.102 012 011 011             2390          DB      NL,TAB,TAB,TAB,'Version:  ',VERS/16+'0',',',VERS&0FH+'0'
063.123 012 011 011             2391          DB      NL,TAB,TAB,'      ','Issue  #50.06.00',ENL      *071080*
                                2392
                                2393  *       WARN HIM ABOUT THE FACTS OF LIFE
                                2394
063.155 315 136 031             2395  DUN1    CALL    $TYPTX
063.160 007 012 011             2396          DB      BELL,NL,TAB,'This program tests your disk system.  Certain'
063.241 040 164 145             2397          DB      ' tests'
063.247 012 144 145             2398          DB      NL,'destroy the '
063.264 144 141 164             2399          DB      'data on the volume under test.  This volume must'
063.344 012 150 141             2400          DB      NL,'have been '
063.357 151 156 151             2401          DB      'initialized at least once, and may have to be'
064.041 012 162 145             2402          DB      NL,'reinitialized'
064.057 040 142 145             2403          DB      ' before being used for anything else.',ENL
064.125 315 331 075             2404          CALL    $CCO
064.130 315 136 031             2405          CALL    $TYPTX
064.133 012 120 162             2406          DB      NL,'Proceed (Yes/No)? ',7,' '+200Q
064.156 315 237 071             2407          CALL    CYR             CHECK FOR YES REPLY
064.161 302 346 044             2408          JNE     EXIT            TRY AGAIN
                                2409
                                2410  *       HE'S BEEN WARNED.  FIND OUT WHICH UNIT HE WANTS
                                2411
064.164 315 331 075             2412  DUN2    CALL    $CCO
064.167 315 136 031             2413          CALL    $TYPTX
064.172 012 127 150             2414          DB      NL,'Which Drive (0/1/2)? ',7,' '+200Q
064.221 041 014 103             2415          LXI     H,LINE
064.224 315 037 076             2416          CALL    $RTL
064.227 176                     2417          MOV     A,M
064.230 326 060                 2418          SUI     '0'
064.232 332 164 064             2419          JC      DUN2
064.235 376 003                 2420          CPI     3
064.237 322 164 064             2421          JNC     DUN2
064.242 062 336 101             2422          STA     UNIT
064.245 306 060                 2423          ADI     '0'             PLACE UNIT # IN MESSAGE         /071080/
064.247 062 044 053             2424          STA     TIMER1
064.252 062 116 054             2425          STA     DRIVEA1
064.255 062 012 055             2426          STA     MEDIAB1
064.260 062 056 063             2427          STA     SEEKH1
064.263 257                     2428          XRA     A
064.264 062 013 102             2429          STA     INTDSK          FLAG INITIALIZED DISK NOT MOUNTED
064.267 311                     2430          RET                                             /071080/
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                        2433  **      RID - REQUIRE INITIALIZED DISK TO BE MOUNTED.
                        2434  *
                        2435
        064.270         2436  RID     EQU     *
        064.270 072 013 102 2437          LDA     INTDSK
        064.273 247         2438          ANA     A
        064.274 300         2439          RNZ                     INITIALIZED DISK ALREADY MOUNTED
                        2440
                        2441  *       ASK USER TO MOUNT INITIALIZED DISK.
                        2442
        064.275 315 331 075 2443          CALL    $CCO
        064.300 315 136 031 2444          CALL    $TYPTX
        064.303 012 111 156 2445          DB      NL,'Insert the Diskette you wish to use for this test'
        064.365 012 151 156 2446          DB      NL,'into drive',' '+200Q
        065.001 072 336 101 2447          LDA     UNIT
        065.004 306 060     2448          ADI     '0'
        065.006 315 134 076 2449          CALL    $WCHAR
        065.011 315 136 031 2450          CALL    $TYPTX
        065.014 072 054 040 2451          DB      '1','; and hit RETURN.'
        065.036 012 040 122 2452          DB      NL,' Ready','?'+200Q
        065.046             2453  WARN2.5 EQU     *
        065.046 315 126 076 2454          CALL    $RCHAR
        065.051 376 012     2455          CPI     NL
        065.053 302 046 065 2456          JNZ     WARN2.5
        065.056 076 001     2457          MVI     A,1
        065.060 062 013 102 2458          STA     INTDSK  SHOW USER SAYS INITIALIZED DISK IS MOUNTED
                        2459
                        2460  *       MOUNT DISK.
                        2461
        065.063 257         2462          XRA     A
        065.064 062 012 102 2463          STA     TRKFLG                  INIT MY FLAG
        065.067 056 000     2464          MVI     L,0
        065.071 076 010     2465          MVI     A,DC.MOU
        065.073 303 105 072 2466          JMP     DDRV                    MOUNT DISK AND RETURN   /071080/
```

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                                2469  **      RL/ZL - READ AND ZAP LABEL SECTOR.
                                2470  *
                                2471  *       RL READS THE DEVICE'S LABEL SECTOR.
                                2472  *       ZL WRITES A SPECIAL 'DESTROYED BY 'DIAG'' LABEL.
                                2473  *         THIS LABEL HAS A ZERO BYTE AS IT'S FIRST CHARACTER,
                                2474  *         SO THAT THE BOOT AND MOUNT ROUTINES WILL KNOW
                                2475  *         ITS A BADDIE.
                                2476  *
                                2477  *       ENTRY   UNIT = UNIT NUMBER
                                2478  *       EXIT    NONE
                                2479  *       USES    ALL
                                2480
                                2481
065.076                         2482  RL      EQU     *
065.076  315 270 064            2483          CALL    RID             REQUIRES INITIALIZED DISK MOUNTED
065.101  076 000                2484          MVI     A,DC.REA
065.103  001 000 001            2485          LXI     B,256
065.106  021 014 102            2486          LXI     D,LABEL
065.111  041 011 000            2487          LXI     H,DDF.LAB
065.114  315 105 072            2488          CALL    DDRV            READ LABEL SECTOR
065.117  320                    2489          RNC
                                2490
                                2491  *       CAN'T EVEN READ DISK LABEL.  GOT SERIOUS PROBLEMS.
                                2492
065.120  315 136 031            2493          CALL    $TYPTX
065.123  007 012 125            2494          DB      BELL,NL,'Unable To Read This Disk At All.'
065.165  012 122 145            2495          DB      NL,'Remember That The Disks Must Be Initialized '
065.242  102 171 040            2496          DB      'By The 'INIT'',NL
065.260  120 162 157            2497          DB      'Program Before They Can Be Used By This '
065.330  104 151 141            2498          DB      'Diagnostic.',ENL
065.344  257                    2499          XRA     A
065.345  062 013 102            2500          STA     INTDSK          SAY NO INITIALIZED DISK MOUNTED
065.350  303 356 042            2501          JMP     RESTART
                                2502
065.353                         2503  ZL      EQU     *
065.353  076 040                2504          MVI     A,' '
065.355  001 074 000            2505          LXI     B,LAB.LBL
065.360  041 035 102            2506          LXI     H,LABEL+LAB.LAB
065.363  315 341 073            2507          CALL    FILL
065.366  315 354 075            2508          CALL    $MOVEL
065.371  037 000 075            2509          DW      RZLAL,RZLA,LABEL+LAB.LAB        MOVE IN NEW LABEL
065.377  076 002                2510          MVI     A,LAB.NOD
066.001  062 024 102            2511          STA     LABEL+LAB.VLT   SET NO DIRECTORY ON THIS VOLUME
066.004  076 001                2512          MVI     A,DC.WRI
066.006  001 000 001            2513          LXI     B,256
066.011  021 014 102            2514          LXI     D,LABEL
066.014  041 011 000            2515          LXI     H,DDF.LAB                                       /071080/
066.017  315 105 072            2516          CALL    DDRV            WRITE IT                        /101080/
066.022  320                    2517          RNC
                                2518
066.023  315 136 031            2519          CALL    $TYPTX
066.026  007 012 125            2520          DB      BELL,NL,'Unable To Write On This Disk.',ENL
066.066  257                    2521          XRA     A
066.067  062 013 102            2522          STA     INTDSK          SAY NO INITIALIZED DISK MOUNTED
066.072  303 356 042            2523          JMP     RESTART                                         /101080/
                                2524
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```
066.075  124 150 151  2525  RZLA    DB      'This disk was erased by 'TEST'',0
000.037                2526  RZLAL   EQU     *-RZLA
```

```
                                2530  **      CCP - CHECK FOR CONSTANT PATTERN.
                                2531  *
                                2532  *       CCP CHECKS FOR A CONSTANT TWO/-BYTE PATTERN OVER THE
                                2533  *       ENTIRE CODED DISK SURFACE.
                                2534  *
                                2535  *       FOR EACH TRACK, CCP READS THE SECTOR PAIRS
                                2536  *
                                2537  *       0,1
                                2538  *       4,5
                                2539  *       8,9
                                2540  *       2,3
                                2541  *       6,7
                                2542  *
                                2543  *       IN THAT ORDER, TO MINIMIZE MISSED REVS
                                2544  *
                                2545  *       ENTRY   (G) = 1ST BYTE IN PAIR
                                2546  *               (L) = 2ND BYTE IN PAIR
                                2547  *       EXIT    NONE
                                2548  *       USES    ALL
                                2549
                                2550
066.134 353                     2551  CCP     XCHG                    (DE) = PATTERN
066.135 041 320 066             2552          LXI     H,CCPC
066.140 042 316 066             2553          SHLD    CCPB            INITIALIZE SECTOR NUMBER
066.143 041 012 000             2554          LXI     H,10            (H) = SECTOR NUMBER
                                2555
066.146 345                     2556  CCP1    PUSH    H               SAVE SECTOR NUMBER
066.147 325                     2557          PUSH    D               SAVE PATTERN
066.150 353                     2558          XCHG                    (DE) = TRACK NUMBER*10
066.151 052 316 066             2559          LHLD    CCPB            (HL) = ADDRESS OF SECTOR NUMBER
066.154 156                     2560          MOV     L,M
066.155 046 000                 2561          MVI     H,0
066.157 031                     2562          DAD     D               (HL) = SECTOR ADDRESS
066.160 042 326 066             2563          SHLD    CCPA            SET NUMBER
066.163 001 000 002             2564  CCP1.5  LXI     B,512
066.166 021 054 103             2565          LXI     D,BUFF
066.171 052 326 066             2566          LHLD    CCPA
066.174 076 000                 2567          MVI     A,DC.REA
066.176 315 062 072             2568          CALL    DDRV.           READ DISK               *071080*
                                2569
                                2570  *       CHECK FOR PATTERN
                                2571
066.201 321                     2572          POP     D               (DE) = PATTERN
066.202 332 232 066             2573          JC      CCP2.5          DONT CHECK IF HARD ERROR
066.205 041 054 103             2574          LXI     H,BUFF
066.210 006 000                 2575          MVI     B,0             512 BYTES TO CHECK
066.212 172                     2576  CCP2    MOV     A,D
066.213 276                     2577          CMP     M
066.214 302 274 066             2578          JNE     CCPERR
066.217 043                     2579          INX     H
066.220 173                     2580          MOV     A,E
066.221 276                     2581          CMP     M
066.222 302 274 066             2582          JNE     CCPERR
066.225 043                     2583          INX     H
066.226 005                     2584          DCR     B
066.227 302 212 066             2585          JNZ     CCP2
```

```
                          2586
                          2587  *       ALL OK. ADVANCE SECTOR NUMBER
                          2588
066.232  052 316 066      2589  CCP2.5  LHLD    CCPB
066.235  043              2590          INX     H
066.236  176              2591          MOV     A,M
066.237  247              2592          ANA     A
066.240  362 263 066      2593          JP      CCP3            NOT TIME FOR NEW TRACK
                          2594
                          2595  *       DONE WITH THIS TRACK, ADVANCE TRACK NUMBER
                          2596
066.243  001 012 000      2597          LXI     B,10
066.246  341              2598          POP     H               (HL) = TRACK*10
066.247  011              2599          DAD     B               (HL) = NEW TRACK NUMBER
066.250  345              2600          PUSH    H               REPLACE
066.251  001 160 376      2601          LXI     B,-400
066.254  011              2602          DAD     B
066.255  332 272 066      2603          JC      CCP4            ALL DONE
066.260  041 320 066      2604          LXI     H,CCPC
066.263  042 316 066      2605  CCP3    SHLD    CCPB            SET NEW SECTOR INDEX
066.266  341              2606          POP     H               (HL) = TRACK NUMBNER*10
066.267  303 146 066      2607          JMP     CCP1
                          2608
                          2609  *       ALL DONE
                          2610
066.272  341              2611  CCP4    POP     H               DISCARD TRACK NUMBER
066.273  311              2612          RET
                          2613
                          2614
                          2615  **      DATA ERROR UNDETECTED BY CHECKSUM
                          2616
066.274  315 260 071      2617  CCPERR  CALL    IERR1           COUNT IT
066.277  041 261 040      2618          LXI     H,D.HECNT
066.302  176              2619          MOV     A,M
066.303  306 001          2620          ADI     1
066.305  322 312 066      2621          JNC     CCPERR1         IF NOT >256
066.310  076 200          2622          MVI     A,128           WE'LL JUST USE 128, ITS BAD ENOUGH!
066.312  167              2623  CCPERR1 MOV     M,A             ADVANCE HARD COUNT
066.313  303 232 066      2624          JMP     CCP2.5          TRY AGAIN
                          2625
                          2626
066.316  320 066          2627  CCPB    DW      CCPC            SECTOR NUMBER INDEX
066.320  000 006 002      2628  CCPC    DB      0,6,2,8,4
066.325  377              2629          DB      -1              END OF LIST FLAG
                          2630
066.326  000 000          2631  CCPA    DW      0               SECTOR NUMBER
```

```
                                2634  **      WCP - WRITE CONSTANT PATTERN.
                                2635  *
                                2636  *       WCP WRITES A CONSTANT ONE BYTE PATTERN TO THE DISK.
                                2637  *
                                2638  *       ENTRY   (A) = BYTE
                                2639  *       EXIT    NONE
                                2640  *       USES    ALL
                                2641
                                2642
066,330  041 054 103            2643  WCP     LXI     H,BUFF
066,333  021 000 012            2644          LXI     D,10*256
066,336  167                    2645  WCP1    MOV     M,A
066,337  043                    2646          INX     H
066,340  033                    2647          DCX     D
066,341  107                    2648          MOV     B,A
066,342  172                    2649          MOV     A,D
066,343  263                    2650          ORA     E
066,344  170                    2651          MOV     A,B             RESTORE A
066,345  302 336 066            2652          JNZ     WCP1            MORE TO GO
                                2653
                                2654  *       WRITE A TRACK AT A TIME
                                2655
066,350  041 012 000            2656          LXI     H,10            (HL) = TRACK POINTER
066,353  345                    2657  WCP2    PUSH    H
066,354  001 000 012            2658          LXI     B,10*256
066,357  021 054 103            2659          LXI     D,BUFF
066,362  076 001                2660          MVI     A,DC.WR1
066,364  315 062 072            2661          CALL    DDRV,           WRITE DISK              *071080*
066,367  341                    2662          POP     H               (HL) = SECTOR #
066,370  021 012 000            2663          LXI     D,10
066,373  031                    2664          DAD     D               (HL) = NEW ADDRESS
066,374  353                    2665          XCHG
066,375  041 160 376            2666          LXI     H,-400
067,000  031                    2667          DAD     D
067,001  353                    2668          XCHG
067,002  322 353 066            2669          JNC     WCP2            IF MORE TO GO
067,005  311                    2670          RET
```

```
                                2674  **      RRT - RANDOM READ/WRITE TEST
                                2675  *
                                2676  *       RRT RANDOLY SELECTS A SECTOR, AND READS OR
                                2677  *       WRITES IT.
                                2678  *
                                2679  *       EVERY 8 TRYS, RRT PAUSES TO ALLOW THE HEAD TO UNLOAD.
                                2680  *
                                2681  *       RRT KEEPS TRACK OF THOSE WHICH HAVE BEEN WRITTEN.
                                2682  *       A SECTOR HAS EITHER BEEN WRITTEN WITH A MODIFIED BIT PATTERN,
                                2683  *       OR A REGULAR BIT PATTERN.
                                2684
                                2685
067.006  041 163 067           2686  RRT     LXI     H,RRTA
067.011  021 220 001           2687          LXI     D,RRTAL
067.014  066 000               2688  RRT0    MVI     M,0
067.016  043                   2689          INX     H
067.017  033                   2690          DCX     D
067.020  172                   2691          MOV     A,D
067.021  263                   2692          ORA     E
067.022  302 014 067           2693          JNZ     RRT0            ZERO TAG TABLE
067.025  041 350 003           2694          LXI     H,1000          TRY 1000 OF EM
067.030  042 003 071           2695          SHLD    RRTB
                                2696
067.033  315 212 076           2697  RRT00   CALL    $RND            GET RANDOM NUMBER
067.036  174                   2698          MOV     A,H
067.037  247                   2699          ANA     A               CLEAR CARRY
067.040  037                   2700          RAR
067.041  147                   2701          MOV     H,A
067.042  175                   2702          MOV     A,L
067.043  037                   2703          RAR
067.044  157                   2704          MOV     L,A
067.045  365                   2705          PUSH    PSW             SAVE R/W FLAG
067.046  021 160 376           2706          LXI     D,-400
067.051  031                   2707  RRT1    DAD     D               GET SECTOR MODULO 400
067.052  332 051 067           2708          JC      RRT1
067.055  021 220 001           2709          LXI     D,400
067.060  031                   2710          DAD     D
                                2711
                                2712  *       SEE IF IN FIRST TRACK
                                2713
067.061  174                   2714          MOV     A,H
067.062  267                   2715          ORA     A
067.063  302 100 067           2716          JNZ     RRT1.3          NOT
067.066  076 011               2717          MVI     A,9
067.070  275                   2718          CMP     L
067.071  332 100 067           2719          JC      RRT1.3
067.074  361                   2720          POP     PSW
067.075  303 033 067           2721          JMP     RRT00           RE-TRY
                                2722
067.100  361                   2723  RRT1.3  POP     PSW             'C' SET IF WRITE
067.101  315 131 067           2724          CALL    RRT1.5
067.104  052 003 071           2725          LHLD    RRTB
067.107  053                   2726          DCX     H
067.110  042 003 071           2727          SHLD    RRTB
067.113  175                   2728          MOV     A,L
067.114  346 003               2729          ANI     3
```

```
067.116  076 113      2730          MVI     A,150/2         150 MS
067.120  314 053 000  2731          CZ      .DLY            WAIT IF TIMEE
067.123  174         2732          MOV     A,H
067.124  265         2733          ORA     L
067.125  302 033 067  2734          JNZ     RRT00           TRY AGAIN
067.130  311         2735          RET
                     2736
067.131  322 151 067  2737  RRT1.5  JNC     RRT2            IS READ
                     2738
                     2739  *       IS WRITE
                     2740
067.134  076 001      2741          MVI     A,1
067.136  315 233 072  2742          CALL    WLP             WRITE LABEL PATTERN
067.141  353         2743          XCHG
067.142  041 163 067  2744          LXI     H,RRTA
067.145  031         2745          DAD     D               (HL) = FLAG BYTE
067.146  066 001      2746          MVI     M,1             FLAG WRITTEN
067.150  311         2747          RET
                     2748
                     2749  *       IS READ
                     2750
067.151  353         2751  RRT2    XCHG
067.152  041 163 067  2752          LXI     H,RRTA
067.155  031         2753          DAD     D
067.156  176         2754          MOV     A,M             (A) = 0 IF UNMODDED, 1 IF MODDED
067.157  353         2755          XCHG
067.160  303 365 071  2756          JMP     RLP             READ LABEL PATTERN
                     2757
067.163  000 000 000  2758  RRTA    DW      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
067.233  000 000 000  2759          DW      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
067.303  000 000 000  2760          DW      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
067.353  000 000 000  2761          DW      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
070.023  000 000 000  2762          DW      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
070.073  000 000 000  2763          DW      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
070.143  000 000 000  2764          DW      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
070.213  000 000 000  2765          DW      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
070.263  000 000 000  2766          DW      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
070.333  000 000 000  2767          DW      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
001.220              2768  RRTAL   EQU     *-RRTA          LENGTH
071.003  000 000     2769  RRTB    DW      0               ITTERATION COUNT
```

```
                                2773  **      WIP - WRITE ID PATTERN.
                                2774  *
                                2775  *       WIP WRITES THE FIXED ID PATTERN TO ALL SECTORS
                                2776  *
                                2777  *       TO MINIMIZE LOST REVS, WIP WRITES EVERY FORTH SECTOR IN ONE
                                2778  *       PASS. AFTER 4 PASSES, ALL ARE WRITTEN.
                                2779  *
                                2780  *       ENTRY   NONE
                                2781  *       EXIT    NONE
                                2782  *       USES    ALL
                                2783
                                2784
071.005  041 012 000           2785  WIP     LXI     H,10            (HL) = SECTOR NUMBER
071.010  345                   2786          PUSH    H               SAVE SECTOR NUMBER
071.011  257                   2787  WIP1    XRA     A               TYPE 0
071.012  315 233 072           2788          CALL    WLP             WRITE LABEL PATTERN
071.015  043                   2789          INX     H
071.016  043                   2790          INX     H
071.017  043                   2791          INX     H
071.020  043                   2792          INX     H
071.021  021 160 376           2793          LXI     D,-400
071.024  353                   2794          XCHG
071.025  031                   2795          DAD     D
071.026  353                   2796          XCHG
071.027  322 011 071           2797          JNC     WIP1            MORE TO GO
071.032  341                   2798          POP     H               (HL) = PREVIOUS STARTING NUMBER
071.033  043                   2799          INX     H
071.034  076 016               2800          MVI     A,14
071.036  275                   2801          CMP     L
071.037  310                   2802          RE                      ALL DONE
071.040  345                   2803          PUSH    H               SAVE NEW STARTING NUMBER
071.041  303 011 071           2804          JMP     WIP1
071.044  311                   2805          RET
```

```
                                2809  **      CIP - READ ID PATTERN.
                                2810  *
                                2811  *       CIP READS THE FIXED ID PATTERN TO ALL SECTORS
                                2812  *
                                2813  *       TO MINIMIZE LOST REVS, CIP READS EVERY FORTH SECTOR IN ONE
                                2814  *       PASS.  AFTER 4 PASSES, ALL ARE READ.
                                2815  *
                                2816  *       ENTRY   NONE
                                2817  *       EXIT    NONE
                                2818  *       USES    ALL
                                2819
                                2820
071.045  041 012 000           2821  CIP     LXI     H,10            (HL) = SECTOR NUMBER
071.050  257                   2822  CIP1    XRA     A               TYPE 0
071.051  315 365 071           2823          CALL    RLP             READ LABEL PATTERN
071.054  043                   2824          INX     H
071.055  021 160 376           2825          LXI     D,-400
071.060  353                   2826          XCHG
071.061  031                   2827          DAD     D
071.062  353                   2828          XCHG
071.063  322 050 071           2829          JNC     CIP1            MORE TO GO
071.066  311                   2830          RET
```

```
                                2834  **      EAM - EXERCISE ARM MOVEMENTS.
                                2835  *
                                2836  *       EAM PERFORMS ARM EXERCISING BY MOVING THE ARM BETWEEN
                                2837  *       TWO TARGET SECTORS, A AND B. A MOVES FROM 0 TO
                                2838  *       398, B MOVES FROM 398 TO 0.
                                2839  *
                                2840  *       ENTRY   NONE
                                2841  *       EXIT    NONE
                                2842  *       USES    ALL
                                2843
                                2844
071.067  041 012 000           2845  EAM     LXI     H,10
071.072  042 213 071           2846          SHLD    EAMA            SET A
071.075  041 216 001           2847          LXI     H,398
071.100  042 215 071           2848          SHLD    EAMB
                                2849
                                2850  *       READ A
                                2851
071.103  052 213 071           2852  EAM1    LHLD    EAMA
071.106  001 000 001           2853          LXI     B,256
071.111  021 054 103           2854          LXI     D,BUFF
071.114  076 000               2855          MVI     A,DC.REA
071.116  315 062 072           2856          CALL    DDRV.                                   *071080*
071.121  330                   2857          RC                      ERROR
071.122  072 263 040           2858          LDA     D.SECNT+1
071.125  247                   2859          ANA     A
071.126  300                   2860          RNZ                     TOO MANY SOFT ERRORS
071.127  052 215 071           2861          LHLD    EAMB
071.132  001 000 001           2862          LXI     B,256
071.135  021 054 103           2863          LXI     D,BUFF
071.140  076 000               2864          MVI     A,DC.REA
071.142  315 062 072           2865          CALL    DDRV.                                   *071080*
071.145  330                   2866          RC                      ERROR
071.146  072 263 040           2867          LDA     D.SECNT+1
071.151  247                   2868          ANA     A
071.152  300                   2869          RNZ                     TOO MANY SOFT ERRORS
                                2870
                                2871  *       ADVANCE SECTORS
                                2872
071.153  052 213 071           2873          LHLD    EAMA
071.156  001 012 000           2874          LXI     B,10
071.161  011                   2875          DAD     B
071.162  042 213 071           2876          SHLD    EAMA
071.165  052 215 071           2877          LHLD    EAMB
071.170  001 366 377           2878          LXI     B,-10
071.173  011                   2879          DAD     B
071.174  042 215 071           2880          SHLD    EAMB
071.177  174                   2881          MOV     A,H
071.200  267                   2882          ORA     A
071.201  302 103 071           2883          JNZ     EAM1            MORE TO GO
071.204  076 012               2884          MVI     A,10
071.206  275                   2885          CMP     L
071.207  332 103 071           2886          JC      EAM1            NOT AT END
071.212  311                   2887          RET
                                2888
                                2889
```

```
071.213  000 000      2890  EAMA    DW      0
071,215  000 000      2891  EAMB    DW      0
```

```
                                2895  **      CEC - CLEAR ERROR COUNT.
                                2896  *
                                2897  *       CEC CLEARS THE DRIVER HARD AND SOFT ERROR COUNTS.
                                2898  *
                                2899  *       ENTRY   NONE
                                2900  *       EXIT    NONE
                                2901  *       USES    NONE
                                2902
                                2903
071.217  315 054 031           2904  CEC     CALL    $SAVALL         SAVE REGS
071.222  257                    2905          XRA     A
071.223  062 261 040           2906          STA     D.HECNT         CLEAR HARD ERRORS
071.226  041 000 000           2907          LXI     H,0
071.231  042 262 040           2908          SHLD    D.SECNT         CLEAR SOFT ERRORS
071.234  303 047 031           2909          JMP     $RSTALL         RESTORE AND EXIT


                                2911  **      CYR - CHECK FOR YES REPLY.
                                2912  *
                                2913  *       CYR READS A LINE FROM THE CONSOLE, AND CHECKS TO SEE IF IT
                                2914  *       STARTED WITH THE CHARACTERS 'YES'
                                2915  *
                                2916  *       ENTRY   NONE
                                2917  *       EXIT    'Z' SET IF YES
                                2918  *               'Z' CLEAR IF NOT
                                2919  *       USES    ALL
                                2920
                                2921
071.237  041 014 103           2922  CYR     LXI     H,LINE
071.242  315 030 076           2923          CALL    $RTL.           READ LINE
071.245  021 255 071           2924          LXI     D,CYRA
071.250  016 003               2925          MVI     C,3
071.252  303 060 030           2926          JMP     $COMP           COMPARE AND EXIT
                                2927
071.255  131 105 123           2928  CYRA    DB      'YES'


                                2930  **      IERR - INTERNAL ERROR
                                2931  *
                                2932  *       DATA ERROR GOT PAST CHECKSUM
                                2933
                                2934
071.260  315 054 031           2935  IERR1   CALL    $SAVALL
000.001                         2936          IF      .DEBUG.         PRINT MESSAGE IF DEBUGGING
                                2937          CALL    $TYPTX
                                2938          DB      NL,'INTERNAL ERROR #1. CONTACT TECHNICAL CORRESPONDENCE'
                                2939          DB      NL,'FOR ASSISTANCE.',ENL
                                2940          ENDIF
071.263  303 047 031           2941          JMP     $RSTALL
```

```
                                2943  **      PSE - PRINT SIGNIFICANT ERRORS.
                                2944  *
                                2945  *       PSE PRINTS AN ERROR COUNT IFF A SIGNIFICANT NUMBER OF
                                2946  *       ERRORS HAS OCCURED.
                                2947  *
                                2948  *       IF ANY HARD ERRORS, OR MORE THAN 16 SOFT ERRORS HAVE OCCURRED,
                                2949  *       PSE PRINTS A MESSAGE OF THE FORM
                                2950  *
                                2951  *       ' HHH/SSS '
                                2952  *
                                2953  *       WHERE HHH = DECIMAL HARD ERROR COUNT, AND
                                2954  *              SSS = DECIMAL SOFT ERROR COUNT
                                2955  *
                                2956  *       IN ALL CASES, THE ERROR COUNT IS ZEROED WHEN PSE EXITS.
                                2957  *
                                2958  *       ENTRY   NONE
                                2959  *       EXIT    NONE
                                2960  *       USES    ALL
                                2961
                                2962
071.266  072 261 040           2963  PSE     LDA     D.HECNT
071.271  247                   2964          ANA     A
071.272  302 310 071           2965          JNZ     PSE1            MUST PRINT COUNTS
071.275  052 262 040           2966          LHLD    D.SECNT
071.300  353                   2967          XCHG                    (DE) = COUNT
071.301  041 370 377           2968          LXI     H,-8
071.304  031                   2969          DAD     D
071.305  322 217 071           2970          JNC     CEC             NOT MANY SOFT ERRORS, CLEAR COUNTS AND EXIT
                                2971
                                2972  *       HE LOOSES, PRINT AN ERROR COUNT
                                2973
071.310  072 261 040           2974  PSE1    LDA     D.HECNT
071.313  117                   2975          MOV     C,A
071.314  006 000               2976          MVI     B,0
071.316  041 355 071           2977          LXI     H,PSEB
071.321  076 003               2978          MVI     A,3
071.323  315 137 076           2979          CALL    $UDDN           UNPACK HARD COUNT
071.326  052 262 040           2980          LHLD    D.SECNT
071.331  104                   2981          MOV     B,H
071.332  115                   2982          MOV     C,L
071.333  076 003               2983          MVI     A,3
071.335  041 361 071           2984          LXI     H,PSEC
071.340  315 137 076           2985          CALL    $UDDN           UNPACK HARD COUNT
071.343  041 354 071           2986          LXI     H,PSEA
071.346  315 127 074           2987          CALL    PMSG            TYPE/PRINT MESSAGE              *071080*
071.351  303 217 071           2988          JMP     CEC             CLEAR ERROR COUNT AND EXIT
                                2989
071.354  040                   2990  PSEA    DB      ' '             ERROR MESSAGE
071.355  110 110 110           2991  PSEB    DB      'HHH/'          HARD COUNT
071.361  123 123 123           2992  PSEC    DB      'SSS',' '+200Q  SOFT COUNT
```

```
                                2994  **      RLP - READ LABEL PATTERN
                                2995  *
                                2996  *       RLP READS A SECTOR, AND CHECKS THE LABEL PATTERN AND THE
                                2997  *       TYPE PATTERN
                                2998  *
                                2999  *       ENTRY   (A) = TYPE
                                3000  *               (HL) = BLOCK NUMBER
                                3001  *       EXIT    NONE
                                3002  *       USES    A,F,B,C,D,E
                                3003
                                3004
071.365  042 260 072            3005  RLP     SHLD    WLPB
071.370  062 262 072            3006          STA     WLPC
071.373  076 000                3007  RLP0    MVI     A,DC.REA
071.375  001 000 001            3008          LXI     B,256
072.000  021 054 103            3009          LXI     D,BUFF
072.003  315 062 072            3010          CALL    DDRV.                           *071080*
072.006  332 034 072            3011          JC      RLP2            HARD ERROR, DONT CHECK
072.011  041 054 103            3012          LXI     H,BUFF
072.014  021 260 072            3013          LXI     D,WLPB
072.017  006 000                3014          MVI     B,0             (B) = COUNT
072.021  032                    3015  RLP1    LDAX    D
072.022  276                    3016          CMP     M
072.023  302 040 072            3017          JNE     RLPERR
072.026  043                    3018          INX     H
072.027  023                    3019          INX     D
072.030  005                    3020          DCR     B
072.031  302 021 072            3021          JNZ     RLP1
072.034  052 260 072            3022  RLP2    LHLD    WLPB
072.037  311                    3023          RET                     ALL OK
                                3024
072.040  315 260 071            3025  RLPERR  CALL    IERR1           COUNT IT
072.043  041 261 040            3026          LXI     H,D.HECNT
072.046  176                    3027          MOV     A,M
072.047  306 001                3028          ADI     1
072.051  322 056 072            3029          JNC     RLPERR1         IF NOT >256
072.054  076 200                3030          MVI     A,128           WE'LL JUST USE 128, IT'S BAD ENOUGH!
072.056  167                    3031  RLPERR1 MOV     M,A             ADVANCE HARD COUNT
072.057  303 034 072            3032          JMP     RLP2
                                3033


                                3035  **      DDRV. - USE DEVICE DRIVER AND FLAG HARD ERRORS.
                                3036
072.062                         3037  DDRV.   EQU     *
072.062  315 105 072            3038          CALL    DDRV
072.065  320                    3039          RNC                     ALL OK
072.066  365                    3040          PUSH    PSW             SAVE CODE
072.067  072 261 040            3041          LDA     D.HECNT
072.072  247                    3042          ANA     A
072.073  302 103 072            3043          JNZ     DDRV1.          DID FLAG HARD ERROR
072.076  076 002                3044          MVI     A,2
072.100  062 261 040            3045          STA     D.HECNT         THIS IS A HARD ERROR
072.103  361                    3046  DDRV1.  POP     PSW             RESTORE CODE
```

```
072.104  311            3047           RET


                        3049  **       DDRV - DEVICE DRIVER.
                        3050  *
                        3051  *        USE DEVICE DRIVER IN H17 ROM.
                        3052  *
                        3053  *        IF OPERATION IS READ OR WRITE, THEN MOUNT UNIT
                        3054  *        IF NECESSARY SO CORRECT VOLUME # (0 FOR TRACK 0,
                        3055  *        X FOR OTHERS) IS IN DRIVER SLOTS.
                        3056  *
                        3057
072.105                 3058  DDRV     EQU     *
072.105  376 000       3059           CPI     DC.REA
072.107  312 117 072   3060           JZ      DDRV1           READ OPERATION
072.112  376 001       3061           CPI     DC.WRI
072.114  302 202 072   3062           JNZ     DDRV5           NOT A WRITE OPERATION
072.117                 3063  DDRV1    EQU     *
072.117  365            3064           PUSH    PSW
072.120  305            3065           PUSH    B
072.121  325            3066           PUSH    D
072.122  345            3067           PUSH    H
072.123  072 012 102    3068           LDA     TRKFLG
072.126  247            3069           ANA     A               0, LAST I/O ON TRACK 0
072.127  302 155 072    3070           JNZ     DDRV2               BR IF NOT
                        3071
                        3072  *        LAST I/O WAS ON TRACK 0.  IF THIS I/O IS FOR OTHER
                        3073  *        THAN TRACK 0, THEN MOUNT UNIT WITH VOLUME # FROM LABEL.
                        3074
072.132  021 366 377    3075           LXI     D,-10
072.135  031            3076           DAD     D
072.136  322 176 072    3077           JNC     DDRV4           TRACK 0 IS BLOCK # < 10
072.141  076 001        3078           MVI     A,1
072.143  062 012 102    3079           STA     TRKFLG          INDICATE I/O ON OTHER THAN TRACK 0
072.146  072 014 102    3080           LDA     LABEL+LAB.SER
072.151  157            3081           MOV     L,A             GET VOLUME #
072.152  303 171 072    3082           JMP     DDRV3
                        3083
                        3084  *        LAST I/O WAS ON OTHER THAN TRACK 0.  IF THIS I/O IS
                        3085  *        FOR TRACK 0, THEN MOUNT UNIT WITH VOLUME # OF 0.
                        3086
072.155                 3087  DDRV2    EQU     *
072.155  021 366 377    3088           LXI     D,-10
072.160  031            3089           DAD     D
072.161  332 176 072    3090           JC      DDRV4           OTHER TRACKS ARE BLOCK #'S >= 10
072.164  257            3091           XRA     A
072.165  062 012 102    3092           STA     TRKFLG          INDICATE I/O ON TRACK 0
072.170  157            3093           MOV     L,A             GET VOLUME # 0
                        3094
072.171                 3095  DDRV3    EQU     *
072.171  076 010        3096           MVI     A,DC.MOU
072.173  315 105 072    3097           CALL    DDRV            MOUNT UNIT
                        3098
072.176                 3099  DDRV4    EQU     *
```

```
072.176  341            3100          POP     H
072.177  321            3101          POP     D
072.200  301            3102          POP     B
072.201  361            3103          POP     PSW
                        3104
072.202                 3105  DDRV5   EQU     *
072.202  365            3106          PUSH    PSW
072.203  072 336 101     3107          LDA     UNIT
072.206  062 081 041     3108          STA     AIO.UNI
072.211  361            3109          POP     PSW
                        3110
072.212  376 011        3111          CPI     DC.LOD
072.214  332 316 033     3112          JC      R.SYDD          USE DRIVER IN H17 ROM
072.217  312 311 074     3113          JZ      SYLOAD          USE LOAD ENTRY IN H17LIB
                        3114
072.222  376 012        3115          CPI     DC.RDY
072.224  312 030 075     3116          JZ      SYREDY          USE READY ENTRY IN H17LIB
                        3117
072.227  076 012        3118          MVI     A,EC.ILR        ILLEGAL DEVICE DRIVER REQUEST
072.231  067            3119          STC
072.232  311            3120          RET                                             /071080/


                        3122  **      WLP - WRITE LABEL PATTERN.
                        3123  *
                        3124  *       WLP WRITES TO A SECTOR A LABEL PATTERN.
                        3125  *
                        3126  *       THE PATTERN IS:
                        3127  *
                        3128  *       DW      SECTOR NUMBER
                        3129  *       DB      FLAG BYTE
                        3130  *       DS      256-3           VARIOUS PATTERNS
                        3131  *
                        3132  *       ENTRY   (A) = FLAG BYTE
                        3133  *               (HL) = SECTOR NUMBER
                        3134  *       EXIT    NONE
                        3135  *       USES    A,F,B,C,D,E
                        3136
                        3137
072.233  042 260 072     3138  WLP     SHLD    WLPB
072.236  062 282 072     3139          STA     WLPC
072.241  076 001        3140          MVI     A,DC.WRT
072.243  001 000 001     3141          LXI     B,256
072.246  021 260 072     3142          LXI     D,WLPB
072.251  315 062 072     3143          CALL    DDRV.                                   *071080*
072.254  052 260 072     3144          LHLD    WLPB
072.257  311            3145          RET
                        3146
072.260  000 000        3147  WLPB    DW      0               BLOCK NUMBER
072.262  000            3148  WLPC    DB      0               ID BYTE
072.263  001 002 004     3149          DB      1,2,4,8,16,32,64,128
072.273  377 376 374     3150          DB      -1,-2,-4,-8,-16,-32,-64,-128
072.303  000 377 000     3151          DB      0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1
072.323  360 360 360     3152          DB      360Q,360Q,360Q,360Q,360Q,360Q,360Q,360Q,360Q,360Q
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072.335 360 360 360  3153          DB      360Q,360Q,360Q,360Q,360Q,360Q
072.343 017 017 017  3154          DB      170,170,170,170,170,170,170,170,170,170,170,170,170,170,170,170
072.363 377 377 377  3155          DB      -1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1
073.003 000 000 000  3156          DB      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
073.023 000 001 002  3157          DB      0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
073.043 020 021 022  3158          DB      16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31
073.063 040 041 042  3159          DB      32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47
073.103 060 061 062  3160          DB      48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63
073.123 106 107 110  3161          DB      70,71,72,73,74,75,76,77,78,79
073.135 120 121 122  3162          DB      80,81,82,83,84,85,86,87,88,89
073.147 132 133 134  3163          DB      90,91,92,93,94,95,96,97,98,99
073.161 144 145 146  3164          DB      100,101,102,103,104,105,106,107,108,109
073.173 156 157 160  3165          DB      110,111,112,113,114,115,116,117,118,119
073.205 170 171 172  3166          DB      120,121,122,123,124,125,126,127,128,129
073.217 202 203 204  3167          DB      130,131,132,133,134,135,136,137,138,139
073.231 214 215 216  3168          DB      140,141,142,143,144,145,146,147,148,149
073.243 226 227 230  3169          DB      150,151,152,153,154,155,156,157,158,159
073.255 240 241 242  3170          DB      160,161,162,163,164,165,166,167,168,169
073.267              3171          DS      256-*+WLPB              FINISH BLOCK
```

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                     3173  ***     ETL - ENTER LINE.
                     3174  *
                     3175  *       $ETL  - READS A LINE OF DATA INTO A BUFFER UNTIL A
                     3176  *               <CR> IS ENTERED.  DATA IS ONLY PLACED INTO
                     3177  *               THE BUFFER UNTIL THE BUFFER IS FULL.  EXCESS
                     3178  *               CHARACTERS ARE THROWN AWAY.
                     3179  *
                     3180  *       $ETL. - PERFORMS THE SAME FUNCTION AS $ETL AND APPENDS
                     3181  *               A NULL BYTE TO THE END OF THE BUFFER.
                     3182  *
                     3183  *       ENTRY - (A) LENGTH OF BUFFER
                     3184  *               (HL) ADDR OF BUFFER
                     3185  *       EXIT  - (A) # OF CHARACTERS READ
                     3186  *               (HL) ADDR OF LAST BYTE PLACED IN BUFFER + 1
                     3187  *               PSW/C =0 OK
                     3188  *                     =1 # OF CHARACTERS ENTERED EXCEEDED
                     3189  *                        LENGTH OF BUFFER
                     3190  *       USES  - A,H,L,PSW
                     3191  *
                     3192
073.260              3193  $ETL.   EQU     *
073.260 075          3194          DCR     A               PREDECREMENT FOR NULL BYTE
073.261 315 271 073  3195          CALL    $ETL
073.264 066 000      3196          MVI     M,0
073.266 043          3197          INX     H
073.267 074          3198          INR     A
073.270 311          3199          RET
                     3200
073.271              3201  $ETL    EQU     *
073.271 305          3202          PUSH    B               SAVE BC
073.272 365          3203          PUSH    PSW             SAVE BUFFER LENGTH
073.273 107          3204          MOV     B,A
                     3205
```

```
                                3206  *       READ CHARACTERS AND PLACE THEM INTO THE BUFFER UNTIL
                                3207  *         1) <CR> ENTERED
                                3208  *         2) BUFFER IS FULL
                                3209
        073.274                 3210  $ETL0   EQU     *
        073.274  315 126 076    3211          CALL    $RCHAR
        073.277  376 012        3212          CPI     NL
        073.301  312 321 073    3213          JZ      $ETL1           <CR> ENTERED (HDOS TRANSLATES TO <NL>)
        073.304  117            3214          MOV     C,A
        073.305  170            3215          MOV     A,B
        073.306  326 001        3216          SUI     1
        073.310  332 325 073    3217          JC      $ETL2           BUFFER FULL
        073.313  107            3218          MOV     B,A
        073.314  161            3219          MOV     M,C
        073.315  043            3220          INX     H
        073.316  303 274 073    3221          JMP     $ETL0
                                3222
                                3223  *       <CR> ENTERED -- DETERMINE NUMBER OF CHARACTERS ENTERED AND RETURN
                                3224
        073.321                 3225  $ETL1   EQU     *
        073.321  361            3226          POP     PSW
        073.322  220            3227          SUB     B
        073.323  301            3228          POP     B
        073.324  311            3229          RET
                                3230
                                3231  *       MORE CHARACTERS ENTERED THAN BUFFER CAN HOLD.
                                3232  *       THROW AWAY CHARACTERS AND WAIT FOR <CR> TO BE ENTERED.
                                3233
        073.325                 3234  $ETL2   EQU     *
        073.325  315 126 076    3235          CALL    $RCHAR
        073.330  376 012        3236          CPI     NL
        073.332  302 325 073    3237          JNZ     $ETL2
        073.335  361            3238          POP     PSW
        073.336  301            3239          POP     B
        073.337  067            3240          STC
        073.340  311            3241          RET


                                3243  ***     FILL - FILL MEMORY
                                3244  *
                                3245  *       FILL FILLS MEMORY WITH A CONSTANT BYTE VALUE.
                                3246  *
                                3247  *       ENTRY - (A)  = CONSTANT BYTE VALUE
                                3248  *               (BC) = COUNT
                                3249  *               (HL) = FWA OF MEMORY
                                3250  *       EXIT  - (HL) = LWA+1
                                3251  *       USES  - A,B,C,H,L,PSW
                                3252  *
                                3253
        073.341                 3254  FILL    EQU     *
        073.341  325            3255          PUSH    D
        073.342  127            3256          MOV     D,A
        073.343                 3257  FILL1   EQU     *
        073.343  162            3258          MOV     M,D
```

```
073.344  043          3259          INX     H
073.345  013          3260          DCX     B
073.346  170          3261          MOV     A,B
073.347  261          3262          ORA     C
073.350  302 343 073  3263          JNZ     FILL1
073.353  321          3264          POP     D
073.354  311          3265          RET

                      3267  ***     FNP - FORCE NEW PAGE
                      3268  *
                      3269  *       FNP -- FORCE NEW PAGE AND PRINT HEADING.
                      3270  *
                      3271  *       FNP. - FORCE NEW PAGE W/O PRINTING HEADING.
                      3272  *
                      3273  *       ENTRY - NONE
                      3274  *       EXIT  - NONE
                      3275  *       USES  - ALL
                      3276  *
                      3277
                      3278  *       FORCE NEW PAGE WITH HEADING.
                      3279
073.355               3280  FNP     EQU     *
073.355  076 001     3281          MVI     A,1
073.357  062 125 074  3282          STA     FNPB            INDICATE PRINT HEADING
                      3283
                      3284  *       IF 1ST TIME HERE, THEN ASSUME PAPER IS AT TOP OF NEW FORM.
                      3285  *       DON'T ISSUE FORMFEED.
                      3286
073.362               3287  FNP0    EQU     *
073.362  072 124 074  3288          LDA     FNPA
073.365  247          3289          ANA     A
073.366  312 000 074  3290          JZ      FNP1            NOT 1ST TIME HERE
073.371  257          3291          XRA     A
073.372  062 124 074  3292          STA     FNPA            CLEAR 1ST TIME FLAG
073.375  303 014 074  3293          JMP     FNP2
                      3294
                      3295  *       ISSUE FORMFEED TO DEVICE.
                      3296
074.000               3297  FNP1    EQU     *
074.000  001 001 000  3298          LXI     B,1
074.003  021 126 074  3299          LXI     D,FNPC
074.006  041 113 050  3300          LXI     H,RPTD
074.011  315 026 100  3301          CALL    $FWRIB.
                      3302
                      3303  *       PRINT HEADING IF DESIRED.
                      3304
074.014               3305  FNP2    EQU     *
074.014  072 125 074  3306          LDA     FNPB
074.017  247          3307          ANA     A
074.020  310          3308          RZ                      HEADING NOT DESIRED
074.021  072 111 050  3309          LDA     RPTB
074.024  306 001      3310          ADI     1
074.026  047          3311          DAA
```

```
074.027  062 111 050  3312          STA     RPTB            INCREMENT PAGE NUMBER
074.032  107          3313          MOV     B,A
074.033  037          3314          RAR
074.034  037          3315          RAR
074.035  037          3316          RAR
074.036  037          3317          RAR
074.037  346 017      3318          ANI     0FH
074.041  302 046 074  3319          JNZ     FNP3
074.044  076 360      3320          MVI     A,'0'-'0'
074.046               3321  FNP3    EQU     *
074.046  306 060      3322          ADI     '0'
074.050  062 105 050  3323          STA     RPTA3           CONVERT 10'S DIGIT TO ASCII
074.053  170          3324          MOV     A,B
074.054  346 017      3325          ANI     0FH
074.056  306 060      3326          ADI     '0'
074.060  062 106 050  3327          STA     RPTA3+1         CONVERT UNIT'S DIGIT TO ASCII
074.063  001 116 000  3328          LXI     B,RPTAL
074.066  021 373 047  3329          LXI     D,RPTA
074.071  041 113 050  3330          LXI     H,RPTD
074.074  315 026 100  3331          CALL    $FWR1B.         WRITE HEADING
074.077  076 074      3332          MVI     A,FNPD
074.101  326 003      3333          SUI     3
074.103  062 306 074  3334          STA     WRTLA           RESET LINE COUNTER = PAGE HEADING
074.106  311          3335          RET
                      3336
                      3337  *       FORCE NEW PAGE WITHOUT HEADING.
                      3338
074.107               3339  FNP.    EQU     *
074.107  257          3340          XRA     A
074.110  062 125 074  3341          STA     FNPB            INDICATE NO HEADING
074.113  315 362 073  3342          CALL    FNP0            FORCE NEW PAGE
074.116  076 074      3343          MVI     A,FNPD
074.120  062 306 074  3344          STA     WRTLA           RESET LINE COUNTER
074.123  311          3345          RET
                      3346
074.124  001          3347  FNPA    DB      1               FLAG := <>0 1ST TIME HERE
074.125               3348  FNPB    DS      1               FLAG := <>0 PRINT HEADING
074.126  014          3349  FNPC    DB      FF              FORMFEED
000.074               3350  FNPD    EQU     60              LINES/PAGE


                      3352  ***     PMSG - PRINT MESSAGE.
                      3353  *
                      3354  *       PMSG  -- PRINT MESSAGE ON BOTH THE TERMINAL AND THE
                      3355  *                HARDCOPY DEVICE.
                      3356  *
                      3357  *       ENTRY - (HL) = FWA OF MESSAGE
                      3358  *       USES  - NONE
                      3359  *
                      3360
074.127               3361  PMSG    EQU     *
074.127  365          3362          PUSH    PSW
074.130  305          3363          PUSH    B
074.131  325          3364          PUSH    D
```

```
074.132 345          3365          PUSH    H
074.133 315 144 031  3366          CALL    $TYPTX.         PRINT LINE ON TERMINAL
074.136 341          3367          POP     H
074.137 345          3368          PUSH    H
074.140 315 171 074  3369          CALL    WRTL            PRINT LINE ON HARDCOPY DEVICE
074.143 341          3370          POP     H
074.144 321          3371          POP     D
074.145 301          3372          POP     B
074.146 361          3373          POP     PSW
074.147 311          3374          RET
                     3375
                     3376  *       PMSG. - PRINT MESSAGE ON BOTH THE TERMINAL AND
                     3377  *               THE HARDCOPY DEVICE
                     3378  *
                     3379  *       ENTRY - (SP) = FWA OF MESSAGE
                     3380  *       EXIT  - (SP) = LWA+1 OF MESSAGE
                     3381  *       USES  - NONE
                     3382
074.150              3383  PMSG.   EQU     *
074.150 343          3384          XTHL
074.151 365          3385          PUSH    PSW
074.152 305          3386          PUSH    B
074.153 325          3387          PUSH    D
074.154 345          3388          PUSH    H
074.155 315 171 074  3389          CALL    WRTL            PRINT MESSAGE ON HARDCOPY DEVICE
074.160 341          3390          POP     H
074.161 315 144 031  3391          CALL    $TYPTX.         PRINT MESSAGE ON TERMINAL
074.164 321          3392          POP     D
074.165 301          3393          POP     B
074.166 361          3394          POP     PSW
074.167 343          3395          XTHL
074.170 311          3396          RET
```

```
                     3398  ***     WRTL - WRITE LINES ON HARDCOPY DEVICE.
                     3399  *
                     3400  *       WRTL -- WRITES LINES TO THE HARDCOPY DEVICE KEEPING
                     3401  *               TRACK OF A LINE COUNTER.  WHEN THE LINE
                     3402  *               COUNTER REACHES ZERO AND ANOTHER LINE
                     3403  *               IS TO BE PRINTED, A NEW PAGE IS FORCED.
                     3404  *
                     3405  *       ENTRY - (HL) = FWA OF BUFFER
                     3406  *       EXIT  - (HL) = LWA+1
                     3407  *       USES  - ALL
                     3408  *
                     3409  *       NOTE:
                     3410  *         THE LAST BYTE TO BE WRITTEN IS INDICATED BY SETTING THE
                     3411  *         SIGN BIT OF THE BYTE TO A 1.  THE <NL> CHARACTER SHOULD
                     3412  *         NOT HAVE THE SIGN BIT SET, SINCE SOME DEVICE DRIVERS
                     3413  *         ONLY CHECK FOR <NL> BUT NOT <NL>+80H.  THIS CAN CAUSE
                     3414  *         PROBLEMS IF THE DEVICE DRIVER WANTS TO TRANSLATE <NL>'S
                     3415  *         TO <CR><LF>.
                     3416  *
                     3417
```

```
074.171                  3418  WRTL    EQU     *
074.171  072 112 050     3419          LDA     RPTC
074.174  247             3420          ANA     A
074.175  310             3421          RZ                      HARDCOPY NOT REQUESTED
                         3422
074.176                  3423  WRTL0   EQU     *
074.176  042 307 074     3424          SHLD    WRTLB           SAVE BUFFER POINTER
074.201  072 306 074     3425          LDA     WRTLA
074.204  247             3426          ANA     A
074.205  302 215 074     3427          JNZ     WRTL1           NOT TIME FOR NEW PAGE
074.210  345             3428          PUSH    H
074.211  315 355 073     3429          CALL    FNP             FORCE NEW PAGE WITH HEADING
074.214  341             3430          POP     H
                         3431
                         3432  *       SCAN BUFFER FOR NEXT <NL> OR END OF BUFFER.
                         3433
074.215                  3434  WRTL1   EQU     *
074.215  176             3435          MOV     A,M
074.216  043             3436          INX     H
074.217  107             3437          MOV     B,A
074.220  346 177         3438          ANI     07FH
074.222  376 012         3439          CPI     NL
074.224  312 240 074     3440          JZ      WRTL2           BR IF <NL>
074.227  170             3441          MOV     A,B
074.230  247             3442          ANA     A
074.231  362 215 074     3443          JP      WRTL1           NOT END OF BUFFER
                         3444
                         3445  *       END OF BUFFER.  WRITE WHAT WE HAVE.
                         3446
074.234  315 260 074     3447          CALL    WRTL3
074.237  311             3448          RET
                         3449
                         3450  *       WRITE A LINE OF DATA AND UPDATE LINE COUNTER.
                         3451
074.240                  3452  WRTL2   EQU     *
074.240  315 260 074     3453          CALL    WRTL3           WRITE LINE
074.243  072 306 074     3454          LDA     WRTLA
074.246  075             3455          DCR     A
074.247  062 306 074     3456          STA     WRTLA           UPDATE LINE COUNTER
074.252  170             3457          MOV     A,B             Q. <NL> ALSO
074.253  247             3458          ANA     A                 END OF BUFFER
074.254  362 176 074     3459          JP      WRTL0               BR IF NOT
074.257  311             3460          RET
                         3461
                         3462  *       WRITE TO THE HARDCOPY DEVICE.
                         3463
074.260                  3464  WRTL3   EQU     *
074.260  305             3465          PUSH    B
074.261  345             3466          PUSH    H
074.262  353             3467          XCHG                    (DE)=LWA+1
074.263  052 307 074     3468          LHLD    WRTLB           (HL)=FWA
074.266  353             3469          XCHG                    (DE)=FWA (HL)=LWA+1
                         3470
                         3471  *       CALCULATE COUNT.
                         3472
074.267  175             3473          MOV     A,L
```

```
074.270  223          3474          SUB     E
074.271  117          3475          MOV     C,A
074.272  174          3476          MOV     A,H
074.273  232          3477          SBB     D
074.274  107          3478          MOV     B,A
                      3479
074.275  041 113 050  3480          LXI     H,RPTD
074.300  315 026 100  3481          CALL    $FWRIB.
074.303  341          3482          POP     H
074.304  301          3483          POP     B
074.305  311          3484          RET
                      3485
074.306  000          3486  WRTLA   DB      0               LINE COUNTER
074.307               3487  WRTLB   DS      2               BUFFER POINTER          /071080/
074.311               3488          XTEXT   H17LIB                                  *072180*
                      3490X ***     The H17 ROM handles will handle device driver I/O for
                      3491X *         1) READ
                      3492X *         2) WRITE
                      3493X *         3) READ REGARDLESS
                      3494X *         4) OPEN READ
                      3495X *         5) OPEN WRITE
                      3496X *         6) OPEN UPDATE
                      3497X *         7) CLOSE
                      3498X *         8) ABORT
                      3499X *         9) MOUNT
                      3500X *
                      3501X
033.316               3502X R,SYDD  EQU     033316A         ADDR OF H17 ROM DEVICE DRIVER ENTRY
                      3503X
                      3504X *       DEVICE DRIVER ENTRIES
                      3505X *         1) LOAD
                      3506X *         2) READY
                      3507X *       ARE NEW AND ARE HANDLED BY CODE IN THIS COMMON DECK.
                      3508X
                      3509X ***     SYLOAD
                      3510X *
                      3511X *       SYLOAD process the device LOAD entry.
                      3512X *
                      3513X *       Formerly, this code was found in HDOS proper, for the
                      3514X *       sake of modularity, it has been moved.
                      3515X *
                      3516X
074.311               3517X SYLOAD  EQU     *
                      3518X
074.311  257          3519X         XRA     A
074.312  323 175      3520X         OUT     UP.FC           Set Fill character = 0
                      3521X
                      3522X *       Set up the orisinal vectors
                      3523X
074.314  052 131 040  3524X         LHLD    SYDD+1
074.317  345          3525X         PUSH    H               Save current system device
074.320  001 130 000  3526X         LXI     B,BOOTAL
074.323  021 132 037  3527X         LXI     D,BOOTA
074.326  041 110 040  3528X         LXI     H,D.CON
074.331  315 252 030  3529X         CALL    $MOVE           Move in constants and vectors
074.334  341          3530X         POP     H
```

```
074.335  042 131 040  3531X          SHLD    SYDD+1          Restore system device
                      3532X
                      3533X *        Re-Vector any obsolete ROM code
                      3534X
074.340  041 135 075  3535X          LXI     H,DSKERR
074.343  042 233 040  3536X          SHLD    D.ERRT+1        ERROR Trap
                      3537X
074.346  041 146 075  3538X          LXI     H,RAMCDE
074.351  042 161 040  3539X          SHLD    D.CDE+1         Count Disk Errors
                      3540X
074.354  041 224 075  3541X          LXI     H,RAMWRI
074.357  042 156 040  3542X          SHLD    D.WRITE+1       Write
                      3543X
074.362  041 266 075  3544X          LXI     H,RAMSDP
074.365  042 206 040  3545X          SHLD    D.SDP+1         Set-Up Device Parameters
                      3546X
074.370  052 167 040  3547X          LHLD    D.SDT+1
074.373  042 222 075  3548X          SHLD    RAMSDTA         Save Current Address
074.376  041 212 075  3549X          LXI     H,RAMSDT
075.001  042 167 040  3550X          SHLD    D.SDT+1         Replace  R.SDT
                      3551X
                      3552X *        Initialize Drive Parameters
                      3553X
075.004  076 074      3554X          MVI     A,30*2
075.006  062 110 040  3555X          STA     D.XITA          Set Motor on delay
                      3556X
075.011  257          3557X          XRA     A
075.012  062 111 040  3558X          STA     D.XITA+1        Set No head settle time-out
                      3559X
075.015  062 126 040  3560X          STA     D.ERTS          Clear Error Track Number
                      3561X
075.020  072 311 075  3562X          LDA     TDT
075.023  062 115 040  3563X          STA     D.MAIA          Set Track Delay Time
                      3564X
075.026  247          3565X          ANA     A               Clear Carry
075.027  311          3566X          RET


                      3568X **       SYREDY
                      3569X *
                      3570X *        SYREDY Processes the device READY entry.
                      3571X *
                      3572X *        A drive is considered ready if 12 holes pass before
                      3573X *        time-out count expires.  (12 holes means one entire
                      3574X *        revolution of the diskette.)
                      3575X *
                      3576X *        ENTRY:  NONE
                      3577X *
                      3578X *        EXIT:   PSW     = 'C' set if
                      3579X *
                      3580X
075.030  001 000 012  3581X SYREDY   LXI     B,REDYA         Initialize Time-Out Count
075.033  036 014      3582X          MVI     E,12            Initialize the Hole Count
                      3583X
```

```
                        3584X *       Watch a hole
                        3585X
075.035  170           3586X SYREDY1 MOV     A,B
075.036  261           3587X         ORA     C
075.037  312 105 075   3588X         JZ      SYREDY3         Time-Out
075.042  315 107 075   3589X         CALL    REDY
075.045  302 105 075   3590X         JNZ     SYREDY3         Abort
                        3591X
075.050  346 001       3592X         ANI     DF.HD
075.052  013           3593X         DCX     B               check for time-out
075.053  302 035 075   3594X         JNZ     SYREDY1         Watching a hole so by
                        3595X
                        3596X *       Watch a gap
                        3597X
075.056  170           3598X SYREDY2 MOV     A,B
075.057  261           3599X         ORA     C
075.060  312 105 075   3600X         JZ      SYREDY3         Time-Out
075.063  315 107 075   3601X         CALL    REDY
075.066  302 105 075   3602X         JNZ     SYREDY3         Abort
                        3603X
075.071  346 001       3604X         ANI     DF.HD
075.073  013           3605X         DCX     B
075.074  312 056 075   3606X         JZ      SYREDY2         Watching a gap pass
                        3607X
075.077  035           3608X         DCR     E               Count a hole
                        3609X
075.100  302 035 075   3610X         JNZ     SYREDY1         More holes to go
                        3611X
                        3612X *       The device must be ready
                        3613X
075.103  247           3614X         ANA     A               Flag device ready
075.104  311           3615X         RET
                        3616X
                        3617X *       The device must be NOT ready
                        3618X
075.105  067           3619X SYREDY3 STC                     Flag device NOT ready
075.106  311           3620X         RET
                        3621X
075.107  305           3622X REDY    PUSH    B
075.110  072 061 041   3623X         LDA     AIO.UNI
075.113  107           3624X         MOV     B,A
075.114  004           3625X         INR     B
075.115  257           3626X         XRA     A
075.116  315 312 075   3627X         CALL    BITS            A = device select byte
075.121  366 020       3628X         ORI     DF.MO
075.123  323 177       3629X         OUT     DP.DC           Turn on Motor and Drive Select
                        3630X
075.125  072 334 040   3631X         LDA     S.CAADR+1
075.130  247           3632X         ANA     A
075.131  333 177       3633X         IN      DP.DC           Look at the drive status
075.133  301           3634X         POP     B
075.134  311           3635X         RET
                        3636X
012.000                 3637X REDYA   EQU     12000A          Time-Out Counter
```

```
                        3639X ;*****************************************************************************
                        3640X ;*
                        3641X ;*       The followins code is H17 ROM Replacement Code.
                        3642X ;*
                        3643X ;*****************************************************************************


                        3645X ;**      DSKERR - DISK ERROR.
                        3646X ;*
                        3647X
075.135  064            3648X DSKERR  INR     M               COUNT ERROR
075.136  052 262 040    3649X         LHLD    D.SECNT
075.141  043            3650X         INX     H
075.142  042 262 040    3651X         SHLD    D.SECNT
075.145  311            3652X         RET


                        3654X ;**      CDE - COUNT DISK ERRORS.
                        3655X ;*
                        3656X ;*       CDE IS CALLED WHEN A DISK SOFT ERROR OCCURS. IF THERE HAVE
                        3657X ;*       OCCURED 10 SOFT ERRORS FOR THIS OPERATION, THEN A HARD ERROR
                        3658X ;*       IS FLAGGED.
                        3659X ;*
                        3660X ;*       ENTRY   NONE
                        3661X ;*       EXIT    'C' SET IF HARD ERROR
                        3662X ;*               INTERRUPTS DISABLED
                        3663X ;*       USES    A,F,H,L
                        3664X
000.012                 3665X ERPTCNT EQU     10              ERROR REPEAT COUNT (DEFINED IN ROMDD)
                        3666X
075.146  373            3667X RAMCDE  EI
075.147  315 213 040    3668X         CALL    D.STZ           SEEK TRACK ZERO
075.152  315 166 040    3669X         CALL    D.SDT           SEEK DESIRED TRACK
075.155  247            3670X         ANA     A               CLEAR CARRY
075.156  052 262 040    3671X         LHLD    D.SECNT
075.161  043            3672X         INX     H
075.162  042 262 040    3673X         SHLD    D.SECNT         INCREMENT COUNT
075.165  041 264 040    3674X         LXI     H,D.OECNT       (HL) = #OPERATION ERROR COUNT
075.170  065            3675X         DCR     M
075.171  360            3676X         RP                      NOT TOO MANY
075.172  053            3677X         DCX     H
075.173  053            3678X         DCX     H               (HL) = #D.SECNT
                        3679X
000.000                 3680X         ERRNZ   D.SECNT-D.OECNT+2
075.174  076 366        3681X         MVI     A,-ERPTCNT
075.176  206            3682X         ADD     M               REMOVE SOFT COUNT
075.177  167            3683X         MOV     M,A
000.000                 3684X         ERRNZ   D.SECNT-D.HECNT-1
075.200  053            3685X         DCX     H               (HL) = #D.HECNT
075.201  064            3686X         INR     M               COUNT HARD ERROR
075.202  052 240 040    3687X         LHLD    D.TT
075.205  042 126 040    3688X         SHLD    D.ERTS          RECORD ERROR TRACK AND SECTOR
```

```
075.210  067          3689X          STC
075.211  311          3690X          RET                    EXIT WITH 'C' SET


                      3692X **       R.SDT   - Seek Desired Track
                      3693X *
                      3694X *        R.SDT seeks the desired track.  This is a preface to the H17 ROM
                      3695X *        code because it does not delay enough after turning off the write
                      3696X *        gate.  When sectors are rapidly updated as are those in the dir-
                      3697X *        ectory and GRT, they tend to be smashed if the drives begins to
                      3698X *        step before the tunnel erase is finished.
                      3699X *
                      3700X
075,212  365          3701X RAMSDT   PUSH   PSW
075.213  076 172      3702X          MVI    A,900/15*1024/500       900*2.048/15 = 900 mic sec delay
075,215  315 216 040  3703X          CALL   D.UDLY          Wait for the disk to settle
075.220  361          3704X          POP    PSW
                      3705X
075.221  303 377 377  3706X          JMP    -1              Enter the orisinal
075,222               3707X RAMSDTA  EQU    *-2


                      3709X **       R.WRITE - PERFORM DISK WRITE.
                      3710X *
                      3711X *        PARTIALLY REPLACES ROM CODE IN H17ROM (ROMDD OR H17ROM LISTING)
                      3712X *
                      3713X *        SEE LISTING FOR DETAILS.
                      3714X
                      3715X
034,370               3716X WRITE1   EQU    34370A
035.132               3717X WRITE8   EQU    35132A
                      3718X
075.224               3719X RAMWRI   EQU    *
075,224               3720X R.WRITE  EQU    *
075.224  345          3721X          PUSH   H               SAVE BLOCK NUMBER
075,225  315 205 040  3722X          CALL   D.SDP           SET DEVICE PARAMETERS
075.230  052 275 040  3723X          LHLD   D.OPW
075,233  043          3724X          INX    H
075.234  042 275 040  3725X          SHLD   D.OPW           COUNT OPERATION
075,237  333 177      3726X          IN     DP.DC           SEE IF DISK WRITE PROTECTED
075.241  346 004      3727X          ANI    DF.WP
075,243  067          3728X          STC
075.244  076 025      3729X          MVI    A,EC.WP
075,246  302 132 035  3730X          JNZ    WRITE8          DISK IS WRITE PROTECTED
                      3731X
                      3732X *        READY TO WRITE SECTOR
                      3733X *
                      3734X *            (BC) = COUNT
                      3735X *            (DE) = ADDRESS
                      3736X *            ((SP)) = SECTOR NUMBER
                      3737X
075.251  041 377 000  3738X          LXI    H,3770
```

```
075.254  011            3739X          DAD     B
075.255  104            3740X          MOV     B,H             (B) = # OF SECTORS TO WRITE
075.256  170            3741X          MOV     A,B
075.257  247            3742X          ANA     A
075.260  312 132 035    3743X          JZ      WRITE8          NONE TO WRITE
075.263  303 370 034    3744X          JMP     WRITE1          RE-JOIN ROM


                        3746X **       R.SDP   -  SETUP DEVICE PARAMETERS
                        3747X *
                        3748X *        SDP SETS UP ARGUMENTS FOR THE SPECIFIC UNIT.
                        3749X *
                        3750X *                D.DVCTL = MOTOR ON
                        3751X *                D.TRKPT =ADDRESS OF DEVICE TRACK NUMBER
                        3752X *
                        3753X *
                        3754X *        Modified to access drive 3, or SY2:.
                        3755X *
                        3756X *        ENTRY:  A10.UNI = UNIT NUMBER
                        3757X *
                        3758X *        EXIT:   (HL) = (D.TRKPT)
                        3759X *
                        3760X *        USES:   (PSW),(HL)
                        3761X *
                        3762X
036.073                 3763X R.SDP.   EQU     036073A                 THE GOOD ROM CODE ENTRY POINT
                        3764X
075.266                 3765X RAMSDP   EQU     *
075.266                 3766X R.SDP    EQU     *
                        3767X
075.266  076 012       3768X          MVI     A,ERPTCNT
075.270  062 264 040   3769X          STA     D.DECNT                 SET MAX ERROR COUNT FOR THE OPERATION
075.273  072 061 041   3770X          LDA     A10.UNI
075.276  365           3771X          PUSH    PSW
075.277  376 002       3772X          CPI     1+1
                        3773X
075.301  332 073 036   3774X          JC      R.SDP.                  UNIT 0 OR 1
000.000                 3775X          ERRNZ   DF.DS0-2
000.000                 3776X          ERRNZ   DF.DS1-4
                        3777X
075.304  076 003       3778X          MVI     A,3                     UNIT 2
000.000                 3779X          ERRNZ   DF.DS2-8
075.306  303 073 036   3780X          JMP     R.SDP.


                        3782X ***      Data
                        3783X *
                        3784X
000.017                 3785X DEF.TDT  EQU     30/2                    TRACK DELAY TIME DEFAULTS TO 30 MS
                        3786X
075.311  017           3787X TDT      DB      DEF.TDT         Track Delay Time
```

```
075.312                 3790          XTEXT   BITS


                        3792X **      BITS    -  BIT SET
                        3793X *
                        3794X *       BITS SETS THE SPECIFIED BIT IN THE ACCUMULATOR.
                        3795X *
                        3796X *       ENTRY:  A       = ORIGINAL  A
                        3797X *               B       = NUMBER OF BIT TO SET ( 7=HIGH,...,0=LOW )
                        3798X *
                        3799X *       EXIT:   A       = ORIGINAL  A  WITH  BIT(B) SET
                        3800X *
                        3801X *       USES:   PSW
                        3802X *
                        3803X
075.312 305             3804X BITS    PUSH    B
                        3805X
075.313 365             3806X         PUSH    PSW
075.314 076 200         3807X         MVI     A,10000000B
075.316 004             3808X         INR     B
075.317 007             3809X BITS1   RLC
075.320 005             3810X         DCR     B
075.321 302 317 075     3811X         JNZ     BITS1
                        3812X
075.324 117             3813X         MOV     C,A
075.325 361             3814X         POP     PSW
075.326 261             3815X         ORA     C
                        3816X
075.327 301             3817X         POP     BC
075.330 311             3818X         RET
075.331                 3819          XTEXT   CCO


                        3821X **      $CCO - CLEAR CONTROL-O
                        3822X *
                        3823X *       $CCO IS CALLED TO CLEAR THE EFFECT OF THE CTL-O CHARACTER.
                        3824X *
                        3825X *       ENTRY   NONE
                        3826X *       EXIT    NONE
                        3827X *       USES    NONE
                        3828X
                        3829X
075.331 315 054 031     3830X $CCO    CALL    $SAVALL         SAVE REGISTERS
075.334 076 004         3831X         MVI     A,I.CONFL
075.336 001 001 000     3832X         LXI     B,CO.FLG        CLEAR CO.FLG
075.341 377 006         3833X         DB      SYSCALL,.CONSL
075.343 303 047 031     3834X         JMP     $RSTALL         RESTORE REGISTERS AND RETURN
075.346                 3835          XTEXT   CDEHL
```

```
                        3837X **      $CDEHL - COMPARE (DE) TO (HL)
                        3838X *
                        3839X *       $CDEHL COMPARES (DE) TO (HL) FOR EQUALITY.
                        3840X *
                        3841X *       ENTRY   NONE
                        3842X *       EXIT    'Z' SET IF (DE) = (HL)
                        3843X *       USES    A,F
                        3844X
                        3845X
030.216                 3846X $CDEHL  EQU     30216A          IN H17 ROM
075.346                 3847          XTEXT   COMP


                        3849X **      $COMP - COMPARE TWO CHARACTER STRINGS.
                        3850X *
                        3851X *       $COMP COMPARES TWO BYTE STRINGS.
                        3852X *
                        3853X *       ENTRY   (C) = COMPARE COUNT
                        3854X *               (DE) = FWA OF STRING #1
                        3855X *               (HL) = FWA OF STRING #2
                        3856X *       EXIT    'Z' CLEAR, IS MIS-MATCH
                        3857X *                (C) = LENGTH REMAINING
                        3858X *               (DE) = ADDRESS OF MISMATCH IN STRING#1
                        3859X *               (HL) = ADDRESS OF MISMATCH IN STRING #2
                        3860X *               'C' SET, HAVE MATCH
                        3861X *                (C) = 0
                        3862X *               (DE) = (DE) + (OC)
                        3863X *               (HL) = (HL) + (OC)
                        3864X *       USES    A;F;C;D;E;H;L
                        3865X
                        3866X
030.060                 3867X $COMP   EQU     30060A          IN H17 ROM
075.346                 3868          XTEXT   CRLF


                        3870X **      $CRLF - TYPE CARRIAGE RETURN/ LINE FEED
                        3871X *
                        3872X *       $CRLF IS USED TO GENERATE PADDED CRLF'S.
                        3873X *
                        3874X *       ENTRY   NONE
                        3875X *       EXIT    (A) = 0
                        3876X *       USES    A,F
                        3877X
                        3878X
075.346  076 012       3879X $CRLF   MVI     A,NL
075.350  377 002       3880X         DB      SYSCALL,.SCOUT
075.352  257           3881X         XRA     A
075.353  311           3882X         RET
075.354                 3883          XTEXT   DADA2
```

```
                        3885X **      $DADA, - ADD (0,A) TO (H,L)
                        3886X *
                        3887X *       ENTRY   NONE
                        3888X *       EXIT    (HL) = (HL) + (0A)
                        3889X *       USES    A,F,H,L
                        3890X
                        3891X
030.101                 3892X $DADA,  EQU     30101A          IN H17 ROM
075.354                 3893          XTEXT   MOVE



                        3895X **      $MOVE - MOVE DATA
                        3896X *
                        3897X *       $MOVE MOVES A BLOCK OF BYTES TO A NEW MEMORY ADDRESS.
                        3898X *       IF THE MOVE IS TO A LOWER ADDRESS, THE BYTES ARE MOVED FROM
                        3899X *       FIRST TO LAST.
                        3900X *
                        3901X *       IF THE MOVE IS TO A HIGHER ADDRESS, THE BYTES ARE MOVED FROM
                        3902X *       LAST TO FIRST.
                        3903X *
                        3904X *       THIS IS DONE SO THAT AN OVERLAPED MOVE WILL NOT 'RIPPLE'.
                        3905X *
                        3906X *       ENTRY   (BC) = COUNT
                        3907X *               (DE) = FROM
                        3908X *               (HL) = TO
                        3909X *       EXIT    MOVED
                        3910X *               (DE) = ADDRESS OF NEXT FROM BYTE
                        3911X *               (HL) = ADDRESS OF NEXT *TO* BYTE
                        3912X *               'C' CLEAR
                        3913X *       USES    ALL
                        3914X
                        3915X
030.252                 3916X $MOVE   EQU     30252A          IN H17 ROM
075.354                 3917          XTEXT   DU66



                        3919X **      $DU66 - UNSIGNED 16 / 16 DIVIDE.
                        3920X *
                        3921X *       (HL) = (BC)/(DE)
                        3922X *
                        3923X *       ENTRY   (BC), (DE) PRESET
                        3924X *       EXIT    (HL) = RESULT
                        3925X *               (DE) = REMAINDER
                        3926X *       USES    ALL
                        3927X
                        3928X
030.106                 3929X $DU66   EQU     30106A          IN H17 ROM
075.354                 3930          XTEXT   MOVEL
```

```
                        3932X **      $MOVEL - MOVE DATA
                        3933X *
                        3934X *       $MOVEL MOVES A BLOCK OF BYTES TO A NEW MEMORY ADDRESS.
                        3935X *       IF THE MOVE IS TO A LOWER ADDRESS, THE BYTES ARE MOVED FROM
                        3936X *       FIRST TO LAST.
                        3937X *
                        3938X *       IF THE MOVE IS TO A HIGHER ADDRESS, THE BYTES ARE MOVED FROM
                        3939X *       LAST TO FIRST.
                        3940X *
                        3941X *       THIS IS DONE SO THAT AN OVERLAPED MOVE WILL NOT 'RIPPLE'
                        3942X *
                        3943X *       CALL    $MOVEL
                        3944X *       DW      COUNT
                        3945X *       DW      FROM
                        3946X *       DW      TO
                        3947X *
                        3948X *       ENTRY   ((SP)) = RET
                        3949X *               (RET+0) = COUNT (WORD VALUE)
                        3950X *               (RET+2) = FROM
                        3951X *               (RET+4) = TO
                        3952X *       EXIT    TO (RET+6)
                        3953X *               (DE) = ADDRESS OF NEXT FROM BYTE
                        3954X *               (HL) = ADDRESS OF NEXT *TO* BYTE
                        3955X *               'C' CLEAR
                        3956X *       USES    ALL
                        3957X
                        3958X
075.354  341           3959X $MOVEL  POP     H               (HL) = RET
075.355  116           3960X         MOV     C,M
075.356  043           3961X         INX     H
075.357  106           3962X         MOV     B,M             (BC) = COUNT
075.360  043           3963X         INX     H
075.361  136           3964X         MOV     E,M
075.362  043           3965X         INX     H
075.363  126           3966X         MOV     D,M             (DE) = FROM
075.364  043           3967X         INX     H
075.365  325           3968X         PUSH    D               ((SP)) = FROM
075.366  136           3969X         MOV     E,M
075.367  043           3970X         INX     H
075.370  126           3971X         MOV     D,M             (DE) = TO
075.371  043           3972X         INX     H
075.372  343           3973X         XTHL                    ((SP)) = RET, (HL) = FROM
075.373  353           3974X         XCHG                    (DE) = FROM, (HL) = TO
075.374  303 252 030   3975X         JMP     $MOVE           MOVE IT
075.377               3976          XTEXT   SAVALL


                        3978X **      $RSTALL - RESTORE ALL REGISTERS.
                        3979X *
                        3980X *       $RSTALL RESTORES ALL THE REGISTERS OFF THE STACK, AND
                        3981X *       RETURNS TO THE PREVIOUS CALLER.
                        3982X *
                        3983X *       ENTRY   (SP) = PSW
                        3984X *               (SP+2) = BC
                        3985X *               (SP+4) = DE
```

```
                        3986X *                 (SP+6) = HL
                        3987X *                 (SP+8) = RET
                        3988X *         EXIT    TO *RET*, REGISTERS RESTORED
                        3989X *         USES    ALL
                        3990X
                        3991X
     031.047            3992X $RSTALL   EQU     31047A          IN H17 ROM


                        3994X **        $SAVALL - SAVE ALL REGISTERS ON STACK.
                        3995X *
                        3996X *         $SAVALL SAVES ALL THE REGISTERS ON THE STACK.
                        3997X *
                        3998X *         ENTRY   NONE
                        3999X *         EXIT    (SP) = PSW
                        4000X *                 (SP+2) = BC
                        4001X *                 (SP+4) = DE
                        4002X *                 (SP+6) = HL
                        4003X *         USES    H,L
                        4004X
                        4005X
     031.054            4006X $SAVALL   EQU     31054A          IN H17 ROM
     075.377            4007            XTEXT   TJMP


                        4009X **        $TJMP - TABLE JUMP.
                        4010X *
                        4011X *         USAGE
                        4012X *
                        4013X *         CALL    $TJMP           (A) = INDEX
                        4014X *         DW      ADDR1
                        4015X *         .         .
                        4016X *         .         .
                        4017X *         .         .
                        4018X *         DW      ADDRN
                        4019X *
                        4020X *         ENTRY   (A) = INDEX
                        4021X *         EXIT    TO PROCESSOR
                        4022X *                 (A) = INDEX*2
                        4023X *         USES    NONE.
                        4024X
                        4025X
     031.061            4026X $TJMP     EQU     31061A          IN H17 ROM, (A) = INDEX*2
                        4027X
     031.062            4028X $TJMP.    EQU     31062A          IN H17 ROM
     075.377            4029            XTEXT   MLU
```

```
                                4031X **      MLU - MAP LOWER CASE LINE TO UPPER CASE.
                                4032X *
                                4033X *       MLU MAPS THE LOWER CASE ALPHABETICS IN A LINE TO UPPER CASE.
                                4034X *
                                4035X *       ENTRY   (HL) = LINE FWA
                                4036X *       EXIT    NONE
                                4037X *       USES    NONE
                                4038X
                                4039X
075.377  365                   4040X $MLU    PUSH    PSW             SAVE (PSW)
076.000  345                   4041X         PUSH    H               SAVE FWA
076.001  053                   4042X         DCX     H               ANTICIPATE INX H
076.002  043                   4043X $MLU1   INX     H
076.003  176                   4044X         MOV     A,M             (A)= CHARACTER
076.004  315 017 076           4045X         CALL    $MCU            MAP CHAR TO UPPER
076.007  167                   4046X         MOV     M,A
076.010  247                   4047X         ANA     A
076.011  302 002 076           4048X         JNZ     $MLU1           MORE TO GO
076.014  341                   4049X         POP     H               RESTORE (HL)
076.015  361                   4050X         POP     PSW             RESTORE (PSW)
076.016  311                   4051X         RET
076.017                        4052          XTEXT   MCU


                                4054X **      MCU - MAP LOWER CASE TO UPPER CASE.
                                4055X *
                                4056X *       MCU MAPS A LOWER CASE ALPHABETIC TO UPPER
                                4057X *       CASE.
                                4058X *
                                4059X *       ENTRY   (A) = CHARACTER
                                4060X *       EXIT    (A) = CHARACTER RESULT
                                4061X *       USES    A,F
                                4062X
                                4063X
076.017  376 141               4064X $MCU    CPI     'a'
076.021  330                   4065X         RC                      NOT LOWER CASE
076.022  376 173               4066X         CPI     'z'+1
076.024  320                   4067X         RNC                     NOT LOWER CASE
076.025  326 040               4068X         SUI     'a'-'A'
076.027  311                   4069X         RET
076.030                        4070          XTEXT   RTL


                                4072X **      $RTL - READ TEXT LINE.
                                4073X *
                                4074X *       $RTL READS A LINE FROM THE TERMINAL.
                                4075X *
                                4076X *       CHARACTER ARE ACCEPTED FROM THE TERMINAL, RUBOUT AND BACKSPACE
                                4077X *       CHARACTERS ARE PROCESSED. WHEN A CARRIAGE RETURN IS ENTERED,
                                4078X *       $RTL RETURNS.
                                4079X *
                                4080X *       ENTRY   (HL) = BUFFER FWA
```

```
                        4081X *       EXIT    'C' CLEAR IF OK
                        4082X *               DATA IN BUFFER
                        4083X *               (A) = TEXT LENGTH
                        4084X *               'C' SET IF CTL-D STRUCK
                        4085X *       USES    A,F
                        4086X
                        4087X
076.030 315 037 076     4088X $RTL.   CALL    $RTL            $RTL IN UPPER CASE
076.033 330             4089X         RC                      CTL-D
076.034 303 377 075     4090X         JMP     $MLU            MAP LINE TO UPPER CASE
                        4091X
076.037                 4092X $RTL    EQU     *
076.037 345             4093X         PUSH    H               SAVE FWA
076.040 315 126 076     4094X $RTL1   CALL    $RCHAR
076.043 376 004         4095X         CPI     CTLD
076.045 312 072 076     4096X         JE      $RTL2           CTL-D STRUCK
076.050 167             4097X         MOV     M,A
076.051 043             4098X         INX     H
076.052 376 012         4099X         CPI     NL
076.054 302 040 076     4100X         JNE     $RTL1
076.057 053             4101X         DCX     H
076.060 066 000         4102X         MVI     M,0
076.062 043             4103X         INX     H
                        4104X
                        4105X *       ALL DONE. COMPUTE LENGTH
                        4106X
076.063 353             4107X         XCHG                    (DE) = LWA+1
076.064 343             4108X         XTHL                    (HL) = FWA
076.065 173             4109X         MOV     A,E
076.066 225             4110X         SUB     L               (A) = LENGTH
076.067 247             4111X         ANA     A               CLEAR CARRY
076.070 321             4112X         POP     D               RESTORE (DE)
076.071 311             4113X         RET
                        4114X
                        4115X *       CTL-D STRUCK
                        4116X
076.072 341             4117X $RTL2   POP     H               (HL) = FWA
076.073 067             4118X         STC
076.074 311             4119X         RET
076.075                 4120          XTEXT   TBLS


                        4122X **      $TBLS - TABLE SEARCH
                        4123X *
                        4124X *       TABLE FORMAT
                        4125X *
                        4126X *       DB      KEY1,VAL1,
                        4127X *       .       .
                        4128X *       .       .
                        4129X *       DB      KEYN,VALN
                        4130X *       DB      0
                        4131X *
                        4132X *       ENTRY   (A) = PATTERN
                        4133X *               (H,L) = TABLE FWA
```

```
                        4134X *         EXIT    (A) = PATTERN IF FOUND
                        4135X *                 'Z' SET IF FOUND
                        4136X *                 'Z' CLEAR IF NOT FOUND OR PATTERN=0              /78.10.GC/
                        4137X *         USES    A,F,H,L
                        4138X
                        4139X
076.075  305           4140X $TBLS   PUSH    B
076.076  376 000       4141X         CPI     0                                                  /78.10.GC/
076.100  312 122 076   4142X         JZ      TBL2                                               /78.10.GC/
076.103  107           4143X         MOV     B,A
076.104  176           4144X TBL1    MOV     A,M             (A) = CHARACTER
076.105  043           4145X         INX     H
076.106  270           4146X         CMP     B
076.107  312 124 076   4147X         JZ      TBL3            IF MATCH
076.112  247           4148X         ANA     A
076.113  043           4149X         INX     H               SKIP PAST
076.114  302 104 076   4150X         JNZ     TBL1            IF NOT END OF TABLE
076.117  053           4151X         DCX     H
076.120  053           4152X         DCX     H
076.121  257           4153X         XRA     A               SET TO ZERO FOR OLD USERS          /78.10.GC/
076.122  376 001       4154X TBL2    CPI     1               CLEAR ZERO                         /78.10.GC/
                        4155X
                        4156X *         DONE
                        4157X
076.124  301           4158X TBL3    POP     B
076.125  311           4159X         RET
076.126                 4160          XTEXT   RCHAR


                        4162X **        $RCHAR - READ SINGLE CHARACTER FROM CONSOLE.
                        4163X *
                        4164X *         ENTRY   NONE
                        4165X *         EXIT    (A) = CHARACTER
                        4166X *         USES    A,F
                        4167X
                        4168X
076.126  377 001       4169X $RCHAR  DB      SYSCALL,;SCIN
076.130  332 126 076   4170X         JC      $RCHAR          NOT READY
076.133  311           4171X         RET
                        4172X
076.134  377 002       4173X $WCHAR  DB      SYSCALL,;SCOUT
076.136  311           4174X         RET
076.137                 4175          XTEXT   DADA


                        4177X **        $DADA - PERFORM (H,L) = (H,L) + (0,A)
                        4178X *
                        4179X *         ENTRY   (H,L) = BEFORE VALUE
                        4180X *                 (A) = BEFORE VALUE
                        4181X *         EXIT    (H,L) = (H,L) + (0,A)
                        4182X *                 'C' SET IF OVERFLOW
                        4183X *         USES    F,H,L
```

```
                        4184X
                        4185X
030.072                 4186X $DADA   EQU     30072A          IN H17 ROM
076,137                 4187          XTEXT   UDDN


                        4189X **      $UDDN - UNPACK DECIMAL DIGITS.
                        4190X *
                        4191X *       UDDN CONVERTS A 16 BIT VALUE INTO A SPECIFIED NUMBER OF
                        4192X *       DECIMAL DIGITS. THE RESULT IS NULL FILLED TO THE LEFT.
                        4193X *
                        4194X *       ENTRY   (B,C) = ADDRESS VALUE
                        4195X *               (A) = DIGIT COUNT
                        4196X *               (H,L) = MEMORY ADDRESS
                        4197X *       EXIT    (HL) = (HL) + (A)
                        4198X *       USES    ALL
                        4199X
                        4200X
076.137                 4201X $UDDN   EQU     *
076.137 315 072 030     4202X         CALL    $DADA
076.142 345             4203X         PUSH    H               SAVE FINAL (H,L) VALUE
                        4204X
076.143 365             4205X UDDN1   PUSH    PSW
076.144 345             4206X         PUSH    H
076.145 021 012 000     4207X         LXI     D,10
076.150 315 106 030     4208X         CALL    $DU66           (H,L) = VALUE/10
076.153 104             4209X         MOV     B,H
076.154 115             4210X         MOV     C,L             (BC) = QUOTIENT
076.155 341             4211X         POP     H
076.156 076 060         4212X         MVI     A,'0'
076.160 203             4213X         ADD     E               ADD REMAINDER
076.161 053             4214X         DCX     H
076.162 167             4215X         MOV     M,A             STORE DIGIT
076.163 170             4216X         MOV     A,B
076.164 261             4217X         ORA     C
076.165 312 177 076     4218X         JZ      UDDN2           ALL ZEROS
076.170 361             4219X         POP     PSW
076.171 075             4220X         DCR     A
076.172 302 143 076     4221X         JNZ     UDDN1           IF MORE TO GO
                        4222X
                        4223X *       ALL DONE, EXIT
                        4224X
076.175 341             4225X UDDN1.5 POP     H               RESTORE H
076.176 311             4226X         RET                     RETURN
                        4227X
                        4228X *       DIGITS LEADING THIS ONE ARE ZERO, STORE NULLS INSTEAD.
                        4229X
076.177 361             4230X UDDN2   POP     PSW
076.200 075             4231X UDDN3   DCR     A
076.201 312 175 076     4232X         JE      UDDN1.5         ALL DONE
076.204 053             4233X         DCX     H
076.205 066 000         4234X         MVI     M,0
076.207 303 200 076     4235X         JMP     UDDN3
076.212                 4236          XTEXT   RND
```

```
                        4238X **      $RND - COMPUTE TAUSWORTH 15 BIT RANDOM NUMBER
                        4239X *
                        4240X *       $RND COMPUTES A RANDOM NUMBER USING RSEED
                        4241X *       AS THE SEED.
                        4242X *
                        4243X *       ENTRY   (RSEED) = NON-ZERO SEED(16 BIT)
                        4244X *       EXIT    (HL) = RANDOM NUMBER
                        4245X *       USES    A,F,H,L
                        4246X
                        4247X
076.212  052 334 101   4248X $RND    LHLD    RSEED           (HL) = SEED
076.215  325           4249X         PUSH    D               SAVE (DE)
076.216  026 017       4250X         MVI     D,15            (D) = BIT COUNT
                        4251X
076.220  174           4252X RND1    MOV     A,H             SHIFT RIGHT ONE
076.221  247           4253X         ANA     A
076.222  037           4254X         RAR
076.223  147           4255X         MOV     H,A
076.224  175           4256X         MOV     A,L
076.225  037           4257X         RAR
076.226  157           4258X         MOV     L,A
076.227  027           4259X         RAL                     'C' = 1
076.230  027           4260X         RAL
076.231  027           4261X         RAL
076.232  027           4262X         RAL                     'C' = 100
076.233  255           4263X         XRA     L               XOR WITH VALUE
076.234  027           4264X         RAL
076.235  027           4265X         RAL
076.236  027           4266X         RAL
076.237  346 100       4267X         ANI     100Q
076.241  264           4268X         ORA     H               INSERY IN LEFT
076.242  147           4269X         MOV     H,A
076.243  025           4270X         DCR     D
076.244  302 220 076   4271X         JNZ     RND1            MORE TO GO
076.247  042 334 101   4272X         SHLD    RSEED           SAVE SEED
076.252  321           4273X         POP     D               RESTORE (DE)
                        4274X
076.253  311           4275X         RET                     EXIT
076.254               4276          XTEXT   TYPT2


                        4278X **      $TYPTX - TYPE TEXT.
                        4279X *
                        4280X *       $TYPTX IS CALLED TO TYPE A BLOCK OF TEXT ON THE SYSTEM CONSOLE.
                        4281X *
                        4282X *       IMBEDDED ZERO BYTES INDICATE A CARRIAGE RETURN LINE FEED,
                        4283X *       A BYTE WITH THE 2000 BIT SET IS THE LAST BYTE IN THE MESSAGE.
                        4284X *
                        4285X *       ENTRY   (RET) = TEXT
                        4286X *       EXIT    TO (RET+LENGTH)
                        4287X *       USES    A,F
                        4288X
                        4289X
031.136                 4290X $TYPTX  EQU     31136A          IN H17 ROM
```

```
                        4291X
031,144                 4292X $TYPTX:  EQU     31144A          IN H17 ROM
076,254                 4293           XTEXT   INDL                                    /071080/


                        4295X **       $INDL - INDEXED LOAD.
                        4296X *
                        4297X *        $INDL LOADS DE WITH THE TWO BYTES AT (HL)+DISPLACMENT
                        4298X *
                        4299X *        THIS ACTS AS AN INDEXED FULL WORD LOAD.
                        4300X *
                        4301X *        (DE) = ( (HL) + DSPLACEMENT )
                        4302X *
                        4303X *        ENTRY   ((RET)) = DISPLACMENT (FULL WORD)
                        4304X *                (HL) = TABLE ADDRESS
                        4305X *        EXIT    TO (RET+2)
                        4306X *        USES    A,F,D,E
                        4307X
                        4308X
030,234                 4309X $INDL    EQU     30234A          IN H17 ROM
076,254                 4310           XTEXT   INDXX


                        4312X **       $INDLB - INDEXED LOAD BYTE
                        4313X *
                        4314X *        BYTE INDEXED LOAD PRIMITIVE
                        4315X *
                        4316X *        ENTRY:  HL      = BASE ADDRESS
                        4317X *                (RET)   = FULL WORD RELOCATION
                        4318X *
                        4319X *        EXIT:   A       = ( HL + (RET) )
                        4320X *
                        4321X *        USES:   A
                        4322X *
                        4323X
076,254  353           4324X $INDLB   XCHG                    DE = BASE
076,255  343           4325X          XTHL                    SAVE  .DE.
076,256  325           4326X          PUSH    D               SAVE  BASE
076,257  305           4327X          PUSH    B               SAVE  .BC.
                        4328X
076,260  116           4329X          MOV     C,M
076,261  043           4330X          INX     H
076,262  106           4331X          MOV     B,M             BC = OFFSET
076,263  043           4332X          INX     H               HL = .RET.
                        4333X
076,264  353           4334X          XCHG                    HL = BASE
076,265  011           4335X          DAD     B               HL = BASE + OFFSET
076,266  176           4336X          MOV     A,M             A  = ( BASE + OFFSET )
076,267  353           4337X          XCHG                    HL =  .RET.
                        4338X
076,270  301           4339X          POP     B               RESTORE  .BC.
076,271  321           4340X          POP     D               RESTORE  BASE
```

```
076.272  343          4341X          XTHL                    HL = .DE. ; (SP) = .RET.
076.273  353          4342X          XCHG                    DE = .DE. ; HL = BASE
076.274  311          4343X          RET


                       4345X **       $INDS   -  INDEXED STORE
                       4346X *
                       4347X *        INDEXED STORE PRIMITIVE.
                       4348X *
                       4349X *        ENTRY:  HL = BASE ADDRESS
                       4350X *                DE = VALUE TO STORE
                       4351X *
                       4352X *        EXIT:   ( HL + (RET) ) = DE
                       4353X *
                       4354X *        USES:   NONE
                       4355X *
                       4356X
076.275  315 364 076  4357X $INDS    CALL    XCHGBC
076.300  343          4358X          XTHL                    SAVE  .BC.
076.301  325          4359X          PUSH    D
076.302  315 352 076  4360X          CALL    ILDEHL          DE = OFFSET
076.305  315 364 076  4361X          CALL    XCHGBC          BC = .RET.
076.310  353          4362X          XCHG                    DE = BASE ; HL = OFFSET
076.311  031          4363X          DAD     D               HL = BASE + OFFSET
076.312  353          4364X          XCHG
076.313  343          4365X          XTHL                    SAVE  BASE
076.314  353          4366X          XCHG                    DE = VALUE
076.315  315 357 076  4367X          CALL    ISDEHL
076.320  341          4368X          POP     H               HL = BASE
076.321  315 364 076  4369X          CALL    XCHGBC
076.324  343          4370X          XTHL                    RESTORE  .BC.
076.325  315 364 076  4371X          CALL    XCHGBC
076.330  311          4372X          RET


                       4374X **       $INDSB  -  INDEXED BYTE STORE
                       4375X *
                       4376X *        INDEXED BYTE STORE.
                       4377X *
                       4378X *        ENTRY:  A       = VALUE TO STORE
                       4379X *                HL      = BASE ADDRESS
                       4380X *                (RET)   = OFFSET
                       4381X *
                       4382X *        EXIT:   NONE
                       4383X *
                       4384X *        USES:   PSW
                       4385X *
                       4386X
076.331  353          4387X $INDSB   XCHG                    DE = BASE
076.332  343          4388X          XTHL                    SAVE  .DE.
076.333  325          4389X          PUSH    D               SAVE  BASE
076.334  305          4390X          PUSH    B               SAVE  .BC.
```

```
                        4391X
076.335 116             4392X           MOV     C,M
076.336 043             4393X           INX     H
076.337 106             4394X           MOV     B,M             BC = OFFSET
076.340 043             4395X           INX     H               HL = .RET.
                        4396X
076.341 353             4397X           XCHG                    HL = BASE
076.342 011             4398X           DAD     B               HL = BASE + OFFSET
076.343 167             4399X           MOV     M,A             ( BASE + OFFSET ) = A
076.344 353             4400X           XCHG
                        4401X
076.345 301             4402X           POP     B               RESTORE .BC.
076.346 321             4403X           POP     D               RESTORE  BASE
076.347 343             4404X           XTHL                    HL = .DE. ; (SP) = .RET.
076.350 353             4405X           XCHG                    DE = .DE. ; HL = BASE
076.351 311             4406X           RET
076.352                 4407            XTEXT   ILDEHL


                        4409X **        ILDEHL  -  INDEXED LOAD OF DE FROM HL
                        4410X *
                        4411X *         'DE' GET THE FULL WORD VALUE POINTED TO BY 'HL', AND 'HL' IS
                        4412X *         INCREMENTED BY TWO.
                        4413X *
                        4414X *         ENTRY:  HL      = ADDRESS OF FULL WORD VALUE
                        4415X *
                        4416X *         EXIT:   DE      = (HL)
                        4417X *                 HL      = HL + 2
                        4418X *
                        4419X *         USES:   DE
                        4420X *
                        4421X
076.352 136             4422X ILDEHL    MOV     E,M
076.353 043             4423X           INX     H
076.354 126             4424X           MOV     D,M
076.355 043             4425X           INX     H
076.356 311             4426X           RET
076.357                 4427            XTEXT   ISDEHL


                        4429X **        ISDEHL  -  INDEXED STORE OF DE AT HL
                        4430X *
                        4431X *         STORE 'DE' AT THE ADDRESS POINTED TO BY 'HL', AND INCREMENT 'HL'
                        4432X *         BY 2.
                        4433X *
                        4434X *         ENTRY:  DE      = VALUE
                        4435X *                 HL      = ADDRESS OF VALUE
                        4436X *
                        4437X *         EXIT:   (HL)    = DE
                        4438X *                 HL      = HL + 2
                        4439X *
                        4440X *         USES:   HL
```

```
                                4441X *
                                4442X
076.357  163                   4443X ISDEHL  MOV     M,E
076.360  043                   4444X         INX     H
076.361  162                   4445X         MOV     M,D
076.362  043                   4446X         INX     H
076.363  311                   4447X         RET
076.364                        4448          XTEXT   XCHGBC
```

```
                                4450X **      XCHGBC  -  XCHG BC
                                4451X *
                                4452X *       EXCHANGE THE 'BC' REGISTER PAIR WITH THE 'HL' REGISTER PAIR.
                                4453X *
                                4454X *       ENTRY:  BC      = ORIGINAL BC
                                4455X *               HL      = ORIGINAL HL
                                4456X *
                                4457X *       EXIT:   BC      = ORIGINAL HL
                                4458X *               HL      = ORIGINAL BC
                                4459X *
                                4460X *       USES:   BC,HL
                                4461X *
                                4462X
076.364  365                   4463X XCHGBC  PUSH    PSW
076.365  170                   4464X         MOV     A,B
076.366  104                   4465X         MOV     B,H
076.367  147                   4466X         MOV     H,A
076.370  171                   4467X         MOV     A,C
076.371  115                   4468X         MOV     C,L
076.372  157                   4469X         MOV     L,A
076.373  361                   4470X         POP     PSW
076.374  311                   4471X         RET
076.375                        4472          XTEXT   FOPE
```

```
                                4474X **      $FOPEx - OPEN FILE BLOCK FOR I/O
                                4475X *
                                4476X *       $FOPEx IS CALLED BEFORE ANY I/O IS DONE VIA A
                                4477X *       FILE BLOCK.  $FOPEx SETS UP THE FILE BLOCK, AND OPENS
                                4478X *       THE FILE VIA *HDOS*.
                                4479X *
                                4480X *       ENTRY   (DE) = ADDRESS OF DEFAULT BLOCK
                                4481X *               (HL) = ADDRESS OF FILE BLOCK
                                4482X *       EXIT    TO $FERROR IF ERROR
                                4483X *               TO CALLER IF OK
                                4484X *       USES    A,F,B,C,D,E
                                4485X
                                4486X
076.375  315 022 077            4487X $FOPER  CALL    $FOPER.
077.000  320                   4488X         RNC
077.001  303 305 100            4489X         JMP     $FERROR         IN ERROR
                                4490X
```

```
077.004  315 025 077  4491X $FOPEW  CALL   $FOPEW.
077.007  320          4492X         RNC
077.010  303 305 100  4493X         JMP    $FERROR          IN ERROR
                      4494X
077.013  315 030 077  4495X $FOPEU  CALL   $FOPEU.
077.016  320          4496X         RNC
077.017  303 305 100  4497X         JMP    $FERROR          IN ERROR
                      4498X
                      4499X
077.022  076 002      4500X $FOPER. MVI    A,FT.OR          FILE TYPE OF OPEN FOR READ
077.024  001          4501X         DB     001Q             LXI,B TO SKIP NEXT MVI
077.025  076 004      4502X $FOPEW. MVI    A,FT.OW          OPEN FOR WRITE
077.027  001          4503X         DB     001Q             LXI,B TO SKIP NEXT MIV
077.030  076 006      4504X $FOPEU. MVI    A,FT.OR+FT.OW
                      4505X
                      4506X *       (A) = FILE FLAGS
                      4507X
077.032  345          4508X         PUSH   H                SAVE FILE BLOCK ADDRESS
077.033  365          4509X         PUSH   PSW              SAVE NEW FLAGS
000.000               4510X         ERRNZ  FB.CHA
077.034  106          4511X         MOV    B,M              (B) = CHANNEL NUMBER
077.035  305          4512X         PUSH   B                SAVE HANNEL NUMBER
000.000               4513X         ERRNZ  FB.FLG-FB.CHA-1
077.036  043          4514X         INX    H
077.037  117          4515X         MOV    C,A              (C) = NEW FILE FLAGS
077.040  176          4516X         MOV    A,M              (A) = CURRENT TYPE
077.041  247          4517X         ANA    A
077.042  171          4518X         MOV    A,C              (A) = NEW FLAGS TO BE SET
077.043  312 055 077  4519X         JZ     $FOPE1           NOT ALREADY OPEN
                      4520X
                      4521X *       ALREADY OPEN. SQUACK
                      4522X
077.046  301          4523X         POP    B                RESTORE (BC)
077.047  361          4524X         POP    PSW              DISCARD NEW FLAGS
077.050  341          4525X         POP    H                (HL) = FB ADDRESS
077.051  076 031      4526X         MVI    A,EC.FAO         FILE ALREADY OPEN
077.053  067          4527X         STC
077.054  311          4528X         RET
                      4529X
000.000               4530X         ERRNZ  FB.FWA-FB.FLG-1
077.055  043          4531X $FOPE1  INX    H                (HL) = $FB.FWA
077.056  116          4532X         MOV    C,M
077.057  043          4533X         INX    H
077.060  106          4534X         MOV    B,M              (BC) = FB.FWA
077.061  043          4535X         INX    H
000.000               4536X         ERRNZ  FB.PTR-FB.FWA-2
077.062  161          4537X         MOV    M,C              SET FB.PTR = FB.FWA
077.063  043          4538X         INX    H
077.064  160          4539X         MOV    M,B
077.065  043          4540X         INX    H
000.000               4541X         ERRNZ  FB.LIM-FB.PTR-2
077.066  161          4542X         MOV    M,C              SET FB.LIM = FB.FWA
077.067  043          4543X         INX    H
077.070  160          4544X         MOV    M,B
077.071  043          4545X         INX    H
000.000               4546X         ERRNZ  FB.NAM-FB.LIM-4
```

```
077,072  043          4547X          INX    H
077,073  043          4548X          INX    H                (HL) = $FB.NAM
                      4549X
                      4550X *        FILE BLOCK POINTERS SETUP, OPEN FILE
                      4551X
077,074  345          4552X          PUSH   H                SAVE NEW ADDRESS FOR NAME
077,075  041 126 077  4553X          LXI    H,$FOPEB
077,100  247          4554X          ANA    A                                        /78.10.GC/
077,101  312 110 077  4555X          JZ     $FOPE2
000,000               4556X          ERRNZ  .EXIT
077,104  315 075 076  4557X          CALL   $TBLS            FIND CODE
077,107  176          4558X          MOV    A,M
077,110  062 116 077  4559X $FOPE2   STA    $FOPEA           SET SYSCALL CODE
077,113  341          4560X          POP    H                (HL) = $FB.NAM
077,114  361          4561X          POP    PSW              (A) = CHANNEL NUMBER
077,115  377 000       4562X          DB     SYSCALL,.EXIT
077,116               4563X $FOPEA   EQU    *-1              SYSCALL CODE
077,117  321          4564X          POP    D                (D) = NEW FLAG
077,120  341          4565X          POP    H                (HL) = FILE BLOCK ADDRESS
077,121  330          4566X          RC                      EXIT IF ERROR
077,122  043          4567X          INX    H
000,000               4568X          ERRNZ  FB.FLG-1
077,123  162          4569X          MOV    M,D              SET NEW FLAGS
077,124  053          4570X          DCX    H                RESTORE (HL)
077,125  311          4571X          RET
                      4572X
077,126  002 042      4573X $FOPEB   DB     FT.OR,.OPENR     TABLE OF SYSCALL CODES
077,130  004 043      4574X          DB     FT.OW,.OPENW
077,132  006 044      4575X          DB     FT.OR+FT.OW,.OPENU
077,134  000          4576X          DB     0                SHOULD NOT OCCUR
077,135               4577           XTEXT  FCLO



                      4579X **       $FCLO - CLOSE FILE BLOCK.
                      4580X *
                      4581X *        $FCLO IS CALLED TO TERMINATE PROCESSING THROUGH A FILE
                      4582X *        BLOCK.
                      4583X *
                      4584X *        ENTRY  (HL) = FILE BLOCK ADDRESS
                      4585X *        EXIT   TO $ERROR IF ERROR
                      4586X *                TO CALLER IF OK
                      4587X *        USES   A,F,B,C,D,E
                      4588X
                      4589X
077,135  315 144 077  4590X $FCLO    CALL   $FCLO.
077,140  320          4591X          RNC                     NO ERROR
077,141  303 305 100  4592X          JMP    $ERROR
                      4593X
077,144  345          4594X $FCLO.   PUSH   H                SAVE FILE BLOCK ADDRESS
000,000               4595X          ERRNZ  FB.FLG-1
077,145  043          4596X          INX    H                (HL) = $FB.FLG
077,146  176          4597X          MOV    A,M
077,147  066 000       4598X          MVI    M,0              CLEAR FLAG
077,151  247          4599X          ANA    A
```

```
                          4600X          JZ      $FCLO4          FILE NOT OPEN
077.155  346 004          4601X          ANI     FT.OW
077.157  312 232 077      4602X          JZ      $FCLO3          NO WRITING, NO FLUSHING NEEDED
                          4603X
                          4604X *        WAS OPEN FOR WRITE. SEE IF NEED FLUSH THE LAST SECTOR
                          4605X
077.162  315 234 030      4606X          CALL    $INDL
077.165  003 000          4607X          DW      FB.PTR-FB.FLG
077.167  325              4608X          PUSH    D               SAVE (FB.PTR)
077.170  315 234 030      4609X          CALL    $INDL           (DE) = (FB.FWA)
077.173  001 000          4610X          DW      FB.FWA-FB.FLG
077.175  341              4611X          POP     H               (HL) = (FB.PTR)
077.176  175              4612X          MOV     A,L
077.177  223              4613X          SUB     E
077.200  117              4614X          MOV     C,A
077.201  174              4615X          MOV     A,H
077.202  232              4616X          SBB     D
077.203  107              4617X          MOV     B,A             (BC) = AMOUNT IN BLOCK
077.204  261              4618X          ORA     C
077.205  312 233 077      4619X          JZ      $FCLO3          NONE TO FLUSH
                          4620X
                          4621X *        NEED TO FLUSH BUFFER
                          4622X *
                          4623X *        (BC) = DATA AMOUNT
                          4624X *        (DE) = FWA
                          4625X *        (HL) = LWA+1
                          4626X
077.210  171              4627X          MOV     A,C
077.211  247              4628X          ANA     A
077.212  312 225 077      4629X          JZ      $FCLO2          DONT HAVE PARTIAL SECTOR
                          4630X
                          4631X *        ZERO FILL PARTIAL SECTOR
                          4632X
077.215  066 000          4633X $FCLO1   MVI     M,0
077.217  043              4634X          INX     H
077.220  014              4635X          INR     C
077.221  302 215 077      4636X          JNZ     $FCLO1
077.224  004              4637X          INR     B               COUNT ANOTHER FULL SECTOR
077.225  341              4638X $FCLO2   POP     H               (HL) = FB FWA
077.226  176              4639X          MOV     A,M             (A) = CHANNEL NUMBER
000.000                   4640X          ERRNZ   FB.CHA
077.227  345              4641X          PUSH    H
077.230  377 005          4642X          DB      SYSCALL,.WRITE          FLUSH
                          4643X
                          4644X *        READY TO CLOSE FILE.
                          4645X *
                          4646X *        'C' SET IF ERROR
                          4647X *        (A) = ERROR CODE
                          4648X
077.232  341              4649X $FCLO3   POP     H               (HL) = FILE BLOCK ADDRESS
077.233  330              4650X          RC                      ERROR
000.000                   4651X          ERRNZ   FB.CHA
077.234  176              4652X          MOV     A,M             (A) = CHANNEL NUMBER
077.235  345              4653X          PUSH    H
077.236  377 046          4654X          DB      SYSCALL,.CLOSE  CLOSE CHANNEL
077.240  341              4655X $FCLO4   POP     H               (HL) = FILE BLOCK ADDRESS
```

```
077.241  311            4656X          RET
077.242                 4657           XTEXT   FUTIL


                        4659X **       $FUTIL - UTILITY ROUTINES FOR FILE BLOCK ROUTINES.
                        4660X
                        4661X **       CBT - COPY BLOCK POINTERS TO TEMP CELLS.
                        4662X *
                        4663X *        ENTRY   (HL) = FILE BLOK FWA
                        4664X *        EXIT    NONE
                        4665X *        USES    A;F;H;L
                        4666X
077.242  325            4667X CBT      PUSH    D
077.243  305            4668X          PUSH    B               SAVE REGISTERS
000.000                 4669X          ERRNZ   TLEN-10         ASSUME 10 BYTES TO MOVE
077.244  021 004 100     4670X          LXI     D,T.CHA         (DE) = TARGET FOR MOVE
077.247  006 005         4671X          MVI     B,10/2
077.251  176            4672X CBT1     MOV     A,M             COPY FILE BUFFER INTO WORK AREA
077.252  022            4673X          STAX    D
077.253  043            4674X          INX     H
077.254  023            4675X          INX     D
077.255  176            4676X          MOV     A,M
077.256  022            4677X          STAX    D
077.257  043            4678X          INX     H
077.260  023            4679X          INX     D
077.261  005            4680X          DCR     B
077.262  302 251 077     4681X          JNZ     CBT1            MORE TO GO
077.265  301            4682X          POP     B
077.266  321            4683X          POP     D               (DE) = DATA TARGET ADDRESS
077.267  311            4684X          RET
                        4685X
                        4686X
                        4687X **       CTB - COPY TEMP CELLS BACK TO FILE BLOCK.
                        4688X *
                        4689X *        ENTRY   (HL) = FILE BLOCK ADDRESS
                        4690X *        EXIT    NONE
                        4691X *        USES    NONE
                        4692X
077.270  365            4693X CTB      PUSH    PSW
077.271  325            4694X          PUSH    D
077.272  305            4695X          PUSH    B
077.273  345            4696X          PUSH    H               SAVE REGISTERS
077.274  006 004         4697X          MVI     B,8/2
077.276  021 004 100     4698X          LXI     D,T.CHA
077.301  032            4699X CTB1     LDAX    D
077.302  167            4700X          MOV     M,A
077.303  023            4701X          INX     D
077.304  043            4702X          INX     H
077.305  032            4703X          LDAX    D
077.306  167            4704X          MOV     M,A
077.307  023            4705X          INX     D
077.310  043            4706X          INX     H
077.311  005            4707X          DCR     B
077.312  302 301 077     4708X          JNZ     CTB1            RESTORE FILE BUFFER VALUES
```

```
077.315  341          4709X          POP     H
077.316  301          4710X          POP     B
077.317  321          4711X          POP     D
077.320  361          4712X          POP     PSW
077.321  311          4713X          RET


                      4715X **       $FFB - FILE FILE BUFFER.
                      4716X *
                      4717X *        $FFB FILLS THE FILE BUFFER BY READING FROM THE FILE.
                      4718X *
                      4719X *        ENTRY   NONE
                      4720X *        EXIT    'C' SET IF READ INCOMPLETE
                      4721X *                (A) = ERROR CODE
                      4722X *                'C' CLEAR IF READ COMPLETEE
                      4723X *                DATA IN BUFFER
                      4724X *        USES    A,F,D,E,H,L
                      4725X
                      4726X
077.322  072 016 100  4727X $FFB     LDA     EOFFLG
077.325  037          4728X          RAR
077.326  330          4729X          RC                      EOF
                      4730X
                      4731X *        CAN READ MORE...DO SO
                      4732X
077.327  305          4733X          PUSH    B               SAVE COUNT
077.330  052 006 100  4734X          LHLD    T.FWA
077.333  042 010 100  4735X          SHLD    T.PTR           CLEAR REMOVAL POINTER
077.336  353          4736X          XCHG
077.337  052 014 100  4737X          LHLD    T.LWA
077.342  042 012 100  4738X          SHLD    T.LIM           SET DATA LIMIT
077.345  175          4739X          MOV     A,L
077.346  223          4740X          SUB     E
077.347  117          4741X          MOV     C,A
077.350  174          4742X          MOV     A,H
077.351  232          4743X          SBB     D
077.352  107          4744X          MOV     B,A             (BC) = ROOM IN BUFFER
077.353  072 004 100  4745X          LDA     T.CHA
077.356  377 004      4746X          DB      SYSCALL,.READ   READ BUFFER
077.360  120          4747X          MOV     D,B             (D) = SECTORS UNREAD
077.361  301          4748X          POP     B               (BC) = DESIRED COUNT
077.362  320          4749X          RNC                     GOT THE DATA
                      4750X
                      4751X *        ERROR ON READ, SEE IF EOF
                      4752X
077.363  027          4753X          RAL
077.364  062 016 100  4754X          STA     EOFFLG          SET EOF, WE HOPE
077.367  376 003      4755X          CPI     EC,EOF*2+1
077.371  037          4756X          RAR
077.372  300          4757X          RNE                     IS NOT EOF, RETURN NOW!
077.373  072 013 100  4758X          LDA     T.LIM+1
077.376  222          4759X          SUB     D
077.377  062 013 100  4760X          STA     T.LIM+1         SET AMOUNT OF DATA WE DID GET
100.002  247          4761X          ANA     A
```

```
  100.003  311          4762X          RET                       EXIT WITH DATA
                        4763X
                        4764X
                        4765X **       TEMP CELLS TO HOLD FILE BLOCK POINTERS DURING I/O
                        4766X
  000.000               4767X          ERRNZ   FB.CHA
  100.004  000          4768X T.CHA    DB      0                 CHANNEL NUMBER
  000.000               4769X          ERRNZ   *-T.CHA-FB.FLG
  100.005  000          4770X T.FLG    DB      0                 FLAG BYTE
  000.000               4771X          ERRNZ   *-T.CHA-FB.FWA
  100.006  000 000      4772X T.FWA    DW      0
  000.000               4773X          ERRNZ   *-T.CHA-FB.PTR
  100.010  000 000      4774X T.PTR    DW      0
  000.000               4775X          ERRNZ   *-T.CHA-FB.LIM
  100.012  000 000      4776X T.LIM    DW      0
  000.000               4777X          ERRNZ   *-T.CHA-FB.LWA
  100.014  000 000      4778X T.LWA    DW      0
  000.012               4779X TLEN     EQU     *-T.CHA           LENGTH OF TEMP CELLS
                        4780X
  100.016  000          4781X EOFFLG   DB      0
  100.017               4782           XTEXT   FWRIB


                        4784X **       $FWRIB - WRITE BYTES FROM FILE BUFFER.
                        4785X *
                        4786X *        $FWRIB IS CALLED TO WRITE A NUMBER OF BYTES FROM A FILE BUFFER.
                        4787X *
                        4788X *        ENTRY   (BC) = BYTE COUNT
                        4789X *                (DE) = FWA FOR BYTES
                        4790X *                (HL) = ADDRESS OF FILE BUFFER
                        4791X *        EXIT    TO *FERROR* IF ERROR
                        4792X *                TO CALLER IF OK
                        4793X *                 (DE) = ADDRESS OF FIRST UNWRITTEN BYTE
                        4794X *        USES    A,F,B,C,D,E
                        4795X
                        4796X
  100.017  315 026 100  4797X $FWRIB   CALL    $FWRIB.
  100.022  320          4798X          RNC                       RETURN IF OK
  100.023  303 305 100  4799X          JMP     $FERROR           ERROR
                        4800X
                        4801X
  100.026               4802X $FWRIB.  EQU     *
  100.026  345          4803X          PUSH    H
  100.027  315 242 077  4804X          CALL    CBT               COPY BUFFER POINTERS TO TEMP CELLS
                        4805X
                        4806X *        COPY DATA FROM USER AREA TO BUFFER
                        4807X
  100.032  325          4808X $WRIB2   PUSH    D                 SAVE AREA ADDRESS
  100.033  072 005 100  4809X          LDA     T.FLG
  100.036  346 004      4810X          ANI     FT.OW             SEE IF OPEN FOR WRITE
  100.040  312 174 100  4811X          JZ      $WRIB8            FILE NOT OPEN FOR WRITE
  100.043  170          4812X          MOV     A,B
  100.044  261          4813X          ORA     C
  100.045  312 174 100  4814X          JZ      $WRIB8            ALL DONE
```

```
                                4815X
                                4816X *         COMPUTE MIN( ROOM IN BUFFER, WRITE COUNT REQUESTED)
                                4817X
100.050  052 010 100           4818X $WRIB3    LHLD    T.PTR
100.053  353                   4819X           XCHG                    (DE) = (FB.PTR) = ADDRESS OF ROOM
100.054  052 014 100           4820X           LHLD    T.LWA           (HL) = LIMIT ADDRESS
100.057  175                   4821X           MOV     A,L
100.060  223                   4822X           SUB     E
100.061  157                   4823X           MOV     L,A
100.062  174                   4824X           MOV     A,H
100.063  232                   4825X           SBB     D
100.064  147                   4826X           MOV     H,A             (HL) = BYTES OF ROOM IN BUFFER
100.065  171                   4827X           MOV     A,C             COMPARE REQUESTED COUNT TO BUFFER ROOM
100.066  225                   4828X           SUB     L
100.067  170                   4829X           MOV     A,B
100.070  234                   4830X           SBB     H
100.071  322 076 100           4831X           JNC     $WRIB4          MORE REQUESTED THEN ROOM
100.074  140                   4832X           MOV     H,B
100.075  151                   4833X           MOV     L,C             USE REQUESTED COUNT
100.076  174                   4834X $WRIB4    MOV     A,H
100.077  265                   4835X           ORA     L
100.100  302 140 100           4836X           JNZ     $WR1B6          SOME ROOM IN BUFFER
                                4837X
                                4838X *         BUFFER IS FULL, EMPTY IT
                                4839X
100.103  305                   4840X           PUSH    B               SAVE COUNT
100.104  052 006 100           4841X           LHLD    T.FWA
100.107  042 010 100           4842X           SHLD    T.PTR           CLEAR REMOVAL POINTER
100.112  353                   4843X           XCHG
100.113  052 014 100           4844X           LHLD    T.LWA
100.116  175                   4845X           MOV     A,L
100.117  223                   4846X           SUB     E
100.120  117                   4847X           MOV     C,A
100.121  174                   4848X           MOV     A,H
100.122  232                   4849X           SBB     D
100.123  107                   4850X           MOV     B,A             (BC) = DATA IN BUFFER
100.124  072 004 100           4851X           LDA     T.CHA
100.127  377 005               4852X           DB      SYSCALL,.WRITE  WRITE BUFFER
100.131  301                   4853X           POP     B               (BC) = DESIRED COUNT
100.132  322 050 100           4854X           JNC     $WRIB3          GOT THE DATA
                                4855X
                                4856X *         ERROR ON WRITE.
                                4857X
100.135  303 174 100           4858X           JMP     $WR1B8          HAVE ERROR
                                4859X
                                4860X *         GOT THE DATA, MOVE IT FROM BUFFER TO TARGET
                                4861X *
                                4862X *         (BC) = REQUEST COUNT
                                4863X *         (DE) = TO
                                4864X *         (HL) = COUNT
                                4865X *         ((SP)) = FROM
                                4866X
100.140  171                   4867X $WRIB6    MOV     A,C
100.141  225                   4868X           SUB     L
100.142  117                   4869X           MOV     C,A
100.143  170                   4870X           MOV     A,B
```

```
100,144  234            4871X           SHB     H
100,145  107            4872X           MOV     B,A             REMOVE BYTES ABOUT TO BE MOVED FROM REQUEST COUNT
100,146  305            4873X           PUSH    B
100,147  343            4874X           XTHL                    (HL) = REMAINING REQUEST COUNT
100,150  301            4875X           POP     B               (BC) = COUNT FOR THIS COPY
100,151  343            4876X           XTHL                    (HL) = TARGET ADDR, ((SP)) = REMAINING REQ. COUNT
100,152  176            4877X $WRIB7    MOV     A,M
100,153  022            4878X           STAX    D
100,154  023            4879X           INX     D
100,155  043            4880X           INX     H
100,156  013            4881X           DCX     B
100,157  170            4882X           MOV     A,B
100,160  261            4883X           ORA     C
100,161  302 152 100     4884X           JNZ     $WRIB7          MORE TO GO
100,164  353            4885X           XCHG
100,165  042 010 100     4886X           SHLD    T.PTR           UPDATE POINTER
100,170  301            4887X           POP     B               (BC) = REMAINING COUNT
100,171  303 032 100     4888X           JMP     $WRIB2          SEE IF MORE IN BUFFER
                        4889X
                        4890X *         WRITE COMPLETE.
                        4891X *
                        4892X *         (PSW) = COMPLETION FLAGS
                        4893X
100,174  321            4894X $WRIB8    POP     D               RESTORE TARGET ADDRESS
100,175  341            4895X           POP     H
100,176  303 270 077     4896X           JMP     CTB             COPY TEMP POINTERS BACK TO BLOCK, EXIT


                        4898X **        $FWBRK - BREAKOUTPUT                                    /80,02,GC/
                        4899X *
                        4900X *         $FWBRK empties the specified buffer by filling it with NULLs
                        4901X *         and then writing it.  Note this is used to insure that block
                        4902X *         mode I/O is output if it is not really a serial device (eg.
                        4903X *         writing to AT: from  *EDIT*.
                        4904X *
                        4905X *
                        4906X *         ENTRY:  HL      = FILE BLOCK POINTER
                        4907X *
                        4908X *         EXIT:   HL      = FILE BLOCK POINTER
                        4909X *                 TO  $FERROR IF ERROR
                        4910X *
                        4911X *         USES:   PSW,BC,DE
                        4912X *
                        4913X
100,201  315 210 100     4914X $FWBRK    CALL    $FWBRK.
100,204  320            4915X           RNC                     NO ERROR
                        4916X
100,205  303 305 100     4917X           JMP     $FERROR
                        4918X
100,210  345            4919X $FWBRK.   PUSH    H
100,211  315 242 077     4920X           CALL    CBT             COPY BUFFER TO TEMPORARY
100,214  315 224 100     4921X           CALL    $FWBRK1
100,217  341            4922X           POP     H
100,220  315 270 077     4923X           CALL    CTB             COPY TEMPORARY TO BUFFER
```

```
100.223  311            4924X          RET
                        4925X
100.224  052 014 100    4926X $FWBRK1  LHLD    T.LWA
100.227  353            4927X          XCHG                  DE = BUFFER LWA
100.230  052 010 100    4928X          LHLD    T.PTR         HL = BUFFER PTR
100.233  173            4929X          MOV     A,E
100.234  225            4930X          SUB     L
100.235  117            4931X          MOV     C,A
100.236  172            4932X          MOV     A,D
100.237  234            4933X          SBB     H
100.240  107            4934X          MOV     B,A           BC = DE - HL
100.241  261            4935X          ORA     C
100.242  310            4936X          RZ                    THE BUFFER IS ALREADY FLUSHED
                        4937X
                        4938X *        FILL THE BUFFER WITH NULLS
                        4939X
100.243  170            4940X FWBRK2   MOV     A,B
100.244  261            4941X          ORA     C
100.245  312 257 100    4942X          JZ      FWBRK3        NO MORE LEFT TO FILL
                        4943X
100.250  066 000        4944X          MVI     M,0
100.252  043            4945X          INX     H
100.253  013            4946X          DCX     B
100.254  303 243 100    4947X          JMP     FWBRK2
                        4948X
100.257  052 006 100    4949X FWBRK3   LHLD    T.FWA
100.262  042 010 100    4950X          SHLD    T.PTR
100.265  353            4951X          XCHG                  DE = BUFFER FWA
100.266  052 014 100    4952X          LHLD    T.LWA         HL = BUFFER LWA
100.271  175            4953X          MOV     A,L
100.272  223            4954X          SUB     E
100.273  117            4955X          MOV     C,A
100.274  174            4956X          MOV     A,H
100.275  232            4957X          SBB     D
100.276  107            4958X          MOV     B,A           BC = HL - DE  ( BC = COUNT )
100.277  072 004 100    4959X          LDA     T.CHA
100.302  377 005        4960X          DB      SYSCALL,.WRITE
100.304  311            4961X          RET
100.305                 4962           XTEXT   FERROR


                        4964X **       $FERROR - PROCESS FILE ERRORS.
                        4965X *
                        4966X *        $FERROR IS CALLED TO COMPLAIN ABOUT AN ERROR ENCOUNTERED
                        4967X *        WHEN PROCESSING FILES.
                        4968X *
                        4969X *        ENTRY   (A) = ERROR CODE
                        4970X *                (HL) = ADDRESS OF FILE NAME - FB.NAM
                        4971X *        EXIT    TO RESTART
                        4972X *        USES    ALL
                        4973X
                        4974X
100.305  365            4975X $FERROR  PUSH    PSW           SAVE CODE
100.306  315 136 031    4976X          CALL    $TYPTX
```

```
100.311  012 007 105  4977X          DB      NL,BELL,'ERROR ON FILE',' '+2000
100.331  021 012 000  4978X          LXI     D,FB.NAM
100.334  031          4979X          DAD     D
                      4980X
                      4981X *        PRINT FILE NAME
                      4982X
100.335  176          4983X $FERR1   MOV     A,M
100.336  043          4984X          INX     H               ADVANCE MESSAGE
100.337  247          4985X          ANA     A
100.340  312 351 100  4986X          JZ      $FERR2
100.343  315 134 076  4987X          CALL    $WCHAR
100.346  303 335 100  4988X          JMP     $FERR1
                      4989X
                      4990X *        TYPE ERROR MESSAGE
                      4991X
100.351  315 136 031  4992X $FERR2   CALL    $TYPTX
100.354  040 055 240  4993X          DB      '-',' '+200Q
100.357  046 012       4994X          MVI     H,NL
100.361  361          4995X          POP     PSW             (A) = CODE
100.362  377 057       4996X          DB      SYSCALL,.ERROR
100.364  303 356 042  4997X          JMP     RESTART         EXIT
100.367               4998           XTEXT   DDS


                      5000X **       DDS     - Decode Device Specification          /80.05.sc/
                      5001X *
                      5002X *        DDS decodes the device specification, returning a two character
                      5003X *        device name, and one byte unit number.
                      5004X *
                      5005X *
                      5006X *        ENTRY:  BC      = Address of destination fields
                      5007X *                DE      = Address of default
                      5008X *                HL      = Address of string specifier
                      5009X *
                      5010X *        EXIT:   PSW     = 'C' SET   if ERROR
                      5011X *                          'C' CLEAR if NO ERROR
                      5012X *
                      5013X *        USES:   ALL
                      5014X *
                      5015X
100.367               5016X DDS      EQU     *
                      5017X
                      5018X *        Initialize the fields to the defaults
                      5019X
100.367  305          5020X          PUSH    B
100.370  315 077 101  5021X          CALL    DDS3
100.373  315 077 101  5022X          CALL    DDS3
100.376  032          5023X          LDAX    D
100.377  326 060      5024X          SUI     '0'
101.001  002          5025X          STAX    B
101.002  301          5026X          POP     B
                      5027X
101.003  176          5028X          MOV     A,M
101.004  247          5029X          ANA     A
```

```
        101.005  310           5030X         RZ                    took the default
                               5031X
                               5032X *       Check the supplied name
                               5033X
        101.006  315 107 101   5034X         CALL    $SOB          skip the whitespace
        101.011  315 060 101   5035X         CALL    DDS2
        101.014  330           5036X         RC                    Not alpha
        101.015  315 060 101   5037X         CALL    DDS2
        101.020  330           5038X         RC                    Not alpha
                               5039X
        101.021  176           5040X         MOV     A,M
        101.022  376 072       5041X         CPI     ':'
        101.024  076 000       5042X         MVI     A,0           assume unit 0
        101.026  312 042 101   5043X         JZ      DDS1          default to unit 0
                               5044X
                               5045X *       Check for a valid digit
                               5046X
        101.031  176           5047X         MOV     A,M
        101.032  326 060       5048X         SUI     '0'
        101.034  330           5049X         RC                    Not digit
        101.035  376 010       5050X         CPI     7+1
        101.037  077           5051X         CMC
        101.040  330           5052X         RC                    digit too large
        101.041  043           5053X         INX     H
                               5054X
        101.042  002           5055X DDS1    STAX    B
        101.043  003           5056X         INX     B
        101.044  176           5057X         MOV     A,M
        101.045  043           5058X         INX     H
        101.046  376 072       5059X         CPI     ':'
        101.050  067           5060X         STC
        101.051  300           5061X         RNZ                   requires ':'
                               5062X
        101.052  176           5063X         MOV     A,M
        101.053  247           5064X         ANA     A
        101.054  067           5065X         STC
        101.055  300           5066X         RNZ                   require 'NULL'
                               5067X
        101.056  247           5068X         ANA     A             Clear ERROR flag
        101.057  311           5069X         RET
                               5070X
        101.060  176           5071X DDS2    MOV     A,M
        101.061  043           5072X         INX     H
        101.062  315 017 076   5073X         CALL    $MCU
        101.065  376 101       5074X         CPI     'A'
        101.067  330           5075X         RC                    Not alpha
                               5076X
        101.070  376 133       5077X         CPI     'Z'+1
        101.072  077           5078X         CMC
        101.073  330           5079X         RC                    Not alpha
                               5080X
        101.074  002           5081X         STAX    B
        101.075  003           5082X         INX     B             replace the default char
        101.076  311           5083X         RET
                               5084X
        101.077  032           5085X DDS3    LDAX    D
```

```
101.100  023          5086X          INX     D
101.101  315 017 076  5087X          CALL    $MCU            Map to upper case
101.104  002          5088X          STAX    B
101.105  003          5089X          INX     B
101.106  311          5090X          RET
000.000               5091X          ERRNZ   IOC.UNI-IOC.DEV-2       2 byte device
000.000               5092X          ERRNZ   IOC.DIR-IOC.UNI-1       1 byte unit
101.107               5093           XTEXT   SOB


                      5095X **       $SOB - SKIP OVER BLANKS.
                      5096X *
                      5097X *        $SOB IS CALLED TO SKIP AN ARBITRARILY LONG STRING OF BLANKS AND TABS.
                      5098X *
                      5099X *        ENTRY   (HL) = FWA OF (POSSIBLE) BLANK STRING
                      5100X *        EXIT    (HL) = LWA+1 OF BLANK STRING (UNCHANGED IF NO BLANKS)
                      5101X *                (A) = FIRST NON-BLANK, NON-TAB CHARACTER EEN
                      5102X *        USES    A,F,H,L
                      5103X
                      5104X
101.107  053          5105X $SOB     DCX     H               PRE-DECREMENT
101.110  043          5106X $SOB1    INX     H
101.111  176          5107X          MOV     A,M
101.112  376 040      5108X          CPI     ' '
101.114  312 110 101  5109X          JE      $SOB1           GOT BLANK
101.117  376 011      5110X          CPI     TAB
101.121  312 110 101  5111X          JE      $SOB1           GOT TAB
101.124  311          5112X          RET
101.125               5113           XTEXT   PDD


                      5115X **       $PDD - PACK DECIMAL DIGITS.
                      5116X *
                      5117X *        $PDD PACKS A STRING OF DECIMAL DIGITS INTO A DECIMAL INTEGER.
                      5118X *
                      5119X *        THE CHARACTERS MUST BE IN MEMORY, AND BE IMMEDIATELY FOLLOWED BY A
                      5120X *        00 BYTE.
                      5121X *
                      5122X *        ENTRY   (HL) = ADDRESS OF CHARACTERS
                      5123X *        EXIT    'C' CLEAR IF OK
                      5124X *                (HL) = NUMBER
                      5125X *                'C' SET IF ERROR
                      5126X *        USES    A,F,D,E,H,L
                      5127X
                      5128X
101.125  353          5129X $PDD     XCHG                    (DE) = TEXT ADDRESS
101.126  041 000 000  5130X          LXI     H,0             (HL) = ACCUM
                      5131X
101.131  032          5132X $PDD1    LDAX    D
101.132  023          5133X          INX     D               ADVANCE ADDRESS
101.133  247          5134X          ANA     A
101.134  310          5135X          RZ                      ALL DONE
```

```
101.135  326 060      5136X          SUI     '0'
101.137  330          5137X          RC                      TOO SMALL
101.140  376 012      5138X          CPI     10
101.142  077          5139X          CMC
101.143  330          5140X          RC                      TOO SMALL
101.144  325          5141X          PUSH    D               SAVE (DE)
101.145  353          5142X          XCHG
101.146  315 324 030  5143X          CALL    $MU10
101.151  321          5144X          POP     D
101.152  330          5145X          RC                      OVERFLOW
101.153  205          5146X          ADD     L
101.154  157          5147X          MOV     L,A
101.155  076 000      5148X          MVI     A,0
101.157  214          5149X          ADC     H
101.160  147          5150X          MOV     H,A
101.161  322 131 101  5151X          JNC     $PDD1           NOT OVERFLOW
101.164  311          5152X          RET
101.165               5153           XTEXT   MU10                                    /071080/


                      5155X **       $MU10 - MULTIPLY UNSIGNED 16 BIT QUANTITY BY 10.
                      5156X *
                      5157X *        (HL) = (DE)*10
                      5158X *
                      5159X *        ENTRY   (DE) = MULTIPLIER
                      5160X *        EXIT    'C' CLEAR IF OK
                      5161X *                 (HL) = PRODUCT
                      5162X *                 'C' SET IF ERROR
                      5163X *        USES    D,E,H,L,F
                      5164X
                      5165X
030,324               5166X $MU10    EQU     30324A          IN H17 ROM
101.165               5167           XTEXT   DOS             DISMOUNT OPERATING SYSTEM


                      5169X **       $DOS - DISMOUNT OPERATING SYSTEM.
                      5170X *
                      5171X *        $DOS disounts all units of all directory devices        /80.04.sc/
                      5172X *
                      5173X *        THE USER IS MESSAGED ABOUT THE DISKS, AND THE OPERATING
                      5174X *        SYSTEM IS NOTIFIED.
                      5175X *
                      5176X *
                      5177X *        ENTRY   NONE
                      5178X *
                      5179X *        EXIT    (PSW)   = 'C' CLEAR IF NO ERROR
                      5180X *                          'C' SET   IF   ERROR
                      5181X *                         (A)  = ERROR CODE
                      5182X *
                      5183X *        USES    ALL
                      5184X *
                      5185X
```

```
101.165  315 136 031  5186X $DOS   CALL    $TYPTX
101.170  012 007 104  5187X         DB      NL,BELL,'Dismounting All Disks!',NL,ENL
                      5188X
101.222  315 317 101  5189X         CALL    $DOS.
101.225  330          5190X         RC
                      5191X
101.226  315 136 031  5192X         CALL    $TYPTX
101.231  012 122 145  5193X         DB      NL,'Remove the Disk(s). Hit RETURN when ready!',' '+200Q
                      5194X
101.305  315 126 076  5195X DOS1    CALL    $RCHAR          READ CHARACTER
101.310  376 012      5196X         CPI     NL
101.312  302 305 101  5197X         JNE     DOS1
                      5198X
101.315  247          5199X         ANA     A               CLEAR CARRY
101.316  311          5200X         RET


101.317  076 000      5202X $DOS.   MVI     A,OVL0
101.321  377 010      5203X         SCALL   .LOADO
101.323  330          5204X         RC
                      5205X
101.324  076 001      5206X         MVI     A,OVL1
101.326  377 010      5207X         SCALL   .LOADO
101.330  330          5208X         RC
                      5209X
101.331  377 206      5210X         SCALL   .DAD            Dismount all Disks              /80.09.sc/
101.333  311          5211X         RET
                      5212
```

```
101.334  000 000      5215  RSEED   DW      0               RANDOM NUMBER SEED
                       5216
101.336  000          5217  UNIT    DB      0               UNIT NUMBER
                       5218
101.337                5219  MEML    EQU     *               MEM LWA
                       5220
101.337                5221  PATCH   DS      40              PATCH AREA
                       5222
102.007                5223  PASS    DS      2               PASS NUMBER
                       5224
                       5225
102.011                5226  MAIA    DS      1               TRACK SEEK TIME
                       5227
102.012                5228  TRKFLG  DS      1               FLAG := 0 I/O FOR TRACK 0      /071080/
                       5229
102.013                5230  INTDSK  DS      1               FLAG := <>0 INITIALIZED DISK MOUNTED
                       5231
102.014                5232  LABEL   DS      256             LABEL SECTOR
                       5233
103.014                5234  LINE    DS      32              LINE BUFFER                    /071080/
                       5235
                       5236  **      MULTI-USE BUFFER
                       5237  *
                       5238  *       THIS FREE SPACE IS USED BY MANY ROUTINES.
                       5239
103.054                5240  FREE    EQU     *
103.054                5241  BUFF    DS      10*256          ENOUGH FOR A TRACK
115.054                5242  .       SET     *
103.054                5243          ORG     FREE
103.054                5244  SECERR  DS      390*2
106.070                5245  SECBUF  DS      256
107.070                5246  SECBUF2 DS      256
110.070                5247  .       SET     *
                       5248
110.070                5249  RMEML   EQU     *               MINIMUM RUN TIME MEMORY LIMIT   *071080*
110.070                5250          END
ASSEMBLY COMPLETE
5250 STATEMENTS
   0 ERRORS DETECTED
8556 BYTES FREE
```

```
$SAVALL 031054  2067    2904    2935    3830    4006E
$SOB    101107  5034    5105L
$SOB1   101110  5106L   5109    5111
$TBLS   076075  1051    4140L   4557
$TJMP   031061  1063    4026E
$TJMP.  031062  4028E
$TYPTX  031136  1030    1043    1053    1092    1115    1121    1168    1174    1197    1232    1267    1290
                1322    1357    2233    2236    2256    2388    2395    2405    2413    2444    2450    2493    2519
                4290E   4976    4992    5186    5192
$TYPTX. 031144  3366    3391    4292E
$UDDN   076137  2049    2070    2308    2345    2358    2979    2985    4201E
$WCHAR  076134  1056    1120    1173    2449    4173L   4987
$WRIB2  100032  4808L   4888
$WRIB3  100050  4818L   4854
$WRIB4  100076  4831    4834L
$WRIB6  100140  4836    4867L
$WRIB7  100152  4877L   4884
$WRIB8  100174  4811    4814    4858    4894L
.       110070  5242S   5247S
.ABUSS  040024   152E   1866    2008    2011    2015    2142    2146    2312
.ALARM  002136   125E
.ALEDS  040013   150E   1472    1490    1492
.CHFLG  000060   820L
.CLEAN  000205   835L
.CLEAR  000055   817L    968
.CLEARA 000056   818L
.CLOSE  000046   810L   4654
.CLRCO  000007   794L   1029
.CONSL  000006   793L   3833
.CRC    002347   133E
.CRCSUM 040027   153E
.CTC    002172   127E
.CTL2FL 040066   159E
.CTLC   000041   805L    995    1017    1134    1193    1230    1405    1858    1995
.CTLFLG 040011   149E
.DAD    000206   836L   5210
.DEBUG. 000001    39E   2936
.DECODE 000053   815L
.DELET  000050   812L
.DISMT  000061   821L
.DLEDS  040021   151E
.DLY    000053   122E   1500    2731
.DMNMS  000203   833L
.DMOUN  000201   831L
.DOD    003122   136E
.DODA   003356   138E   1767
.DSPMOD 040007   147E    971
.DSPROT 040006   146E   1024    2139
.DUMP   001374   124E
.ERROR  000057   819L   1096    4996
.EXIT   000000   787L   1107    4556    4562
.HORN   002140   126E
.IDENT  000000   121E
.IOWRK  040002   144E
.LINK   000040   804L
.LOAD   001267   123E
.LOADD  000062   822L
.LOADO  000010   795L    947     949    5203    5207
```

```
.MFLAG  040010  148E   973   975  1026  1452  1454
.MONMS  000202  832L
.MOUNT  000200  830L
.NAME   000054  816L
.NMIRET 040064  158E
.OPEN   000063  823L
.OPENC  000045  809L
.OPENR  000042  808L  4573
.OPENU  000044  808L  4575
.OPENW  000043  807L  4574
.PCHL   002264  129E
.POSIT  000047  811L
.PRINT  000003  790L
.RCK    003260  137E
.READ   000004  791L  4746
.REGI   040005  145E
.REGPTR 040035  156E
.RENAM  000051  813L
.RESET  000204  834L
.RNB    002331  132E
.RNP    002325  131E
.SCIN   000001  788L  4169
.SCOUT  000002  789L  1792  1815  1819  3880  4173
.SETTP  000052  814L   952
.SRS    002265  130E
.START  040000  143E
.SYSRES 000012  797L
.TICCNT 040033  155E  1000
.TPERR  002205  128E
.TPERRX 040031  154E
.UIVEC  040037  157E
.VERS   000011  796L   959
.WNB    003024  135E
.WNP    003017  134E
.WRITE  000005  792L  4642  4852  4960
ABS.COD 000010  553L   930
ABS.ENT 000006  551L
ABS.ID  000000  547L
ABS.LDA 000002  549L
ABS.LEN 000004  550L
AIO.CGN 041047  704L
AIO.CHA 041116  719L
AIO.CNT 041111  715L
AIO.CSI 041050  705L
AIO.DDA 041041  700E
AIO.DES 041055  709L
AIO.DEV 041057  710L
AIO.DIR 041062  713L
AIO.DTA 041053  708L
AIO.EOF 041113  717L
AIO.EOM 041112  716L
AIO.FLG 041043  701L
AIO.GRT 041044  702L
AIO.LGN 041051  706L
AIO.LSI 041052  707L
AIO.SPG 041046  703L
AIO.TFP 041114  718L
AIO.UNI 041061  711L  1142  1218  3108  3623  3770
```

```
AIO.VEC 041040   699L
ALIGN   045223   1071    1166E
ALN$    045367   1176E   1179
ALN0    046010   1188E   1241
ALN0.5  046023   1195E   1202    1208    1212
ALN0.7  046107   1205    1209E
ALN3    046225   1237E   1242
ALN4    046241   1229    1246E
ALNA    046247   1213    1220    1251L
ALNB    046250   1190    1239    1248    1252L
BELL    000007   168E    1054    1093    1094    1358    2396    2494    2520    4977    5187
BITS    075312   1414    3627    3804L
BITS1   075317   3809L   3811
BKSP    000010   170E
BOOT.P  000001   679E
BOOTA   037132   925E    3527
BOOTAL  000130   926E    3526
BUFF    103054   2565    2574    2643    2659    2854    2863    3009    3012    5241L
C.DSYN  000375   235E
C.STX   000002   172E
C.SYN   000026   171E
CB.CLI  000100    67E     90
CB.MTL  000040    66E
CB.SPK  000200    68E
CB.SSI  000020    65E
CB2.CLI 000002    71E
CB2.ORG 000040    72E
CB2.SID 000100    73E
CB2.SSI 000001    70E
CBT     077242   4667L   4804    4920
CBT1    077251   4672L   4681
CCP     066134   1917    1933    2551L
CCP1    066146   2556L   2607
CCP1.5  066163   2564L
CCP2    066212   2576L   2585
CCP2.5  066232   2573    2589L   2624
CCP3    066263   2593    2605L
CCP4    066272   2603    2611L
CCPA    066326   2563    2566    2631L
CCPB    066316   2553    2559    2589    2605    2627L
CCPC    066320   2552    2604    2627    2628L
CCPERR  066274   2578    2582    2617L
CCPERR1 066312   2621    2623L
CDB.H84 000001    622E
CDB.H85 000000    621E
CEC     071217   1864    2154    2313    2904L   2970    2988
CFF     031354    903E
CIP     071045   1947    2821L
CIP1    071050   2822L   2829
CLEAN   044354   1070    1113E
CLN0    045116   1123E   1126
CLN3    045164   1146E   1155
CLN4    045213   1133    1150    1157E
CLOCK   034031    928E
CN.170M 000014    108E
CN.174M 000003    107E
CN.ABO  000200    112E
CN.BAU  000100    111E
```

```
CN.MEM  000040   110E
CN.PRI  000020   109E
CND.H17 000000   114E
CND.H47 000001   116E
CND.NDI 000000   115E
CO.FLG  000001   532E   3832
CR      000015   164E
CS.FLG  000200   533E
CSL.CHR 000001   509E
CSL.ECH 000200   506E
CSL.RAW 000004   507E
CSL.WRP 000002   508E
CSV     055073  2010    2014   2018   2112L
CSV1    055103  2118L   2123
CSV10   055314  2157    2210L
CSV2    055122  2128    2136L
CSV3    055142  2146L   2214
CSV4    055153  2154L   2206
CSV5    055206  2170L
CSV6    055220  2172    2177L
CSV7    055252  2181    2183   2187L
CSV8    055272  2194    2196L
CSV9    055306  2200    2203L
CSVA    055332  2136    2163   2217L
CSVB    055333  2150    2218L
CTB     077270  4693L   4896   4923
CTB1    077301  4699L   4708
CTLA    000001   179E
CTLB    000002   180E
CTLC    000003   181E    994   1016   1132   1191   1228   1403   1856   1993
CTLD    000004   182E   4095
CTLO    000017   183E
CTLP    000020   184E
CTLQ    000021   185E
CTLS    000023   186E
CTLZ    000032   187E
CTP.2SB 000010   518E
CTP.BKM 000002   519E
CTP.BKS 000200   514E
CTP.FF  000100   515E
CTP.MLI 000040   516E
CTP.MLO 000020   517E
CTP.TAB 000001   520E
CYR     071237  2258    2407   2922L
CYRA    071255  2924    2928L
D.ABORT 040141   415L
D.CDE   040160   420L   3539
D.CON   040110   366L    385   3528
D.DLY   040235   435L
D.DLYHS 040244   453L
D.DLYMO 040243   452L   1145   1148   1236
D.DRVTB 040251   458L
D.DTS   040163   421L
D.DVCTL 040242   450L   1419
D.E.CHK 040267   469L
D.E.HCK 040270   470L
D.E.HSY 040266   468L
D.E.MDS 040265   467L
```

```
D.E.TRK 040272   472L
D.E.VOL 040271   471L
D.ERR   040265   466L  1008  1009  1010
D.ERRL  040273   473L
D.ERRT  040232   434L  3536
D.ERTS  040126   401L  3560  3688
D.HECNT 040261   460L  2173  2186  2191  2315  2618  2906  2963  2974  3026  3041  3045
                 3684
D.LPS   040177   425L
D.LPSA  040116   392L
D.MAI   040171   423L
D.MAIA  040115   391L   987  1022  2302  2342  3563
D.MAO   040174   424L
D.MOUNT 040133   413L
D.OECNT 040264   462L  3674  3680  3769
D.OPR   040273   477L
D.OPW   040275   478L  3723  3725
D.RAM   040240   369L   445   480
D.RAML  000037   480E
D.RDB   040202   426L
D.READ  040147   417L
D.READR 040152   418L
D.SDP   040205   427L  1143  1219  3545  3722
D.SDPA  040117   393L
D.SDPB  040120   394L
D.SDT   040166   422L  1154  1226  3547  3550  3669
D.SECNT 040262   461L  2170  2197  2318  2858  2867  2908  2966  2980  3649  3651  3671
                 3673  3680  3684
D.STS   040210   428L
D.STSA  040121   395L
D.STSB  040122   396L
D.STZ   040213   429L  1224  3668
D.SYDD  040130   412L
D.TRKPT 040245   455L
D.TS    040241   448L
D.TT    040240   447L  1151  1153  1221  1865  2311  3687
D.UDLY  040216   430L  3703
D.VEC   040130   368L   410
D.VOLPT 040247   456L
D.WHDA  040123   397L
D.WNB   040227   433L
D.WNHA  040124   398L
D.WRITA 040112   388L
D.WRITB 040113   389L
D.WRITC 040114   390L
D.WRITE 040155   419L  3542
D.WSC   040221   431L
D.WSCA  040125   399L
D.WSP   040224   432L
D.XIT   040144   416L
D.XITA  040110   387L  3555  3558
D.XOK   040136   414L
D2H     053060  1474  1478  1759L
D2H1    053071  1764  1766L
DC.ABT  000007   347L  1027  1139  1158  1183  1408  1897  2056
DC.CLO  000006   346L
DC.LOD  000011   349L   985  3111
DC.MAX  000013   351L
```

```
DC.MOU  000010      348L     2465    3096
DC.OPR  000003      343L
DC.OPU  000005      345L
DC.OPW  000004      344L
DC.RDY  000012      350L     3115
DC.REA  000000      340L     2129    2484    2587    2855    2864    3007    3059
DC.RER  000002      342L
DC.WRI  000001      341L     2127    2512    2660    3061    3140
DCA     032002      905E
DDF.BOL 000011      274E
DDF.BOO 000000      273L
DDF.LAB 000011      275L     2487    2515
DDF.USR 000012      276L
DDRV    072105      986      1028    1140    1159    1184    1409    1898    2057    2165    2466    2488    2516
                    3038     3058E   3097
DDRV.   072062      2568     2661    2856    2865    3010    3037E   3143
DDRV1   072117      3060     3063E
DDRV1.  072103      3043     3046L
DDRV2   072155      3070     3087E
DDRV3   072171      3082     3095E
DDRV4   072176      3077     3090    3099E
DDRV5   072202      3062     3105E
DDS     100367      1301     5016E
DDS1    101042      5043     5055L
DDS2    101060      5035     5037    5071L
DDS3    101077      5021     5022    5085L
DEF.TDT 000017      3785E    3787
DEV.DDA 000004      580L
DEV.DVG 000015      593L
DEV.DVL 000013      592L
DEV.FLG 000006      581L
DEV.JMP 000003      579L
DEV.MNU 000010      589L
DEV.MUM 000007      588L
DEV.NAM 000000      571L
DEV.RES 000002      575L
DEV.UNT 000011      590L
DEVELEN 000016      595E
DF.CLR  000376      244E
DF.DI   000040      204E
DF.DSO  000002      200E     1415    3775
DF.DS1  000004      201E     1416    3776
DF.DS2  000010      202E     1417    3779
DF.EMP  000377      243E
DF.HD   000001      194E     1435    1442    3592    3604
DF.MO   000020      203E     1418    3628
DF.SD   000010      197E
DF.ST   000100      205E
DF.TO   000002      195E
DF.WG   000001      199E
DF.WP   000004      196E     3727
DF.WR   000200      206E
DIAG2   044244      1052     1061E
DIAGA   044272      1050     1075L
DIR.ALD 000025      259L
DIR.CLU 000015      252L
DIR.CRD 000023      258L
DIR.EXT 000010      247L
```

DIR.FGN	000020	255L							
DIR.FLG	000016	253L							
DIR.LGN	000021	256L							
DIR.LSI	000022	257L							
DIR.NAM	000000	246L							
DIR.PRO	000013	248L							
DIR.VER	000014	249L							
DIRELEN	000027	261E	713	882					
DIRIDL	000015	250E							
DM.MR	000000	80E							
DM.MW	000001	81E							
DM.RR	000002	82E							
DM.RW	000003	83E							
DOS1	101305	5195L	5197						
DP.DC	000177	192E	1420	1434	1441	3629	3633	3726	
DR.IM	000001	576E							
DR.PR	000002	577E							
DRIVE	053205	1064	1847E						
DRIVE1	053234	1864L	1892						
DRIVEA	054052	1860	1957L						
DRIVEA1	054116	1959L	2425						
DRIVEB	054121	1888	1961L						
DRIVEB1	054136	1887	1963L						
DSKERR	075135	3535	3648L						
DT.CH	000020	586E							
DT.CR	000002	583E							
DT.CW	000004	584E							
DT.DD	000001	582E							
DT.RN	000010	585E							
DUN	063061	996	2388L						
DUN1	063155	2395L							
DUN2	064164	2412L	2419	2421					
DV.EL	000000	572E							
DV.NU	000001	573E							
EAM	071067	2314	2845L						
EAM1	071103	2852L	2883	2886					
EAMA	071213	2846	2852	2873	2876	2890L			
EAMB	071215	2848	2861	2877	2880	2891L			
EC.CNA	000004	732L							
EC.DDA	000027	751L							
EC.DIF	000017	743L							
EC.DIW	000035	757L							
EC.DNI	000045	765L							
EC.DNR	000046	766L							
EC.DNS	000005	733L							
EC.DSC	000047	767L							
EC.EOF	000001	729L	4755						
EC.EOM	000002	730L							
EC.FAO	000031	753L	4526						
EC.FAP	000026	750L							
EC.FL	000030	752L							
EC.FNF	000014	740L							
EC.FNO	000011	737L							
EC.FNR	000034	756L							
EC.FOD	000043	763L							
EC.FUC	000013	739L							
EC.ICN	000016	742L							
EC.IDN	000006	734L							

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EC.IFC  000020   744L
EC.IFN  000007   735L
EC.ILC  000003   731L
EC.ILO  000040   760L
EC.ILR  000012   738L   3118
EC.ILV  000037   759L
EC.IOI  000052   770L
EC.IS   000032   754L
EC.NCV  000050   768L    963
EC.NEM  000021   745L    954
EC.NOS  000051   769L
EC.NPM  000044   764L
EC.NRD  000010   736L
EC.NVM  000042   762L
EC.OTL  000053   771L
EC.RF   000022   746L
EC.UNA  000036   758L
EC.UND  000015   741L
EC.UUN  000033   755L
EC.VPM  000041   761L
EC.WF   000023   747L
EC.WP   000025   749L   3729
EC.WPV  000024   748L
ENL     000212   177E   1041   1233   1359   2235   2255   2391   2403   2498   2520   5187
EOFFLG  100016  4727    4754   4781L
ERPTCNT 000012  3665E   3681   3768
ERR.FNO 031344   899E
ERR.ILR 031350   901E
ERROR   044315   956     965    981   1090L
ESC     000033   175E
EXIT    044346  1067    1097   1104E  2408
FB.CHA  000000   842L   4510   4513   4640   4651   4767
FB.FLG  000001   843L   4513   4530   4568   4595   4607   4610   4769
FB.FWA  000002   844L   4530   4536   4610   4771
FB.LIM  000006   846L   4541   4546   4775
FB.LWA  000010   847L   4777
FB.NAM  000012   848L    849   1310   4546   4978
FB.NAML 000021   849E   1381
FB.PTR  000004   845L   4536   4541   4607   4773
FBENL   000033   850E   1382
FF      000014   178E   3349
FFB     032133   907E
FFL     032205   909E
FILL    073341  1321    2507   3254E
FILL1   073343  3257E   3263
FNP     073355  3280E   3429
FNP.    074107  1347    3339E
FNP0    073362  3287E   3342
FNP1    074000  3290    3297E
FNP2    074014  3293    3305E
FNP3    074046  3319    3321E
FNPA    074124  1335    3288   3292   3347L
FNPB    074125  3282    3306   3341   3348L
FNPC    074126  3299    3349L
FNPD    000074  3332    3343   3350E
FREE    103054  5240E   5243
FT.ABS  000000   561E    931
FT.BAC  000003   564E
```

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FT.DD   000001   861E
FT.OC   000020   865E
FT.OR   000002   862E   4500  4504  4573  4575
FT.OU   000010   864E
FT.OW   000004   863E   4502  4504  4574  4575  4601  4810
FT.PIC  000001   562E
FT.REL  000002   563E
FWBRK2  100243  4940L   4947
FWBRK3  100257  4942    4949L
H17SDL  000173   212E
I.CONFL 000004   535E    536  3831
I.CONTY 000001   522E    523
I.CONWI 000003   528E    529
I.CSLMD 000000   511E
I.CUSOR 000002   525E    526
IERR1   071260  2184    2617  2935L  3025
ILDEHL  076352  4360    4422L
INTDSK  102013  1128    1182  2429  2437  2458  2500  2522  5230L
IOC.CGN 000010   870L
IOC.CSI 000011   871L
IOC.DDA 000002   858L    866   880
IOC.DES 000016   877L
IOC.DEV 000020   878L   5091
IOC.DIL 000021   880E
IOC.DIR 000023   882L   5092
IOC.DRL 000010   874E
IOC.DTA 000014   876L
IOC.FLG 000004   860L    874
IOC.GRT 000005   868L
IOC.LGN 000012   872L
IOC.LNK 000000   857L
IOC.LSI 000013   873L
IOC.SPG 000007   869L
IOC.SQL 000003   866E
IOC.UNI 000022   879L   5091  5092
IOCCTD  000001   886E
IOCELEN 000052   884E
IP.CON  000362    56E
IP.PAD  000360    52E
ISDEHL  076357  4367    4443L
LAB.AUX 000117   311E    313
LAB.AXL 000001   313E
LAB.DAT 000000   288E
LAB.DIS 000003   284L
LAB.GRT 000005   285L
LAB.IND 000001   283L
LAB.LAB 000021   307L    308  2506  2509
LAB.LBL 000074   308E   2505
LAB.NOD 000002   290E   2510
LAB.PSS 000016   299L
LAB.RGT 000012   295L
LAB.SER 000000   282L   3080
LAB.SIZ 000014   298L
LAB.SPG 000007   286L
LAB.SPT 000117   312L
LAB.SYS 000001   289E
LAB.VER 000011   293L
LAB.VFL 000020   300L
```

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LAB.VLT 000010   292L   2511
LAB.VPL 000005   302E    304   305
LAB.VPR 000014   297E    302
LABEL   102014  2486    2506  2509  2511  2514  3080  5232L
LDO     033012   913E
LF      000012   165E
LINE    103014  1045    1055  1200  1206  1270  1272  1274  1293  1296  1300  2415  2922
                5234L
M.FOX   000303   100E
M.PAM8  000021    99E
MAIA    102011   988    1021  5226L
MEDIA   054141  1065    1984E
MEDIA1  054170  2001L   2006
MEDIA10 054333  2034    2067L
MEDIA2  054253  2028L   2040
MEDIA3  054264  2031    2034L
MEDIA8  054323  1994    2055E
MEDIAA  054363  2000    2044  2073  2077L
MEDIAB  054364  2022    2078L
MEDIAB1 055012  2080L   2426
MEDIAC  055015  2050    2082L
MEDIAC1 055016  2047    2084L
MEDIAD  055047  2071    2086L
MEDIAD1 055056  2069    2088L
MEML    101337   933    5219E
MOUNT   042314   992E    993  1069
NL      000012   176E    177  1031  1031  1033  1035  1037  1039  1040  1041  1093
                1116    1122  1125  1169  1175  1178  1198  1268  1291  1323  1358  1359  1370
                1370    1743  1747  1814  1958  1960  1964  2079  2081  2083  2085  2089  2235
                2237    2237  2238  2239  2240  2241  2242  2243  2244  2245  2246  2247  2248
                2249    2250  2251  2252  2253  2254  2255  2255  2363  2365  2366  2368  2369
                2371    2373  2389  2390  2391  2396  2398  2400  2402  2406  2414  2445  2446
                2452    2455  2494  2495  2496  2520  3212  3236  3439  3879  4099  4977  4994
                5187    5187  5193  5196
NUL2    000000   167E
NULL    000200   166E
OP.CTL  000360    53E
OP.DIG  000360    54E
OP.SEG  000361    55E
OP2.CTL 000362    57E
OVL.COD 000000   320L
OVL.ENS 000010   325E
OVL.ENT 000004   322L
OVL.FLB 000006   323L
OVL.IN  000001   646E
OVL.NUM 000014   648E
OVL.RES 000002   647E
OVL.SIZ 000002   321L
OVL.UCS 000200   649E
OVL0    000000   331L    946  5202
OVL1    000001   332L    948  5206
PASS    102007  1003    1863  1881  5223L
PATCH   101337  5221L
PDI     033145   915E
PMSG    074127  1861    1889  2051  2072  2310  2347  2360  2987  3361E
PMSG.   074150  1906    1914  1922  1930  1938  1945  1953  2325  3383E
PSE     071266  1868    1870  1872  1874  1876  1878  1880  2963L
PSE1    071310  2965    2974L
```

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PSEA    071354  2986    2990L
PSEB    071355  2977    2991L
PSEC    071361  2984    2992L
QUOTE   000047   173E
R.SDP   075266  3766E
R.SDP.  036073  3763E   3774    3780
R.SYDD  033316  3112    3502E
R.WHD   036235  1396E   1426
R.WNH   036271  1395E   1427
R.WRITE 075224  3720E
RAMCDE  075146  3538    3667L
RAMSDP  075266  3544    3765E
RAMSDT  075212  3549    3701L
RAMSDTA 075222  3548    3707E
RAMWRI  075224  3541    3719E
REDY    075107  3589    3601    3622L
REDYA   012000  3581    3637E
REL     033177   919E
REL.    033175   917E
REPORT  046251  1072    1258E
RESTART 042356  1014E   1015    1019    1049    1057    1160    1192    1510    1900    2059    2259    2348
                2361    2501    2523    4997
RID     064270  1399    2436E   2483
RL      065076  1851    1988    2231    2482E
RLP     071365  2756    2823    3005L
RLP0    071373  3007L
RLP1    072021  3015L   3021
RLP2    072034  3011    3022L   3032
RLPERR  072040  3017    3025L
RLPERR1 072056  3029    3031L
RMEML   110070   951    5249E
RND1    076220  4252L   4271
ROMBOOT 030000  3618
RPT1    046370  1289E   1295    1302
RPT8    047255  1105    1262    1343E
RPT9    047300  1314    1356E
RPTA    047373  1362L   1371    3329
RPTA1   047373  1320    1325    1363L   1364
RPTA1L  000062  1319    1324    1364E
RPTA2   050062  1328    1366L
RPTA3   050105  1369L   3323    3327
RPTAL   000116  1371E   3328
RPTB    050111  1338    1372L   3309    3312
RPTC    050112  1333    1344    1351    1373L   3419
RPTD    050113  1310    1312    1348    1374L   1382    3300    3330    3480
RPTE    050146  1377    1378    1379    1380    1383L   1384
RPTEL   001000  1380    1384E
RPTF    051146  1299    1385L
RPTG    051151  1298    1306    1308    1310    1386L
RRT     067006  1955    2686L
RRT0    067014  2688L   2693
RRT00   067033  2697L   2721    2734
RRT1    067051  2707L   2708
RRT1.3  067100  2716    2719    2723L
RRT1.5  067131  2724    2737L
RRT2    067151  2737    2751L
RRTA    067163  2686    2744    2752    2758L   2768
RRTAL   001220  2687    2768E
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RRTB     071003     2695      2725    2727    2769L
RSEED    101334     1001      4248    4272    5215L
RUBOUT   000177      169E
RUC      033257      923E
RZLA     066075     2509      2525L   2526
RZLAL    000037     2509      2526E
S.BAUD   040344      623L
S.BDA    041120      721L
S.BOOTF  041034      678L
S.CAADR  040333      539L      3631
S.CACC   041006      662L
S.CCTAB  040335      540L
S.CDB    040343      620L
S.CFWA   040352      630L
S.CODE   041007      663L
S.CONFL  040332      537L
S.CONTY  040327      524L
S.CONWI  040331      530L
S.CSLMD  040326      512L       523     526     529     536     970
S.CUSOR  040330      527L
S.DATC   040310      493L
S.DATE   040277      492L      1328
S.DCS    041033      676L
S.DDDTA  040366      641L
S.DDGRP  040364      638L
S.DDLDA  040360      636L
S.DDLEN  040362      637L
S.DDOPC  040370      642L
S.DFWA   040354      631L
S.DIREA  041016      670L
S.DLINK  040346      628L
S.FASER  041013      669L
S.FCI    041021      671L
S.GRT0   024000      357E
S.GRT1   025000      358E
S.GRT2   026000      359E
S.GUP    041027      673L
S.HIMEM  040316      495L
S.INT    040343      371L       616
S.JUMPS  041010      667L
S.MOUNT  041032      675L
S.OFWA   040350      629L
S.OMAX   040324      501L
S.OSN    041004      658L
S.OVLE   041000      655L
S.OVLFL  040371      651L
S.OVLS   040376      654L
S.OVSTK  041035      683L
S.READ   031275      895E
S.RFWA   040356      632L
S.SCI    041024      672L
S.SCR    041121      722L
S.SDD    041010      668L
S.SDVR   041146      373L       375
S.SSN    041002      657L
S.SYSM   040320      497L
S.TIME   040312      494L
S.UCSF   040372      652L
```

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S.UCSL  040374   653L
S.USRM  040322   499L
S.VAL   040277   370L   490
S.WRITE 031330   897E
SECBUF  106070  2112   2161   2178   5245L
SECBUF2 107070  2113   2179   5246L
SECERR  103054  1998   2026   2189   5244L
SEEK    055346  1066   2227E
SEEK1   062000  2296L  2329
SEEK3   062110  2298   2317   2321   2333E
SEEKA   062152  2338   2352E
SEEKA   062200  2309   2363L
SEEKB   062210  2303   2364L
SEEKC   062244  2346   2365L
SEEKD   062300  2343   2366L
SEEKE   062334  2292   2334   2367L
SEEKF   062335  2359   2368L
SEEKG   062376  2356   2369L
SEEKH   063032  2260   2370L
SEEKH1  063056  2372L  2427
STACK   042200   377E  1018
STACKL  001032   375E
SYDD    040130   367E  3524   3531
SYLOAD  074311  3113   3517E
SYREDY  075030  3116   3581L
SYREDY1 075035  3586L  3594   3610
SYREDY2 075056  3598L  3606
SYREDY3 075105  3588   3590   3600   3602   3619L
SYSCALL 000377   780E   947    949    952    959    968    995   1017   1029   1096   1107   1134
                1193   1230   1405   1792   1815   1819   1858   1995   3833   3880   4169   4173   4562
                4642   4654   4746   4852   4960   4996
T.CHA   100004  4670   4698   4745   4768L  4769   4771   4773   4775   4777   4779   4851   4959
T.FLG   100005  4770L  4809
T.FWA   100006  4734   4772L  4841   4949
T.LIM   100012  4738   4758   4760   4776L
T.LWA   100014  4737   4778L  4820   4844   4926   4952
T.PTR   100010  4735   4774L  4818   4842   4886   4928   4950
TAB     000011   174E  2238   2239   2240   2241   2242   2243   2244   2245   2246   2247   2248
                2249   2250   2251   2252   2253   2254   2389   2389   2389   2390   2390   2390   2391
                2391   2396   5110
TBL1    076104  4144L  4150
TBL2    076122  4142   4154L
TBL3    076124  4147   4158L
TDT     075311  3562   3787L
TEST    042200   934    944E
TEST0   042226   953    958E
TEST1   042240   960    963L
TEST2   042246   962    967L
TEST5   053350  1857   1896E
TESTA   053360  1867   1905E
TESTB   053370  1869   1913E
TESTC   054002  1871   1921E
TESTD   054013  1873   1929E
TESTE   054025  1875   1937E
TESTF   054034  1877   1944E
TESTG   054043  1879   1952E
TFE     033233   921E
THD     053107  1497   1782L
```

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THD.     053200   1788    1797   1807   1811   1818L
TIME     051156   1068    1398E
TIME0    051174   1407E   1503
TIME1    051235   1431L   1437   1446
TIME2    051246   1438L   1444
TIME3    051277   1458L   1466
TIME5    052010   1404    1514E
TIMEA    052016   1455    1547E
TIMEB    053016   1507    1742L
TIMEB1   053044   1744L   2424
TIMEB2   053050   1746L   1789   1793   1798   1808   1812
TIMEC    053057   1402    1501   1516   1749L
TLEN     000012   4669    4779E
TRKFLG   102012   2463    3068   3079   3092   5228L
UDDN1    076143   4205L   4221
UDDN1.5  076175   4225L   4232
UDDN2    076177   4218    4230L
UDDN3    076200   4231L   4235
UF.FCT   000100    228E
UF.RDA   000001    225E
UF.ROR   000002    226E
UF.RPE   000004    227E
UF.TBM   000200    229E
UNIT     101336   1118    1141   1171   1217   1410   2422   2447   3107   5217L
UNT.DIS  000006    605L
UNT.FLG  000000    601L
UNT.GRT  000002    603L
UNT.GTS  000004    604L
UNT.SIZ  000010    607E
UNT.SPG  000001    602L
UO.CLK   000001     92E   1025
UO.DDU   000002     91E    974   1453
UO.HLT   000200     89E   1025
UO.NFR   000100     90E    974
UP.DP    000174    219E
UP.FC    000175    220E   3520
UP.SC    000176    222E
UP.SR    000176    223E
UP.ST    000175    221E
USERFWA  042200    378E    930    932    933
VERS     000040    778E    961   2390   2390
VFL.NSD  000001    301E
WARN2.5  065046   2453E   2456
WCP      066330   1909    1925   2643L
WCP1     066336   2645L   2652
WCP2     066353   2657L   2669
WIP      071005   1940    2785L
WIP1     071011   2787L   2797   2804
WLP      072233   2742    2788   3138L
WLPB     072260   3005    3013   3022   3138   3142   3144   3147L   3171
WLPC     072262   3006    3139   3148L
WRITE1   034370   3716E   3744
WRITE8   035132   3717E   3730   3743
WRTL     074171   1508    2023   2261   3369   3389   3418E
WRTL0    074176   3423E   3459
WRTL1    074215   3427    3434E  3443
WRTL2    074240   3440    3452E
WRTL3    074260   3447    3453   3464E
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WRTLA	074306	1337	3334	3344	3425	3454	3456	3486L
WRTLB	074307	3424	3468	3487L				
XCHGBC	076364	4357	4361	4369	4371	4463L		
ZL	065353	1852	1989	2503E				

13114 BYTES FREE