LIGHTNING COPY

DOS 3.3 O 0

This fast disk copy program allows you to ignore bad sectors, and to skip the initialization of the target disk. It requires DOS 3.3 and two drives.

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Apple owners use CopyA to copy their disks for the same reason that people climb a mountain: because it's there. It comes with the DOS 3.3 System Master. CopyA copies any file type, but it gives up when it encounters bad sectors on a damaged disk. You get an error message and the program stops.

It's important to be able to copy as much of a disk as possible, even if it has bad sectors. The bad sectors may not contain important data, while the rest of the disk does. Or you may want to try to reconstruct the bad sectors with a disk zap utility. As this is sometimes a trial and error process, it is important to have a valid copy of the rest of the disk to work on, while preserving the original damaged disk.

When you want to copy a bad disk to recover data or repair it, Lightning Copy won't give up. It copies an entire disk in just 70 seconds and lets you decide how to proceed when there is an error in copying.

USING LIGHTNING COPY

To use Lightning Copy, type:

BRUN LIGHTNING.COPY

The program's title and a series of prompts will be displayed as shown in **Figure 1**. When you enter the source drive, the target drive will automatically be set to the other drive. If a bell sounds after a response is entered, it signifies an illegal entry; the information must be re-entered.

The message:

ENTER TYPE :

prompts for the type of error handling to be used. The types of error handling you may use are: STOP (stops copying on the first error found), IGNORE (ignores all errors found), and MANUAL (lets the user decide what to do when an error is found).

The message:

INITIALIZE TARGET DISK :

lets you initialize the target disk before copying, if necessary.

When you have responded to each prompt, you press <RETURN> to initiate the copy process, or press <ESC> to abort the copy. During the copy the current track and sector being copied are displayed at the bottom of the screen. If an error is found during the copy process, a bell sounds and an error message is displayed just below the status line.

COPYING DAMAGED DISKS

Lightning Copy is very helpful in copying damaged disks. To copy as much as possible of a damaged disk, use IGNORE as the error handling type. When this is selected, you will still be able to see the errors that are found, but the program will continue to copy.

ENTERING THE PROGRAM

If you don't have an assembler, type CALL −151 to enter the Monitor, and enter the code as it appears in **Listing 1**. When you've entered the listing, save the file on disk by typing:

BSAVE LIGHTNING.COPY,A$803, L$5C7

FIGURE 1: Lightning Copy Display

```
          LIGHTNING FAST COPY
             BY TODD WOOD
  COPYRIGHT (C) 1985 BY MICROSPARC, INC

ENTER SLOT    :6  ENTER DRIVE   :1 SOURCE
                          DRIVE   :2 TARGET

I=IGNORE S=STOP M=MANUAL
ENTER TYPE    :M

INITIALIZE TARGET DISK :N

PRESS <RETURN> TO BEGIN COPY
      <ESC>    TO ABORT COPY :


              COPYING DISK
  TRACK : 1E  SECTOR: ØF  PROCESS : R
```

For help in entering machine language listings, see "A Welcome to New *Nibble* Readers" at the beginning of this issue.

HOW LIGHTNING COPY WORKS

Lightning Copy's logic is very simple. The first thing it does is to print the title and copyright ($827). Next, it gets the parameters needed for the copy — the slot ($94F), the drives ($995), the error handling type ($A0F), and whether to initialize the target disk ($A70). If the INIT disk parameter is set, the program calls RWTS (Read/Write a Track/Sector) to initialize the disk in the target drive ($BDA). The pointers are then set up ($B8D).

The main routine is called to copy the disk ($B98). This routine calls RWTRACK ($BDA) to read a range of pages from the source disk, then write the same range of pages to the target disk. It then asks if you want to make another copy ($D74).

The RWTRACK routine prints the command being processed ($BE4) and the current track and sector ($BF6). Then it reads a sector ($C0F), and checks the track and the buffer to see if the copy is done. If an error is found, the program jumps to the ERR routine ($C52). The error routine prints the error message, then finds the current error handling type ($CF8) and branches to the routine needed.

LISTING 1: LIGHTNING.COPY

```
                        1   ***********************
                        2   *  LIGHTNING.COPY     *
                        3   *  BY TODD J. WOOD    *
                        4   *  COPYRIGHT (C) 1985 *
                        5   *  BY MICROSPARC, INC *
                        6   *  CONCORD, MA  01742 *
                        7   ***********************
                        8
                        9   * MERLIN ASSEMBLER
                       10
                       11           ORG  $803
                       12
0803: 4C 27 08         13           JMP  BEGIN
                       14
                       15
                       16   HTAB    =    $24
                       17   PTR     =    $6
                       18
                       19   HOME    =    $FC58
                       20   VTABZ   =    $FB5B
                       21   PRCHR   =    $FDED
                       22   PRHEX   =    $FDDA
                       23   KEYIN   =    $FD0C
                       24
                       25   RWTS    =    $B7B5
                       26
                       27   *** INPUT, OUTPUT BLOCK TABLE
                       28
                       29   IOBTABLE
0806: 01               30           HEX  01
0807: 60               31   SLOT    HEX  60
0808: 01               32   DRIVE   HEX  01
0809: 00               33   VOLUME  HEX  00
080A: 00               34   TRACK   HEX  00
080B: 00               35   SECTOR  HEX  00
080C: 1C 08            36   DVCT    DA   ^DVCT
080E: 00 10            37   DOSBUFF HEX  0010
0810: 00 00            38   NOTHING HEX  0000
0812: 00               39   COMMAND HEX  00
0813: 00               40   ERROR   HEX  00
0814: 00               41   LASTVOL HEX  00
0815: 60               42   LASTSLOT HEX 60
0816: 01               43   LASTDRIV HEX 01
                       44
                       45   *** LOCAL STORAGE
                       46
0817: D0 D2 D7         47   CMDTABLE ASC  "PRW F"
081A: A0 C6
081C: 00 01 EF         48   ^DVCT   HEX  0001EFD8
081F: D8
0820: 01               49   SOURCED HEX  01
0821: 02               50   TARGETD HEX  02
0822: 00               51   FLG     HEX  00
0823: 00               52   LSTTRK  HEX  00
0824: 00               53   STRTTRK HEX  00
0825: 00               54   HANDLE  HEX  00
0826: 00               55   INITFLG HEX  00
                       56
                       57
                       58   ******************
                       59   * TITLE
                       60   ******************
                       61
                       62   *** PRINT TITLE
                       63
0827: 20 58 FC         64   BEGIN   JSR  HOME
                       65
082A: 20 A9 0D         66           JSR  PRINT
082D: 20 20 20         67           INV  "                                "
0830: 20 20 20 20 20 20 20 20
0838: 20 20 20 20 20 20 20 20
0840: 20 20 20 20 20 20 20 20
0848: 20 20 20 20 20 20 20 20
0850: 20 20 20 20
0854: 8D               68           HEX  8D
0855: 20 20 20         69           INV  "          LIGHTNING FAST COPY          "
0858: 20 20 20 20 20 20 20 20 0C
0860: 09 07 08 14 0E 09 0E 07
0868: 20 06 01 13 14 20 03 0F
0870: 10 19 20 20 20 20 20 20
0878: 20 20 20 20
087C: 8D               70           HEX  8D
087D: 20 20 20         71           INV  "              BY TODD WOOD              "
0880: 20 20 20 20 20 20 20 20
0888: 20 20 02 19 20 14 0F 04
0890: 04 20 17 0F 0F 04 20 20
0898: 20 20 20 20 20 20 20 20
08A0: 20 20 20 20
08A4: 8D               72           HEX  8D
08A5: 20 03 0F         73           INV  " COPYRIGHT (C) 1985 BY MICROSPARC, INC "
08A8: 10 19 12 09 07 08 14 20
08B0: 28 03 29 20 31 39 38 35
08B8: 20 02 19 20 0D 09 03 12
08C0: 0F 13 10 01 12 03 2C 20
08C8: 09 0E 03 20
08CC: 8D 00            74           HEX  8D00
                       75
                       76   *** PRINT STATUS LINE
                       77
08CE: A9 11            78           LDA  #17
08D0: 20 5B FB         79           JSR  VTABZ
08D3: 20 A9 0D         80           JSR  PRINT
08D6: 20 20 20         81           INV  "                                "
08D9: 20 20 20 20 20 20 20 20
08E1: 20 20 20 20 20 20 20 20
08E9: 20 20 20 20 20 20 20 20
08F1: 20 20 20 20 20 20 20 20
08F9: 20 20 20 20
08FD: 8D               82           HEX  8D
08FE: 20               83           INV  " "
08FF: A0 D4 D2         84           ASC  " TRACK :      SECTOR:      PROCESS :   "
0902: C1 C3 CB A0 BA A0 A0 A0
090A: A0 A0 D3 C5 C3 D4 CF D2
0912: BA A0 A0 A0 A0 A0 D0 D2
091A: CF C3 C5 D3 D3 A0 BA A0
0922: A0 A0
0924: 20               85           INV  " "
0925: 8D               86           HEX  8D
0926: 20 20 20         87           INV  "                                "
0929: 20 20 20 20 20 20 20 20
0931: 20 20 20 20 20 20 20 20
0939: 20 20 20 20 20 20 20 20
0941: 20 20 20 20 20 20 20 20
0949: 20 20 20 20
094D: 8D 00            88           HEX  8D00
                       89
                       90   ****************
                       91   * GET PARAMETERS
                       92   ****************
                       93
                       94   *** GET SLOT
                       95
                       96   GETCMD
094F: A9 05            97           LDA  #5
0951: 20 5B FB         98           JSR  VTABZ
0954: A9 00            99           LDA  #0
0956: 85 24           100           STA  HTAB
                      101
0958: 20 A9 0D        102           JSR  PRINT
095B: C5 CE D4        103           ASC  "ENTER SLOT   :6"
095E: C5 D2 A0 D3 CC CF D4 A0
0966: A0 A0 BA B6
096A: 88 00           104           HEX  8800
                      105
```

```
096C: 20 0C FD  106             JSR  KEYIN
096F: C9 8D     107             CMP  #$8D
0971: F0 17     108             BEQ  ^GET1^3
                109
0973: 20 ED FD  110  ^GET1      JSR  PRCHR
0976: C9 B1     111             CMP  #$B1
0978: B0 06     112             BCS  ^GET1^1
097A: 20 5D 0D  113             JSR  BELL
097D: 4C 4F 09  114             JMP  GETCMD
                115
0980: C9 B8     116  ^GET1^1    CMP  #$B8
0982: 90 08     117             BCC  ^GET1^2
0984: 20 5D 0D  118             JSR  BELL
0987: 4C 4F 09  119             JMP  GETCMD
                120
098A: A9 06     121  ^GET1^3    LDA  #$06
                122
098C: 29 0F     123  ^GET1^2    AND  #$0F
098E: 0A        124             ASL
098F: 0A        125             ASL
0990: 0A        126             ASL
0991: 0A        127             ASL
0992: 8D 07 08  128             STA  SLOT
                129
                130  *** GET SOURCE DRIVE
                131
0995: A9 05     132  ^GET2      LDA  #5
0997: 20 5B FB  133             JSR  VTABZ
099A: A9 11     134             LDA  #17
099C: 85 24     135             STA  HTAB
099E: 20 A9 0D  136             JSR  PRINT
09A1: C5 CE D4  137             ASC  "ENTER DRIVE  :1 "
09A4: C5 D2 A0 C4 D2 C9 D6 C5
09AC: A0 A0 BA B1 A0
09B1: 13 0F 15  138             INV  "SOURCE"
09B4: 12 03 05
09B7: 00        139             HEX  00
                140
09B8: A9 1F     141             LDA  #31
09BA: 85 24     142             STA  HTAB
09BC: 20 0C FD  143             JSR  KEYIN
09BF: C9 8D     144             CMP  #$8D
09C1: F0 17     145             BEQ  ^GET2^3
09C3: 20 ED FD  146             JSR  PRCHR
09C6: C9 B1     147             CMP  #$B1
09C8: B0 06     148             BCS  ^GET2^1
09CA: 20 5D 0D  149             JSR  BELL
09CD: 4C 95 09  150             JMP  ^GET2
                151
09D0: C9 B3     152  ^GET2^1    CMP  #$B3
09D2: 90 08     153             BCC  ^GET2^2
09D4: 20 5D 0D  154             JSR  BELL
09D7: 4C 95 09  155             JMP  ^GET2
                156
09DA: A9 01     157  ^GET2^3    LDA  #$01
                158
09DC: 29 0F     159  ^GET2^2    AND  #$0F
09DE: 8D 20 08  160             STA  SOURCED
09E1: C9 01     161             CMP  #$01
09E3: F0 05     162             BEQ  ^GET2^4
09E5: A9 B1     163             LDA  #$B1
09E7: 4C EC 09  164             JMP  ^GET2^5
09EA: A9 B2     165  ^GET2^4    LDA  #$B2
09EC: 8D 21 08  166  ^GET2^5    STA  TARGETD
09EF: 8D 06 0A  167             STA  ^GET3^^1
                168
                169  *** GET TARGET DRIVE
                170
09F2: A9 06     171  ^GET3      LDA  #6
09F4: 20 5B FB  172             JSR  VTAB7
09F7: A9 17     173             LDA  #23
09F9: 85 24     174             STA  HTAB
09FB: 20 A9 0D  175             JSR  PRINT
09FE: C4 D2 C9  176             ASC  "DRIVE  :"
0A01: D6 C5 A0 A0 BA
0A06: 02 A0     177  ^GET3^^1   HEX  02A0
0A08: 14 01 12  178             INV  "TARGET"
0A0B: 07 05 14
0A0E: 00        179             HEX  00
                180
                181  *** GET ERROR HANDLE TYPE?
                182
0A0F: A9 08     183  ^GET4      LDA  #8
0A11: 20 5B FB  184             JSR  VTABZ
0A14: A9 00     185             LDA  #0
0A16: 85 24     186             STA  HTAB
0A18: 20 A9 0D  187             JSR  PRINT
0A1B: C9 BD C9  188             ASC  "I=IGNORE S=STOP M=MANUAL"
0A1E: C7 CE CF D2 C5 A0 D3 BD
0A26: D3 D4 CF D0 A0 CD BD CD
0A2E: C1 CE D5 C1 CC
0A33: 8D        189             HEX  8D
0A34: C5 CE D4  190             ASC  "ENTER TYPE   :M"
0A37: C5 D2 A0 D4 D9 D0 C5 A0
0A3F: A0 A0 BA CD
0A43: 88 00     191             HEX  8800
                192
0A45: 20 0C FD  193             JSR  KEYIN
0A48: C9 8D     194             CMP  #$8D
0A4A: F0 1F     195             BEQ  ^GET4^3
0A4C: 20 ED FD  196             JSR  PRCHR
0A4F: C9 C9     197             CMP  #"I"
0A51: D0 05     198             BNE  ^GET4^1
0A53: A9 00     199             LDA  #$00
0A55: 4C 6D 0A  200             JMP  ^GET4^5
                201
0A58: C9 D3     202  ^GET4^1    CMP  #"S"
0A5A: D0 05     203             BNE  ^GET4^2
0A5C: A9 01     204             LDA  #$01
0A5E: 4C 6D 0A  205             JMP  ^GET4^5
                206
0A61: C9 CD     207  ^GET4^2    CMP  #"M"
0A63: F0 06     208             BEQ  ^GET4^3
0A65: 20 5D 0D  209             JSR  BELL
0A68: 4C 0F 0A  210             JMP  ^GET4
                211
0A6B: A9 02     212  ^GET4^3    LDA  #$02
0A6D: 8D 25 08  213  ^GET4^5    STA  HANDLE
                214
                215  *** INIT TARGET DISK?
                216
0A70: A9 0B     217  ^GET5      LDA  #11
0A72: 20 5B FB  218             JSR  VTABZ
0A75: A9 00     219             LDA  #0
0A77: 85 24     220             STA  HTAB
0A79: 20 A9 0D  221             JSR  PRINT
0A7C: C9 CE C9  222             ASC  "INITIALIZE TARGET DISK :N"
0A7F: D4 C9 C1 CC C9 DA C5 A0
0A87: D4 C1 D2 C7 C5 D4 A0 C4
0A8F: C9 D3 CB A0 BA CE
0A95: 88 00     223             HEX  8800
0A97: 20 0C FD  224             JSR  KEYIN
0A9A: C9 8D     225             CMP  #$8D
0A9C: F0 19     226             BEQ  ^GET5^2
0A9E: 20 ED FD  227             JSR  PRCHR
0AA1: C9 CE     228             CMP  #"N"
0AA3: F0 12     229             BEQ  ^GET5^2
                230
0AA5: C9 D9     231  ^GET5^1    CMP  #"Y"
0AA7: F0 06     232             BEQ  ^GET5^3
0AA9: 20 5D 0D  233             JSR  BELL
0AAC: 4C 70 0A  234             JMP  ^GET5
                235
0AAF: A9 FF     236  ^GET5^3    LDA  #$FF
0AB1: 8D 26 08  237             STA  INITFLG
0AB4: 4C BC 0A  238             JMP  ^GET6
                239
0AB7: A9 00     240  ^GET5^2    LDA  #0
0AB9: 8D 26 08  241             STA  INITFLG
                242
                243  *** PRESS <RETURN> TO COPY
                244
0ABC: A9 0D     245  ^GET6      LDA  #13
0ABE: 20 5B FB  246             JSR  VTABZ
0AC1: A9 00     247             LDA  #0
0AC3: 85 24     248             STA  HTAB
0AC5: 20 A9 0D  249             JSR  PRINT
0AC8: D0 D2 C5  250             ASC  "PRESS <RETURN> TO BEGIN COPY"
0ACB: D3 D3 A0 BC D2 C5 D4 D5
0AD3: D2 CE BE A0 D4 CF A0 C2
0ADB: C5 C7 C9 CE A0 C3 CF D0
0AE3: D9
0AE4: 8D        251             HEX  8D
0AE5: A0 A0 A0  252             ASC  "      <ESC>    TO ABORT COPY :"
0AE8: A0 A0 A0 BC C5 D3 C3 BE
0AF0: A0 A0 A0 A0 D4 CF A0 C1
0AF8: C2 CF D2 D4 A0 C3 CF D0
0B00: D9 A0 BA
0B03: 00        253             HEX  00
                254
0B04: 20 0C FD  255             JSR  KEYIN
0B07: C9 9B     256             CMP  #$9B
0B09: D0 09     257             BNE  ^GET6^1
0B0B: 20 5D 0D  258             JSR  BELL
0B0E: 20 5D 0D  259             JSR  BELL
0B11: 4C 27 08  260             JMP  BEGIN
                261
0B14: C9 8D     262  ^GET6^1    CMP  #$8D
0B16: F0 06     263             BEQ  ^GET6^2
0B18: 20 5D 0D  264             JSR  BELL
0B1B: 4C BC 0A  265             JMP  ^GET6
                266
                267
0B1E: AD 26 08  268  ^GET6^2    LDA  INITFLG
0B21: C9 FF     269             CMP  #$FF
0B23: D0 3C     270             BNE  ^GET8
                271
                272  *** INIT TARGET DISK
                273
```

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0B25: A9 11     274          LDA  #17
0B27: 20 5B FB  275          JSR  VTABZ
0B2A: A9 0A     276          LDA  #10
0B2C: 85 24     277          STA  HTAB
0B2E: 8D 22 08  278          STA  FLG
0B31: 8D 0A 08  279          STA  TRACK
0B34: 20 A9 0D  280          JSR  PRINT
0B37: 09 0E 09  281          INV  "INITIALIZING DISK"
0B3A: 14 09 01 0C 09 1A 09 0E
0B42: 07 20 04 09 13 0B
0B48: 00        282          HEX  00
                283
0B49: AD 21 08  284          LDA  TARGETD
0B4C: 8D 08 08  285          STA  DRIVE
0B4F: A9 04     286          LDA  #$04
0B51: 8D 12 08  287          STA  COMMAND
0B54: 20 DA 0B  288          JSR  RWTRACK
                289
                290  *** EXIT?
                291
0B57: AD 22 08  292          LDA  FLG
0B5A: C9 FF     293          CMP  #$FF
0B5C: D0 03     294          BNE  ^GET8
                295
0B5E: 4C 74 0D  296          JMP  EXITCOPY
                297
                298  *** PRINT COPYING
                299
0B61: A9 11     300  ^GET8   LDA  #17
0B63: 20 5B FB  301          JSR  VTABZ
0B66: A9 0A     302          LDA  #10
0B68: 85 24     303          STA  HTAB
0B6A: A9 00     304          LDA  #$00
0B6C: 8D 22 08  305          STA  FLG
0B6F: 8D 26 08  306          STA  INITFLG
0B72: 20 A9 0D  307          JSR  PRINT
0B75: 20 20 20  308          INV  "    COPYING DISK
0B78: 20 03 0F 10 19 09 0E 07
0B80: 20 04 09 13 0B 20 20 20
0B88: 20 20 20
0B8B: 8D 00     309          HEX  8D00
                310
                311  ******************
                312  * SETUP POINTERS
                313  ******************
                314
                315  SETUP
0B8D: A9 22     316          LDA  #$22
0B8F: 8D 23 08  317          STA  LSTTRK
0B92: 8D 0A 08  318          STA  TRACK
0B95: 8D 24 08  319          STA  STRTTRK
                320
                321  ******************
                322  * MAIN COPY
                323  ******************
                324
                325  *** READ SOURCE
                326
0B98: A9 01     327  COPY    LDA  #$01
0B9A: 8D 12 08  328          STA  COMMAND
0B9D: AD 20 08  329          LDA  SOURCED
0BA0: 8D 08 08  330          STA  DRIVE
                331
0BA3: AD 23 08  332          LDA  LSTTRK
0BA6: 8D 24 08  333          STA  STRTTRK
                334
0BA9: 20 DA 0B  335          JSR  RWTRACK
0BAC: AD 0A 08  336          LDA  TRACK
0BAF: 8D 23 08  337          STA  LSTTRK
                338
                339  *** DONE?
                340
0BB2: AD 22 08  341          LDA  FLG
0BB5: C9 FF     342          CMP  #$FF
0BB7: D0 03     343          BNE  ^COPY
                344
0BB9: 4C 74 0D  345          JMP  EXITCOPY
                346
                347  *** WRITE TARGET
                348
0BBC: AD 21 08  349  ^COPY   LDA  TARGETD
0BBF: 8D 08 08  350          STA  DRIVE
0BC2: A9 02     351          LDA  #$02
0BC4: 8D 12 08  352          STA  COMMAND
                353
0BC7: AD 24 08  354          LDA  STRTTRK
0BCA: 8D 0A 08  355          STA  TRACK
0BCD: 20 DA 0B  356          JSR  RWTRACK
                357
                358  *** DONE?
                359
0BD0: AD 22 08  360          LDA  FLG
0BD3: C9 FF     361          CMP  #$FF
0BD5: D0 C1     362          BNE  COPY
                363
0BD7: 4C 74 0D  364          JMP  EXITCOPY
                365
                366  ******************
                367  * READ/WRITE A TRK
                368  ******************
                369
                370  RWTRACK
0BDA: A9 00     371          LDA  #0
0BDC: 8D 0E 08  372          STA  DOSBUFF
0BDF: A9 10     373          LDA  #$10
0BE1: 8D 0F 08  374          STA  DOSBUFF+1
                375
                376  *** PRINT COMMAND
                377
0BE4: A9 12     378          LDA  #18
0BE6: 20 5B FB  379          JSR  VTABZ
0BE9: A9 24     380          LDA  #36
0BEB: 85 24     381          STA  HTAB
0BED: AE 12 08  382          LDX  COMMAND
0BF0: BD 17 08  383          LDA  CMDTABLE,X
0BF3: 20 ED FD  384          JSR  PRCHR
                385
                386  *** PRINT TRK,SCT
                387
0BF6: A9 0A     388  ^RW3    LDA  #10
0BF8: 85 24     389          STA  HTAB
0BFA: AD 0A 08  390          LDA  TRACK
0BFD: 20 DA FD  391          JSR  PRHEX
0C00: A9 0F     392          LDA  #$0F
0C02: 8D 0B 08  393          STA  SECTOR
                394
0C05: A9 16     395  ^RW1    LDA  #22
0C07: 85 24     396          STA  HTAB
0C09: AD 0B 08  397          LDA  SECTOR
0C0C: 20 DA FD  398          JSR  PRHEX
                399
                400  *** READ A SECTOR
                401
0C0F: A9 08     402          LDA  #>IOBTABLE
0C11: A0 06     403          LDY  #<IOBTABLE
0C13: 20 B5 B7  404          JSR  RWTS
0C16: 08        405          PHP
0C17: A9 00     406          LDA  #$00
0C19: 85 48     407          STA  $48
0C1B: 28        408          PLP
0C1C: B0 34     409          BCS  ERR
                410
0C1E: CE 0B 08  411  ^RW     DEC  SECTOR
0C21: EE 0F 08  412          INC  DOSBUFF+1
0C24: AD 26 08  413          LDA  INITFLG
0C27: C9 FF     414          CMP  #$FF
0C29: D0 01     415          BNE  ^RW^1
0C2B: 60        416          RTS
                417
                418  *** NEW TRACK?
                419
0C2C: AD 0B 08  420  ^RW^1   LDA  SECTOR
0C2F: C9 FF     421          CMP  #$FF
0C31: D0 D2     422          BNE  ^RW1
                423
0C33: CE 0A 08  424          DEC  TRACK
                425
                426  *** FULL BUFFER?
                427
0C36: AD 0F 08  428          LDA  DOSBUFF+1
0C39: C9 90     429          CMP  #$90
0C3B: 90 01     430          BCC  ^RW2
                431
0C3D: 60        432          RTS
                433
                434  *** LAST TRACK?
                435
0C3E: AD 0A 08  436  ^RW2    LDA  TRACK
0C41: C9 FF     437          CMP  #$FF
0C43: D0 D1     438          BNE  ^RW3
                439
0C45: AD 12 08  440          LDA  COMMAND
0C48: C9 02     441          CMP  #$02
0C4A: D0 05     442          BNE  ^^RW
                443
0C4C: A9 FF     444          LDA  #$FF
0C4E: 8D 22 08  445          STA  FLG
                446
0C51: 60        447  ^^RW    RTS
                448
                449  *** ERR PROCESSOR
                450
0C52: A9 14     451  ERR     LDA  #20
0C54: 20 5B FB  452          JSR  VTABZ
0C57: A9 00     453          LDA  #0
0C59: 85 24     454          STA  HTAB
0C5B: 18        455          CLC
                456
0C5C: AD 13 08  457          LDA  ERROR
                458
                459  *** PRINT ERROR MESSAGE
                460
0C5F: C9 08     461          CMP  #$08
```

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0C61: D0 1C     462             BNE  ^ERR1
                463
0C63: 20 A9 0D  464             JSR  PRINT
0C66: C9 CE C9  465             ASC  "INITIALIZATION ERROR"
0C69: D4 C9 C1 CC C9 DA C1 D4
0C71: C9 CF CE A0 C5 D2 D2 CF
0C79: D2
0C7A: 8D 00     466             HEX  8D00
0C7C: 4C F8 0C  467             JMP  ^ERRHAND
                468
0C7F: C9 10     469  ^ERR1      CMP  #$10
0C81: D0 1C     470             BNE  ^ERR2
0C83: 20 A9 0D  471             JSR  PRINT
0C86: D7 D2 C9  472             ASC  "WRITE PROTECT ERROR "
0C89: D4 C5 A0 D0 D2 CF D4 C5
0C91: C3 D4 A0 C5 D2 D2 CF D2
0C99: A0
0C9A: 8D 00     473             HEX  8D00
0C9C: 4C F8 0C  474             JMP  ^ERRHAND
                475
0C9F: C9 20     476  ^ERR2      CMP  #$20
0CA1: D0 1C     477             BNE  ^ERR3
                478
0CA3: 20 A9 0D  479             JSR  PRINT
0CA6: D6 CF CC  480             ASC  "VOLUME MISMATCH     "
0CA9: D5 CD C5 A0 CD C9 D3 CD
0CB1: C1 D4 C3 C8 A0 A0 A0 A0
0CB9: A0
0CBA: 8D 00     481             HEX  8D00
0CBC: 4C F8 0C  482             JMP  ^ERRHAND
                483
0CBF: C9 40     484  ^ERR3      CMP  #$40
0CC1: D0 1C     485             BNE  ^ERR4
                486
0CC3: 20 A9 0D  487             JSR  PRINT
0CC6: C4 C9 D3  488             ASC  "DISK DRIVE ERROR    "
0CC9: CB A0 C4 D2 C9 D6 C5 A0
0CD1: C5 D2 D2 CF D2 A0 A0 A0
0CD9: A0
0CDA: 8D 00     489             HEX  8D00
0CDC: 4C F8 0C  490             JMP  ^ERRHAND
                491
0CDF: 20 A9 0D  492  ^ERR4      JSR  PRINT
0CE2: D3 D4 D2  493             ASC  "STRANGE ERROR       "
0CE5: C1 CE C7 C5 A0 C5 D2 D2
0CED: CF D2 A0 A0 A0 A0 A0 A0
0CF5: A0
0CF6: 8D 00     494             HEX  8D00
                495
                496  *** DECIDE HOW TO REACT
                497  *** TO THE ERROR?
                498
0CF8: 20 5D 0D  499  ^ERRHAND JSR  BELL
0CFB: AD 25 08  500             LDA  HANDLE
                501
                502  *** STOP COPY
                503
0CFE: F0 50     504             BEQ  ^ERREXIT
                505
                506  *** IGNORE IT
                507
0D00: C9 01     508             CMP  #$01
0D02: D0 06     509             BNE  ^ERR5
                510
0D04: A9 FF     511             LDA  #$FF
0D06: 8D 22 08  512             STA  FLG
0D09: 60        513             RTS
                514
                515  *** MANUAL
                516
0D0A: 20 A9 0D  517  ^ERR5      JSR  PRINT
0D0D: C9 C7 CE  518             ASC  "IGNORE, STOP (I,S):"
0D10: CF D2 C5 AC A0 D3 D4 CF
0D18: D0 A0 A8 C9 AC D3 A9 BA
0D20: 00        519             HEX  00
0D21: 20 0C FD  520             JSR  KEYIN
0D24: 8D 22 08  521             STA  FLG
0D27: A9 00     522             LDA  #$00
0D29: 85 24     523             STA  HTAB
0D2B: 20 A9 0D  524             JSR  PRINT
0D2E: A0 A0 A0  525             ASC  "                    "
0D31: A0 A0 A0 A0 A0 A0 A0 A0
0D39: A0 A0 A0 A0 A0 A0 A0 A0
0D41: 8D 00     526             HEX  8D00
0D43: AD 22 08  527             LDA  FLG
0D46: C9 C9     528             CMP  #"I"
0D48: F0 06     529             BEQ  ^ERREXIT
                530
0D4A: A9 FF     531             LDA  #$FF
0D4C: 8D 22 08  532             STA  FLG
0D4F: 60        533             RTS
                534
                535  *** CLEAR ERROR & RETURN
                536
0D50: A9 00     537  ^ERREXIT LDA  #$00
0D52: 8D 13 08  538             STA  ERROR
0D55: A9 12     539             LDA  #18
0D57: 20 5B FB  540             JSR  VTABZ
0D5A: 4C 1E 0C  541             JMP  ^RW
                542
                543  ****************
                544  * BAD ENTRY BELL
                545  ****************
                546
0D5D: A0 90     547  BELL       LDY  #$90
                548
0D5F: 98        549  BELL1      TYA
0D60: 20 6C 0D  550             JSR  BELL2
0D63: 49 FF     551             EOR  #$FF
0D65: 20 6C 0D  552             JSR  BELL2
0D68: 88        553             DEY
0D69: D0 F4     554             BNE  BELL1
0D6B: 60        555             RTS
                556
                557
0D6C: AA        558  BELL2      TAX
0D6D: CA        559  BELL3      DEX
0D6E: D0 FD     560             BNE  BELL3
0D70: 2C 30 C0  561             BIT  $C030
0D73: 60        562             RTS
                563
                564  ******************
                565  * EXITCOPY
                566  ******************
                567
0D74: A9 00     568  EXITCOPY LDA  #$00
0D76: 85 24     569             STA  HTAB
0D78: A9 16     570             LDA  #22
0D7A: 20 5B FB  571             JSR  VTABZ
0D7D: 20 A9 0D  572             JSR  PRINT
0D80: CD C1 CB  573             ASC  "MAKE ANOTHER COPY (Y,N):"
0D83: C5 A0 C1 CE CF D4 C8 C5
0D8B: D2 A0 C3 CF D0 D9 A0 A8
0D93: D9 AC CE A9 BA
0D98: 00        574             HEX  00
0D99: 20 0C FD  575             JSR  KEYIN
0D9C: C9 D9     576             CMP  #"Y"
0D9E: D0 03     577             BNE  ^EXIT
                578
0DA0: 4C 27 08  579             JMP  BEGIN
                580
0DA3: 20 58 FC  581  ^EXIT      JSR  HOME
0DA6: 6C F2 03  582             JMP  ($3F2)
                583
                584  ******************
                585  * PRINT LINE
                586  ******************
                587
                588  *** PRINT FOLLOWING LINE & RETURN
                589
0DA9: 68        590  PRINT      PLA
0DAA: 85 06     591             STA  PTR
0DAC: 68        592             PLA
0DAD: 85 07     593             STA  PTR+1
0DAF: A0 01     594             LDY  #$01
                595
0DB1: B1 06     596  ^PRINT     LDA  (PTR),Y
0DB3: F0 06     597             BEQ  ^PRINT1
0DB5: 20 ED FD  598             JSR  PRCHR
0DB8: C8        599             INY
0DB9: D0 F6     600             BNE  ^PRINT
                601
0DBB: 18        602  ^PRINT1    CLC
0DBC: 98        603             TYA
0DBD: 65 06     604             ADC  PTR
0DBF: 85 06     605             STA  PTR
0DC1: A5 07     606             LDA  PTR+1
0DC3: 69 00     607             ADC  #$00
0DC5: 48        608             PHA
0DC6: A5 06     609             LDA  PTR
0DC8: 48        610             PHA
0DC9: 60        611             RTS

--End assembly--

1479 bytes

Errors: 0
END OF LISTING 1
```

KEY PERFECT 4.0
RUN ON
LIGHTNING.COPY

CODE	ADDR# - ADDR#
2C0F	0803 - 0852
26E6	0853 - 08A2
2B2F	08A3 - 08F2
273D	08F3 - 0942
28D6	0943 - 0992
2954	0993 - 09E2
2A6E	09E3 - 0A32
27D4	0A33 - 0A82
26ED	0A83 - 0AD2
27E7	0AD3 - 0B22
2A2E	0B23 - 0B72
29CB	0B73 - 0BC2
2296	0BC3 - 0C12
23B3	0C13 - 0C62
2384	0C63 - 0CB2
278E	0CB3 - 0D02
2A68	0D03 - 0D52
28D7	0D53 - 0DA2
12C5	0DA3 - 0DC9

PROGRAM CHECK IS : 05C7