SAM DICE UTILITY

Version 1.0 by J Eyre

Advanced Disk Utility for the SAM *Coupe*

Editor   Drive 1 Side 1 Track 0   Sector 1   Offset 0
[ik] 73 61 6D 64 6F 73 32 20 20 20 00 14 04 01 FF samdos2
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....

Drive 1   Directory Information   File No 1

samdos2   AUTO   demo   Screen1   Screen2
Screen3   Sreen4   astro   'King   flash
flash1   Diskview   Drive 1   Side 1   Track 0   Sector 1   Offset 0
UDG D   13 73 61 6D 64 6F 73 32 20 20 20 00 14 04 01 FF samdos2
modif.b 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
test.ud 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
DTRAN 00 00 00 Drive 1   File Information   File No 1
wdemo 00 00 00
Byte=1   00 00 00   Filename samdos2   ERASED   Loads 491529
Offset   00 00 00   File type   code   Page   29
<Vʌ> s   00 00 00   Starts   Track 4 Sector 1   Offset 32777
Input

Drive 1   Analyse Report   Track 1   Sectors Found 10   10000
Sele   0
<Vʌ   Sector Size Data Status   Sector Size Data Status   10000
Rer   1   512   ok   10000000   2   512   ok 10000000
       3   512   Err 10010000   4   512   ok 10000000   0000000
Copyright (c) 1991 Kobrahsoft All Rights Reserved   0010000
                                                                   0100000
           SAM DICE UTILITY   SAM Coupe Data:
                                     Drives 1
           Drive 1   Disk Map   ROM V2.0
                                     RAM 512K   Quit

                                     Disk Data:
                                     Tracks 160
                                     Sectors 10
                                     Format 800K
                                     Data   780K   Quit
                                     Used   66K
                                     Free   714K
  ☐ Directory ■ Data ☐ Not used   Files   10

New Change View Directory Format Analyse Quit
  c 1991 Disk Information Copier Editor V1.0 by J Eyre

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SAMDICE

VERSION 1.0

by J Eyre

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Contents:

SAMDICE is a powerful yet easy to operate utility for use with the SAM Coupe disk system. It combines simple automatic operations for the novice with full analyser and editor facilities for the more experienced SAMDOS user.

What does SAMDICE do? See Annex A for the full specification but put simply it lets you see exactly what's on your disks, rakes it easy to carry out disk operations like copying, erasing and is an insurance policy against the inevitable day when that all important risk refuses to load any data!

DICE stands for Disk Information Copier Editor. The program has different levels of operation, as shown below, depending on the type of disk operation to be performed and the type of disk being examined.

```
                          DISK MAP
                             |
  FILE STRUCTURE             |            DIRECT ACCESS
          ----------------------------------------|
          |                  |                     |
     DIRECTORY INFO          |                     |
          |                  |                     |
       FILE INFO          DISKVIEW             ANALYSE
          |                  |                     |
    FILE CONTENTS            |                     |
          |                  |                     |
          ---------------- EDITOR ----------------
```
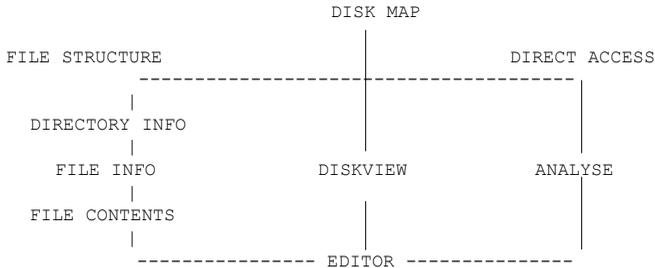
See Annex B for a more detailed block

File Structure provides special facilities for SAM Disk. Diskview provides additional cut wore general facilities making it suitable for SAM and other 512 byte sector disks. The Analyser provides a number of tools for detailed examination of standard and non standard formats. In each case the Editor mode can be initiated to modify data directly on the disk.

Full details on each the functions can be found Parts 2-9.

LOADING INSTRUCTIONS: Assuming that DOS has already booted, SAMDICE can be loaded by typing LOAD "SDU" <ENTER.>from BASIC. Once SAMDICE has loaded with the DISC MAP screen displayed and the disk drive stopped, replace the SAMDICE Program disk with the disk to be examined and press "N".

An auto-start disk can be created by copying the file from the master disk to a new formatted disk which includes SAMDOS and renaming "SDU" to "AUTO".

The program code stares at address 25000 and when running creates data buffers in the memory space 3276 to 65535 see the memory map below. DICE can usual be restarted from BASIC by CALL 25000 <ENTER> however some DOS command- will overwrite SAMDICE program code located in the display pages.

Memory Map

Address	Page	Used for
0		
16384	0	ROM 0
25000		System variables and BASIC Program Area
		SAMDICE Program Code
32768	1	SAMDICE Buffers for Disc Data
38400		Directory Data
65535	2	
	3-12 (3-28)	Additional Memory used by COPY and LOG
	13 (19)	SAMDOS
	14-15 (30-31)	Mode 3 Display Memory
	(512K Version)	SAMDICE Program Code

The data displays are organised as shown in the following diagram. The value of each byte in hexadecimal:-00-FF (0-255 in decimal) is displayed on the left side of the screen and its corresponding ASCII character is shown oh the right. Where the byte vale is outside the ASCII character range a "." is displayer

```
-------------------------------------------------
              DISK LOCATION INFORMATION

   ---------------------------        -------------
  |  256 Byte                 |      | 256         |
  | Half Sector               |      | Byte        |
  |   Display                 |      | ASCII       |
  | In Hexadecimal            |      | Display     |
  |   format                  |      |             |
  |                           |      |             |
   ---------------------------        -------------
        ------------------------------------
              Additional Information Area
                KEY SELECTION MENUS

   PROMPT LINE
-------------------------------------------------
```
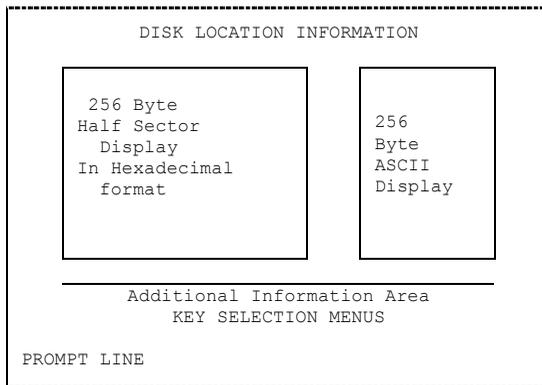
An alternative display is available at the Diskview screen. All 512 bytes of the sector are displayed in ASCII again '.' replaces non ASCII characters. This display is most suited to Text files from Word Processors but is useful for quick scanning as the arrow keys move a sector at a time in this display node.

MENU SELECTION: To select an option from a menu, press the key corresponding to the first letter of the required option. These are highlighted on the menu bar.

PROMPTS: Various confirmation prompts are displayed ie "Erase Y/N" to guard against accidental key selections. Pressing "Y" accepts any other key rejects.

ERROR MESSAGES: DOS error messages (see Annex E) are displayed at the prompt line. Since this is a busy Part of the screen, error messages may be over written. A reminder that a DOS error has occurred is provided by an error flag at the bottom right corner of the display. It is recommended that should a DOS error occur, SAMDICE be reset by pressing "N" at the Disk Map screen. A successful reset will remove the error flag.

INPUT MODES: Information can be entered from the keyboard in various ways. The input mode can be changed by pressing the TAB key which cycles through alphanumeric, decimal and hexadecimal. The input mode is indicated by the cursor which is, "L" (lower case) or "C" (upper case), "D" for decimal and "H" for hexadecimal. The input modes available will depend on whether a prompt expects a number or an ASCII character or either. Press ESC to exit the input routine.

Setting up SAMDICE: If you are using the SAM internal disk drive(s) and are happy with the display colours then there is nothing for you to set up. If you are using an external disk drive you may need to set the stepping rate to suit your drive, as you did when installing SANDOS2. To do this amend line 40 of the "SDU" BASIC program to POKE the appropriate value, as shown below, into address 25003 for Drive 1 and 25004 for Drive 2.

Step Rate	Value
6ms	0
12ms	1
2ms	2
3ms	3

Only 4 colours are used for all SAMDICE displays. They have been selected to provide good contrast. You can chose your own colours by changing the numbers assigned to Palettes 0 - 3 in the "SDU" BASIC program.

SAMDICE has been primarily designed for use with SAM Coupe disks which use IBM 3470 format. Many other disks, ie IBM PC, ATARI ST etc. also use this format but store and index data in a different way. These disks can often be read but will not give valid directories or disk maps. The Analyse option allows many non standard disk sectors to be read and modified.

IMPORTANT: writing to any disk should be treated with caution and only attempted when sure of the consequences.

SAMDICE has been designed for both novice and the exPerienced user alike. Many of the functions require no knowledge of how information is stored on the disk. However to make full use of SAMDICE a certain amount of knowledge is essential. Annexes C and D provide some useful guidance. Further information can be found in the SAM Technical manual.

```
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SAM DICE UTILITY          SAM Coupe Data:
                          Drives    2
                          ROM       V3.0
 Drive 1   Disk Map       RAM       512K

                          Disk Data:
                          Tracks    160
                          Sectors   10
                          Size      512
                          Format    800K
                          Data      780K
                          Used      37K
                          Free      743K
                          Files     7

■ Directory  ■ Data   Not used

New  Change  View  Directory  Format  Analyse  Quit

@ 1991  Disk Information Copier Editor V1.0 by J Eyre
```

This display provides details about the number of tracks and sectors, sector size and the total disk format capacity available. If the disk is recognised as SAM format the number of current files, the amount of disk space allocated co current files and the space available for use is also identified together with a graphic indication of disk space used.

OPTIONS AVAILABLE:

N - NEW   Resets SAMDICE to read the data from a new disk or
                following a DOS error message (see Annex E).

C - CHANGE   Change between disk drives.(twin drive machines only

V - VIEW   Select this option to directly access any disk sector
                and read or modify data.   (See Parts 6 & 8)

D - DIRECTORY   Select this option to List the Directory and read or
                modify file information/data.(See Parts 3,4,5 & 8)

F - FORMAT   Select t this option to Format a disk.

A - ANALYSE   Select this option to read or modify single sectors,
                including non standard sectors and to diagnose and
                repair disk faults.(See Part 9)

Q - QUIT   Return to BASIC.

```
 Drive 1            Directory Information         File No 1
 samdos2    AUTO      demo        screen1     screen2
 screen3    screen4   astro       king        flash
 flash1     flash2    fontld      font        dumpld
 UDG Design btrans    btrans1     emulator    skelt.bin
 modif.bin  snapt.bin trans.bin   patch.bin   udg demo
 test.udg   gdemo     ademo       idemo       dbt.bas
 DTRANS     mand1.scr mand2.scr   con1.scr    con2.scr
 udemos.dem LOAD.ME   SNAP1R



 Selected  Files 0   Sectors 0     Bytes 0K

 <^v> scan Info Select Blank Copy Erase Rename Move Quit
```

   This display is a single page list of the disk directory showing all files, including hidden and erased files, up to the 80 maximum available with SAMMDOS. The names of erased files are displayed in yellow ink.

   The Drive number in use and the number of the file highlighted by the cursor is displayed at the top of the screen.

   Files can be selected for subsequent copy and erase actions by moving the cursor over the filename and pressing "S". Selected files are highlighted. Pressing "S" again de-selects the file. Pressing "B" de-selects all files. Details of files selected are displayed at the additional information line.

OPTIONS AVAILABLE:

ARROW KEYS Move the cursor around the directory list.

I - INFO   Selects the entry at the cursor and displays file
             information. (See Part 4)

S - SELECT   Selects a file for subsequent copy or erase actions.
             Pressing "S" again de-selects the file.

B - BLANK   De-selects all selected files.

C - COPY   Provides a back-up copy of all or the selected disk
             files. Prompts are displayed questing disk change
             overs. The prompts refer to the disk to be copied as
             the SOURCE disk and the copy as the TARGET disk.

E - ERASE   If one or more files have been marked the prompt "Erase
             selected files Y;N" is displayed otherwise only the file
             the cursor will be erased and the prompt "Erase Y/N"
             is displayed. Press Y to erase the file or files
             selected, any other key cancels the request.

R - RENAME   Change the name of the file at the cursor. A prompt and
             filename "Rename F filename to " is displayed . Type new
             name then. ENTER. Press ESC to exit RENAME

  M - MOVE   Move a file within the Directory. At the prompt "Move
             from rile", move the cursor to highlight the file to be
             moved and Press ENTER. Then move the cursor to the

position the file is to be moved to and press ENTER.
                    Press ESC to exit without moving any files.

   Q - QUIT   Return to DISK MAP. (See Part 2)

   COPY:

   If one or more files have been selected a confirmation prompt
"Selected File copy Y/N" is displayed, otherwise "Copy all Files Y/N"
is displayed. The copy routine uses any available memory paces so any
data logged to memory (see part 7) will be lost.

   The Copier performs the DOS command COPY "D1:*.*" TO "D2:" and
provides an unfragmented copy of all or just those files selected.
Fragmentation often occurs when files are erased and new files saved on
the disk. (See Annex C). Note if files are being copied to a disk
which already contains fragmented files then the data for the new files
will be stored at the first available locations in the normal way.

   SAMDICE checks there is sufficient room on the Target disc before
starting to copy any files. If a duplicate filename occurs, the
prompt "Overwrite <filename> Y/N" is displayed. Pressing "Y" will
overwrite the file on the Target disk. Any other key cancels the copy
process, ie no files will be copied.

   Single Drive:

   Source and target disks are inserted in sequence until all data has
been copied. All available memory is used to minimise the number of
disk changes required. Prompts are displayed advising which disk
should be inserted. It is a wise precaution to open the write protect
tab on the source disk in case it is accidentally inserted instead of
the target disk.

   Twin Drives:

   The copy can be made on one drive or between drives. At the prompt
"Copy from Drive x to Drive ? " (where x is the default drive , press 1
or 2 to select the drive for the target disk. If the default drive
number is selected, follow the procedure above for single drive
machines. Select the second drive number to copy between drives ie no
disk change overs.

```
Drive 1              File Information              File No 38
Filename    SNAP1R    ERASED        Loads     289022
File Type                           Page      18
Starts      Track 140  Sector 3     Offset    10494
Occupies    97  Sectors of Disk Space
                                    Length   :97709
                                    Page      63
                                    Offset    65517

                                    Executes
                                    Page
                                    Offset

                                    Recovery
                                    may be
                                    possible

   ▌ Directory   ▌ Data   ▌ Not used

 ◁ ▷ scan      View      Attributes   Recover    Quit
```

   This display shows the filename followed by any file attributes or in
the case of an erased file an erased indicator. Details of the
location of the file and the amount of disk space used are displayed
together with a disk map for the file.

   The start of the file is identified by Track and Sector number.
Erased files are indicated and an assessment of the possibility of
recovery is displayed. Pressing "R" automatically recovers the file.
An error is reported if existing file has the same filename. Use
Rename at the Directory Information screen to change the name of the
erased file to allow recovery

OPTIONS AVAILABLE

  < >   Move backward or forward one entry.
  V - VIEW   Displays Hex and ASCII details of the file starting at
               its first sector. (See Part 5)

  A - ATTRIBUTES Change file attribute settings. A series of prompts
               are displayed - "Hidden Y/N", "Protected Y/N", "Save
               to Disk ,'Y/N" pressing "Y" sets the attribute, any
               other key cancels it.

  R - RECOVER Recover an erased file.

  Q - QUIT   Return to Directory Information. (See Part 3)

```
Diskview  Drive:1   Side:1   Track:4      Sector:1   Offset:0

13 10 27 09 80 FF FF 00 7D 21 FE 81 11 02 04 AF  .'....)!...
32 11 81 22 05 B8 7B D3 E2 DB E0 CB 47 20 FA DB  2."..{.....G...
E1 BA 28 0E 3E 7B 30 02 3E 5B D3 E0 06 14 10 FE  ..(.>{0.>[.....
18 E7 F3 3E 80 D3 E0 06 14 10 FE 2A 05 B8 01 E3  ...>......*....
00 18 02 ED A2 DB E0 CB 4F 20 F8 CB 47 20 F6 FB  ........O..G...
E6 1C 28 1B 3A 11 81 3C 32 11 81 F5 E6 02 28 08  ..(.:..<2....(.
3E 09 D3 E0 06 14 10 FE F1 FE 0A 38 AC CF 13 2B  >.........8...+
5E 2B 56 7A B3 20 98 3A B4 5C 32 2F 81 3D 32 08  ^+Vz. .:.\2/.=2.
81 3D 32 C2 5B 26 51 6F 36 60 21 44 01 22 06 5A  .=2.[&Qo6`!D.".Z
C9 00 D0 00 00 00 00 20 01 14 50 00 0C 01 00 01 00  .......P......
00 00 00 00 00 00 00 CD 03 01 00 00 C9 00 00 00  ..............
00 0D 80 80 80 1B 4D 80 80 1B 41 80 80 1B 2A 05  ......M...A...*.
80 80 80 80 18 20 20 78 20 20 7C 00 00 00 24 7E  ..... x  | ..$~
24 24 7E 24 00 7E 81 BD A1 A1 BD 81 7E 1B 2A 05  $$~$.~.....~.*.
40 02 80 80 80 55 54 50 55 54 20 44 49 46 41 20  @....UTPUT DIFA
54 4F 20 52 4F 4D 55 49 46 41 00 00 00 80 30 00  TO ROMUIFA....0.

Log starts 65536  Sectors 0     Bytes 0      Sector 1     of 20

Filename DOS            K  N scan  Display  Edit  Log  Quit
```

   On entry the data at the first sector of the file is displayed. This
is normally includes the file header information. (See Annex D)

   The Drive, Track and Sector numbers are indicated on the top line of
the display. 256 bytes of data are displayed, in Hexadecimal to the
left and ASCII to the right. Non ASCII character codes are replaced
by a "." on the display.

   Each disk sector holds 512 bytes of data, so two pages are needed to
cover a sector. The half sector being displayed is indicated by an
offset number in the range 0-1. An alternative display shows the full
sector, 512 bytes, in ASCII only.

   When SAMDOS saves a file to disk it finds the next available sector
to store the data. Therefore on a well used disk file data may not be
stored on contiguous sectors but maybe split up and spread around the
disk. The left and right arrow keys scan through the file
automatically locating the next track and sector and displaying file
data in the correct sequence. Only the sectors occupied by the file
are scanned. Start of file and end of file indications are displayed
at the limits of the file.

OPTIONS AVAILABLE

   < >   Scan backward and forwards through the file either a half
              sector or full sector depending on display mode.

   D - DISPLAY Toggles between the 256 byte HEX/ASCII and 512 byte ASCII
              display formats

   E - EDIT   Enter the Editor mode. (See Part 8)

   L - LOG   Load sector data into memory. (See Part 7)

   Q - QUIT   Return to File Information. (See Part 4)

    The Drive, Track and Sector numbers are indicated on the top line of
the display. 256 bytes of data are displayed, in Hexadecimal to the
left and ASCII to the right. Non ASCII character codes are replaced
by a "." on the display.

    Each disk sector holds 512 bytes of data, so two pages are needed to
cover a sector. The half sector being displayed is indicated by an
offset number in the range 0-1 on the top line. An alternative display
shows the full sector, 512 bytes, in ASCII only.

OPTIONS AVAILABLE

    < >   Scan backward and forward a half sector or full sector
                depending on display mode.

                Scan backward and forward one track.

    D - DISPLAY Toggles between the 256 byte HEX/ASCII and 512 byte
                ASCII display formats

    T - TRACK   Change Track number. The required Track number should
                be typed at the prompt, followed by <ENTER>. DELETE
                removes the character to the left of the input cursor.
                ESC aborts the request.

    S - SECTOR Change Sector number. The required Sector number should
                be typed at the prompt, followed by <ENTER>. DELETE
                removes the character to the left of the input cursor.
                ESC aborts the request.

    F - FIND   Search the disk for a string of up to 10 bytes which can
                be input in any combination of alphanumeric, decimal or
                hexadecimal. See below.

    E - EDIT   Enter the Editor mode. (See Part 8)

    L - LOG   Load sector data into memory. (See part 7)

    Q - QUIT   Return to Disk Map (See Part 2).

FIND:

   A forward search of the disk can be made to find a selected string of
up to 10 bytes. The search string can be built up using any
combination of alphanumeric, decimal or hexadecimal numbers. The TAB
key switches between input modes. (See Part 1).

   Pressing ENTER in either the decimal or hexadecimal modes enters
the value in the input line. Alphanumerics are entered as they are
typed. The value or character entered is displayed on the upper screen
in ASCII, decimal and hexadecimal.

   DELETE removes the character to the left of the input cursor. If one
input line is empty the left arrow key deletes the last entered value
displayed on the upper screen.

   ESC exits the search mode and returns to the previous Hex and ASCII
displays.

   Pressing the right arrow key initiates the disk search. The Track
.number being searched is displayed at the bottom of the screen. Press
"Q" to stop the search.

   If the string is found, the Hex and ASCII displays are set show
   the data at the new disk location and the first character one string
highlighted. The message "Found in File Nos:" is displayed at the
bottom of the screen followed by a list of any file numbers which use
the data sector(s) containing the string.

   On entry to the search mode the last string used is displayed on
the upper screen which may then be edited or a new search initiated.

Additional Keys for FIND:

<   Removes the last value/character entered in the string
                displayed on the upper screen.

>   Initiates a disk search for the string displayed on the
                upper screen

ENTER   Enters the value in the inᵖut line.

DELETE   Removes the character to the left of one input cursor.

ESC   Exits the search mode.

TAB   Cycles the input mode through alphanumeric - decimal –
                hexadecimal.

CAPS   Toggles upper or lowercase in Alphanumeric input mode
                only.

Q   Abandons the disk search.

The data from any sector may be loaded from disk into SAM memory using the Diskview screen. This allows "lost data" to be recovered. Lost data is where all or part of a file's data is still on the disk but the directory entry cannot be read or has been reused.

The process of reclaiming lost data requires patience and a knowledge of what data to expect or which sectors it occupies. Use any Diskview screen to display the required sector and press "L". A prompt "Log Sector Y/N" is displayed. Press Y to load the data into memory any other key to cancel. This process is then repeated for each sector required.

The number of sectors and bytes logged is displayed on the screen. Log memory starts at address 65536 ie page 3. Once all the required sectors have been loaded into memory, return to BASIC to manipulate and save the data as required. Note using COPY will overwrite any logged data.

Although there are 512 bytes to each sector, SAMDOS only uses 510 to store data. The remaining two bytes hold the Track and Sector numbers for the next Sector of the file. These two bytes are shown in yellow ink on the 256 byte Hex/ASCII display. They are inserted when data is saved to disk and therefore are not required when loaded back into memory. Other computers use all 512 bytes for data. (See Annex D).

When Logging data to memory SAMDICE will:

    always load 512 bytes when Track is 0-3

    always load 512 bytes when reading a 9 sector disk

    always load 512 bytes when the ASCII only screen is in use

    only load 510 bytes when Track is 4-207 and the disk is recognised as SAM format and the 256 Hex/ASCII display is in use.
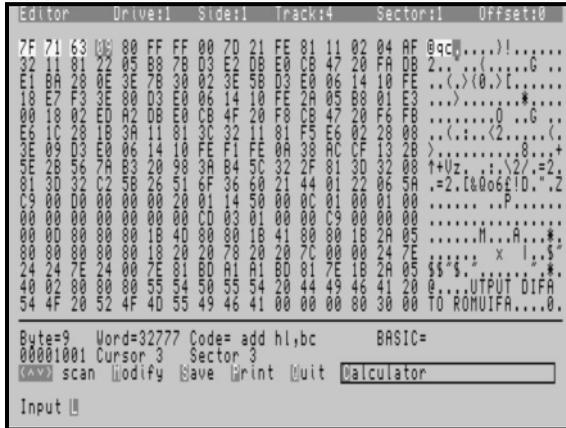
The Editor allows disk data to be examined, modified and output to a printer. The cursor (Inverse Video) can be moved around the Hex and ASCII displays using the arrow keys.

Readouts at the additional information area show the value of the byte at the cursor in binary and in decimal for both byte and 16 bit word (LSB first). If the value of the byte corresponds to a BASIC token then it is displayed together with a single line disassembly, within sector only, from the byte at the cursor. The cursor offsets for the display (0-255) and for the sector (0-511) are also displayed.

OPTIONS AVAILABLE

ARROW KEYS   Move the cursor around the Hex and ASCII displays

M - MODIFY   Enters modify mode see below

S - SAVE   Save changes to disk

P - PRINT   Output Hex/ASCII data to a parallel printer. The SAM
                ROM routine and channel B is used so output may be
                re-directed for serial printers etc. The ROM routine
                has no timeout, if the printer is not connected press
                ESC which returns to SAM BASIC.

Q - QUIT   Return to FILE CONTENTS (See Part 5) or DISK ACCESS
                (See ?art 6) or ANALYSE (See Part 9) depending on entry
                to the EDITOR.

C - CALCULATOR Converts between decimal and hexadecimal numbers. The
                TAB key selects the input mode. Press ENTER to
                display the conversion. DELETE removes the character
                to the left of the input cursor. ESC exits the
                calculator.

Note the calculator displays hex numbers Most Significant Byte first ie 512 = 0200. However the Z80 micro processor in SAM always stores 16 bit data Least Significant Byte first ie 512 =00 02

MODIFY MODE:

   Press "M" to modify data. A prompt "Input" is displayed at the
bottom of the screen. The input mode can be changed by pressing the
TAB key (See Part 1).

   DELETE removes the character to the left of the input cursor. ENTER
inputs the new data. In the decimal and hexadecimal input modes the
right and left arrow keys input the new value and move the display
cursor forwards or backwards one position. In the alphanumeric mode
characters are input as they are typed and the cursor moved one
position forward. ESC exits modify mode, any data in the input line is
ignored.

   Changed data is highlighted.

   When the Editor is entered from Analyse there is an option to save the
Sec-ear as normal or deleted data. Press "N" or "D" to select.
Note: deleted data should not be confused with erased or deleted files.
It is used by some operating systems hide information from the user.
SAMDOS does not appear to discriminate between normal and deleted data.

   Pressing "Q" exits the Editor. On return to Diskview any changes not
previously saved to disk are lost. On return to the Analyse screen the
edited data is displayed and the sector must be re-read to retrieve the
original data ie the current data on the disk.

Additional Keys for MODIFY:

   DELETE   Delete the character to the left of one input cursor.

   TAB   Change input mode through alphanumeric - decimal –
                hexadecimal.

   CAPS   Toggles upper or lowercase in alphanumeric input mode
                only.

   ESC   Exit Modify mode any data in the input line is ignored

   ENTER   Input new data.

   <>   Inputs new data, in the decimal and hexadecimal modes,
                and moves the cursor backwards or =_forwards one position
                on the Hex and ASCII displays.

```
Drive 1    Analyse Report    Track 0    Sectors Found 10
┌─────────────────────────────────────────────────────────┐
│ Sector  Size  Data  Status   Sector  Size  Data  Status  │
│   6     512    ok  10000000     7     512    ok  10000000 │
│   8     512    ok  10000000     9     512    ok  10000000 │
│  10     512    ok  10000000     1     512    ok  10000000 │
│   2     512    ok  10000000     3     512    ok  10000000 │
│   4     512    ok  10000000     5     512    ok  10000000 │
│                                                           │
│                                                           │
│                                                           │
│                                                           │
│                                                           │
│                                                           │
│                                                           │
│ Read   Locate   Track   Sector   Format   Checkdisk   Quit │
└─────────────────────────────────────────────────────────┘
```

   The initial Analyse display shows the Drive and Track number and the
number of Sectors found on the Track. Each Sector number is listed
with its size in bytes and whether the data was read as normal (ok), or
as deleted data (Del), or if an error occurred (Err). The value of the
Status Register after reading the Sector is also displayed in binary,
most significant bit first ie D7 D6 D5 D4 D3 D2 D1 D0. The meaning of
each bit is shown in Table 1.

OPTIONS AVAILABLE

R - READ   Read complete Track, including ID fields, gaps and CRC
                bytes. (See Table 2). The Track data is displayed as a
                series of pages indicated by the Offset number at the
                top right of the display. Pages are scanned using the
                left- right cursor keys

L - LOCATE   Locate a Track. As Track below but re-aligns to Track 0
                first then steps to the requested Track number.

T - TRACK   Select a Track and display Sector information.

S - SECTOR   Select a Sector and display the usual 256 byte
                Hex/ASCII data display, with access to the Editor.

F - FORMAT   Format a single Track. Type in Track number required
                at the prompt.

C - CKECKDISK   Check disk for faulty Sectors. Option to Lock Out
                defective Sectors.

Q - QUIT   Return to DISK MAP (See Part 2).

CHECKDISK

   The complete disk is read, any errors found are reported and a count
of defective Sectors made. On completion all faulty Sectors are listed
in the form Track number/Sector number.

   If the disk is recognised as SAM format the files affected by the

- 15 -

faulty Sectors are listed and an option to create a "BADSECTORS" file. This is a special file which pretends to use the defective Sectors so that they are not available to SAMDOS for genuine files.

The "BADSECTORS" file has hidden and protected attributes so that it is not listed by the DIR command and is not easily erased.

BIT	Meaning
7	1 = Motor on
6	1 = Disk write protected
5	0= normal data 1 = deleted data
4	1 = Side, Track or Sector not found
3	1 = error in data field If bit 4=1 error in ID field
2	1 = Disk controller interface error
1	Request to read/write data
0	1 = executing a command

Table 1   Status Register

Number of bytes	HEX	Meaning
60	4E	
12	00	
3	A1	Synchronisation
1	FE	ID address mark
1	-	Track Number
1	-	Side Number
1	-	Sector Number
1	-	Sector Size
2	-	ID CRC
22	4E	
12	00	
3	A1	Synchronisation
1	FB	Data address mark
512	-	Sector data
2	-	Data CRC
24	4E	

Table 2   Typical Format   (Single Sector only)

The specification for Version 1.0 is shown below:

Read Disk Sectors -   Data displayed in Hex and ASCII with cursor
readouts of byte (binary & decimal), word
(decimal), line disassembly and BASIC token.

Modify Disk Sectors - Input in alphanumeric, decimal or hexadecimal

Supports most 3.5" Double Density Disk formats

Analyser to examine and edit non standard sectors

Access any part of the Disk - by Track and Sector or Cursor Keys

Back-up Disk Files - Copies all or selected files, unfragments files
(unless copying to a fragmented target disk)

Full Directory Listing - including hidden and erased files

Automatically locates the start of a selected file's data

Automatically follows file data via fragmented sectors

Automatically assesses whether an erased file can be recovered

Single key press to recover (unerase) files

Recover lost data from part files or disks with defective directories

Erase single or multiple files by cursor selection

Rename files (checks for duplicate filenames)

Set/cancel file attributes

Move files within the Directory

Read file headers and displays file type and details

Graphic and numeric display of file location and disk space used

Graphic and numeric display of overall disk space used

Print out of HEX/ASCII sector data

Fast disk search for a string of up to 10 bytes in length.

Format whole Disk and single Tracks

Displays DOS error warnings with permanent reminder

Check Disk with option to lock out defective sectors

Decimal/Hexadecimal convertor (0-65535 0000-FFFF)

Confirmation checks before writing to Disk

Easy single key selections from menus

```
                              |   |          ...................................   |          |
                              |   | ...........................................    |          |
This diagram shows the        |   |              DISK MAP                     |    |          |
main features of SAMDICE      |   | ...........................................    |    CHANGE
and the Keys which are     FORMAT |     Graphic and Numeric display           |    |    DRIVE
used to move around the     DISK  |       of disk space used and free.        |    |  RESET FOR
program.                      |   |        Indicates Disk Format              |    |   NEW DISK
                              |   | ..........................................     |          |
                              |   |  |F|  |D|  |V|    |A|   |C|  |N|  |         |    |          |
                              |   | ...........................................    |          |
                              |___|   |    |    |     |     |___|                             |
                                      |    |    |     |_____|
                                      |    |    |_____
                                      |    |                  |
                              _____   |    FILES              |
                             |     |  |    |  |         |  |  |    _____
                             |     ....................  |  |  |  |  ...........................  |
                             |   | DIRECTORY INFORMATION |  |  |  |  |        ANALYSE          |  |
                             |   |.......................  |  |  |  |  |.........................  |
                             |   |Full Directory Listing | MOVE |FORMAT|Read full Track & Status  SELECT
                      COPY   |   |Cursor selection of Entry| ERASE |TRACK |Single Track Formatter    TRACK
                     FILES   |   |Copy all/selected files | RENAME|CHECK |Checkdisk facility to     SECTOR
                             |   |Rename/erase/move files | FILES | DISK |Lock out faulty sectors   |
                             |   |.......................  |  |  |  |  |.........................  |
                             |   |  |C|  |I|   |M| |E| |R| |  |  |  |  |  |C| |F| |E| |R| |T| |S| |
                             |   | ........................  |  |  |  | ..........................  |
                             |___|    |     |___|            |  |  |__|    |__|    |___|            |
                                    SELECT                    |  |_____       ....... >EDIT
                                    ENTRY                     |_____ |
                                       |                                     | |
                              _____    |    |         |    |    |            | |     |    |
                             |     | ..........................  |    |  |  | ...........................  |
                             |   |  FILE INFORMATION     |  |  FIND |  |  DISKVIEW             |  |
                             |   |.......................  | STRING |256 Byte Hex/ASCII and    |  |
                    SET/      |   |File details including |  |  LOG  |512 Byte ASCII Displays   SELECT
                    CANCEL    |   |Header information.    |  | DATA  |Selection of Track/Sector  TRACK
                    FILE      |   |Graphic indication of  |  |  |    |Log sector data to memory  SECTOR
                  ATTRIBUTES  |   |Disk space occupied.   |  |  |    |Search disk for a string. |
                             |   |File recovery assessment| RECOVER |..........................  |
                             |   |.......................  | ERASED |  |L| |F| |E|  |T| |S| |  |
                             |   |  |A|   |V|     |R|      | FILE    | ..........................  |
                             |   | ........................  |    |__|   |__|    |___|            |
                             |___|     |              |___|             EDIT        |
                                    EXAMINE                                         |
                              _____  A FILE                  _____|
                             |     |  |         |            |    |    |         |    |
                             |   | .....................      |  ...........................  |
                             |   |   FILE CONTENTS     |      |  |   EDIT MODE           |  |
                             |   |.....................      |  |.........................  |
                     LOG     |   |256 Byte Hex/ASCII   |      |  |Data printout. Calculator  |
                   SECTORS   |   |512 Byte ASCII Displays|    EDIT |Cursor readouts in binary  CHANGE
                             |   |Automatically follows  |      |  |and decimal for Byte/Word  SAVE
                             |   |File Sectors.          |      |  |Disassembly, BASIC Token.  TO DISK
                             |   |.....................      |  |Modify data on disk.    |  |
                             |   |  |L|          |E|   |      |  |.........................  |
                             |   | .....................      |  |  |P|    |M|   |S| |  |
                             |___|      |            |___|    |  ...........................  |
                                                             |___|    |___|            |
```

The disks used with the SAM Coupe are 3.5 inch Double Sided Double Density disks on ach side of the disk there are 80 tracks (0-79) each divided into 10 Sectors. Each Sector holds 512 bytes of data giving a total formatted capacity of 800K.
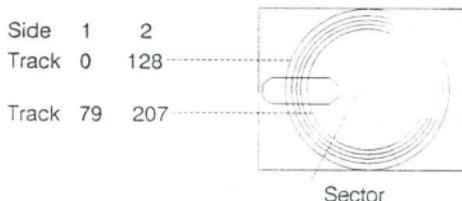
Note: The format used by many other computers has only 9 sectors per Track giving a total formatted capacity of 720K. Most SAM documentation refers to the Tracks as 0 to 79 on side 1 and 128 to 207 on side 2.

The formatting process places an identification marker at the start of each Sector (See Part 9, Table 2). When data is to be read or written, the disk is revolved and he disk drive read/write head positioned at the required track. DOS then checks for the sector identifier to read or write data at the correct Sector.

SAMDICE has Disk Maps which show where data is stored on the whole disk or here the data for a particular file is stored. These maps show the Tracks sequentially as shown in the following diagram:
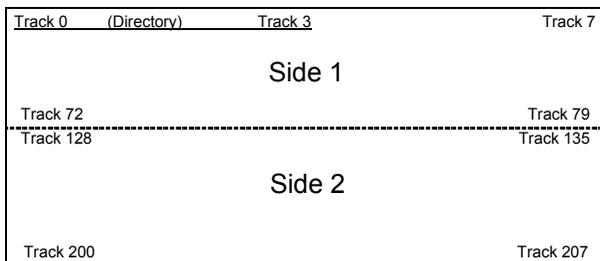
SAMDOS2 reserves the first 4 Tracks (40 Sectors) for the Directory. Each file entry requires 256 bytes so the directory can hold upto 80 files. The Directory uses 20K of disk space leaving 780K for data.

SAM stores data on side 1 of the disk first and then on side 2. Other computers store data at Side 1 then Side 2 for each Track position thus reducing the amount of track movement.

The key to the data stored on a disk is the Directory. SAMDOS reserves Tracks
0 to 3 (40 Sectors) for this purpose. Each entry in the Directory uses 256 bytes
so the details of up to 80 files can be recorded. Table 1 on the next page shows
the format of each entry in the Directory.

When SAMDOS saves a file it locates the first available entry in the Directory.
This may hold information on a previously erased file or if there are no erased files
will be the next unused entry. The same procedure is used for the file's data. The
first available sector, which may have been previously allocated to an erased file,
is used and the procedure repeated until all the file's data has been stored.

Thus on a well used disk which has had many files of varying length saved and
erased, any one file may have data store in various parts of the disk. This
fragmentation of data increases the time taken to load data from the disk.
If your files become fragmented it may cc wise to copy them onto another disk.
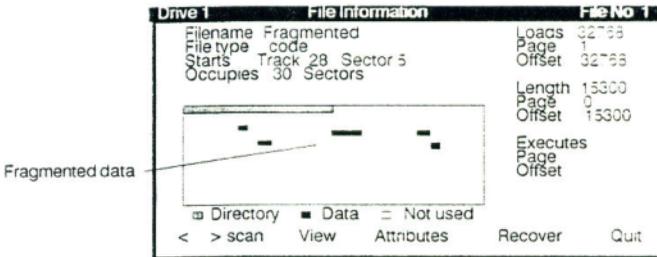
The Directory records the number of the first Track and Seeker used by the file and
acts as a pointer into the disk. The last 2 bytes of each Sector hold the number of
the next Track and Sector. These bytes are displayed in yellow ink on the 256 byte
Diskview screen (offset 1). The pointer bytes in the last Sector used by the
file hold 00 00 and act as a terminator.
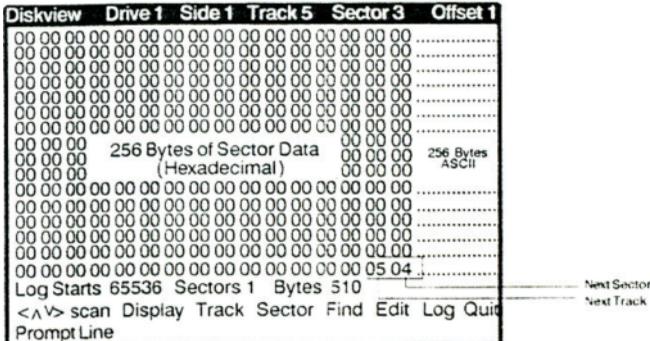
Directory and File Information

Byte	Used for
0	Status and File Type
1 – 10	Filename
11	MSB ⎱
12	LSB ⎰ File size, number of Sectors
13	Track number ⎱
14	Sector number ⎰ Start of File
15 – 209	Sector Address Bit Map
210 – 219	not used
220	Flags
221 -231	File type information
232 – 235	not used
236	Starting Page number
237 - 238	Page offset (8000 - BFFFH)
239	Number of Pages in length
240 – 241	Length modulo 16384
242 – 244	Execution address if Code File or Line number if BASIC Program
245 - 255	not used

Table 1 Directory Entry for a File

The first 9 bytes of each file hold header information as shown in Table 2. The first byte describes the file type. Table 3 lists the various types.

Byte	Used for
0	File Type
1 – 2	Modula Length
3 – 4	Offset Start
5 – 6	Not used
7	Number of Pages
8	Stating Page number

Table 2 Disk File Header

Byte	Meaning
o	Erased
5	ZX 48K Snapshot
16	SAM BASIC Program
17	Numeric Array
18	String Array
19	Code File
20	Screen$ File

Table 3 File Type Numbers

DOS ERRORS:

The 3.5 inch disks as used on the SAM are generally more robust
than other types of floppy disk but from time to time defects will
occur. When a fault is detected SAMDICE displays an error message
at the bottom of the screen indicating the fault and if applicable
the track and sector affected.

                    "ERROR TRK 1 SECT 1 <Message>"

SAMDICE normally reads disk information a Track at a time. If the
disk is of non standard format or unformatted the program will make
several attempts to read each sector on the Track reporting an error
before moving on to read the next sector. To abort this process
press and hold down the ESC key.

It is recommended that SAMDICE be reset when an error has occurred
by returning to the DISK MAP display and pressing "N"-NEW. If the
error is ignored the message will to overwritten by other messages
in the prompt line. An Error Flag remains as a warning at the
bottom right corner all displays. A successful reset clears the error
flag.

ERROR MESSAGES:

Check Disk in Drive   No disk in Drive
Write Protected   Write Protect tab on disk is open
Bad Format   Unformatted or unrecognised disk
Track 1 Sector 1 not found   Unable to find Track or Sector
Track 1 Sector 1 Data CRC   Data read but with errors
Track 1 Sector 1 ID CRC   Error in Sector indentifier
ERROR   Unknown Disk error

                    This pdf doc was compiled by
                  Steve Parry-Thomas 15 February 2005

                    For SAM Coupé uses everywhere.

                        www.samcoupe.org