TRACKED!

DISK UTILITIES FOR THE ATARI ST AND TT COMPUTERS

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From time to time changes are made in the filenames and in the files actually included on the distribution disks. This manual should not be construed as a representation or warranty that particular files or facilities exist on the distribution disks.

Each Tracked! package is identified by a unique serial number. This number is the user's personal key for user-support and price reduction on future releases of the Tracked! package.

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CONTENTS

INTRODUCTION

The Tracked! package consists of the Tracked! manual, a user registration card and a double sided floppy disk containing 4 programs: Disk!, File!, Backup! and Restore!.

The **Disk!** program performs several functions for disk maintenance. Its main functions are checking a disk's integrity, optimizing a disk and recover files and/or directories that you have accidently erased. In addition, it allows to edit specific sectors of a disk.

The **File!** program allows to quickly erase superfluous files such as *.BAK files, etc. Also, it has the facility to set the file's attributes in order to e.g. protect files by hiding them from the desktop.

The **Backup!** program offers a very fast and efficient backup procedure of entire hard disks or selected partitions, directories or files.

The **Restore!** program is used to restore the backup files onto the hard disk.

The distribution disks may include a README file. This file explains possible variations from the manual. Make sure to read this file before using the software.

HARDWARE NOTE

The Tracked! programs run on all ATARI ST and TT computers in all resolutions, except low resolution, and with all types of disk drives. For hard disks, the AHDI version 3.00 (or higher) device driver should be used.

The programs were tested thoroughly on different hardware configurations. Memory resident programs, accessories and some other programs in the AUTO directory of the boot disk, and specific device drivers may interfere with Tracked! on your particular system. Therefore we strongly recommend that you would first make a complete backup of your hard disk, using your current backup method, before using the Tracked! programs. Next, you should test the programs thoroughly on your system.

THE TRACKED! DIALOG FORMS

The Tracked! programs make full use of the GEM environment and therefore are easy to learn and to use. However, there is one peculiarity. At the top of every Tracked! dialog form there is a bar containing a title for the form. When you move the mouse to this title bar and press the left side button, the mouse form on the screen will change and you can now drag the dialog form to another place on the screen. This option to move the dialog forms is available on all Tracked! forms, and may prove to be useful when the dialog form is overlapping some vital information on the screen.

SECTION 1. DISK!

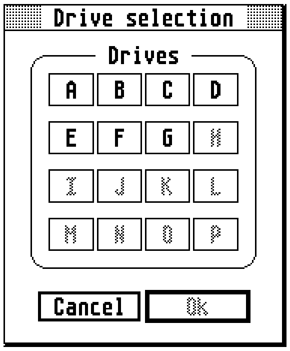
INTRODUCTION

The Disk! program provides several specific functions for hard disk maintenance. The program bypasses GEMDOS and only makes use of BIOS routines for disk access. Therefore, although the desk accessories remain available during working with Disk!, you should not use accessories that perform any disk operation while running this program, in order to avoid interference and possible consequential data loss.

DISK MENU

SELECT DISK

After having started the Disk! program, you must first select a disk in the dialog form that appears after clicking on *Select disk* in the disk menu.

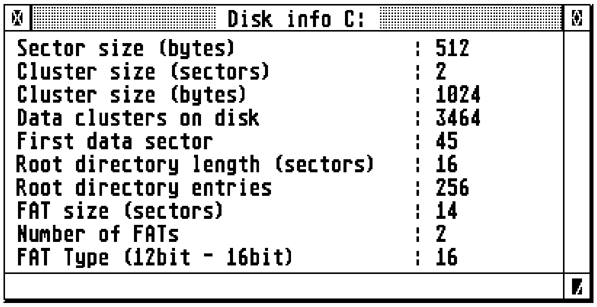


When you select drive A or B, you must make sure that a formatted disk is inserted in the corresponding disk drive.

The disk is selected for almost all other menu options such as Info, Map Disk, View/Edit Sectors, Check Disk, Optimize, Zero Disk, etc. When selecting a non-valid disk, these menu items are disabled.

DISK INFO - PRINT DISK INFO

Some technical information concerning the selected disk will be displayed after selection of *Disk info*. To obtain a printout of the data in the window, select *Print disk info* in the menu.

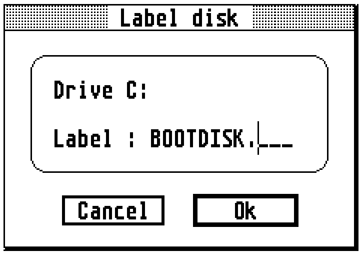


```
Sector size (bytes)               : 512
Cluster size (sectors)            : 2
Cluster size (bytes)              : 1024
Data clusters on disk             : 3464
First data sector                 : 45
Root directory length (sectors)   : 16
Root directory entries            : 256
FAT size (sectors)                : 14
Number of FATs                    : 2
FAT Type (12bit - 16bit)          : 16
```

LABEL DISK

Every diskette and hard disk partition can contain a volume name or label. When formatting a floppy disk from the desktop, this label can be entered in the desktop's *Format* dialog form. However, the desktop does not allow to rename or relabel a disk. This can be achieved with Tracked! and in addition the program allows to label hard disk partitions as well.

Select *Label disk* in the menu in order to display the label of the selected drive in a dialog form. You can now erase or change the disk's label. Select the *Ok* button to proceed with renaming the disk. Click on the *Cancel* button if you want the disk label to remain unchanged.

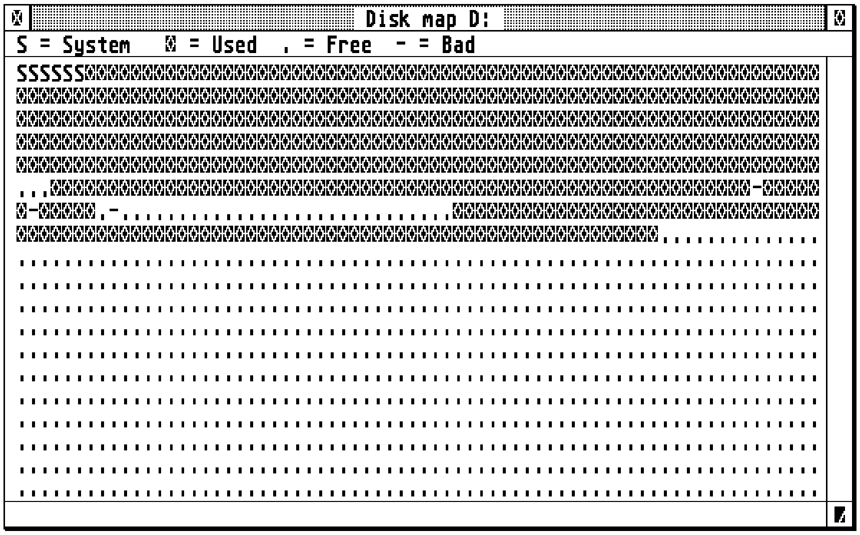


Drive C:

Label : BOOTDISK.___

MAP DISK

This function will display a graphical representation of the different areas of the hard disk: system area (boot sector, FAT area, root directory), clusters occupied by files and directories, free data clusters and possible bad clusters.



For a high capacity disk such as a hard disk, one character in the map window may represent more than one cluster on the disk.

It is not abnormal to have one or more data clusters marked as *Bad* on a hard disk. GEMDOS will simply ignore these clusters. Floppy disks with bad clusters should not be used.

QUIT

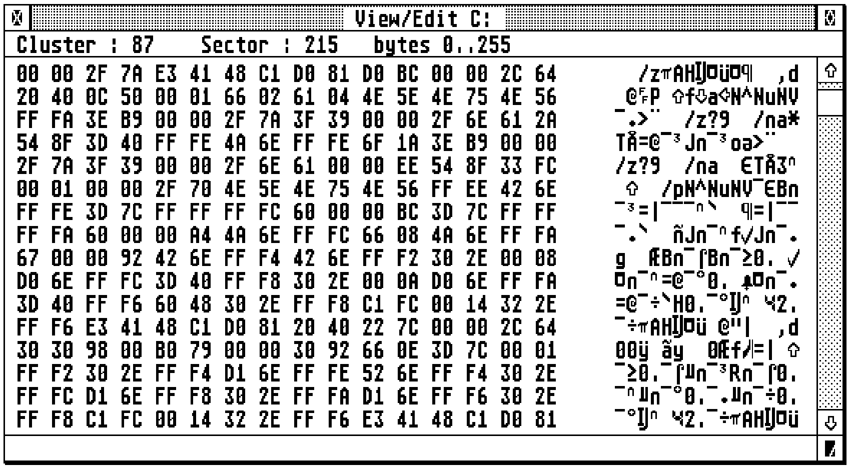
Select *Quit* to exit the program.

You have the option to reboot the computer. When you are not using the Atari hard disk driver AHDI version 3.00 (or higher), it may be necessary to select this option and reboot the computer, otherwise data loss may occur!

VIEW/EDIT MENU

VIEW/EDIT SECTORS

With this function you can inspect and edit the contents of logical sectors on the disk. The left portion of the window displays the contents of the sector in hexadecimal codes. At the right side the characters with the corresponding ASCII code are displayed.

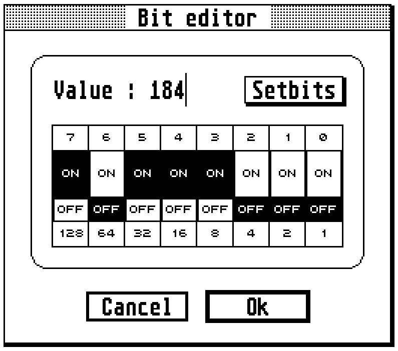


```
Cluster : 87    Sector : 215   bytes 0..255
00 00 2F 7A E3 41 48 C1 D0 81 D0 BC 00 00 2C 64      /zπAHĲ□ü□¶  ,d
20 40 0C 50 00 01 66 02 61 04 4E 5E 4E 75 4E 56     _@╒P ⇧f⇩a⇦N^NuNV
FF FA 3E B9 00 00 2F 7A 3F 39 00 00 2F 6E 61 2A     ¯.>¨  /z?9  /na*
54 8F 3D 40 FF FE 4A 6E FF FE 6F 1A 3E B9 00 00     TÅ=@¯³Jn¯³oa>¨
2F 7A 3F 39 00 00 2F 6E 61 00 00 EE 54 8F 33 FC     /z?9  /na  ∈TÅ3ⁿ
00 01 00 00 2F 70 4E 5E 4E 75 4E 56 FF EE 42 6E      ⇧  /pN^NuNV¯∈Bn
FF FE 3D 7C FF FF FF FC 60 00 00 BC 3D 7C FF FF     ¯³=|¯¯¯ⁿ`  ¶=|¯¯
FF FA 60 00 00 A4 4A 6E FF FC 66 08 4A 6E FF FA     ¯.`  ñJn¯ⁿf√Jn¯.
67 00 00 92 42 6E FF F4 42 6E FF F2 30 2E 00 08     g  ÆBn¯⌠Bn¯≥0. √
D0 6E FF FC 3D 40 FF F8 30 2E 00 0A D0 6E FF FA     □n¯ⁿ=@¯°0. ♪□n¯.
3D 40 FF F6 60 48 30 2E FF F8 C1 FC 00 14 32 2E     =@¯÷`H0.¯°Ĳⁿ ¶2.
FF F6 E3 41 48 C1 D0 81 20 40 22 7C 00 00 2C 64     ¯÷πAHĲ□ü @"|  ,d
30 30 98 00 B0 79 00 00 30 92 66 0E 3D 7C 00 01     00ÿ ãy  0Æf♪=| ⇧
FF F2 30 2E FF F4 D1 6E FF FE 52 6E FF F4 30 2E     ¯≥0.¯⌠╜n¯³Rn¯⌠0.
FF FC D1 6E FF F8 30 2E FF FA D1 6E FF F6 30 2E     ¯ⁿ╜n¯°0.¯.╜n¯÷0.
FF F8 C1 FC 00 14 32 2E FF F6 E3 41 48 C1 D0 81     ¯°Ĳⁿ ¶2.¯÷πAHĲ□ü
```

Use the sliders at the right side of the window to go to the next/previous sectors. In order to edit the contents of a sector you must double-click in the view/edit window. The cursor appears and you can make changes in the window. At the left side you can only enter hexadecimal values. At the right side, you can enter ASCII characters directly from the keyboard.

You will have the option to save the changes when changing to another sector or when closing the window. Also, you can press the *Escape* key to exit from the edit mode.

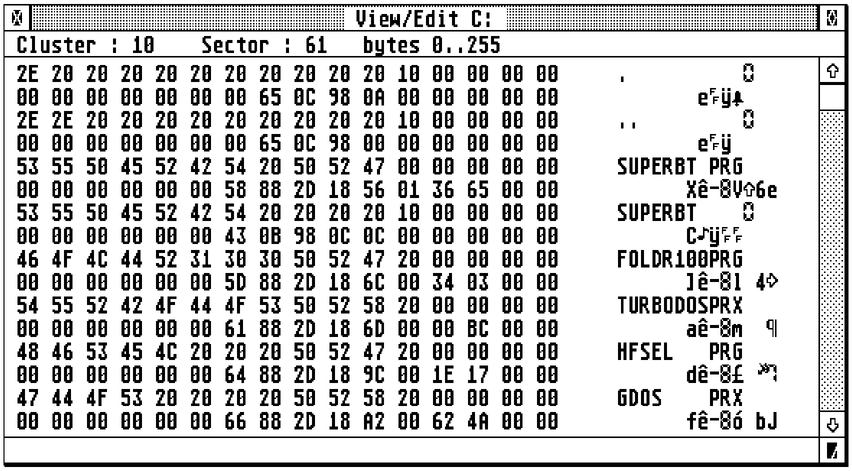
When you are working in edit mode, then double clicking on a character or hexadecimal code in the window will invoke the *Bit Editor* dialog form. In this form, you can edit the character or byte on bit-level.



Value : 184

7	6	5	4	3	2	1	0
ON	ON	ON	ON	ON	ON	ON	ON
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
128	64	32	16	8	4	2	1

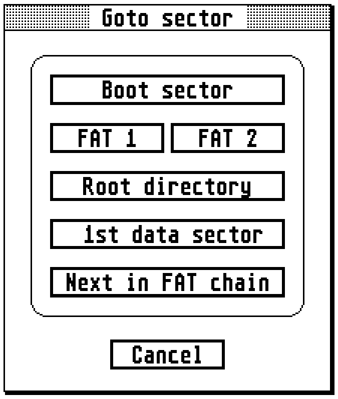
If a sector belonging to the root directory or to a subdirectory is displayed, then clicking on the file's name in the right panel will cause the program to jump to this file's first data cluster. Next, you can select *Goto sector* in the menu to jump to the file's next data cluster (if you want to edit a particular file: see p. 18). The first entry of a subdirectory has **.** as a filename and this entry contains information of the subdirectory itself. The second entry has **..** as filename and this entry contains the information of the parent directory. So by clicking on this second entry, you will jump to the parent directory of the displayed subdirectory.



```
View/Edit C:
Cluster : 10    Sector : 61   bytes 0..255
2E 20 20 20 20 20 20 20 20 20 20 10 00 00 00 00      .          0
00 00 00 00 00 00 00 65 0C 98 0A 00 00 00 00 00             e␌ÿ↓
2E 2E 20 20 20 20 20 20 20 20 20 10 00 00 00 00      ..         0
00 00 00 00 00 00 00 65 0C 98 00 00 00 00 00 00             e␌ÿ
53 55 50 45 52 42 54 20 50 52 47 00 00 00 00 00      SUPERBT PRG
00 00 00 00 00 00 58 88 2D 18 56 01 36 65 00 00            Xê-8V⇧6e
53 55 50 45 52 42 54 20 20 20 20 10 00 00 00 00      SUPERBT    0
00 00 00 00 00 00 43 0B 98 0C 0C 00 00 00 00 00            C♪ÿ␌␌
46 4F 4C 44 52 31 30 30 50 52 47 20 00 00 00 00      FOLDR100PRG
00 00 00 00 00 00 5D 88 2D 18 6C 00 34 03 00 00            ]ê-8l 4⇨
54 55 52 42 4F 44 4F 53 50 52 58 20 00 00 00 00      TURBODOSPRX
00 00 00 00 00 00 61 88 2D 18 6D 00 00 BC 00 00            aê-8m  ¶
48 46 53 45 4C 20 20 20 50 52 47 20 00 00 00 00      HFSEL   PRG
00 00 00 00 00 00 64 88 2D 18 9C 00 1E 17 00 00            dê-8£
47 44 4F 53 20 20 20 20 50 52 58 20 00 00 00 00      GDOS    PRX
00 00 00 00 00 00 66 88 2D 18 A2 00 62 4A 00 00            fê-8ó bJ
```

GOTO SECTOR

After selection of *Goto Sector* a dialog form is displayed with the buttons: *Boot Sector, FAT 1, FAT 2, Root directory, 1st data sector, Next in FAT chain*. Click on any of these buttons and the view/edit window will immediate display the corresponding sector of the disk.



In order to locate a file on the disk you must select *Goto sector* in the menu, and select *Root directory* in the dialog form. The first sector of the root directory will be displayed. If the file you want to locate is in a subdirectory, you must click on the corresponding directory names until the name of the file is displayed (see *View/Edit Sectors*). By clicking on the filename itself, the first data sector of the file will be displayed.

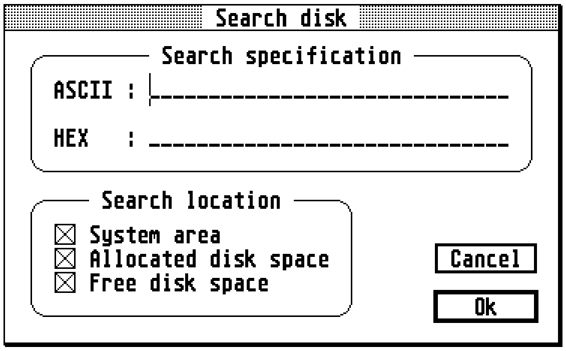
FIND OWNER

If you want to know which file or which part of the system area the displayed sector belongs to, select *Find Owner* in the *View/Edit* menu. The information will be displayed in the info bar at the top of the window. If the displayed sector is not occupied by a file, and does not belong to the disk's system area, an appropriate message will be displayed.

SEARCH

When you want to locate a particular text or value on the selected disk, select *Search* (see p. 18 if you want to locate a text in a specific file). In the dialog form you can enter the data to search, either as a text in the top line (ASCII), or as hexadecimal values in the bottom line (HEX).

E.g. ASCII: Results
HEX : 526573756C7473



Search disk

Search specification

ASCII : ______________________________

HEX : ______________________________

Search location

☒ System area
☒ Allocated disk space
☒ Free disk space

When searching for an ASCII string, the program does not distinguish between uppercase and lowercase characters.

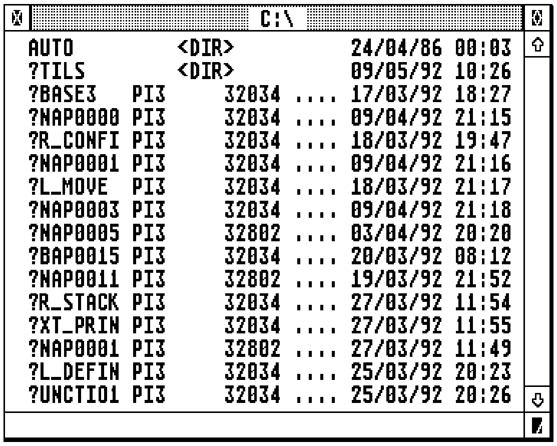
The program starts searching in the sector following the one displayed in the view/edit window. If a match is found, the view/edit window will display the corresponding sector. Press the *Alternate* key when you want to interrupt the search procedure.

PRINT SECTOR

Select *Print sector* if you want to obtain a printout of the complete sector. Because of the specific character set used by the ST, the characters that appear in the right panel of the printout may not be the same as the ones displayed on the screen.

UNDELETE FILE/DIRECTORY

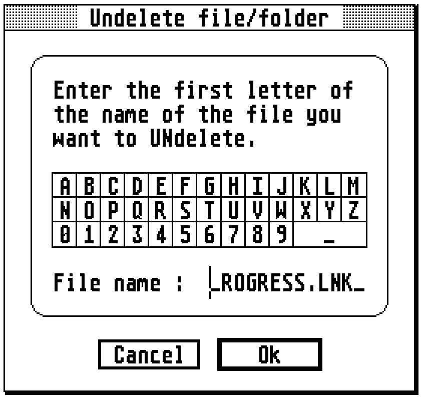
Tracked! offers the possibility to undelete files that you might have deleted accidently. In order to undelete a deleted file, select the *Undelete file/directory* option. A window will be opened displaying the existing directories and the deleted files and directories on the disk. The first character of an erased item is indicated by a question mark.



C:\

```
AUTO          <DIR>          24/04/86 00:03
?TILS         <DIR>          09/05/92 10:26
?BASE3   PI3      32034 .... 17/03/92 18:27
?NAP0000 PI3      32034 .... 09/04/92 21:15
?R_CONFI PI3      32034 .... 18/03/92 19:47
?NAP0001 PI3      32034 .... 09/04/92 21:16
?L_MOVE  PI3      32034 .... 18/03/92 21:17
?NAP0003 PI3      32034 .... 09/04/92 21:18
?NAP0005 PI3      32802 .... 03/04/92 20:20
?BAP0015 PI3      32034 .... 20/03/92 08:12
?NAP0011 PI3      32802 .... 19/03/92 21:52
?R_STACK PI3      32034 .... 27/03/92 11:54
?XT_PRIN PI3      32034 .... 27/03/92 11:55
?NAP0001 PI3      32802 .... 27/03/92 11:49
?L_DEFIN PI3      32034 .... 25/03/92 20:23
?UNCTIO1 PI3      32034 .... 25/03/92 20:26
```

By clicking on an existing directory name, the subdirectories and deleted files of that directory are displayed. After clicking on an erased file, you will be requested to enter the missing first character of the filename.



Undelete file/folder

Enter the first letter of the name of the file you want to UNdelete.

File name : _ROGRESS.LNK_

After having entered this character, the program will attempt to undelete the file. If the program cannot successfully undelete the file, it will display an appropriate message and you will have the option to undelete the file manually by searching for the file's data clusters on the disk and allocate these clusters to the file (see below: *Add cluster to file*).

In order to undelete a complete directory you must, after having undeleted the directory itself, also undelete the files which were present in that directory.

Fragmented files are difficult to, or cannot, be undeleted successfully. It is therefore important to optimize the disk regularly in order to avoid file fragmentation.

CONVERT CLUSTER TO FILE

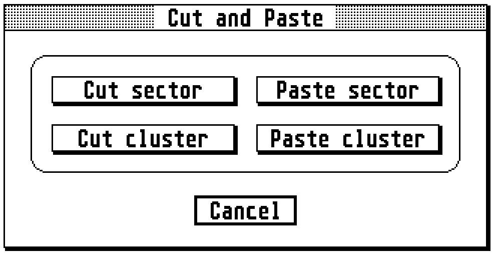
If the displayed sector is part of a data cluster that is not in use by any file, you have the option to create a file with this cluster as its first data cluster. The program will create a file in the root directory with filename CLnnnnnn.CNV where nnnnnn is the cluster number. Do not select *Convert to file* while you are manually deleting a file. By doing so you would end the undelete procedure since clusters will not longer be added to the file to be undeleted (see *Add cluster to file*).

ADD CLUSTER TO FILE

If the displayed sector is part of a data cluster that is not in use by any file, and you have previously allocated a data cluster to a file (see above), or if you are manually undeleting a file, you have the option to add this cluster to that file.

CUT AND PASTE

This function will display a dialog form with the following options: *Cut sector, Paste sector, Cut cluster* and *Paste cluster*. When you select *Cut sector*, the displayed sector is saved in a buffer in memory. You can now paste the sector on another part of the disk by selecting the corresponding item *Paste sector* in the dialog form.


Cut and Paste

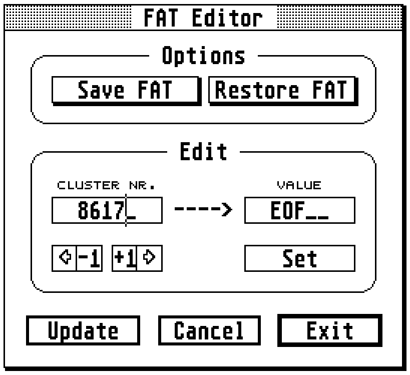
With this option, you can also copy sectors from one disk to another, provided they have the same sector size (usually all disks in the MS-DOS and ST world have a sector size of 512 bytes).

The functions *Cut* and *Paste cluster* act similarly as *Cut* and *Paste sector*, but in this case the complete data cluster (usually 2 or more sectors) is copied. These options may prove to be useful when trying to undelete a (text) file which is partially overwritten by another file. By using the cut and paste cluster function, you can also copy data clusters from one disk to another, provided these disks have the same cluster size.

Floppy disks and small hard disk partitions usually have a cluster size of 2 sectors. Larger hard disk partitions may have a cluster size of 4 or more sectors. Remember that a cluster is the allocation unit for disk storage. This means that a file of 1 byte long also occupies 1 complete cluster and so uses 1024 bytes of disk space when the cluster size is 2 sectors (and the sector size is 512 bytes).

EDIT FAT

From the information about the file allocation table (FAT) in the appendix, it should be clear that studying the FAT of a disk, especially a 12-bit FAT, is very difficult, and editing is, if not impossible, very awkward. We therefore suggest not to attempt to change the file allocation table using the editor facilities in the view/edit window, but use the special function *Edit FAT* in the *View/Edit* menu. The following dialog form will be displayed:


FAT Editor

Options

Edit

CLUSTER NR. 8617 ----> VALUE EOF

When you want to change the FAT of a floppy disk, make sure to make a copy of the complete disk, before performing any changes to the FAT. At the top of the form, 2 buttons are displayed that will provide some security in your attempts to change the FAT of a hard disk. Select *Save FAT* in order to write the contents of the FAT of the hard disk onto a floppy disk. This operation will destroy all information on the floppy disk! Put a clear label on this floppy disk and do not use the floppy disk for any other purpose. Make two such copies. You can now edit the FAT with the knowledge that if something goes wrong (and if you do not know exactly what you are doing, it will go wrong), you can restore the FAT from the floppy disk by selecting the *Restore FAT* button in the dialog form.

At the left of the form, the number of the FAT entry is displayed, and at the right the value for that entry in the FAT. Below *Cluster nr.* 4 buttons are displayed. By clicking on the [-1] button, the previous cluster number or FAT entry will be displayed, and by clicking on the [+1] button, the next cluster number is displayed. In order to follow a file's cluster chain, you can use the left arrow and right arrow buttons.

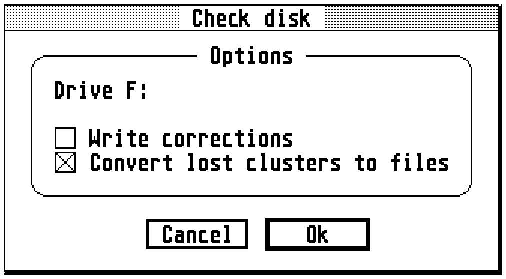
You can jump to any other entry by changing the cluster number, and then click with the mouse on the entry number rectangle. When you want to change the value for a particular cluster entry, you can edit the number displayed in the value box, and next click on the *Set* button.

Two special values can be entered in the *Value* box, i.e. EOF or BAD. When you enter the code EOF, confirmed with clicking on *Set*, the End-Of-File value will be written in this entry of the FAT (FFFH in a 12-bit or FFFFH in a 16-bit FAT). When you enter the code BAD, the cluster will be marked as unusable (FF7H in a 12-bit or FFF7H in a 16-bit FAT). Finally, you have to select the *Update* button in order to write the edited FAT to the disk. The two copies of the FAT on the disk will be updated.

OPTIMIZE MENU

CHECK DISK

This procedure performs an extensive disk check and reports possible errors found on the selected disk. Lost clusters, these are clusters marked as used in the FAT (File Allocation Table) but not belonging to any file chain, may be recovered and converted to files. After selection of *Check disk* a dialog form appears.



Drive F:

□ Write corrections
☒ Convert lost clusters to files

It is recommended to run *Check disk* first without the option to write corrections. Select *Ok* to proceed with checking the disk's logical integrity. After a few moments a report appears on the screen. Select the *Page up* and/or *Page down* buttons to read possible next or previous pages of the report. Select *Print* to obtain a printed report.

If the report mentions an error, you must exit the report form and run *Check disk* again (unless crosslinked files are reported, see later), but now with select the option *Write corrections* selected.

If the first report mentioned lost clusters, i.e. there are data clusters marked as used that do not belong to any file, you can select the option *Convert lost clusters to files*. Select *Ok* to proceed. Corrections will now be written to disk. If lost clusters must be converted to files, the program will create a number of files named FILEnnnn.CHK in the root directory of the selected disk, where nnnn is a serial number. You can now inspect these files and check if they contain valid data. If so, you should rename these files with meaningful names. If these files do not contain valid data you can delete them.

These are possible errors reported by *Check disk* and the actions the program takes to correct these errors:

- Circular reference in FAT, file chain points to itself: *Adjust file size and set EOF (End Of File) marker in FAT*.
- Crosslinked files (cluster used by 2 or more files): *Find other clashing file and report, no corrections are written to disk (see later).*
- Illegal FAT entry: *Adjust file size and set EOF marker in FAT.*
- File size in directory entry too large (conflicting with EOF marker in FAT): *Correct file size.*
- Lost clusters (clusters marked as used in FAT but not belonging to a file chain): *Convert clusters to files or mark as unused in FAT*.

Crosslinked files

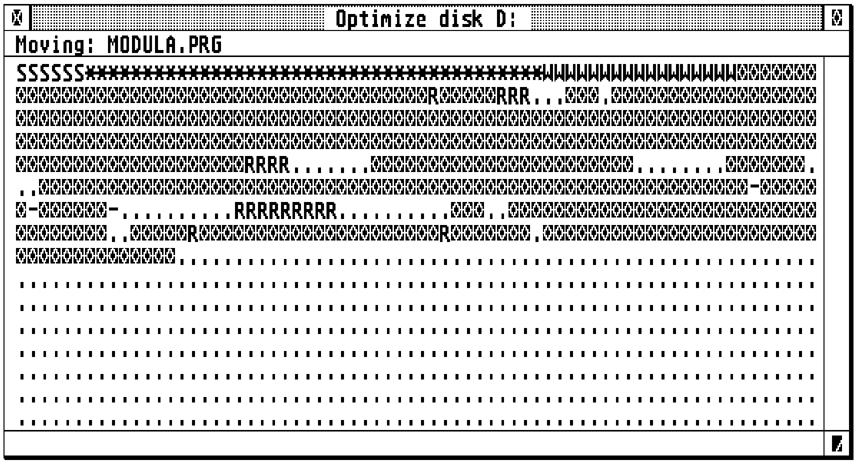
When crosslinked files are reported you should perform the following steps: copy both files to another disk and check the copies to see which one contains valid data and which one is damaged. You may now erase the files on the original disk and run *Check disk* again. As long as crosslinked files are reported you must not run *Check disk* with the option *Write corrections* selected. When the disk is ok, you can copy the undamaged file back to its original disk.

OPTIMIZE DISK

As files and directories are created on a disk and others are erased or expanded, disk performance decreases due to file fragmentation. A file is fragmented if it is not stored in one contiguous space of a disk. The result is that more disk activity is needed to locate, open and close, read from or write to the file. By running *Optimize* regularly, the files on the disk are re-arranged so that all files are written as sequential blocks on disk, without intermediate gaps. This will result in improved disk performance.

After selecting the *Optimize* option, the program first checks the integrity of the disk's logical structure. If the program finds errors, an appropriate warning is displayed. If the disk is ok, the program continues and a window is displayed similar to the map window. The changes written by the optimize procedure are visualized in this window.

After optimizing a disk, there is only one contiguous block of allocated clusters without any intermediate gaps. You can safely interrupt the optimize procedure by pressing the *Alternate* key.



Optimize disk D:

Moving: MODULA.PRG

After running *Optimize*, the program will ask whether you want to clear the free clusters on the disk. By doing so, all clusters on the disk that do not belong to any file will be overwritten by zeros. This will facilitate recognizing clusters to belong to an existing or deleted file.

Files which are marked as *read only* or *hidden* are not moved by the optimize procedure. Because of this, some fragmentation may still exist afterwards.

VERIFY DISK

For a hard disk, it is not abnormal to have some bad sectors. By selecting *Verify disk*, the program will check all sectors on the hard disk. If a bad sector is found in the system area (boot sector, 1st and 2nd FAT, and root directory), the program will display a warning, but it cannot make any corrections.

If a bad sector is found in the disk's data area, the corresponding cluster will be marked as *bad* in the file allocation tables. The program's progress is displayed in a window with a graphical representation of the disk similar to *Map disk*.

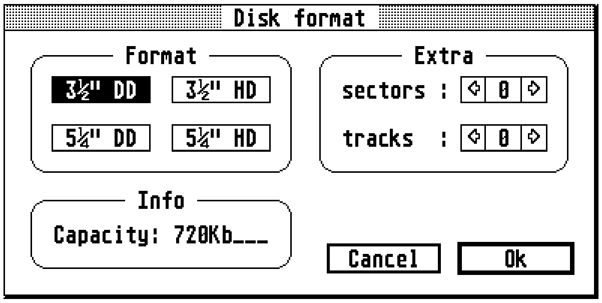
After the compete disk has been scanned, you have the option to write corrections in the FAT.

If a bad cluster is detected that belongs to a data file, this data file will be damaged by updating the FAT (perform *Check disk* and recover lost clusters).

OPTIONS MENU

DRIVE A AND B

By selecting these items in the options menu you can select the format of the disks in drive A and B. It is important to set the correct disk format for drives A and B because this information is also used for the disk format procedure as well as by the File!, Backup! and Restore! program.



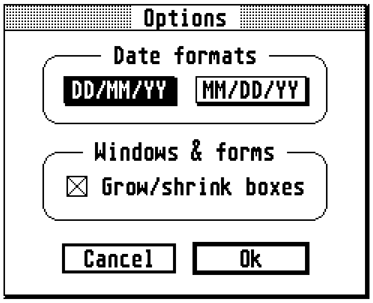
sectors : 0

tracks : 0

Capacity: 720Kb___

OTHER OPTIONS

In the *Other options* dialog form you can select the date format used in the Tracked! programs. In addition, you may select growing and schrinking boxes to be displayed when the program opens a window or a dialog form.



[✓ DD/MM/YY] MM/DD/YY

☒ Grow/shrink boxes

CONVERT DISK

With early versions of TOS, it is not possible to use a floppy disk formatted with TOS in a MS-DOS system. The function *Convert disk* will convert a floppy disk to a MS- DOS compatible disk.

FORMAT FLOPPY DISK

By selecting *Format floppy disk* you can format a floppy disk. In the drive selection form you may select either disk A or disk B to proceed with formatting the floppy disk, or select the *Cancel* button in order to cancel the format procedure. The disk is formatted according to the format specifications as set in the corresponding menu options (see above). Disks formatted with Tracked! are always MS-DOS compatible. If a disk is already formatted, and you only want to erase all data on the disk, refer to *Zero floppy disk*.

ZERO FLOPPY DISK

When a disk contains a lot of files, it is often faster to reformat the disk than erasing all individual files. With Tracked! you need not to reformat the disk. Simply select *Zero floppy disk* in the *Options* menu. After selecting the disk in the drive selection form some warnings appear on the screen. If you want to proceed with zeroing the disk, select the *Ok* button, else select *Cancel*. Zeroing a disk is an option included in Atari's hard disk utility HDX. In Tracked!, the same feature is provided for floppy disks.

In order to zero a disk the program clears the disk's file allocation tables and root directory. The other sectors and/or tracks on the disk are not overwritten.

SAVE OPTIONS

Select *Save options* to save the selected disk formats and other options in a file on disk. There is only one options file, namely TRACKED.OPT for all programs that are part of the Tracked package.

SECTION 2. FILE!

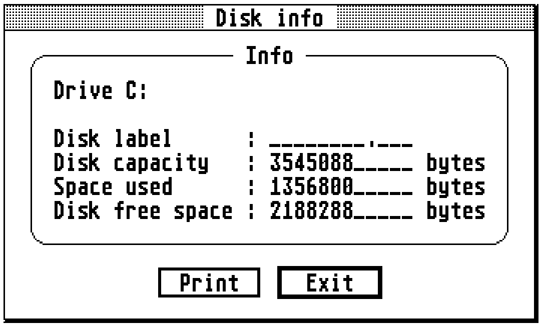
DISK MENU

SELECT DISK

Use this menu item in order to select a disk in the dialog form that is displayed. When selecting a non-valid (e.g. not formatted) disk, other menu items are disabled.

INFO

Select *Info* to display information about the selected disk: drive identification letter, disk label (or disk name), disk capacity, space used and disk free space. This form does not necessarily give the same information as the desktop's information form.



```
Drive C:

Disk label      : ________.___
Disk capacity   : 3545088_____ bytes
Space used      : 1356800_____ bytes
Disk free space : 2188288_____ bytes
```

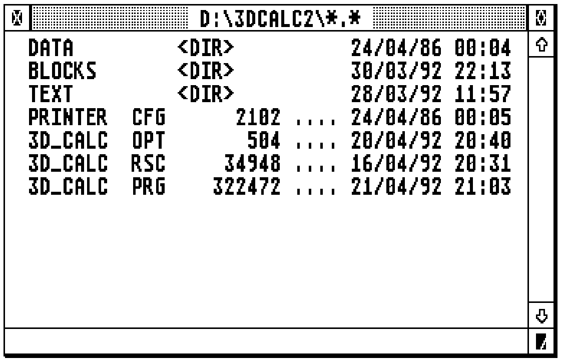
QUIT

Select *Quit* in order to exit the program and to return to the desktop.

FILES MENU

DIRECTORY

After selection of *Directory* in the *Files* menu, a window is opened displaying files and directories on the selected drive. Filename, extension, file size, attributes, date and time are displayed. First the subdirectories are listed, next the files. The items are displayed unsorted, in the order they are present in the directory.



```
D:\3DCALC2\*.*
DATA          <DIR>           24/04/86 00:04
BLOCKS        <DIR>           30/03/92 22:13
TEXT          <DIR>           28/03/92 11:57
PRINTER  CFG      2102 .... 24/04/86 00:05
3D_CALC  OPT       504 .... 20/04/92 20:40
3D_CALC  RSC     34948 .... 16/04/92 20:31
3D_CALC  PRG    322472 .... 21/04/92 21:03
```

For the file attribute the following characters are used:

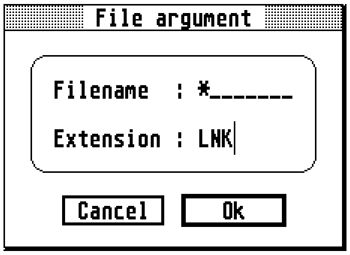
H	Hidden file
S	System file
A	Archive bit is set
R	Read only

Directories are indicated with the code <DIR>. Click on a directory name to list the files in that directory. Click on the window close box to return to the previous level, or to close the window. You can select files by clicking on the filename once, and unselect a file by clicking on it again. Selected files are displayed in reverse.

On the Atari ST the *System file* bit is not used by the system. The *Archive* bit was not used in the first versions of the ST's operating system.

FILE LIST ARGUMENT

If you only want particular files to be displayed in the directory window, you can define the filename and extension argument for the directory list after selecting *File list argument*. E.g. if you only want to display the files with extension LNK, you can enter:



File argument

Filename : *_______

Extension : LNK

SELECT ALL

After selecting *Select all* in the files menu, all files displayed in the directory window are selected and are displayed in reverse.

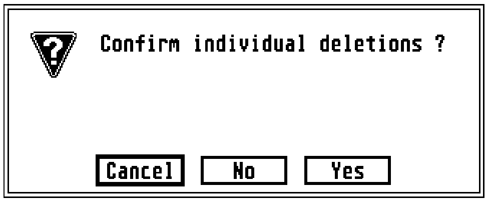
UNSELECT ALL

Use this menu option to unselect all files that are selected in the directory window.

DELETE SELECTED FILES

If you want to delete the selected files, click on this menu item. Files marked as *Read only* can also be deleted using this procedure.

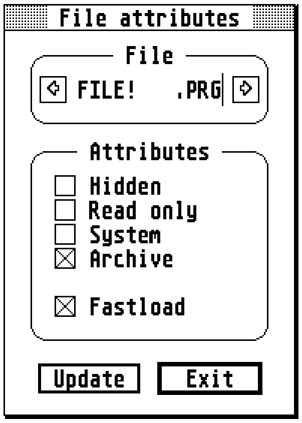
You may select confirmation of all deletions.



Confirm individual deletions ?

ATTRIBUTES

Select *Attributes* in the file window if you want to change the attributes or names of the selected files.



File attributes

File

FILE!   .PRG

Attributes

☐ Hidden
☐ Read only
☐ System
☒ Archive

☒ Fastload

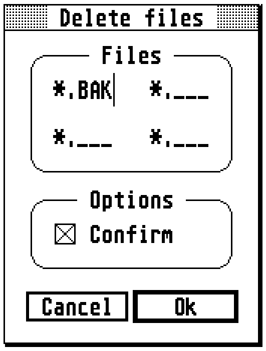
In the *File attributes* dialog form, select the *Read Only* attribute if you want to protect the file. Select the *Hidden* attribute if you don't want the file to be displayed on the desktop or the standard file selection form. Select *Update* to save the new name and/or attributes. Select the right arrow button to display the next selected file, if any. Select *Exit* to end this part of the program.

DELETE FILES

With this function you can erase all files with selected extensions on a selected set of disks.

E.g. to erase all files with extension BAK on drives D: and E: select menu item *Delete files*. Now select drive D and E on the drive selection form. In the next dialog form enter the extension BAK.

You may request confirmation of individual file deletions, or select automatic deletion of all selected files without confirmation. Files marked as *Read only* will not be deleted by this program option.



Delete files

Files

*.BAK *.___

*.___ *.___

Options

☒ Confirm

PRINT MENU

PRINT DIRECTORY

Select *Print Directory* to print the list of files/directories as displayed in the directory window. If the printer is on line, the program will immediately start printing. If the printer is not ready, an appropriate warning message will be displayed.

PRINT TREE

The *Print tree* option will print a structured overview of the subdirectories on the selected disk.

PRINT SELECTED FILES

If you want the selected files to be printed as text files, select *Print files*. All selected files will be printed.

This option assumes the text file to contain all formatting codes and information required for the printer. Normally, only ASCII files can be printed adequately with this procedure. By pressing the *Alternate* key you can interrupt the printing.

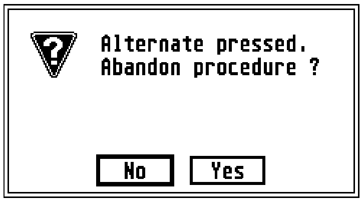
DUMP SELECTED FILES

After selection of *Dump selected files*, you will requested to select either an *ASCII* or *HEX* dump.

When selecting an *ASCII* dump, the files will be printed with 64 characters per line, control codes (ASCII values less than 32) and ASCII value 127 will be replaced by spaces.

When selecting a *HEX* dump, the files will be printed with 16 characters per line, each character represented by its 2 character hexadecimal code in a left panel and the corresponding ASCII character in the right panel. All selected files will be printed.

By pressing the *Alternate* key you can interrupt the printing procedure.



Alternate pressed.
Abandon procedure ?

Note that the printed ASCII characters may not correspond to the characters displayed on the Atari computer screen due to the ST's deviating character set.

EDIT MENU

OPEN FILE

In the item selector form that appears after selection of *Open file* in the menu, you can select the name of an existing file to be loaded in memory. The file will be displayed in a new window. The display mode can be selected in the menu (see *Display mode*).

SAVE

Select *Save* when you want to save the changes you have made to the file on disk. With this command, you will replace the old version with the new, edited version.

SAVE AS

Select *Save as* in the menu in order to save the changes in a new file. This will leave the original file unchanged.

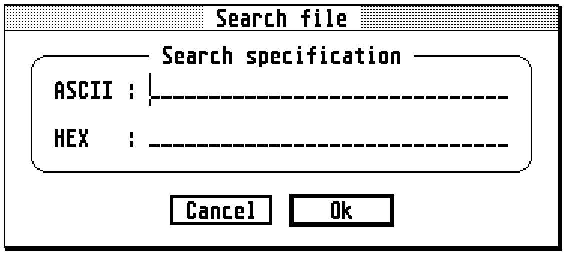
DISPLAY MODE

When you select the *Hex* display mode, the window will display two columns. In the left column the contents of the file will be presented as hexadecimal codes, and in the right column, the corresponding ASCII characters will be displayed.

When *Text* display mode is selected, only ASCII characters will be displayed in the window.

SEARCH

Use *Search* to quickly locate a certain text, or certain codes in the file (see also p. 6).



In the dialog form you can enter the data to search, either as a text in the top line (ASCII), or as hexadecimal values in the bottom line (HEX). The program will give priority to the text entered in the top line (ASCII) and will not search for the values entered in HEX format if the top line is not empty.

When searching for an ASCII string, the program does not distinguish between uppercase and lowercase characters.

Press the *Alternate* key when you want to interrupt the search procedure.

PRINT FILE

Select *Print file* if you want the file to be printed as a text file.

This option assumes the text file to contain all formatting codes and information required for the printer. Normally, only ASCII files can be printed adequately with this procedure. By pressing the *Alternate* key you can interrupt the printing.

DUMP FILE

After selection of *Dump selected files*, you will requested to select either an *ASCII* or *HEX* dump.

When selecting an *ASCII* dump, the file will be printed with 64 characters per line, control codes (ASCII values less than 32) and ASCII value 127 will be replaced by spaces.

When selecting a *HEX* dump, the file will be printed with 16 characters per line, each character represented by its 2 character hexadecimal code in a left panel and the corresponding ASCII character in the right panel.

By pressing the *Alternate* key you can interrupt the printing procedure.

OPTIONS MENU

By selecting the appropriate items in the options menu you can select the format of the disks in drive A and B (see also p. 12), as well as other options such as date format (see p. 12). Select *Save options* to save this information on disk (see p. 13).

SECTION 3. BACKUP!

FILE MENU

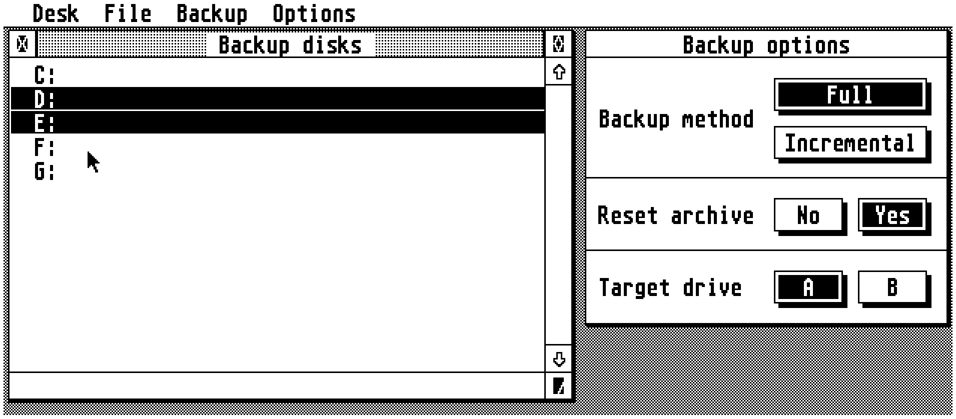
NEW

Select *New* in order to unselect all selected items and to start a new backup session.

SELECT ITEMS

The first step in making a backup of the hard disk is to select the hard disk partitions or and/or directories and/or files that you want to be backed up.

After selection of *Select items*, a window is opened displaying the existing hard disk partitions. You can select a partition by clicking on the corresponding line in this window.



C:
D:
E:
F:
G:

Backup method: Full, Incremental

Reset archive: No, Yes

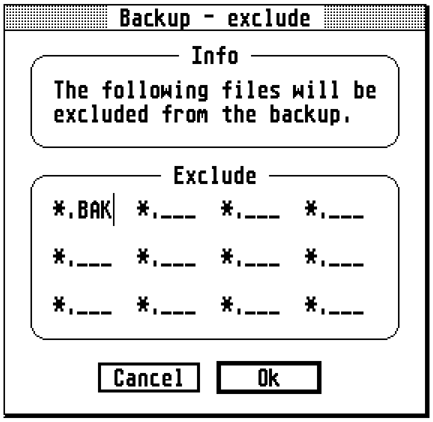
Target drive: A, B

By double-clicking on a disk identifier (C, D, ...) in the left window, the contents of the root directory is displayed. You can now also double-click on a subdirectory to display the files it contains. Select the items you wish to backup by clicking with the mouse. The selected items will be displayed in reverse. The selected disks should not contain any errors in the FAT (File Allocation Table). Run the *Check disk* option of the Disk! program to ascertain disk integrity.

EXCLUDE ITEMS

Some files on the hard disk will never need to be backed up. E.g. all files with extension BAK. Also program and resource files can be excluded, since you possess the original program disks.

After selecting *Exclude items*, a dialog form is displayed in which you can enter up to 12 extensions of files that should be excluded from the backup. E.g. BAK, LNK, MOZ, DEZ, TMP etc.

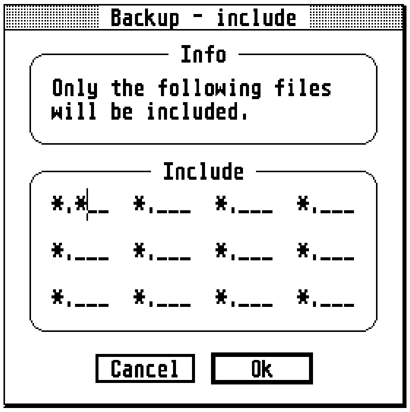


The following files will be excluded from the backup.

```
*.BAK  *.___  *.___  *.___
*.___  *.___  *.___  *.___
*.___  *.___  *.___  *.___
```

INCLUDE ITEMS

After selecting *Include items*, the following dialog form is displayed:



Only the following files will be included.

```
*.*__  *.___  *.___  *.___
*.___  *.___  *.___  *.___
*.___  *.___  *.___  *.___
```

In this dialog form you can enter the filename extentions of the files that should be included in the backup. Files with different filename extensions will not be included in the backup.

If you enter the extension * in the form, all files will be included (exept of course these defined in the *exclude* dialog form).

This option should be used with caution: it is always better to include some superfluous files in the backup, than accidently exclude an important one.

SAVE & READ SELECTIONS

Select *Save selections* when you want to save your selections in a file on disk. This file, with extension BDA, will contain in ASCII format the name and path of the disks, directories and files that you have selected for backup. Lines beginning with * are considered to be remarks and are ignored by the program. A typical BDA file would include data directories only and will, for example, look like this:

```
* BDA file for data files
D:\WORDPLUS\TEXT
D:\WORDPLUS\LETTERS
E:\DEGAS\PICTURES
E:\3DCALC\DATA
```

For your next backup, you can simply read the BDA file and you will not have to select the disks, directories and/or files again.

If a BDA file with filename DEFAULT.BDA exists in the Tracked! directory, this BDA file will be loaded automatically by the Backup! program when it is started.

QUIT

Select *Quit* to exit the backup program and return to the desktop.

BACKUP MENU

BACKUP OPTIONS WINDOW

The backup options window is displayed immediately when the Backup! program is started.

Full backup and incremental backup

When you select *Full backup*, then the program will disregard the *Archive* bit for file selection, and the backup program will create a new LOG file.

When you select *Incremental backup*, only files with the *Archive* bit set will be processed by the program. The backup program will add the files to the existing backup disk set, and will append the selected files to the existing LOG file. The backup program will therefore ask to insert the last backup disk of the previous backup session.

Reset archive

Select the *Reset archive* option when you want the archive bit of a file to be updated after it has been processed by the backup program.

Backup target drive

In the backup options window you can also select the floppy disk drive to backup the files onto.

Use of backup options

Older version of the ST's operating system do not correctly use the archive bit: the archive bit is not set by the system when a file is created or has been updated. This property of your system is tested by the Backup! program when it is started. If the result of the test is negative, i.e. when the archive bit is not being used correctly, the *Incremental backup* option will be disabled.

For a first backup session you should select *Full backup* and the *Reset archive* option. By doing so, you will create a complete new set of backup diskettes, and all files on the hard disk(s) will have the archive bit reset, indicating that they have been copied by the backup program.

In a next session you can select *Incremental backup*. The program will add the files that have been changed since the previous backup session to the latest backup set.

From time to time you can create a complete new backup by selecting the *Full backup* option again.

DO BACKUP

Select *Do backup* to start the backup procedure. You will be requested to insert sequentially numbered floppy disks. Be sure to put a label on the disks with the date of backup and the floppy disk's serial number.

The floppy disks need not to be formatted: if they are not, or if they do not correspond with the disk format specified in the options menu, the backup program will reformat them automatically.

If a bad floppy disk is detected, this disk should simply be thrown away, and you will have to repeat the backup procedure (a full backup). Therefore it is recommended always to use good quality disks only.

After completion of the backup, you are requested to insert an additional floppy disk to write a copy of the BACKUP.LOG file onto. Label the disk accordingly. The BACKUP.LOG file is essential to ensure a successful restore.

When the backup procedure is completed, store the backup diskettes in a safe place. Do not store backup diskettes next to your computer. In addition, it is good practice to save several complete backups.

OPTIONS MENU

By selecting the appropriate items in the options menu you can select the format of the disks in drive A and B (see also p. 12), as well as other options such as date format (see p. 12). Select *Save options* to save this information on disk (see p. 13).

SECTION 4. RESTORE!

FILES MENU

DIRECTORY

When you select *Directory* in the files menu, a window will be displayed similar to the item selection window of the backup program. This option will enable you to compare the files that are present on the hard disk partitions with the files on the backup floppy disks.

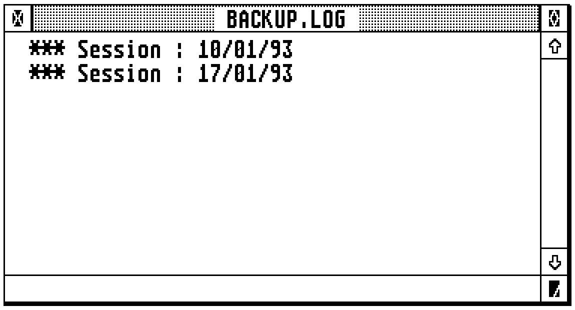
QUIT

Select *Quit* in order to exit the program and return to the desktop.

RESTORE MENU

READ LOG FILE

A restore session always starts with reading the BACKUP.LOG file. The LOG file contains essential data about the backup disks and without this file, restore is impossible.



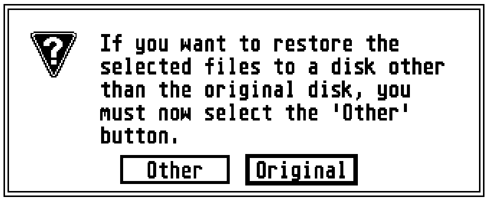
```
*** Session : 10/01/93
*** Session : 17/01/93
```

After reading the LOG file, a window is opened displaying the dates of the different backup sessions, e.g. a full backup followed by different incremental backups. If you click on one of these dates with the mouse, the program will display the disks that were copied during this session. Click on the disk(s) you wish to restore. If you only want to restore particular directories or files, you must double-click on the disk identifier for a list of directories and files. Double-click on a directory to obtain a list of the files it contains. Select the items you wish to restore by clicking the left-side button of the mouse.

Note that you will only restore the selected items in the restore window (i.e. files and subdirectories on the same harddisk partition or in the same directory).

RESTORE TO HARD DISK

Normally, files are restored to their original disk. If you want to restore the files to another disk, you must select this menu item and select the *Other* button in the dialog form:



If you want to restore the selected files to a disk other than the original disk, you must now select the 'Other' button.

RESTORE SELECTED ITEMS

Select *Restore selected items* in order to proceed with the restore procedure. If you restore the files to another disk than the original disk, you will be requested to select the new target disk. Next, you will have to insert the backup disks as requested by the program. Files are always restored to the directory or subdirectory they belonged to. If the directory does not exist on the target drive, the Restore! program will create it. Files that are marked as write-protected are not replaced or overwritten by the restore procedure.

OPTIONS MENU

By selecting the appropriate items in the options menu you can select the format of the disks in drive A and B (see also p. 12), as well as other options such as date format (see p. 12). Select *Save options* to save this information on disk (see p. 13).

APPENDIX A.
DISK LOGICAL STRUCTURE

BOOT SECTOR

A disk's boot sector is the first sector of the disk (sector number 0). This sector contains the disk format information and, possibly, a boot program to load the operating system, or a virus!

FAT 1 & 2

Normally, a disk contains 2 copies of the file allocation table (FAT). This table is used by GEMDOS to keep record of the disk's data space usage. GEMDOS normally uses only the 2nd FAT, and the 1st FAT is a copy of the 2nd. However, if the 2nd FAT is damaged, e.g. partially located on a bad sector, the 1st FAT can be used.

ROOT DIRECTORY

The root directory follows immediately after the 2nd FAT. It occupies a limited number of sectors on the disk. If the directory can hold 64 entries, the root directory occupies 4 sectors of 512 bytes.

DATA AREA

The data area is used to store the file and subdirectory data on disk. Disk space is allocated to a file/directory in units of clusters.

The information in the boot sector, the file allocation tables and the directories is stored in Intel 8088 format: LSB-MSB (*Back-Words Storage*). In this format, the Least Significant Byte is stored before the Most Significant Byte. E.g. $4502 is stored as 0245. This format allows compatibility with MS-DOS.

APPENDIX B.
GEMDOS BOOT SECTOR

The first sector of a disk, sector number 0, is called the boot sector and usually, the boot sector contains the fields listed in the following table.

Table: GEMDOS Boot sector

Offset	Length	Description
0*	2 bytes	Relative branch to boot code
2*	6 bytes	May contain any ASCII string
8*	3 bytes	Serial number
11	1 word	Bytes per sector (e.g. 512, hex 0200)
13	1 byte	Sectors per cluster (e.g. 01 or 02)
14	1 word	Number of reserved sectors (1 for diskettes)
16	1byte	Number of copies of FAT (normally 02)
17	1word	Number of root directory entries (e.g. 64 or 112)
19	1 word	Total sectors on disk
21	1 byte	Media descriptor byte (not used by ST BIOS)
22	1 word	Sectors per FAT
24	1 word	Sectors per track
26	1 word	Number of sides (heads)
28	1 word sectors	Number of hidden sectors or special reserved

* MS-DOS boot sector:

0	3 bytes	Near JUMP to boot code (Intel 8088 code)
3	8 bytes	System identification (e.g. IBM2.1)

In the boot sector, data are stored in Intel 8088 format: LSB-MSB.

APPENDIX C.
FORMAT IDENTIFICATION BYTE

The format identification or media descriptor byte is one single byte written at offset 28 in the boot sector and is the 1st byte of the 1st and 2nd FAT.

Table: Format idientification byte

ID BYTE	Tracks	Sides	Sectors/Track
FF	40	2	8
FE	40	1	8
FD	40	2	9
FC	40	1	9
F0	80	2	18
F9	80	2	9, 15
F8	Fixed disk		

Due to the fact -amongst others- that early versions of GEMDOS do not copy this format identification byte to the two FATs when formatting disks, these disks cannot be accessed by MS-DOS. In addition to correction of the inexact FATs' 1st byte, which should be the format ID byte, the first 3 bytes of the boot sector should contain a legal 3 byte Intel near jump instruction (e.g. EB 2A 90), where the second byte indicates the beginning of the boot code, in order for the disks to be accessible by MS-DOS.

APPENDIX D.
THE FILE ALLOCATION TABLE

INTRODUCTION

The file allocation table (FAT) contains information about the data clusters on the disk, which data clusters are free, which are occupied, etc. Normally there are 2 copies of the FAT on a disk for safety reasons.

The first FAT is located immediately after the boot sector. The second FAT follows the first FAT. After the second FAT, the root directory is located.

The file allocation table contains one entry for every data cluster on the disk. The first 2 entries (number 0 and 1) are reserved, and numbering of the data clusters starts at 2, i.e. the first data cluster on the disk is data cluster number 2. So the number of entries in a FAT equals the number of data clusters plus 2, and the highest data cluster number is the total number of data clusters plus 1.

12-BIT & 16-BIT FAT

There are 2 kind of FATs: a 12-bit and a 16-bit FAT. In a 12-bit FAT, information about a cluster is stored in 12 bits, (1 byte and a half), in a 16-bit FAT each entry occupies 16 bits or 2 bytes. High capacity disks such as hard disks usually have a 16-bit FAT, floppy disks normally have a 12-bit FAT.

FAT VALUES

There are 2 possible special values in a FAT. The 12-bit value FFFH (or FFFFH in a 16-bit FAT) indicates that this cluster is the last cluster of a file. We will call this value the End-Of-File (EOF) marker. The 12-bit value FF7H (or FFF7H in a 16 -bit FAT) indicates that this cluster number is unusable. We will call this value the BAD marker.

If the FAT entry contains the value 0, this means that the corresponding cluster is free, otherwise the value corresponds with the next data cluster of a file.

Suppose a data file starts at cluster number 3 (this information is recorded in the file's directory entry) and also occupies cluster 4 and 6 of the disk. The FAT would then look like this:

FAT Entry nr.	Value
0	reserved
1	reserved
2	9
3	4
4	6
5	0
6	EOF

In this table, we see that cluster number 5 is not occupied. The first data cluster of our file is cluster 3, and the FAT entry for cluster 3 contains the value 4. This means that cluster number 4 is the next cluster of the file. We next look at the entry for number 4 and find the value 6. This means that cluster number 6 is the file's next data cluster. Finally, entry 6 of the file allocation table contains the End-Of-File marker (FFFH in a 12-bit, FFFFH in a 16-bit FAT), which means that cluster number 6 is the last cluster occupied by this file. Cluster number 2 (the first data cluster on the disk) and number 9 are in use by another file.

ATTENTION

There is one more difficulty in studying the FAT, and this is that the values are stored in Intel format, where the most significant byte follows the least significant byte, e.g. hex value 02F3H would be stored as F3 02. Especially for a 12-bit FAT, this complication makes *human* reading of the FAT almost impossible.

APPENDIX E.
STRUCTURE OF A DIRECTORY ENTRY

Table: Directory Entry Structure

Field	Offset	Size	Description
1	0	8	Filename
2	8	3	Filename extension
3	11	1	Attribute (see Appendix F)
4	12	10	Reserved, unused (zero-filled)
5	22	2	Time
6	24	2	Date
7	26	2	Starting cluster number
8	28	4	File size

Data are stored in 8088 format: LSB-MSB. The root directory has a fixed number of entries (see *Disk Info* in the Disk! program, p. 2).

Subdirectories are actually stored on disk as files which may contain an unlimited number of entries. The first entry of a subdirectory always has a filename coded **.** and this entry contains information of the subdirectory itself. The second entry has a filename coded **..** and contains information of the subdirectory's parent, which may be the root directory or another subdirectory.

When a file is erased, the first character of the filename is replaced with the character E5H and the file's entries in the FAT are cleared. If the first character of the entry's filename is 00H, this indicates that this entry has never been used. GEMDOS will not look in the directory beyond the first entry marked as never used.

APPENDIX F.
FILE ATTRIBUTES

Table: File Attributes

Bit	Value		Description
	Dec	Hex	
0	1	1	Read-only
1	2	2	Hidden
2	4	4	System
3	8	8	Volume label
4	16	10	Subdirectory
5	32	20	Archive
6	64	40	Unused
7	128	80	Unused

In principle, the archive bit is set by the operating system when a file is created or is written to. This bit indicates that the file needs to be backed-up. Backup programs can reset the archive bit of the files that are backed up, so after making a back-up, the archive bit is OFF.

On the ST, the first versions of the operating system do not use the archive bit, so the system does not set the archive bit when a file is created or written to. The Backup! program tests the correct use of the archive bit by your system. If this test is negative, and the archive bit is not being used, the *Incremental backup* option will be disabled.

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