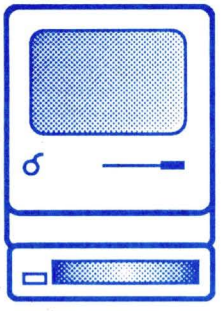


V4.54

Mac Zap System

Mac Zap Tools
Mac Zap Patcher
Mac Zap Copy
Fast Disk Copy

AND

Recover HFS & MFS

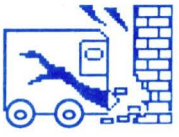
Powerful and Easy to use.

No Macintosh System should be without Mac Zap.
FULL SCSI Support. Safeguard your SCSI Files!

Programs that provide a Macintosh User with SOLUTIONS.

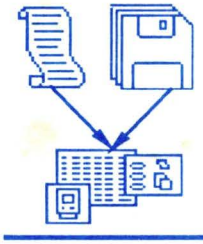
Recover HFS & MFS

No more Sad Macs.
Don't let a Crashed Disk ruin your Day.
NEVER Initialize a Floppy or Hard disk without using Zap First!



Mac Zap can Recover files from damaged or crashed disks. We support all disks, MFS and HFS. Full Hard Disk support. We also support Logical File Volumes such as Mac Serve and others.

Mac Zap System



Mac Zap Tools is a powerful File and Disk Utility. With this program users can edit Disk Volumes, Files, and memory. Other windows are a disassembler, Volume & File Allocation maps, and a graphics window. Make file storage contiguous for faster disk speed. Many other tools!

Unlock the Power of your Hard Disk

Mac Zap Patcher can install protected programs to Hard disks. Patch Files are supplied on disk. No Key disk needed after a patch. Bulletin board support.

Mac Zap Copy makes backup copies of protected software.

Fast Disk Copy is a very fast disk duplication program. It works with MFS or HFS disks.

Bulletin Board Support Available

Compatible with Macintosh 512k, Mac Plus, Mac X/L, MFS & HFS, Hard disks, SCSI Disk Drives, Single and Double Sided Floppies, and Network Hard Disk Volumes such as MacServe.

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3) Ordering Protection Book 4) Ordering MFS/HFS Book

+ Name and Address and serial number for the Mac Zap disk you bought. Also: Your registration card must be enclosed or previously mailed. Your serial number is in Mac Zap Tools under the Apple pull down menu, About Mac Zap Tools.

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Austin Tx 78761

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Software Protection Using Disk Formatting and Operating System Modification

This is a 180 page book describing the popular software protection methods in use today. The mechanics of implementing and removing Software protection are described. Sample protection programs for the Macintosh, IBM and Apple II computers are included, many pictures and diagrams, procedures, guidelines etc.The Six Main Sections are:

1) Disk Structure from Simple Concepts to Disk Controller Usage
2) Protection Techniques Used. Software and Hardware with examples.
3) Protection System Structure
4) Sample Programs for Mac IBM AppleII, Complete Program Listing
5) Copying Methods, Software Hardware Concepts
6) Macintosh Chapter
   a) Disk controller
   b) Rom Routines
   c) Sample programs for reading/writing (assembly)
   d) Protection Removal examples and tutorial

Wire Spiral Bound Price $30 + $3 Shipping ($10 overseas)

Macintosh Floppy and Hard Disk Systems

MFS and HFS Disk Structures

This Book goes into greater detail than the Mac Zap Manual on the disk structures for MFS and HFS operating systems. Some of the sections covered in depth are:

Sector Allocation	File Systems
Volume Information	File Allocation

Also covered is how the file system works. Block and File Servers are explained and network or Lan Servers are explained. Example File I/O down to the sequence of events of the Trap call.

Disk and File Crashes

```
SCSI Structures
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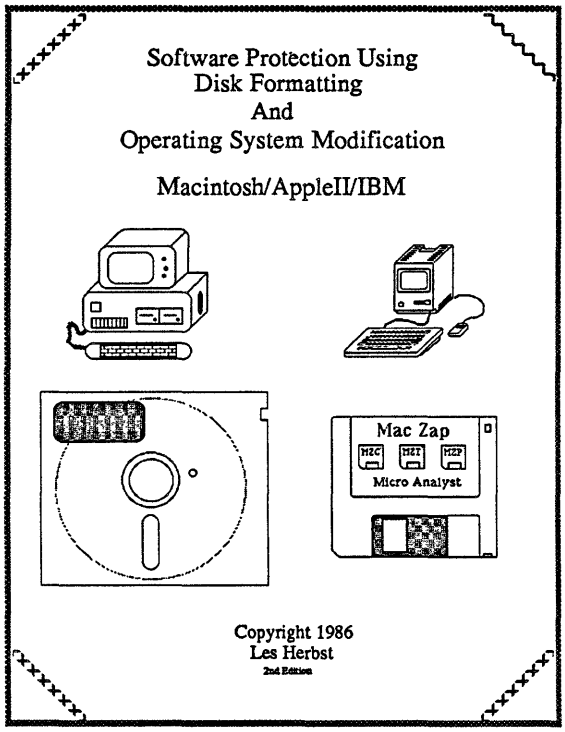
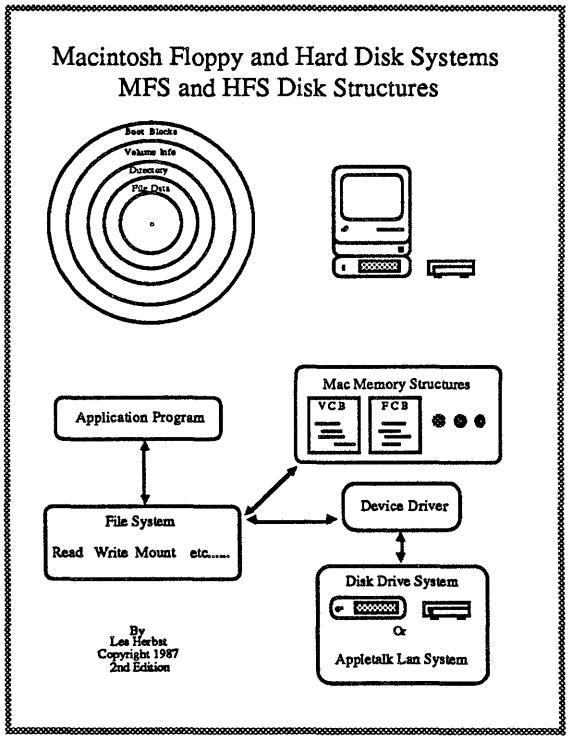
Memory Structures and reference tables for Disks, Volume Control Blocks, File Control Blocks, more.....

Great Reference Manual!!

SoftBound (Like Zap Manual) Price $20 + $3 Shipping





/87/3/3
Manual Date

1.0 Introduction

You have purchased one of the most powerful and useful utility systems for the Macintosh. The Mac Zap System is made up of several separate programs and patch files for Mac Zap Patcher. None of the programs are protected and can be placed on hard disk drives.

Send in the registration card for update notification. Your serial number is in Mac Zap Tools under the Apple pull down menu, About Mac Zap Tools.

This manual describes the operation of the Mac Zap programs. Along with these instructions is some documentation on the Mac Disk system. For more in depth information on the Macintosh Disk and File system we publish two books, see a description of these books on pages 3 and 4.

Bulletin board support is available for the Mac Zap system, see section 7.0.

We recommend you make a backup copy of Mac Zap Right Now!!!
Note: Mac Zap does not have a System & Finder.

If you have a 128kMac then:

A) Boot a system disk, then do a ⌘ shift 1 to eject that disk.
B) Insert the Mac Zap Disk and do a ⌘ shift 1.
C) Insert a blank disk, initialize it, and drag the Mac Zap disk icon over the initialized disk icon.

If you have a 512k Mac or Mac+ then do the following:

A) Boot a system Disk. Insert Mac Zap and double click on Fast Disk Copy.
B) Click on (Read Disk into Memory) . Re-Insert the Mac Zap disk
D) When the entire disk has been read into memory it will eject.
E) Click on ○Format Before Copying
E) Insert a blank disk in drive 1 and click (Copy Memory To Disk)

A short description of the programs is given below. A full set of instructions for each program is in the following sections.

Mac Zap Tools

This program gives the user several powerful tools for accessing Mac Disks, Files, Memory, Hard disks and Ram Disks. It has multiple windows for organizing data and is a powerful utility. The windows are:

Main Window

Hex and ascii display of memory and disk blocks.

Disk & File Window

Disk & File controls. Access any device, online (mounted) or not.

Disassembly Window

A disassembler to screen or file.

Volume Information Window

Information and allocation map for a disk Volume.

File Information Window

File information and allocation map for a file. Also edit file attributes such as invisible and protected.

Graphics Window

Display memory as a graphic bit image. Useful when looking at disk or memory to tell if it is code, data, or a bit image.

Data Window

All search results and information requests will print the resulting values in this window.

In addition to the eight windows there are several pull down menus:

Resources

List the resources of a file. Show their location in resource fork of file.

Search

Enter search strings, Hex or Ascii. Search disk or memory. Compare Disks.

Special

Unit Table List. Volume List. Multiple block Read/Write. Volume Directory Storage Map.

File

Search files,Compare files, List files on Volume. Make File Storage Contiguous.

SCSI

SCSI information

Mac Zap Recover

This program is used to recover crashed disks and files. It will work with single or double sided disks and MFS or HFS systems.Hard disks are supported also. Full SCSI support. HFS Volume files such as Mac Serve are fully supported.

Mac Zap Recover MFS

This program is for MFS disk systems and floppy disks. There are two windows, one for Hard disks and the other for floppies.

Mac Zap Recover HFS

This program is used for HFS disk system recovery. Both floppies and hard disks are supported. HFS Volume Files supported.

Mac Zap Patcher

This program will automatically remove the protection from programs so that they can be backed up. Once the protection is removed many of the programs can be executed off of a ram disk or hard disk. Patch files are supplied on the Mac Zap disk. As new programs are added to the list a new patch file is all that is needed to remove the protection. New Patch files can be acquired by the bulletin board or sending in a disk and $10 for the latest complete set of patch files.

Mac Zap Copy

This program will automatically make backup copies of protected software. There is a block mode and track or bit copy mode. It can also be used on unprotected software. There are also several analysis utilities and a track image display/edit/write capability included for advanced users.

Fast Disk Copy

This program copies unprotected software only. It is a copier that does fast duplication for single or multiple disks.

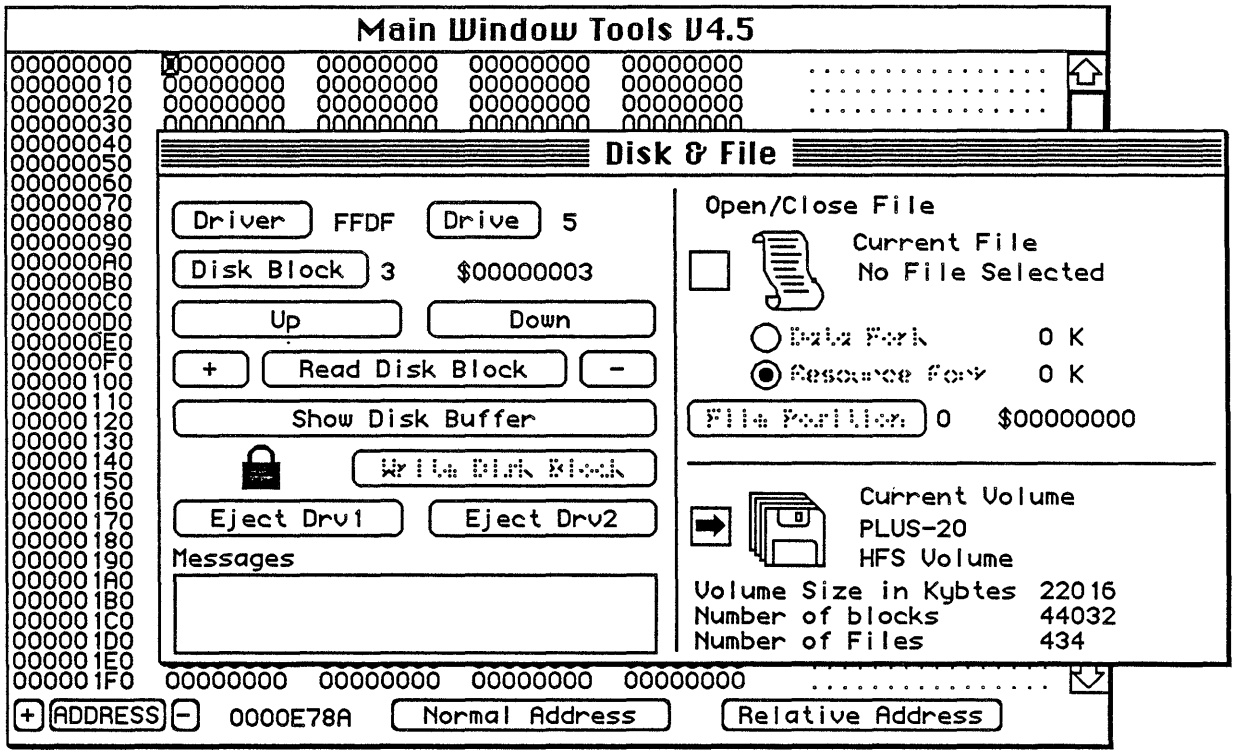
2.0 Mac Zap Tools

->Tutorial in Appendix F<-

Mac Zap Tools is a powerful set of Disk, File and Memory utilities. With Tools you can edit any floppy disk or hard disk, any file or the Macintosh memory. The floppy or hard disk do not have to be online (Mounted) for them to be accessed. There are powerful dialog boxes available for selecting the device you want to read/edit/write blocks to.

Maps of disk block allocations for volumes and files can be requested and drawn. File storage can be made contiguous. These are just a few of the resources available to you with Mac Zap Tools.

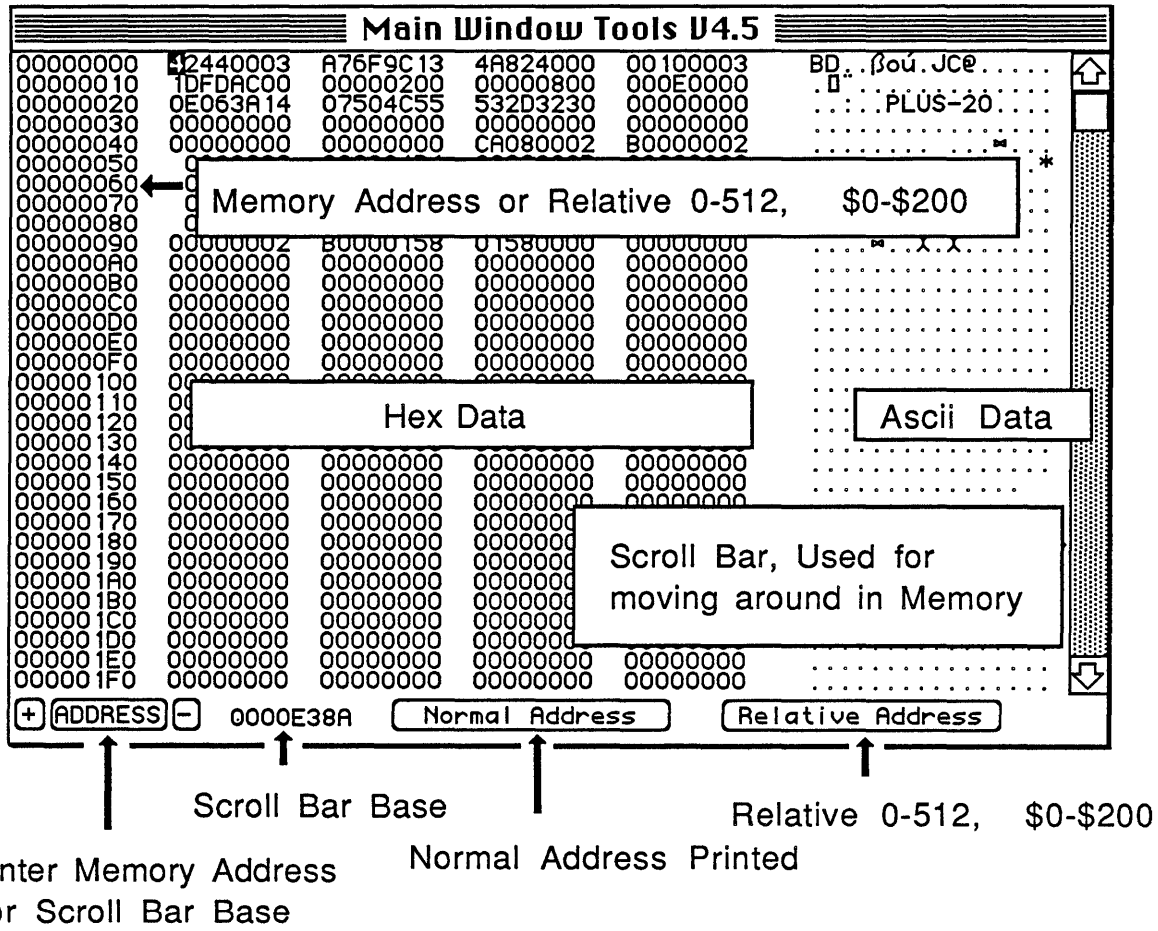
When Mac Zap Tools is started the user sees the screen shown below, the Main and Disk & File windows are open and visible.



The other windows are made visible and invisible by the File pull down menu. The data window contains results from information requests such as file search/compare, disk search/compare or resource lists. When any results are sent to the data window by Zap Tools the data window becomes the frontmost visible window(if not already). See the other sections as to the specifics on the data window.

2.1 Main Window

The Main window contains the Hex and Ascii display area. This is where disk blocks will be displayed and the data can be edited. Both Hex and ascii are displayed as shown below.



Note: Most values printed in this manual are decimal unless they are referenced as hex.. A $ will precede hex values.
Example 10 Decimal is $0A, 10 Decimal is hex 0A

Hex and Ascii Editor For Display

Mac Zap displays 512 bytes of data (size of a disk block) in the Main Window on the screen. This is called the Display. The contents of a disk block are displayed 16 bytes (decimal) $10 (hex) to a row with 32 rows making 512 bytes($200) displayed. For each row there is an address on the left, 16 bytes of hex and then 16 bytes of ascii. The ascii represents the hex data as if it was printed as a screen character. For instance the hex value $41 is the letter A in ascii.

When you read in a disk block the addresses on the left will start at 0000 and increment up to $01F0 (Hex) by increments of $10. A disk block contains 512 bytes (decimal) $200 bytes (hex).

The disk block can be edited using the mouse and keyboard. On the screen there is a cursor (Black Box) on the current hex or ascii byte being edited. The cursor in the picture above is in the upper left on the 4 of the 4244. If the cursor is on a hex number then the user can enter a new hex value to be placed at its address in memory. If the cursor is on an ascii byte then the user can enter a keypress and its ascii value will be stored.

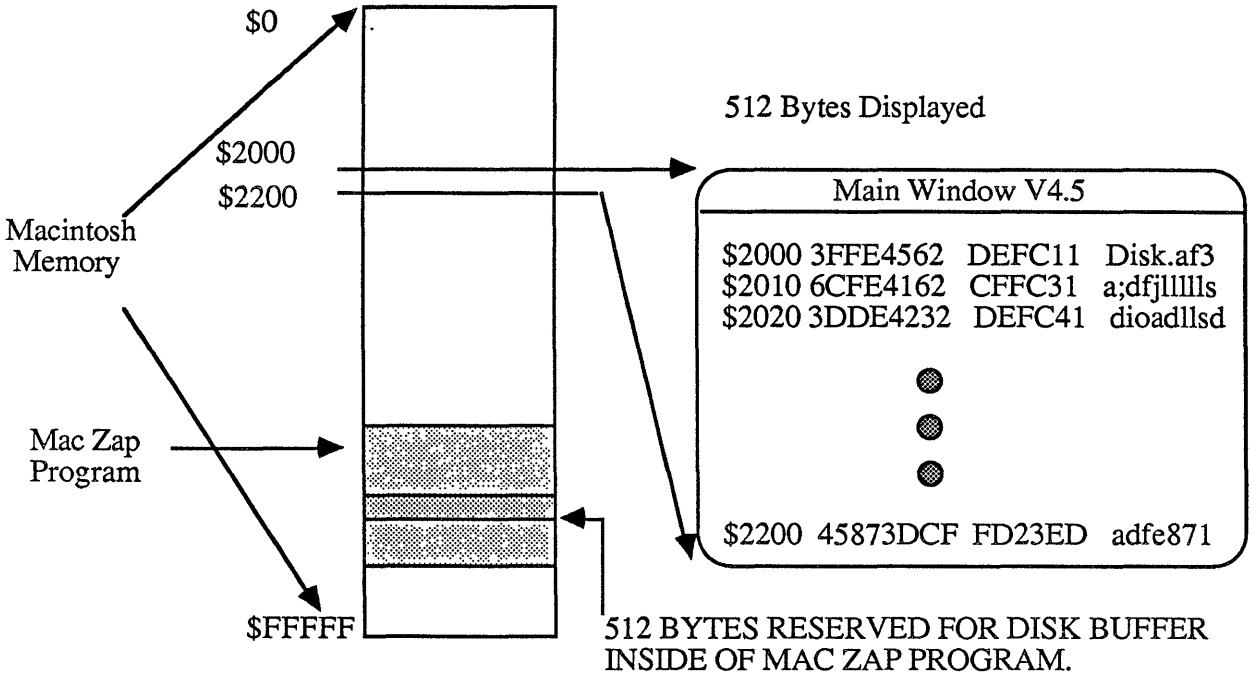
To move to a different location on the screen you can move the mouse to a hex or ascii byte and click. The cursor will follow you to that location and allow entry at that point.

Memory Display Controls

In the Main Window there are several controls that can be used to display any section of the Macintosh memory.

The current disk block resides in a 512 byte buffer inside the Mac Zap program memory. When you read in a disk or file block the display is set to the 512 byte buffer in memory. The addresses on the left are set to relative mode, i.e. they start at 0000 and count up to 512 bytes $200.

The picture below shows graphically that the main window is displaying 512 bytes of memory and you can select which 512 bytes by using the memory controls.



Address (Used for Memory Display)

This control is in the lower left part of the Main window. When you click on address a dialog box will prompt you for the address to display. This address is then used as the base address for the scroll bar. The plus and minus controls on either side of the address control will vary the current display by 1 byte in either direction, useful for aligning memory to graphics or data structures.

Scroll Bar (Used for Memory Display)

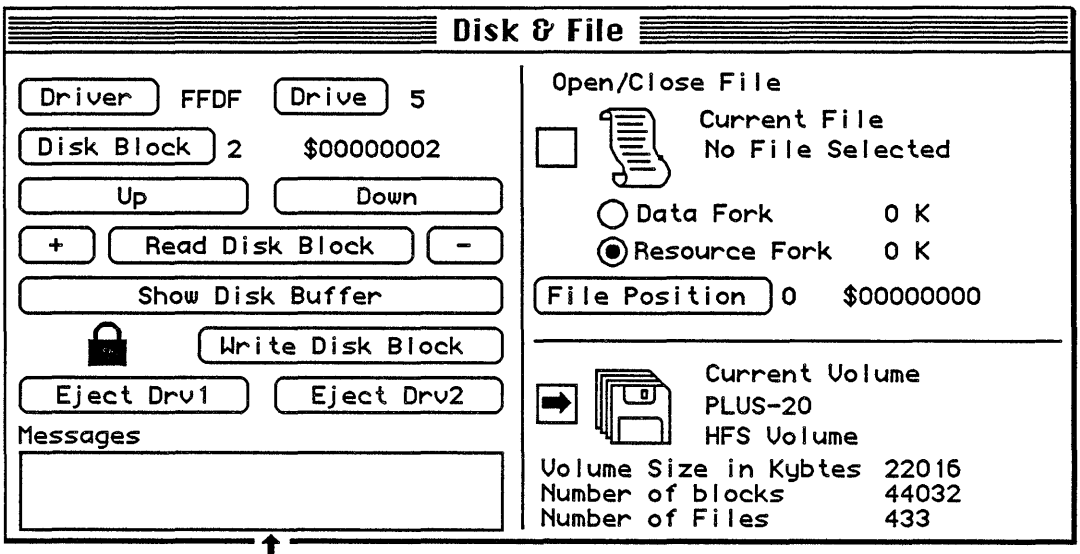
This is a standard scroll bar like the one you have seen in MacWrite and other Applications. It will allow you to move rapidly around memory. It has a range of $20000 hex bytes or 128k decimal bytes from the base address. The current base address is printed next to the Address control.

Relative Normal

When a disk block is read the display shows the contents of the block. Because you have read in a disk block the addresses on the left of the display go from 0000 to $01F0 (512 bytes). The Normal Button will display the normal address values as if you were displaying memory. The relative button puts the 0000 to $01F0 address range up and can be used at any place in memory. It is useful if you are looking at structures etc...

2.2 Disk & File Window

This window is used to select which device (Floppy, Hard Disk, etc) or file you will read blocks from. The window below is what you will see on program startup.



In the window above, the icon has a box next to it with an arrow inside. Above this there is another icon that has a box with no arrow in it. The arrow decides whether you are reading a Volume or a file.

By clicking in the box next to the icon you switch from one mode to the other. Try it now, just click in the box next to the and you will switch from volume mode to file mode. Click in the next to the and you will switch back to volume mode which we will cover first.

Volume Read/Write Blocks

Next to the  icon is the current volume name and some information on that volume such as MFS or HFS type, number of files, number of blocks.

If you click on the  icon Mac Zap will cycle through all of the mounted volumes, advancing one volume for each time you click.

On the left hand side of the Disk & File Window is a set of controls for reading and writing blocks. We will skip the first two controls, Driver and Drive for now and cover the other controls in sequence.

The first control is [Disk Block]. To the right of this control are two numbers, they are the same value printed in decimal and then hex. This is the 'current block' that will be read or written. To enter a new value you can click on the [Disk Block] button and a dialog box will ask you for a number, you can enter a number in hex or decimal.

The next controls are the [Up] and [Down] buttons. These buttons increment and decrement the current block (above) by one.

The next control [Read Disk Block] will read the current block and display it for you in the main window. The [+] control will first increment the current block by 1 and then read a block. The [-] control will decrement the current block by one and then read a block.

On the next row down we have [Show Disk Buffer]. As mentioned previously the Main window can also be used to display memory as well as disk blocks. If you are displaying another part of memory and want to look at the disk buffer this control will bring the display back to the disk buffer.

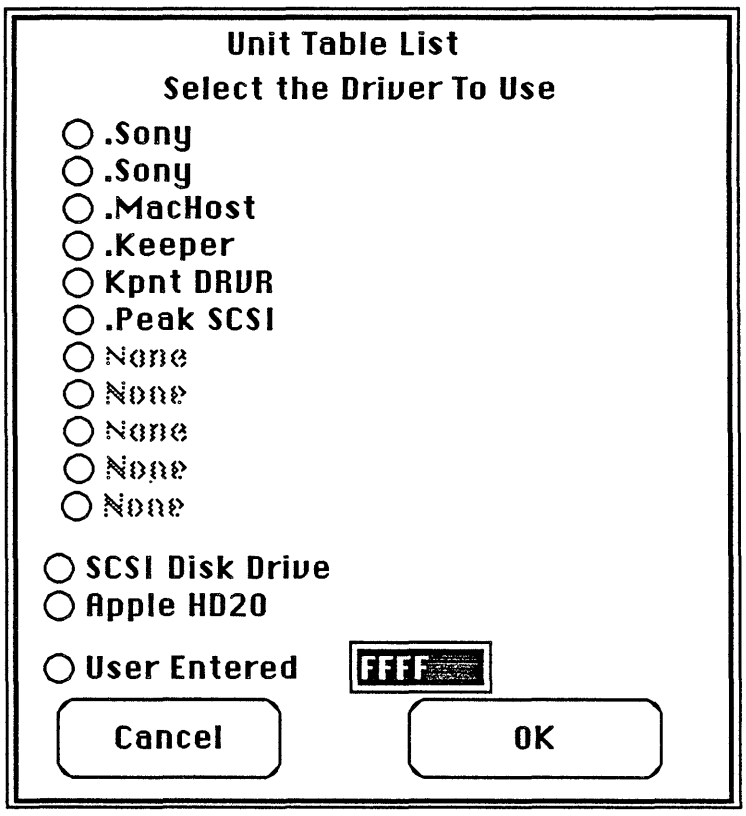
The next row has an icon  of a lock. This is a lock on your write control. We don't want you accidentally writing to a block when you don't want to. If  is showing then the write control is disabled and you cannot write. By clicking on  you change it to the unlocked state and you can then [Write Disk Block].

The last two buttons are used for ejecting floppy disks. The [Eject Drv1] button will eject drive one and similar for drive 2.

Now we come to the [Driver] and [Drive] controls. These controls are for advanced users that want direct access to the device drivers. Normal use of Mac Zap Tools will not require the use of these controls to edit any mounted volumes or files.

When you selected a volume using the  icon the driver number and drive number were automatically set for you. Their values were printed next to the [Driver] and [Drive] controls.To set these values yourself click on either control.

If you click on the [Driver] control the dialog box below appears:

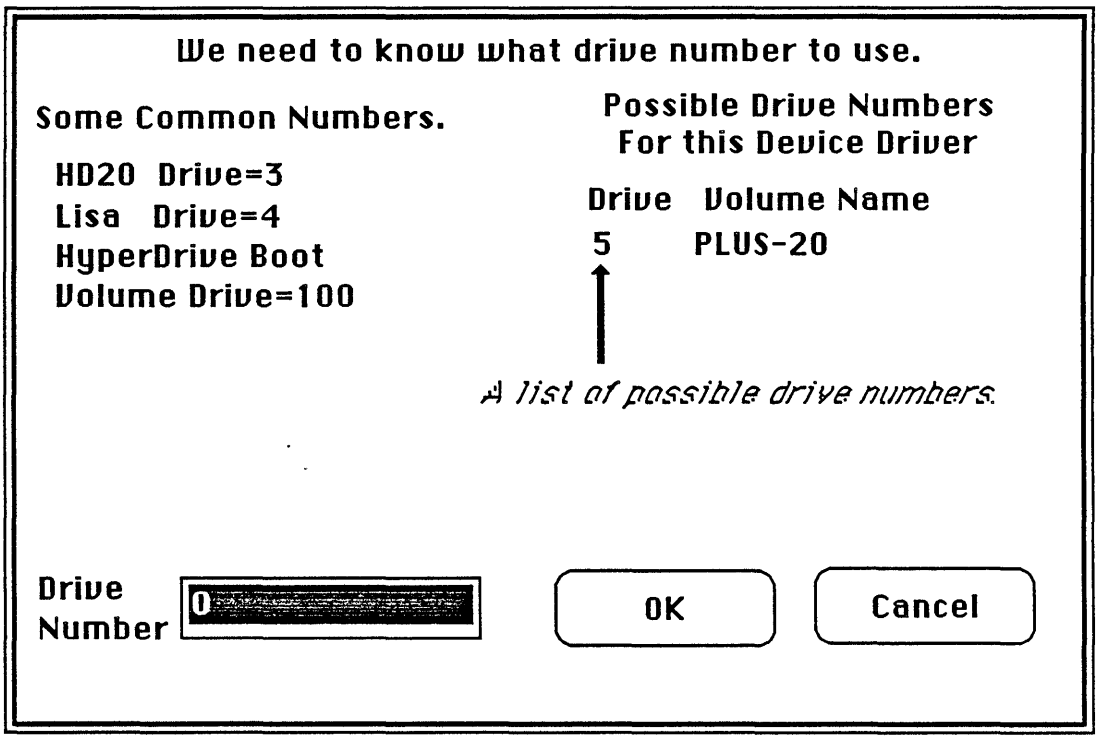


With this dialog you can select any of the device drivers listed in the unit table (those drivers recognized by the Mac). In the example above some of the the drivers are Sony (Floppy disks), Peak SCSI (Hard Disk), and .Keeper (Hard Disk).

Alternatively you can select a SCSI driver inside of Mac Zap Tools with ○ **SCSI Disk Drive** , the Apple HD20 driver, or enter your own driver value ○ **User Entered** FFFF .

If you select the SCSI Disk Drive option you will be prompted for which SCSI device number to use. The Drive number (note DRIVE not Driver) is then set to this device number. Now when you read /write disk blocks you will go directly to the SCSI disk drive and not be limited to the volume partition. This SCSI driver is imbedded in Mac Zap Tools.

By clicking on the [Drive] control you can set the drive number yourself. The dialog box shown below appears.

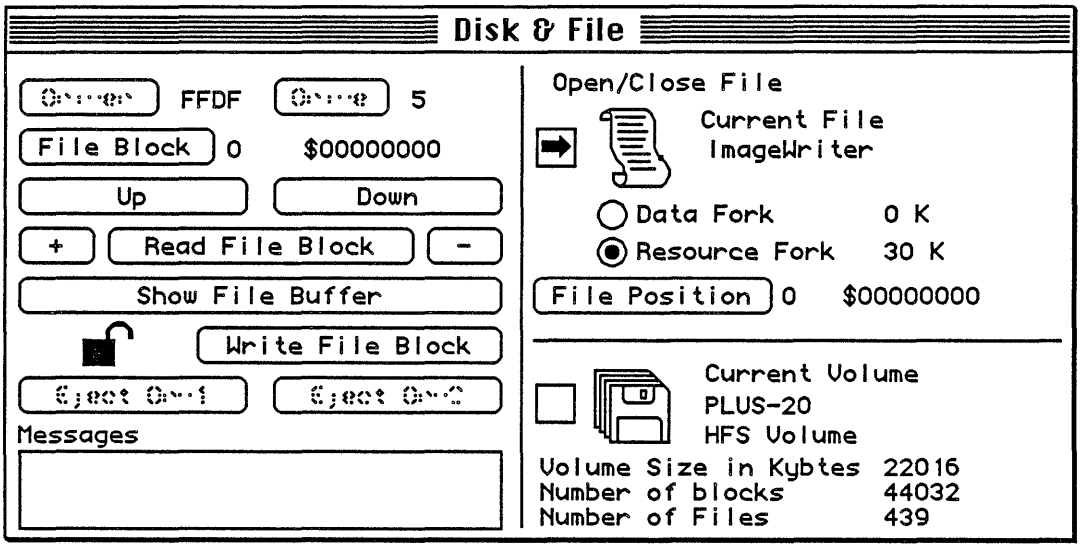


Enter the drive number you want to use and click OK.

File Read/Write Blocks

We have just covered how to use the Disk & file window for editing disk volumes. To edit files click in the ☐ next to  which will select file mode ➡. Click on  to open a file. A standard file select dialog box will appear and you can choose which file to open. If you click cancel in the file select dialog box then any current file is closed and no new file is opened. Mac Zap will not open any files already opened for writing.

In the example below the imagewriter file resource fork has been opened. Note that the controls on the left side of the window are now setup for file editing. Instead of Disk block you have File Block and instead of read disk block you have Read File Block, etc.....



The File Position control below the  is used if you want to read in a known position in the file. The File block and File position values are linked. For Example, if you set the File Position to 680 the File block would change to 1, because block 1 contains File position 512-1024. There are 512 bytes per file block, just as there are 512 bytes per disk block. Next to the control is the current file position, printed in decimal and then hex.

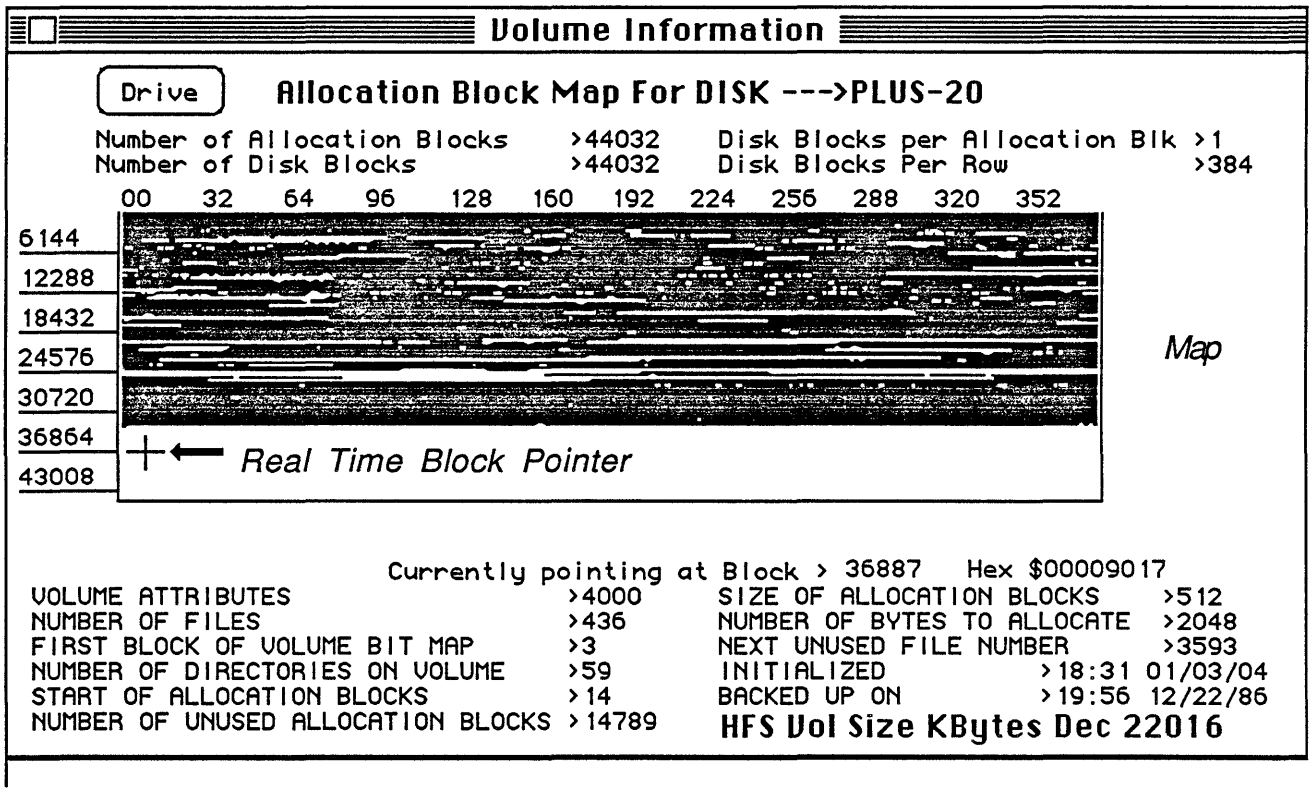
To open the data fork of a file just click on the Data Fork Control below the  .

2.3 Volume Information

The next picture shows the Volume information window. At the top of the window is the disk name and a button labelled Drive. This button is used to obtain information on mounted volumes and an allocation map is drawn.

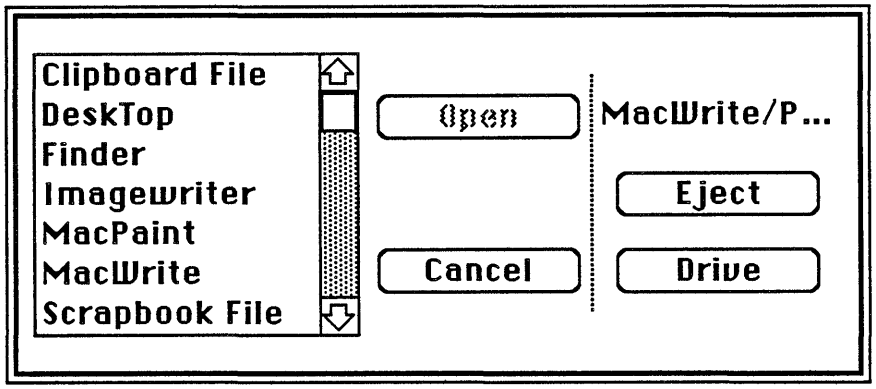
The information displayed and the labels will differ slightly between MFS and HFS volumes due to their different structures and contents. See appendix C for more detail on volume info block structure.

For HFS Disks the map is for allocation blocks, not disk blocks. An allocation block is the BLOCK of disk space that is allocated to a file when a file needs more space to grow. On smaller disks, say 20 Meg or less one disk block = 1 allocation block. On larger disks there are several disk blocks per allocation block. The reason for an allocation block map rather than a disk block map is due to the size of the hard disks. A hard disk may have as small as 20,000 disk blocks for a 10 Meg or over 160,000 disk blocks for an 80 Meg hard disk. On hard disks the allocation block size is manipulated such that the total number of Allocation blocks is between 20,000 and 55,000. In the 80 Meg example above we could map 3 disk blocks to 1 allocation block and end up with 53,000 allocation blocks.



2.3 File Information Window

When opened the user can select a file and display information on it. A standard Macintosh File selector dialog box will appear as shown below:



NOTE: On Finder 5.0 or later the dialog box will be slightly different.

To select a file you can click once on the file and then on open or you can double click on the file name itself. There are two buttons in the upper left of the File Info Window:

New File

Select a new file to display information on.

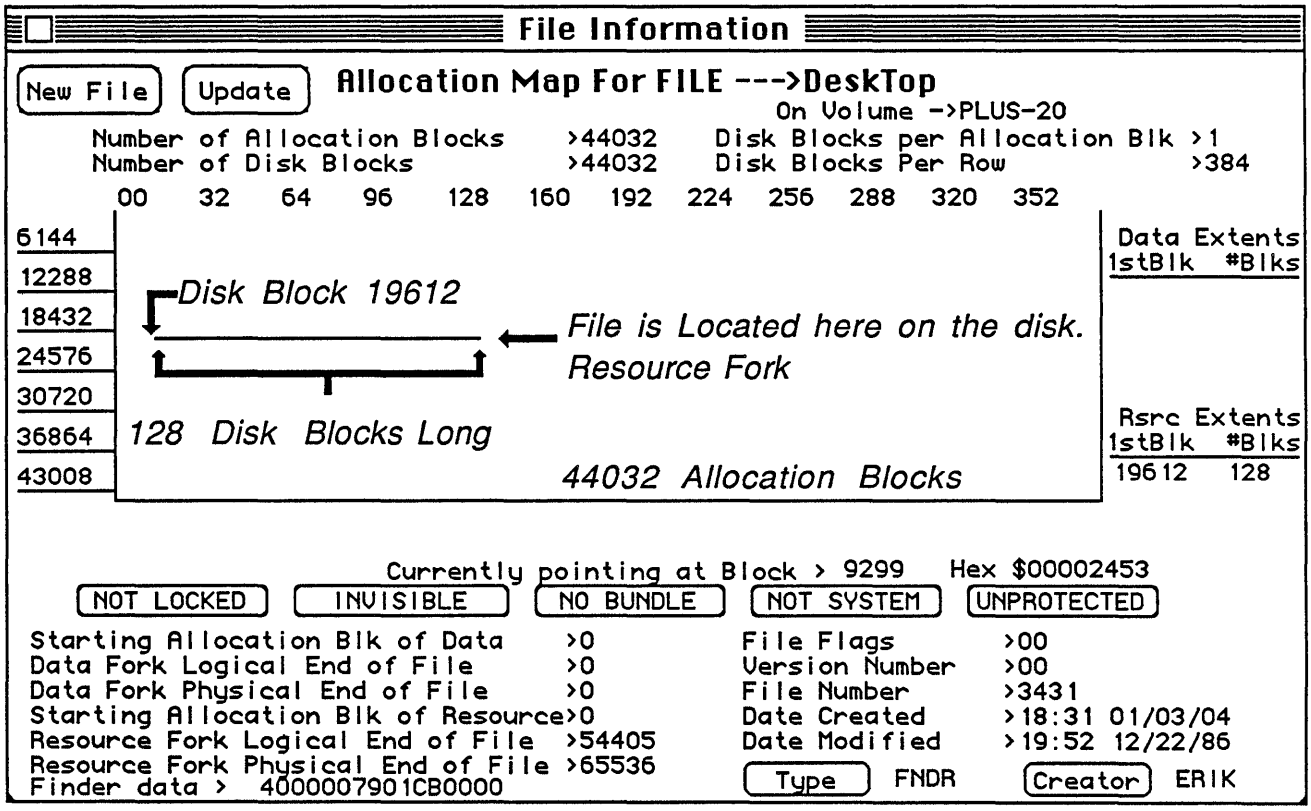
Update

If you change file information and want to update the file on the disk click here.

The example below is on an HFS volume. HFS Files are stored in EXTENTS (a contiguous series of disk blocks). There can be 0 or several extents for each file fork. Each fork of the file has its extents listed on the right side of the screen. Each extent of a fork is listed as two values, 1stBlk and #Blks. 1stBlk is the starting disk block of the extent, note that it is the true disk block and not an allocation block. #Blks is the number of disk blocks that this extent contains. If there are more than 3 extents a message '+++ More+++' is printed beneath the 3rd extent, these are very fragmented files.

The file extents are also mapped graphically in the volume map. Above the map is information on the volume that the file is stored on, such as the number of disk blocks, allocation blocks etc....For more information on the file structure see Appendix D.

Note: Under the Extra:File pull down menu there is an option to make a file's storage contiguous (only one extent per fork) in that menu. This reduces access time on the file and speeds up disk operation. Typical files that can use this are the system file, desktop and any large data files you have on disk.



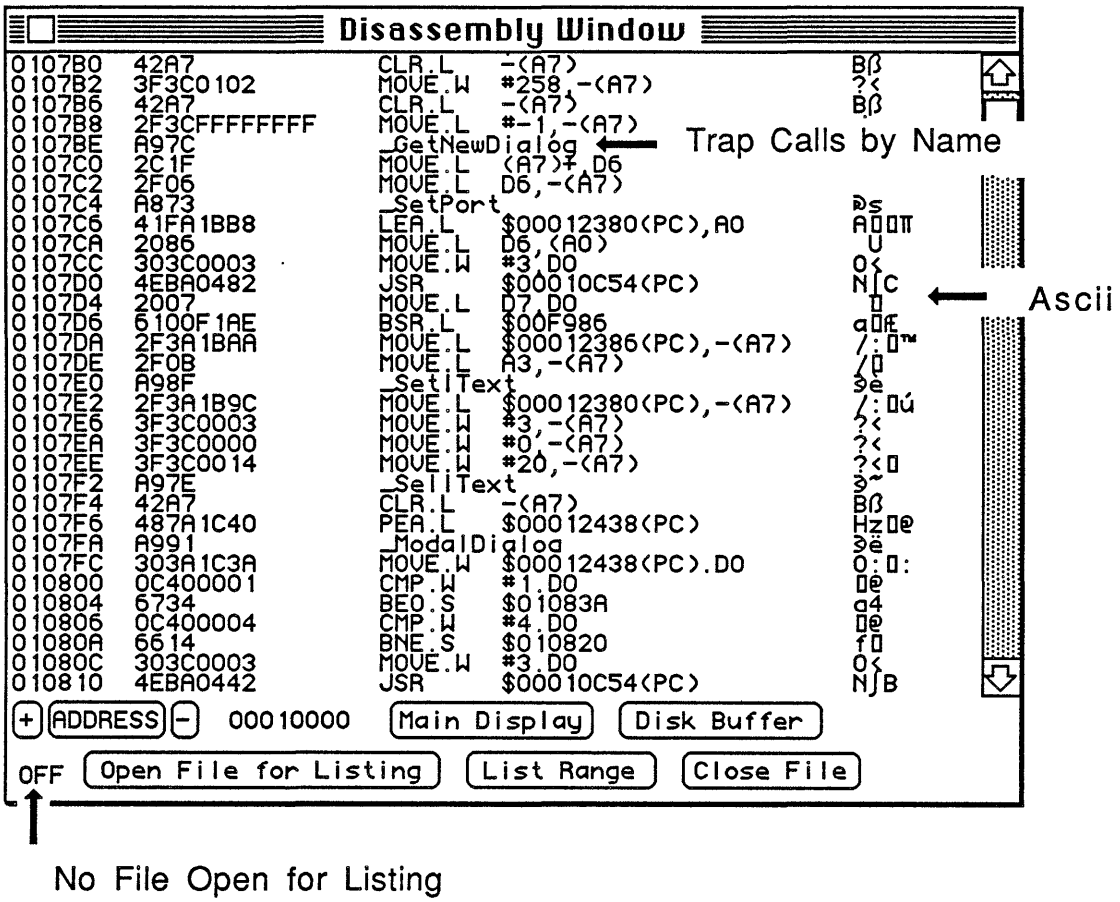
The control buttons beneath the allocation map allow you to edit the Type and Creator fields and set other file data. The 5 buttons below the map allow you to set the file as :

Locked/Unlocked	Lock the file for Deletion
Visible/Invisible	Is the File Visible on Desktop
Bundle set/No Bundle	Does the File have Bundled Resources
System/Not System	Is it a system file
Protected/Unprotected	Is the file protected from copying?(MFS only)
Type	Enter a new 4 character Type field.
Creator	Enter a new 4 character Creator Field.

2.5 Disassembly Window

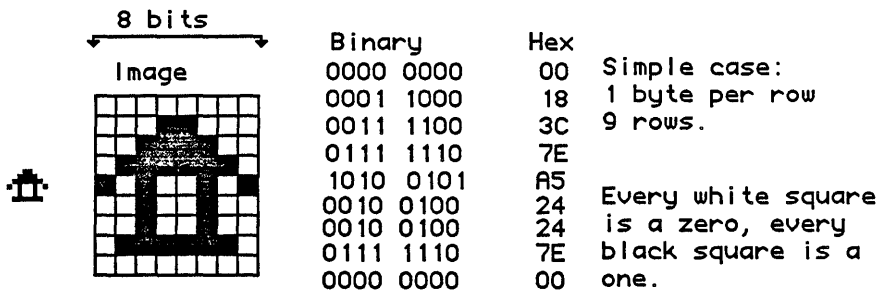
This window has similar controls to the Main Display window. At the current address 32 lines of disassembly are displayed. The address controls enable you to move around in memory. To disassemble a disk block, read in the block and click on [Disk Buffer]. To position the disassembly window to the same address as the Main display window click on [Main Display].

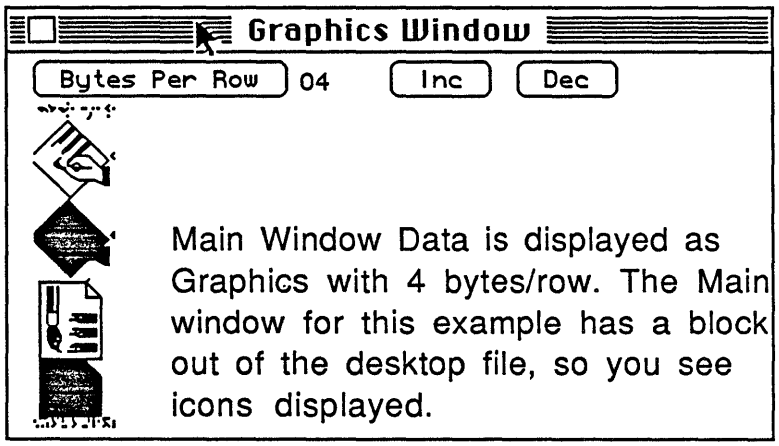
On the bottom line of the window are controls used to send the disassembly listing to a file for printing and editing. The leftmost part of the window either says **OFF** (no file opened for listing) or **ON** (a file is opened for listing). To open a file for listing the disassembly to, click on [Open File for Listing]. You will be prompted to name the file. Click on [Close File] when you are finished listing to a file. To list a range of memory to the file or to the display window you can click on [List Range] and specify a from/to range for listing.



2.6 Graphics Window

This option will allow you to display memory as a bit image (see Quickdraw in INSIDE MACINTOSH for more detail than here). A bit image is a block of hex data. The picture below shows a simple bit image. One byte is 8 bits. For this example there are 9 Rows and 1 byte/row. Note:Quickdraw requires you to use an even number of bytes per row!!





There are two Active Button Controls in the Graphics Window:

INC

Increment the Bytes/Row value - this value is displayed to the left of the INC and DEC controls.

DEC

Decrement the Bytes/Row Value

The top row of the bit image displayed starts at the first hex byte of the main window display. If you move the main window display (using the memory controls) or read in a disk/File block the graphics will change. Use the + and - controls on either side of the **Address** control (Main Window) to change the starting point of the display by one byte.

2.7 Menu Bar Options

The menu bar of Mac Zap Tools has many different options. Some of these options are map resources of a file, search files, search disks, search memory, make file storage contiguous and many more.

2.7.1 Resources

The information stored in the resource fork of a file is called resources. There are many types of resources and developers can define their own new resource types. Examples of resources are:

DLOG	Dialog definitions, such as GetFile Dialog
CODE	Machine code, Application code for example
PICT	Pictures
STR#	Strings, used in prompts etc...

The option under Resources is 'File Resource List' which will give a resource list and map of a file. The user is prompted for a file to perform this operation on. The resource map is output to the data window.

An example output is shown below, all values are HEX:

File Name **Myfile**
File Attributes 0013
Number Resources 3
TYPE ID# ATTR OFFSET SIZE NAME
CODE 0000 0000 001000 00004C Jump Table
CODE 0001 0000 001050 000010 MY APPLICATION CODE
Start offset= 00000008
PICT 2344 0000 001064 000FE0 MY MAC PICTURE

After the file name, attributes and number of resources comes a list of resources. The list's 6 columns are explained below:

TYPE 4 byte type of resource
Note: Code 0 is jump table for application. All other Code segments will have their initial start offset address listed.

ID# 2 byte id # of this resource

ATTR Resource attributes

OFFSET Offset from beginning of file to start of this resource's data.

SIZE Size of this Resource

NAME Name of this Resource (User name, may be blank)

SEE INSIDE MACINTOSH FOR MORE INFORMATION.

2.7.2 Search

This menu has several options, all of which deal with search operations. In a search operation Mac Zap will search (Disk , File , or Memory) for a target string (search string) which can be Ascii (Text) or a number. The different options are described below, in reverse order.

Enter Search Range

The user is prompted with a dialog box to enter the starting search position (From) and the Ending search position (To). The values entered should be in Hex.

See the Special pull down menu option 'Hex<-> Decimal Conversion' if you need the hex value of a decimal number.

Show Search String Area

This option is not needed by normal use of Mac Zap Tools, it will display a section of the Mac Zap Tools program where the search string is located.

Enter Ascii Search String

The user is prompted for a search string, enter any text that you want to search for. An example is 'Welcome'. See the tutorial in appendix F.

Enter Hex Search String

The user is prompted for a search string, enter any number in hex that you want to search for. An example is '4244'.

Compare Disk Blocks and Tags

This option will compare disks in the internal and external disk drives. Any differences in the disks will be printed in the data window. Not only the disk blocks are compared but the file tags also.

Use  and set the current volume in the Disk & File window to either of the two floppy disks in the internal and external disk drives. Set the Search Range to the area of the disk to be searched.

Each difference between disk blocks will be printed as 8 characters, the first four characters are the relative location in the block and the next four are the block. Only the first difference in each disk block will be printed. The numbers are in Hex.

For example: We compare disks blocks between $130 and $168.

Output to data window:
Compare Disk
00140134 01580168 Hex

The first number was 00140134, which means that at byte $14 (<u>0014</u>0134) on block $134 (0014<u>0134</u>) there was a difference between the blocks. The second match was 01580168 which means that at byte $158 on block $168 there was a difference.

File tag differences will have similiar output but will start with an F. Example: Output to data window: F0020134

The number was F0020134, F means file tag difference at byte $2 on block $134.

<u>NOTE: Two Drives Needed, Hitting Q will terminate the Compare.</u>

Compare Disk Blocks

This is the same as above but File Tags are not compared.

Search Disk

Using the search range Mac Zap will search the current volume for any matches to the search string. Any matches will be printed in the data window.

For Example:

Search Range From=0 To=$10

Will search the current volume from block 0 to block $10 for the search string. Matches printed to the data window, in hex format.

Search Disk for xxxxx
00140000 00A00002 0110000E

This means:

Matches were found at:

00140000	Relative Byte $0014	on block $0000
00A00002	Relative Byte $00A0	on block $0002
0110000E	Relative Byte $0110	on block $000E

NOTE: Hitting Q will terminate the Search.

Use the Hex to Decimal Conversion in the Special Pull down menu if you need the decimal value for any hex number.

Search Memory

Using the search range set Mac Zap will search memory for the search string. Any matches will have their full address in hex printed in the data window.

2.7.3 Special

This pull down menu contains several different options described next.

Volume List

List all of the currently mounted volumes that the Mac recognizes in the Data window.

Unit Table List

List the table of device drivers (called the Unit Table) to the Data window. The driver reference numbers, names and memory addresses are printed.

Read Multiple Blocks

Read 10 blocks from the current file or volume, whichever is selected in the Disk & File window. The 10 blocks will be read from the current block location. They are read into a big buffer inside of Mac Zap Tools. With this you can disassemble large portions of files, look for large graphics, or see large portions of a disk at a time.

Write Multiple Blocks

Write 10 blocks to the current file or volume, whichever is selected in the Disk & File window. The 10 blocks will be written starting at the current block location. They are written from the big buffer inside of Mac Zap Tools.

Multiple Block Buffer

This option will set the main display (hex and ascii) to the big buffer.

Current Volume Info Block

This option will print the location of the directory on the current volume. The first block of the directory and the number of blocks in the directory is printed in the data window. The numbers printed are in decimal.

HFS volumes may have a fragmented directory, in that case, for each fragment Mac Zap will list the first block of the directory and the number of blocks in that fragment. This is useful for directly accessing the directory on a disk.

Hex & Decimal Conversion

This option provides a method for conveting between Hex to decimal and vice-versa.

2.7.4 Extra:File

This menu has additional utilities for working with files.

Search Files

The user is prompted for a file, then that file is searched for the search string. The fork set in the Disk & File window is used. If there is a file currently opened for editing it will be closed. For every match the relative offset from the beginning of the file is printed in hex in the data window. Hitting a Q will terminate the search.

Compare Files

The user is prompted to select two files, using two sequential file select dialogs. For every difference between the two files the relative address from the beginning of the file is printed in hex in the data window. The fork set in the Disk & File window is used. If there is a file currently opened for editing it is closed. Hitting a Q will terminate the search.

Volume File List

All of the files on the root level of the volume are printed in the data window. In between the file name and the last modification date is printed 3 of the files attributes:

I If the file is Invisible
P if the file is Protected
L if the file is Locked

2.7.5 SCSI

Mac Zap has powerful SCSI tools including an independent SCSI driver inside of Mac Zap. If a SCSI hard disk is offline or will not mount Mac Zap can still access the disk via the built in Mac Zap SCSI Driver.

How do you turn on the driver?? In the Disk & File Window there is a button labelled Driver, on the top left side of the window. When you click this button Mac Zap will ask you which driver to use. Click on the option SCSI Disk Drive (above Apple HD20). This will set the internal Zap SCSI driver. The drive number is now the device number that Mac Zap will access on the SCSI bus.

When Zap reads or writes a block with it's own SCSI driver it will not limit you to the volume partition, you can access any block on the SCSI.

SCSI Information Dialog

This dialog contains information on the Zap tools available for SCSI.

Driver & Partition Info on SCSI

When this option is selected Mac Zap will print Driver and Partition info on the SCSI device currently set. Remember that the Drive number is the SCSI device number also.

Mac Zap will print the number of Drivers found, the partitions on the SCSI and the sizes.

3.0 Mac Zap Recover

Mac Zap has a very powerful disk and file recovery system. The recovery system is actually two programs, Mac Zap Recover and Mac Zap Recover HFS.

The first program  is used for MFS floppy/hard disks and can also be used for HFS Floppy disks.

The second program 

is used to recover HFS floppy /hard disks. This program can also recover Volume Files such as Mac Serve and others.

NOTE: **In a few cases your disk may be recoverable without Mac Zap, be sure to see section 3.1 'Things to try first'.**

NOTE: **If you want to recover a floppy disk we recommend you copy the damaged disk using Mac Zap Copy and use the copy as the work disk while recovering a file or disk. With the original disk untouched you can make more copies if you have to.**

3.1 Things to try First

In the following discussions we will use the term volume. A volume is a floppy disk or a hard disk. It is a logical device that stores files. When we say mount the volume it means the same thing no matter what type of device you are working with. To mount a floppy disk volume you insert the disk in the Mac, the operating system takes over and 'Mounts' the disk volume. For hard disks there is usually a mount manager utility to mount volumes on the hard disk. For SCSI devices when you turn on the SCSI it will usually try to 'Mount' the startup volume.

If the quick fixes described below do not work then use the Mac Zap Recover programs.

If the the volume is MFS then use  Mac Zap Recover.

If the volume is HFS then use 

Mac Zap Recover HFS.

NOTE: SEE the overall flowchart on last page of Section 3.

Things to Try

Turn off the power and insert a normal undamaged system disk, such as a disk with MacWrite or MacPaint on it, in the Mac's internal drive and turn on the power to your Mac. When you are at the desktop hold down the ⌘ and option keys while you insert the damaged disk (or mount the damaged hard disk volume), this rebuilds the desktop which is a common problem.

If the volume does mount and you can access your files then quit, rebuilding the desktop solved your problem!

If the Mac wants to initialize the volume or the Mac crashes, then rebuilding the desktop did not work and the problem is more severe. There is one more approach to try before using the Mac Zap Recover programs.

Try moving the files off of the bad disk under the control of an application program such as MacWrite, a Database program, MacPaint etc.... depending on what type file it is.

Example. Your disk is bad and there is an important MacWrite file MyFile on it. Start MacWrite up on a good disk and then insert your bad disk into a disk drive and try to load MyFile. If MacWrite does not recognize the disk use one of the recover programs, otherwise try to load the file MyFile. If the file loads normally you can save it to another disk that is undamaged. If the file is recognized but does not load, or only partially loads and reports an error at some point, use one of the recover programs.

3.2 Mac Zap Recover MFS

This program recovers lost files and crashed disks or hard disks.The purpose behind the recover program is to allow you to recover your important files on a disk. Once a disk has crashed we recommend that you move the recovered files onto a freshly initialized disk that you know has no problems! Hard disk volumes should be handled in a similar fashion. If you have a damaged MFS floppy then see section 3.2.1. If you have a damaged MFS Hard disk volume see section 3.2.2.

3.2.1 Floppy Window

Below are the Quick Operating Instructions for the Floppy Window, for more detailed information on the program see the selection after the Quick instructions. For deleted files (Files thrown in the trash can) see the second set of Quick operating instructions.

Quick Operating Instructions for **Crashed or Damaged Floppy Disks**

A) Insert the disk, set Internal/External drive and press **Scan Disk.**

B) Fix any messages that are printed in the prompt box by clicking **Fix Messages.**

C) Mac Zap will try to repair any problems found and then mount the disk. If Mac Zap cannot mount the disk proceed to option E below. A message will tell you if the disk mounted or not.

D) If Mac Zap could mount the repaired disk quit from Mac Zap. Then insert a blank disk, and move your files to the blank disk. If you cannot move your files proceed with E.

E) If the disk is not fixed or you cannot access your files then set the following options.(Options pull down menu)
Rebuild Allocation Blocks
Clear Directory
Put the damaged disk in and Click on **Scan Disk** again.
After the scan, click on **Fix Messages.**

F) In the bottom of the Floppy recovery window is a display box that will print all of the files found on a disk when a scan is done. Select one of these files to recover by clicking on it.

G) Set the Type and Creator.
(Macwrite,Macpaint,Application, or Scan by button)
(You also can set <u>any</u> type and creator using the parameters pull down menu).

H) Click **Recover File.** The file will be rebuilt and a new file name, printed in the prompt window, assigned by the Recover program. This is the file to move to another undamaged floppy. **ALL** recovered files begin with RZ, other files may not be intact!

Loop to F for all of the files you want to recover.
Move the RECOVERED files that are named RZxx to an undamaged disk!!

Quick Operating Instructions for **Deleted Files (Floppy disk only)**

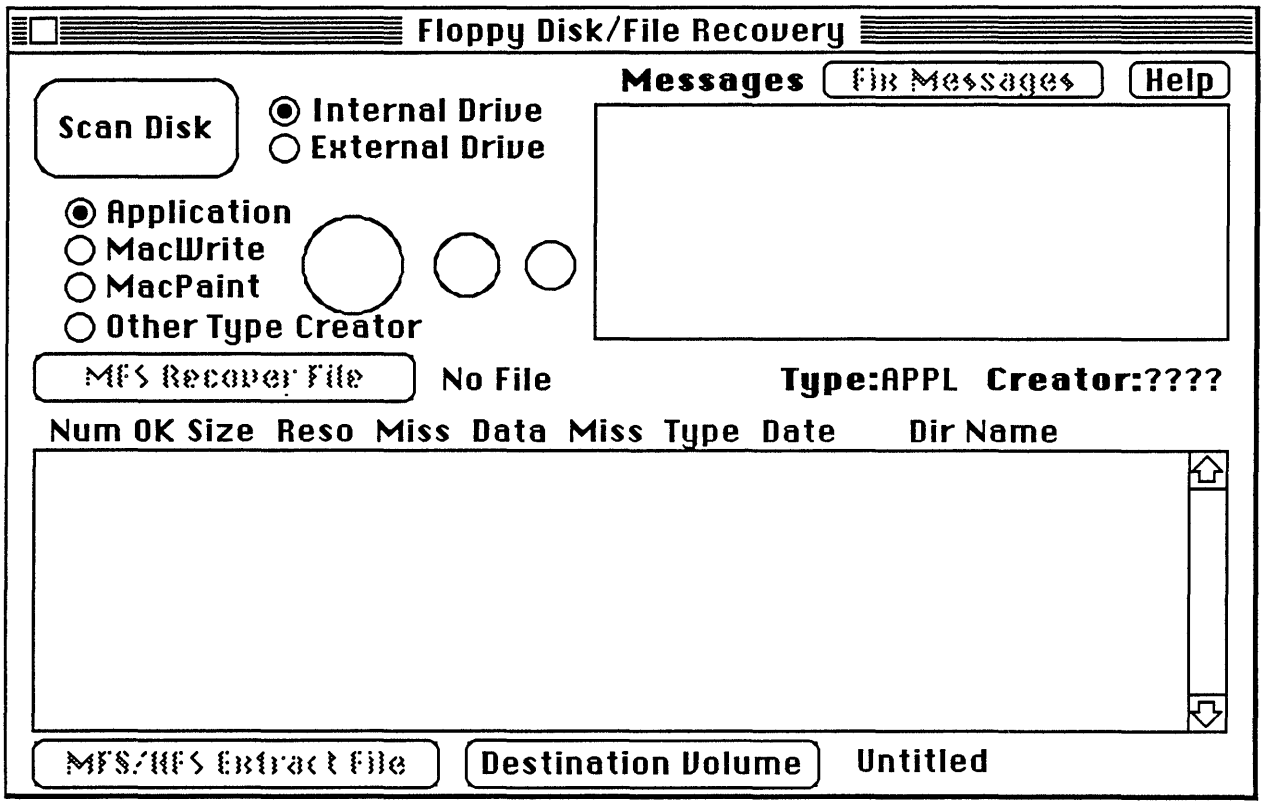
A) Insert disk, set Internal/External and press **Scan Disk.**

B) Goto F in the previous procedure.

Note: The file you want will not be in the directory, therefore it will not have a name. You will have to look at file sizes, dates etc to decide which file to recover. Set the type and creator. If you just deleted the file and have not worked on the disk then only look at those files that have OK = Y as your file should be intact on the disk, but not entered in the directory.

Detailed Information on Floppy Window

The following picture shows the Floppy Disk/File Recovery window.



Scan Disk

This option scans a disk and looks for several error conditions. If any errors are found it prints a message for each in the prompt box and enables the **Fix Messages** button. You can force certain fixes to be performed no matter what by using the **Options** pull down menu, see the next section. Once the scan is done you can fix any errors (click **Fix Messages**).

When a disk is scanned a list of all files that were found during the scan is made, and displayed to you after the scan. Column headings of the file list are:

Num	File Number
OK	Is the file intact (all blocks present) Yes or No
Size	Size, number of 512 byte blocks
Reso	Number of Resource blocks found
Miss	Number of missing Resource blocks
Data	Number of Data blocks found
Miss	Number of missing data blocks
Type	If the file was in the directory its Type is displayed
Date	The latest access date to this file
Dir	Was the file (number) in the directory? Yes or No
Name	If it was in the directory what was its name

This information is supplied to you to help you decide which files to recover. Recover your important files and move them to an undamaged disk.

Fix Messages

If any errors in the disk are detected during the scan Mac Zap will give you a message and enable **Fix Messages.** Clicking on this button will tell Mac Zap to try and fix the errors detected. After Zap is finished it will try to mount the disk and tell you the result. If it could mount the disk exit from Mac Zap and try to access your files. Move them to an initialized disk if possible.

If you cannot move the files then there are more severe problems. Run Mac Zap Recover and start at option E in the quick operating instructions.

Application MacWrite MacPaint Other Type Creator

These buttons set a Type and Creator for a file that is being recovered. The 'Other Type and Creator' control will bring up a dialog box with other popular application programs. In the Other dialog box is also an option for 'Scan Values in List'. If this is set then the Type and Creators found when the disk was scanned will be used. If there is a filename in the list then this 'Scan Values in List' setting should be used.

As a final choice there is a menu bar called Parameters with which you can set any Type and Creator you choose. A dialog will prompt you for the 4 character values.

Recover File

The disk must mount for this button to function. The recovered file is rebuilt and stored on the disk it was found on. To move a rebuilt file off of the bad disk onto another good disk see **Extract File** option below. The 'Extract File' option is for those disks that will not mount.

This button will rebuild a file once a disk has been scanned. See **Scan Disk** detailed previously for a description of the file data presented. Set the type and creator of the file to be recovered, see the previous controls. Select a file in the list with the mouse and click **Recover File.** The file will be rebuilt and given a new name on the disk. All recovered files begin with RZ....Example: RZ00, RZ01, etc. Move the recovered files off of the damaged disk to an undamaged disk.

MFS/HFS Extract File

The **Recover File** button above depends on the disk being able to mount for it to function. In some cases Mac Zap may not be able to mount the disk even after repairs are made. In that case you can extract the file to another good disk using this control.

First set the destination volume, this is where the file will be moved to. Use the Destination Volume button to do this. Select a file in the list with the mouse. Click MFS/HFS Extract File and wait.... The file will be moved onto the destination volume.

This option works on Single or Double sided disks and MFS or HFS formats. The file tag data is used to build the file so this can also be used for HFS although we recommend you first try the Mac Zap Recover HFS program for HFS disks.

Menu Bar Options

Parameters

When the floppy window is active the user can use this pull down menu to set any Type and Creator he chooses. Dialog boxes will prompt for the 4 characters needed. These should be used if none of the known defaults are the file you want.

Options

The options under this menu can be selected (checkmarked). Then, when the Fix Messages button is clicked they will be done by Mac Zap no matter what.

Clear Boot Blocks

Write zeroes in the blocks 0,1. Makes the disk non-booting but solves some problems.

Rebuild Allocation Blocks

Rebuild blocks 2,3 to the initialized fresh disk state. Solves bad allocation or volume block problems.

Clear Directory

Writes zeroes in blocks 4-F. Solves bad directory block problems.

Kill Desktop

Changes the name of Desktop to Desktop. The system will then rebuild the desktop. Solves boot and desktop problems.

Fix Bad Blocks

Try to correct bad blocks to an error free state.

3.2.2 Hard Disk Window

Quick Operating Instructions for **Hard Disk Volume Will not Mount**

A) Click **Setup,** dialog boxes will prompt you.
B) Click on **Check Hard Disk.**
C) The disk will be checked. The driver number and drive number used are printed in the middle of the window.
D) If there are any problems a message will be printed in prompt box.
E) Click on **Fix Messages** to fix these messages.
F) Attempt to mount the volume using your mount manager.
If it mounts then back up what you need. It is your choice as to whether to initialize after you backup. If it is a Hyperdrive it is probably OK not to.
G) If the volume does not mount then use Extract File (Next).

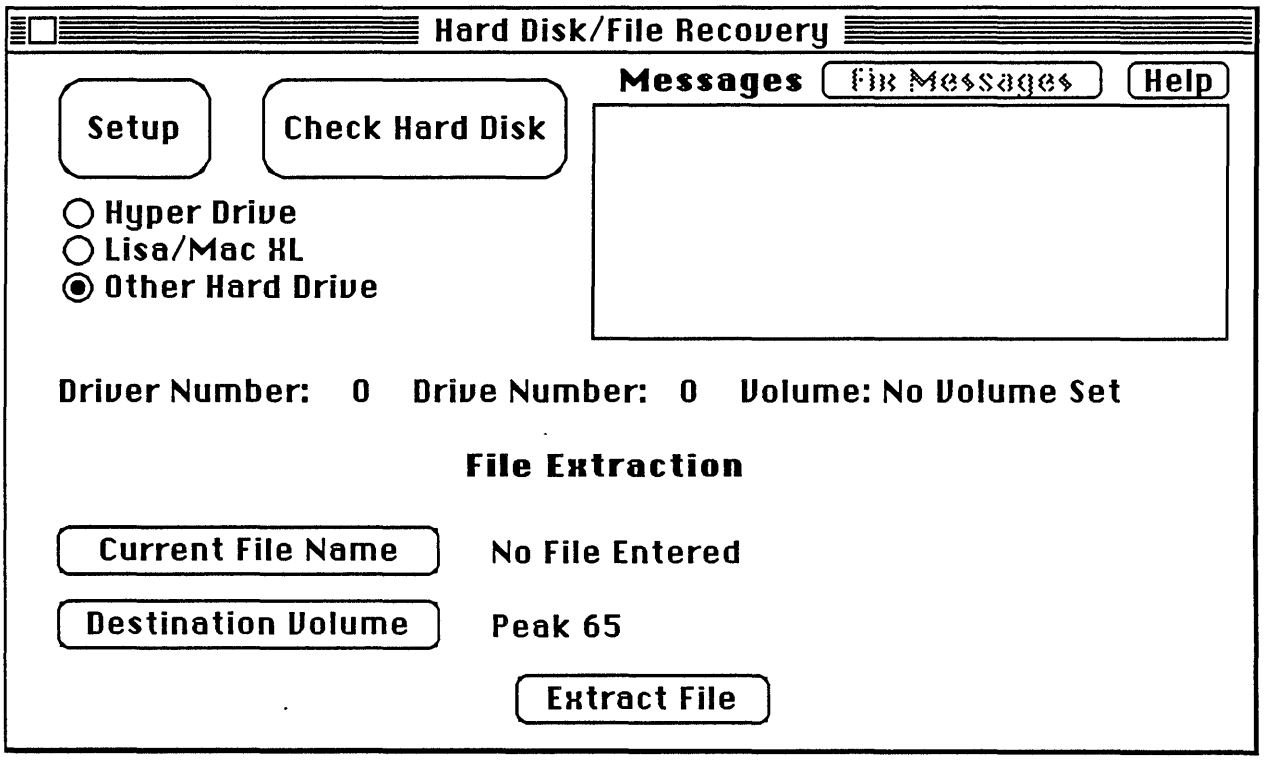
Quick Operating Instructions for **Extract a file from a Volume**

A) Click **Setup,** dialog boxes will prompt you.
B) Set the file name that you want to extract by clicking on **Current File Name.**
C) Set the destination volume to move the file to by clicking on **Destination Volume.**
D) Click on **Extract File**.....WAIT....WAIT..be patient!
Loop to B for each file that you want to extract.

Hard Disk Recover Window

The hard disk window in the Mac Zap Recover program will help you recover crashed volumes on an MFS hard disk. It can also extract files from an MFS hard disk that has totally crashed and Zap Recover cannot revive.

Note: These utilities can also be used on MFS Floppy Disks, use the Sony driver, drive number is 1 (internal) or 2 (external). These utilities do not use the file tag system that the floppy disk window depend on. The directory and allocation block table are used.



Setup

The Recover program needs to know where the bad disk or volume is located. This button will bring up two dialog boxes that prompt you for the Driver and the Drive Number to use. The first dialog box lists all of the drivers currently in memory, you select which one to use. Hard disk companies will usually have a driver name that is recognizable, i.e. their company name is part of it. Other companies might just use a name like '.HDdriver'. There is no standard unfortunately.

After the driver number has been selected the next dialog box prompts you for a drive number. The recover program will try to look for all possible drive numbers and the volume names associated with each. Enter the Drive number to use.

Check Hard Disk

When this is clicked on, the Recover program will take the driver and drive number and check the volume at that location. The allocation blocks (2-??) are read in and checked for accuracy, volumes up to 15Meg (4k alloc) can be checked. Any problems are listed in the prompt window. There are two algorithms used in correcting allocation table problems. These can be selected in the parameter pull down menu. They are described more fully in the menu bar section. If there is a problem detected the Fix Messages button will be enabled.

Fix Messages

This button is clicked on if you want Mac Zap to repair any problems found by the 'Check Hard Disk'.

Current File Name

The name used by Extract File. This is the file that will be moved off of the crashed volume.

Destination Volume

This is where the extracted file will be moved to.

Extract File

This option can be used to extract programs from a crashed volume that cannot be recovered by other Mac Zap Recover. Before using this button set the 'Current File Name' and 'Destination Volume'.

This button will extract the 'Current File Name' to the 'Destination Volume'

3.2.3 Menu Bar Options

Parameters

This pull down menu has two selections that are used in hard disk or other disk recovery, they are described below.

Algorithm 1

This algorithm fixes the allocation table by writing zeroes after NumUsed allocation blocks have been found starting at the beginning of the allocation table. (Number Allocation blocks)-(Number of Free Blocks)= Num Used

Algorithm 2

This algorithm fixes the allocation table by making the table calculated free blocks agree with the entry free at 34 bytes into the volume blocks.

3.3 Mac Zap Recover HFS

Quick Operating Instructions immediately follow this paragraph. For more detailed instructions on all of the features of Mac Zap Recover HFS see section 3.3.1. There are two windows in Zap Recover HFS. The first window is the Quick Recover window that is visible when the program is run. The other window is the Recover Window that can be opened under the 'File' pull down menu.

Quick Operating Instructions for Quick Recover Window

Dialog boxes will lead you through all of the Setup Procedures.

A) Run Zap Recover

B) Zap Recover will recover the files from your damaged disk and move them to another location, either floppy disks or another volume. In the bottom of the Quick Recover Window are two radio buttons. They are used to select where to store the recovered files, on floppy disks or a destination volume. If you select the destination volume you can use the Destination Volume button to point at the volume to store the recovered files on.

C) Click Recover Files in the Quick Recover Window
- Select Device the files are on.
- If Floppy
  - Select Internal/External and Single/Double Sided.
- If Hard Disk
  - Select the Driver to use and then the Drive.
- If SCSI
  - Select Drive to work with.
- If Volume File (MacServe etc..)
  - Select the File to work with. The network volume is stored as a file, we need to know which one.

D) Zap Recover will now scan the disk and look for the files**. When finished Recover will tell you how many files and folders were found and ask for confirmation to save the files onto Floppies or the Destination Volume (whichever you selected in B above). If you confirm then Recover will finish the operation by moving the files.

**Volume INFO Block is Trashed

If you get a dialog box with this error message then Mac Zap needs a parameter file for your disk drive. Mac Zap will use a file select dialog for you too load the parameter file automatically. There are parameter files on the Zap Disk that you received. Select a parameter file that is named for your disk drive. Example 'Dataframe 20' or 'Peak 20'. Once the parameter file is loaded Zap Recover will scan the disk again and continue. If there is no parameter file for your disk drive see page 45.

NOTE:

The recovered files are stored in a folder, named A.Recover, on the destination drive. If a folder A.Recover is present then B.Recover etc... is created.

Quick Operating Instructions for Recover Window

Dialog boxes will lead you through all of the Setup Procedures.

A) Run Recover

B) Open Recover Window

C) Click Setup in the Recover Window
Select Device the files are on.
If Floppy
Select Internal/External and Single/Double Sided.
If Hard Disk
Select the Driver to use and then the Drive.
If SCSI
Select Drive to work with.
If Volume File (MacServe etc..)
Select the File to work with. The network volume is stored as a file, we need to know which one.

D) Click Scan Disk (If you get a message 'NO VOL INFO BLOCK' see below**)

E) Click Dest Volume , point to the volume the recovered file should be stored on.

F) Select File (in File List on Screen) to Recover, Click Recover File

Loop to F: for all of the files you want to recover.

Alternatively
Click on Everyfile Menu Bar to recover all files in list.
With this choice you can save all of the files to the Destination Volume or save all of the files to Floppy disks.

**No Vol Info Block Case.

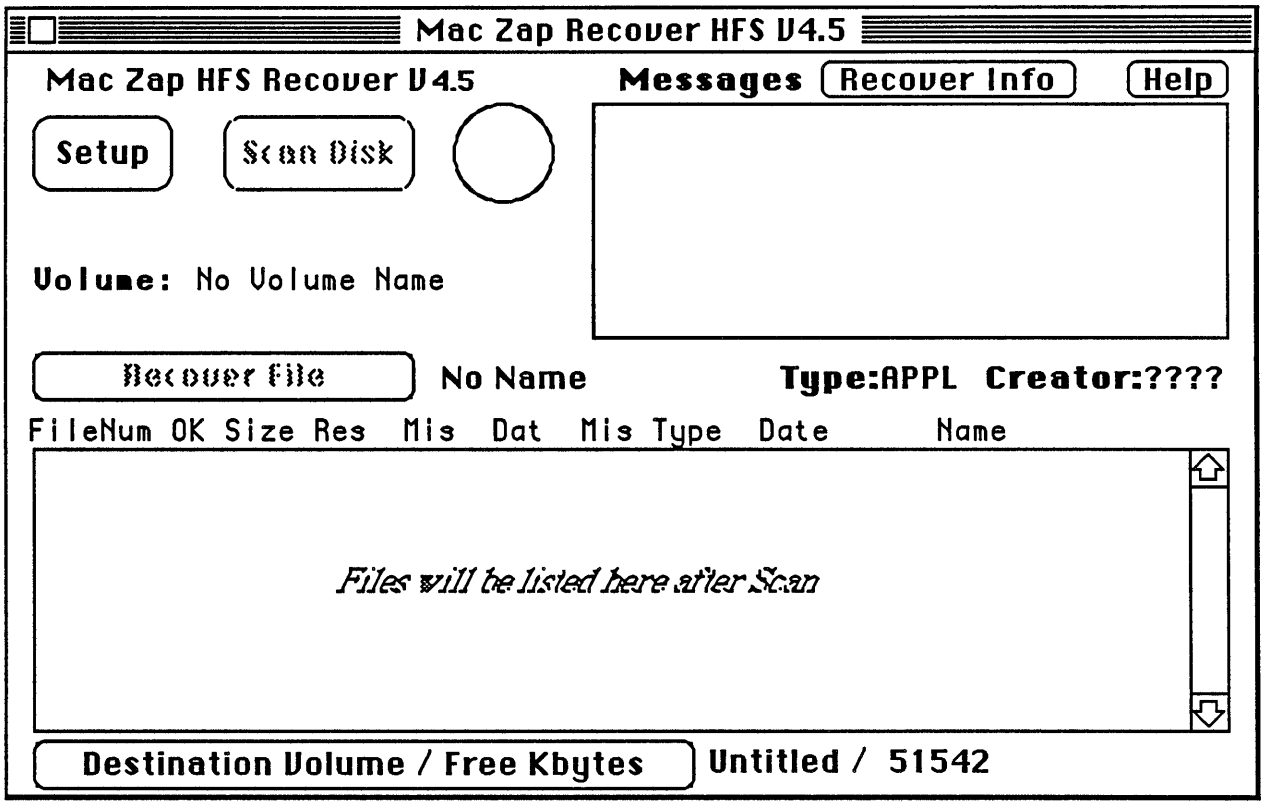
If you get this error message when you press Scan Disk you need to load a parameter file for your disk drive. Use the 'Load Parameter File' option under the Expert pull down menu. Select a parameter file that is named for your disk drive. Example 'Dataframe 20' or 'Peak 20'. Once the parameter file is loaded click on Scan disk and the program will continue. If there is no parameter file for your disk drive see page 45.

NOTE:

The recovered files are stored in a folder, named A.Recover, on the destination drive. If a folder A.Recover is present then B.Recover etc... is created.

3.3.1 Recover Window

Shown below is the Recover Window that is opened when you run Recover HFS.



When you first run Recover the only buttons that are enabled are the Help, Setup, and Destination Volume buttons. They are:

Help

Self Explanatory

Destination Volume / Free Kbytes

Recover will move files off of the damaged hard disk and store them onto the volume selected by this control button. When you click on this button Recover will cycle through all of the mounted HFS volumes that you can store recovered files to. The free space on that volume is printed immediately after the volume name.

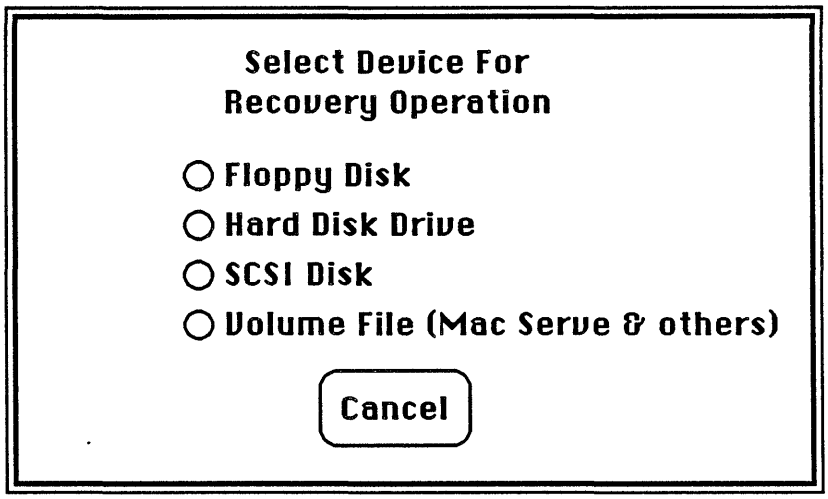
NOTE: The destination volume must be an HFS volume.

Setup

This button is used to 'Setup' the recovery process. The recover program needs to know where the damaged Volume with the files you want is located. There are four options, Floppy disks, Hard Disk Drives, SCSI Hard disk and the last is a Volume File.

SCSI Disks are hard disk drives attached through the SCSI port on the Mac Plus or Enhanced 512k Mac.

Volume Files are volumes stored as a file on another volume such as a hard disk. These volume files are used by programs such as MacServe, a Network Server, and programs that partition hard disks.



Floppy Disk

If Floppy disk is selected you will be asked for internal or external disk and if the disk is single or double sided.

The Scan Disk Button, described later, is then enabled.

Hard Disk Drive

If Hard Disk is pressed you will be asked to select a hard disk driver, from a list presented to you. For example the Hyperdrive uses a Driver called HDdriver. These could be any name possible but companies usually select a recognizable name.

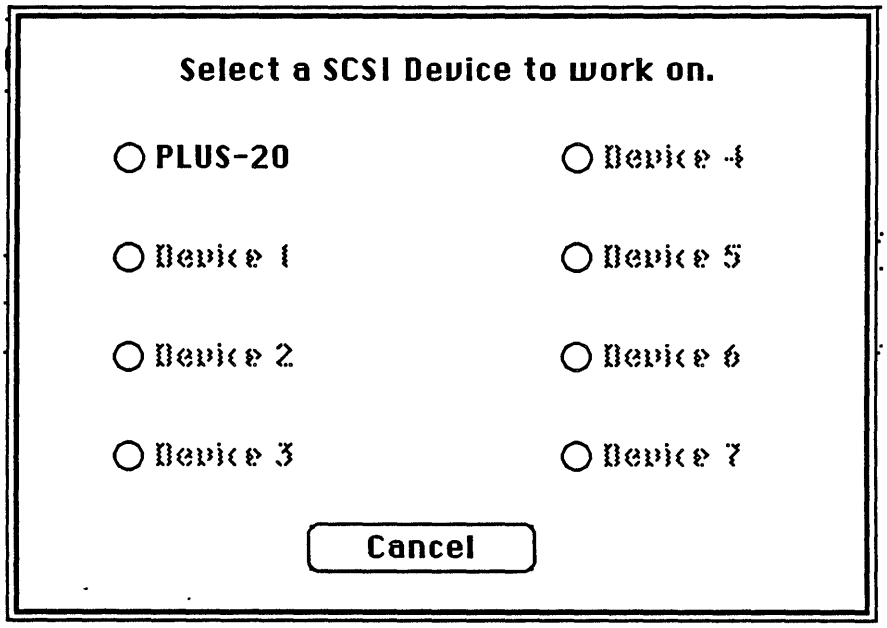
The Scan Disk Button, described later, is then enabled.

NOTE: SCSI disk users should use the SCSI device option and not this Hard Disk Drive option.

SCSI Disk

If SCSI is pressed the recover program will scan the SCSI bus and find all mac hard disk drives that are powered up on the SCSI bus. There are 8 possible hard disk drives on a single Mac. When all of the hard disks are found a dialog (Shown below) is used to select which hard disk to recover files from. When one of the hard disks is selected the recover program will read some volume information off of the hard disk.

The Scan Disk Button, described later, is then enabled.



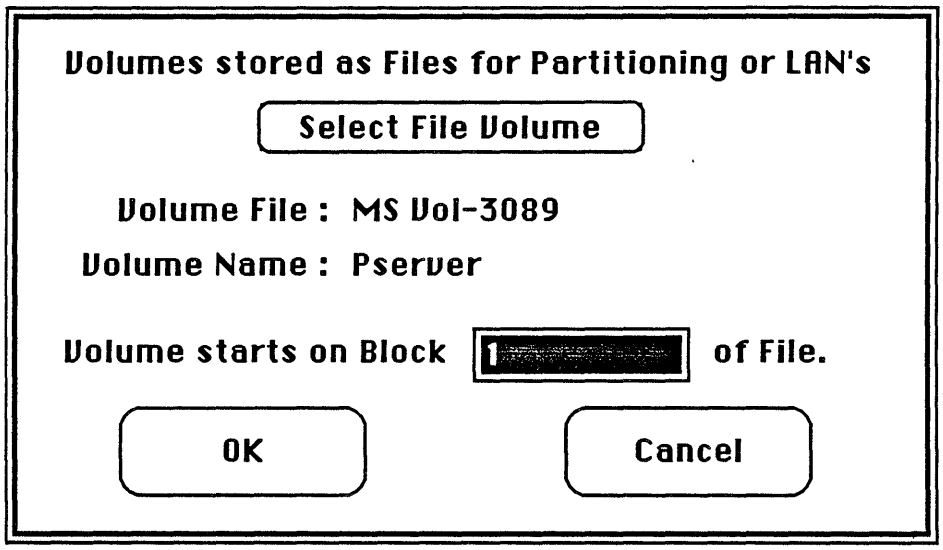
Volume File

If Volume File is selected during Setup the user is prompted for the file to use as a logical volume. The Dialog box below appears. A user would click on 'Select File Volume' and a standard file selection dialog box appears. After selecting one of the files the recover program prints the file name next to Volume File: and the name of the logical volume next to Volume Name:

The Scan Disk Button, described later, is then enabled.

Example:

In the case below a MacServe Volume has been selected, the file on the hard disk is called MS Vol-3089 and the logical volume in the file is Pserver. How do you know which file on a hard disk is the Volume File?? The originating company, such as Infosphere which makes MacServe, can tell you the name of the Volume files.



SCAN DISK

NOTE: Expert users can edit and alter the setup information that the recover program has at this point. See the EXPERT section at the end.

Pressing this button will tell the program to scan the damaged volume and find all of the file information that it can. A list of all of the files is displayed for the user after the scan. Along with the file name is other information:

Filenum	File number (used by operating system)
OK	Is the file intact to the best of our analysis?? Yes or No
Size	Size of the file in Kilobytes
Res	Size of the resource fork in Kilobytes
Mis	Missing data of the resource fork in Kilobytes
Dat	Size of the Data fork in Kilobytes
Mis	Missing data of the data fork in Kilobytes
Type	File Type (Creator can be seen by clicking of this file entry)
Date	Last Modification date for this file
Name	FileName

At this point the user selects a file, out of the displayed file list, and then clicks Recover File. The file is then moved to the destination volume.

This can be done repetitively for all of the files you wish to recover. You do not need to do setup or scan between each file recovered. See the everyfile menu option to recover all files on a volume.

NOTE: If you get a message 'No Volume Info Block' when you press Scan Disk you need to load a parameter file for your disk drive. If there is no parameter file for your disk drive see the discussion at the end of this section, page 45.

3.3.2 Menu Bar Options

Type and Creator

Set the type and creator or use the Scan Values. We recommend you leave this set to Scan Value.

Expert

Gives the user access to recover parameters (see the Expert section at the end of this section).

Special

Sort Files in List

Sort the Files in the list alphabetically.

Find File in List

Enter a file name and the file list will be searched for this file. If present the file list will be moved to start with this file.

Filter Scan by Type

If checked, the user will be prompted for a Type to filter the file list by. Only files of this type will be added to the file list when the disk is scanned.

Example:

To recover all Microsoft Word files use a type of WORD for filter.

First Block, Second Block, Third block

This will allow recovery on very large disks that have over 3000 files on. With these the user can select the 1st 2nd or 3rd block of 3000 files to recover.

Single Recover

Specify a single file, the disk is then scanned for this file only. This is put in because of limitations on memory and structures. **Very** large **Very** fragmented files **may** need to be recovered using this procedure.

Kill Desktop

The recover program will go out to the damaged disk and remove the desktop file. This will sometimes allow the damaged volume to mount.

Kill SCSI Driver

The recover program will kill the driver on a SCSI Disk. In some cases a damaged SCSI drive will repeatedly try to boot, this interferes with the recovery process. By killing the driver on disk and rebooting, the SCSI driver should stop this repetitive boot process. CAUTION: Only for sick Disk drives.

Load Parameters

This option will load a parameter file that contains the values for the 'SCSI Parameters' and 'Recover Parameters' dialog boxes.

Everyfile

This is used to recover all files that are in the file list. There are two options for recovering all files.

The first option will store all of the files on the destination volume. The destination volume must have room for all of the files to be moved to.

The second option will store all of the files on floppy disks. The user will be prompted for blank disks to store the files onto. This is only available if your internal disk drive is a double sided drive.

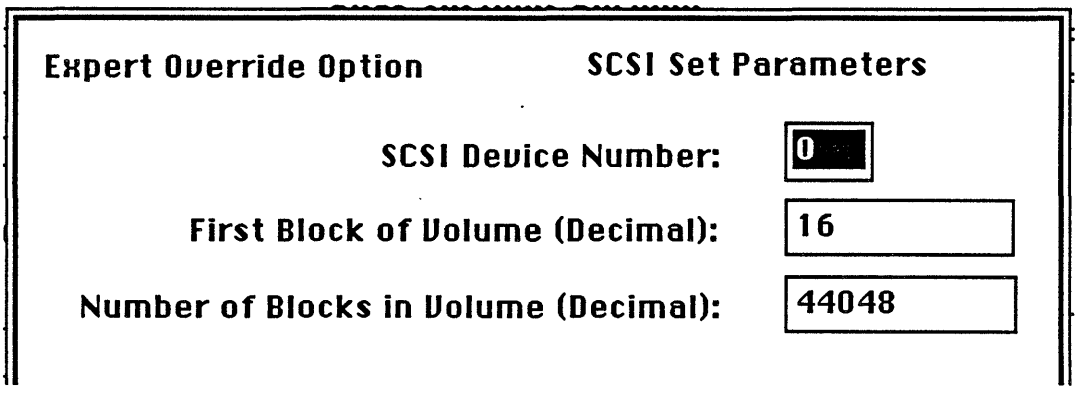
NOTE: by using Filter by type the user can reduce the file list to only those files that he wants, for instance WORD files, Spreadsheet files (XLBN) etc.

Expert Dialogs

A knowledge of SCSI devices and disk structures is assumed in this section. This section and the dialogs described are **NOT** needed in the normal operation of the program. These dialogs set parameters needed in worst case crashes. Users can **skip** these dialogs and load a parameter file made by Micro Analyst for their particular disk drive, use the Load Parameters option under the Expert pull down menu.

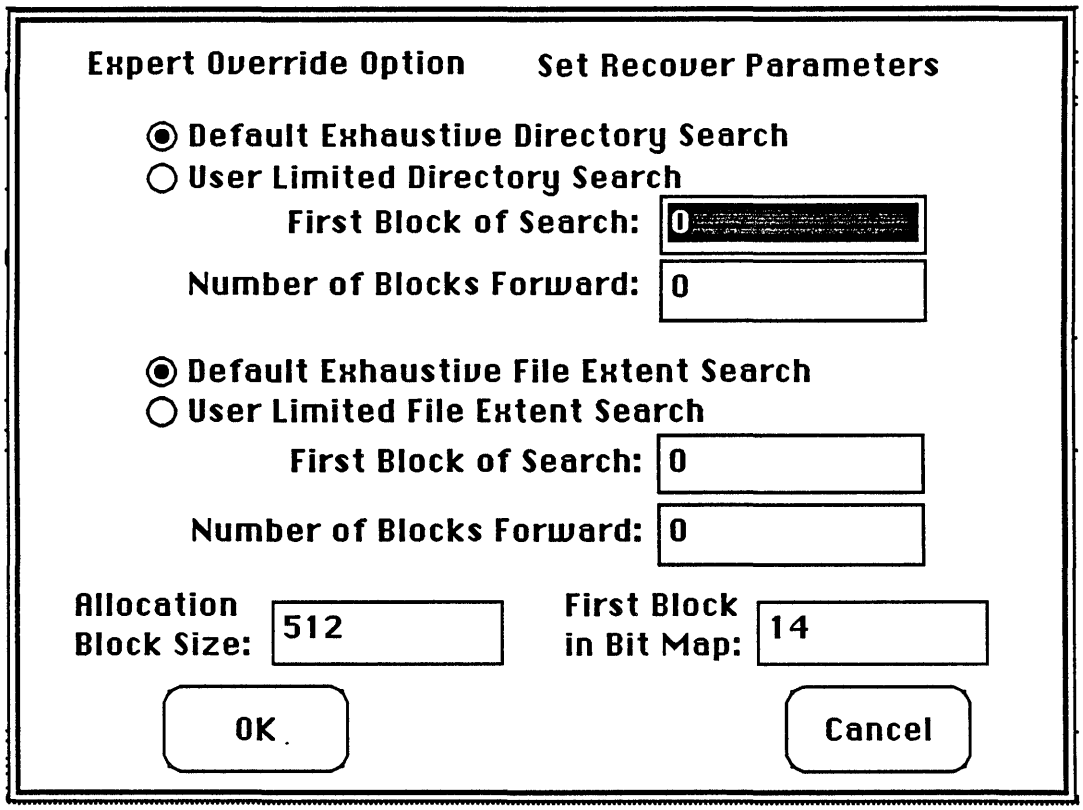
The Expert pull down menu gives the user access to some recover program parameters. Once a device, disk or volume file, has been selected the recover program will look for some information such as allocation block size and other values.

The dialog box below is used to select which SCSI device to use, and define where the Mac partition boundaries are.



The next dialog box is used to set the recover parameters. When a disk has bee selected by Setup the Volume Information block is read and the recover parameters are setup. If there is no volume information block or the user wants to override he can use this dialog box to set the parameters.

If there is no Volume information block and no parameterf file for your disk drive then Zap Recover has no idea how large the volume is and other important information is missing. We need some guidance to scan the disk. Use the 'Recover Parameters' option under the Expert pull down menu to guide Zap Recover, this will show the dialog below.



There are 4 things to set, two search areas and two parameters.

Search Areas

The user needs to set limited search areas for the directory and file extent data areas on disk. As a last resort gesture the user could set the entire disk as the search area. For Example:

Click on 'User Limited Search' for both File and Directory. Set :
Start block=0
Number blocks Forward = (Disk size in bytes)/512
Example 22 meg disk 22,000,000/512 = 42,969 blocks forward

Two Parameters: Allocation Block Size and First Block in Bit Map

Both of these parameters can be acquired by running Zap Recover on a good disk and clicking Setup. Then open this dialog and read off the current values. These are the values for a healthy disk drive. We are trying to build a

database of values....we would appreciate any contributions, via the BBS or by mail. These two values can change from drive to drive and there is no standard. Different drive manufacturers can use different values, there are guidelines but that doesn't mean they are followed.

Allocation Block Size

Allocation Block Size needs to be set. For disk sizes of 20 megs or below set 512. For larger drives set 1024 (30-40 megs) or 1536 (50+megs).

First Block in Bit Map

This value can vary depending on the disk size. We suggest trying 14 but again there is no standard.

One other source of information for these two parameters is the duplicate copy of the volume information block at the end of the disk. This duplicate copy is not always present but usually is. This block is a copy of the volume information block and is at the end of the disk storage.

The other menu options under the Expert pull down menu bring up the different dialog boxes that request user input. They can be called in any order but the Recover program needs the following data before it can do a Scan disk with default search patterns.

If SCSI
    SCSI ID and First block in Volume
Allocation Block Size
First block in Bit Map

INITIALIZED HARD DISKS

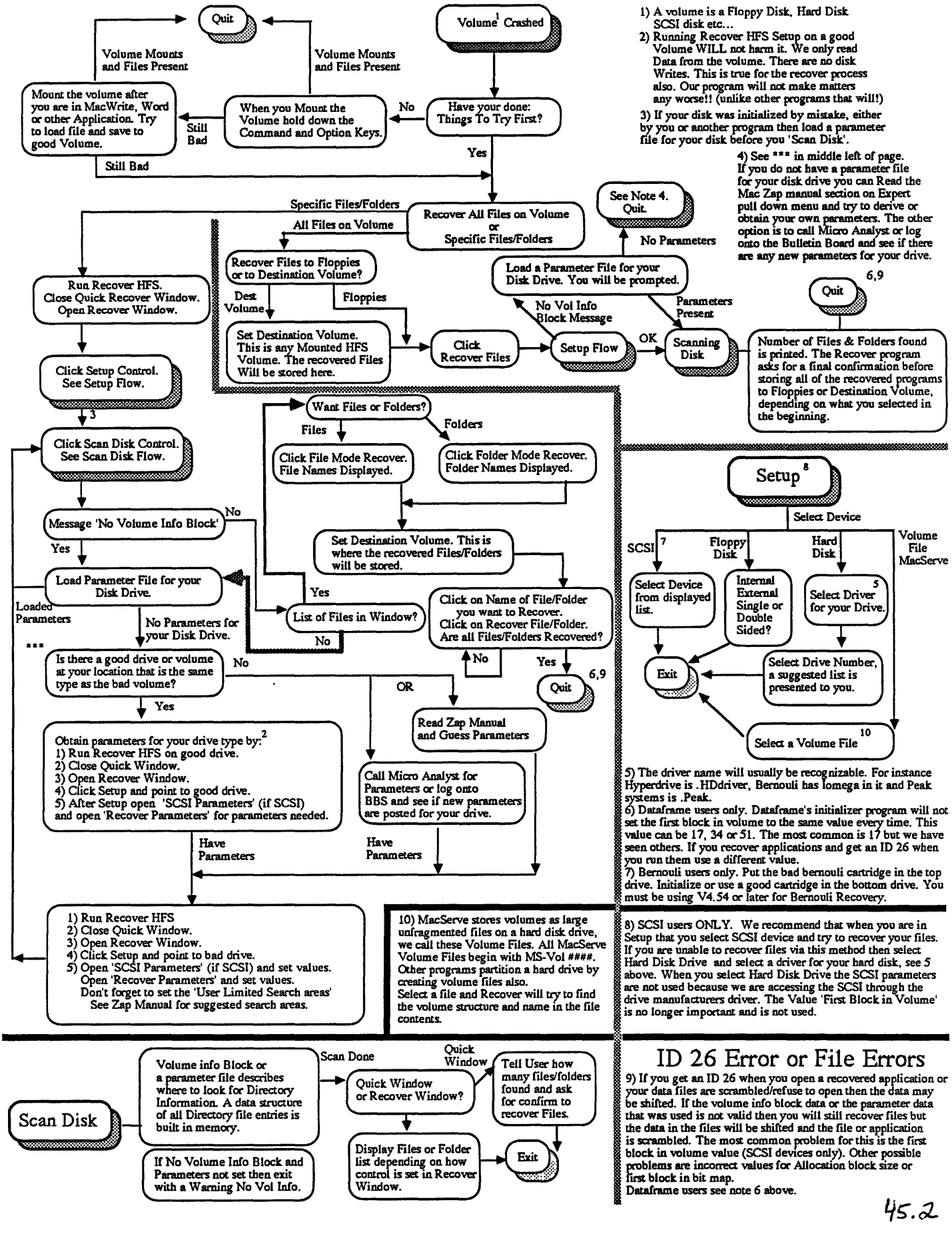
Mac Zap Recover can even recover files from a hard disk that was mistakenly initialized. (Note: Recover cannot help on Formatted hard drives)

Not all files will be recoverable because some of the information is lost when the disk directory is initialized. To recover any files left you can:

Run Recover
Open Recover Window (NOT the Quick Recover window)
Click Setup and point to the initialized disk.
Under the Expert pull down menu select 'Load Parameter File' and load
    the parameter file for your disk drive.
Click Scan Disk, all files left will be displayed to you when the scan is done.

HFS

Times Font Used 4/15/87



NOTES:

1) A volume is a Floppy Disk, Hard Disk SCSI disk etc...
2) Running Recover HFS Setup on a good Volume WILL not harm it. We only read Data from the volume. There are no disk Writes. This is true for the recover process also. Our program will not make matters any worse!! (unlike other programs that will!)
3) If your disk was initialized by mistake, either by you or another program then load a parameter file for your disk before you 'Scan Disk'.
4) See *** in middle left of page. If you do not have a parameter file for your disk drive you can Read the Mac Zap manual section on Expert pull down menu and try to derive or obtain your own parameters. The other option is to call Micro Analyst or log onto the Bulletin Board and see if there are any new parameters for your drive.
5) The driver name will usually be recognizable. For instance Hyperdrive is .HDdriver, Bernouli has Iomega in it and Peak systems is .Peak.
6) Dataframe users only. Dataframe's initializer program will not set the first block in volume to the same value every time. This value can be 17, 34 or 51. The most common is 17 but we have seen others. If you recover applications and get an ID 26 when you run them use a different value.
7) Bernouli users only. Put the bad bernouli cartridge in the top drive. Initialize or use a good cartridge in the bottom drive. You must be using V4.54 or later for Bernouli Recovery.
8) SCSI users ONLY. We recommend that when you are in Setup that you select SCSI device and try to recover your files. If you are unable to recover files via this method then select Hard Disk Drive and select a driver for your hard disk, see 5 above. When you select Hard Disk Drive the SCSI parameters are not used because we are accessing the SCSI through the drive manufacturers driver. The Value 'First Block in Volume' is no longer important and is not used.
10) MacServe stores volumes as large unfragmented files on a hard disk drive, we call these Volume Files. All MacServe Volume Files begin with MS-Vol ####. Other programs partition a hard drive by creating volume files also. Select a file and Recover will try to find the volume structure and name in the file contents.

ID 26 Error or File Errors

9) If you get an ID 26 when you open a recovered application or your data files are scrambled/refuse to open then the data may be shifted. If the volume info block data or the parameter data that was used is not valid then you will still recover files but the data in the files will be shifted and the file or application is scrambled. The most common problem for this is the first block in volume value (SCSI devices only). Other possible problems are incorrect values for Allocation block size or first block in bit map.
Dataframe users see note 6 above.

4.0 Mac Zap Patcher

This program is used to remove protection from programs so that backup copies can be made. Some programs can then be moved to a hard disk for execution without the need of master key disks. Not all programs can be executed off of a hard disk (due to memory requirements or system assumptions by developers) once their protection has been removed, but many can.

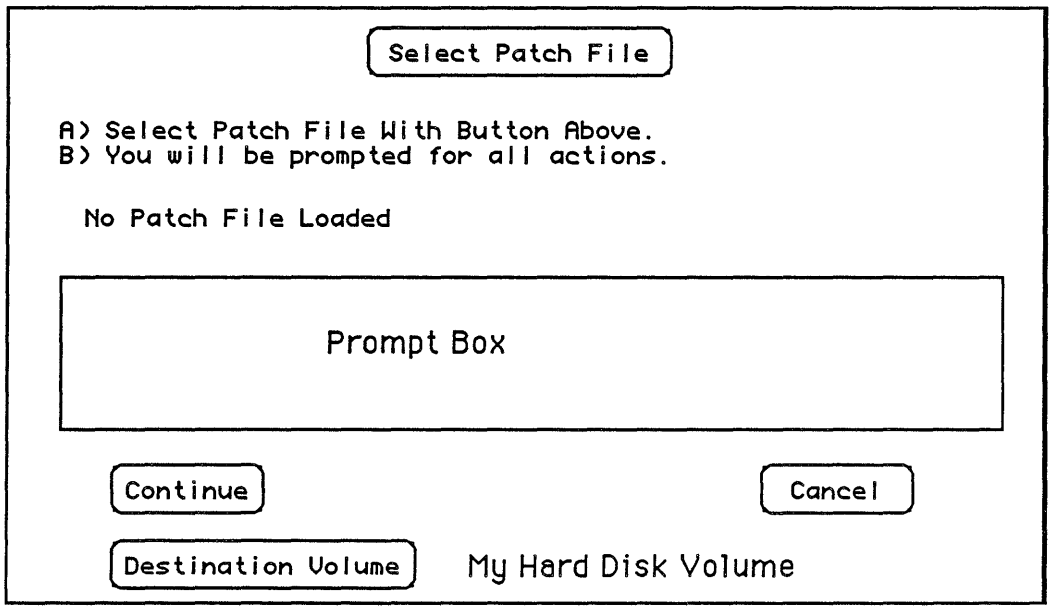
To use this program you should first make a block copy of your original master disk using Mac Zap Copy. This copy will then be patched by Mac Zap Patcher.

See also Appendix A on moving protected programs to a Hard Disk.

Quick Operating Instructions

A) Make a Mac Zap Block Copy of the disk you want to patch.
B) Run Mac Zap Patcher
C) Click on **Select Patch File,** select the patch file you want to use.
D) Insert the block copy (made in A above) when prompted.
E) Click Continue. When the patch is installed, your disk will eject.
F) Drag over application and it's files (some may be invisible) to the hard disk.

4.1 Patcher Window



Select Patch File

A standard File Selection dialog box will appear and you select a filename, such as Multiplan. Once you select a patch file, prompts will appear in the prompt box of the patcher window. You have two options at this point, one is to click Continue after the prompts, the other is to click Cancel and stop all action. The prompts will tell you what to do.

For example:Think Tank 512

The Think Tank patch file will remove the protection from a disk you insert containing Think Tank (the disk you insert should be a copy of your original Think Tank disk). Once the patch has been made just drag Think Tank 512 over to the hard disk. NOTE: Some applications have data files on the disk that need to be present when they run, also some of the data files may be invisible. Mac Zap Tools can be used to show invisible files.

Continue

The patch file will stop at some places and prompt you. For example the patch file might request that a disk be inserted. Once the disk has been inserted click continue to proceed with the patch.

Cancel

This will terminate the patch operation.

Destination Volume

Some of the patch files will move files from a floppy disk to a hard disk volume automatically. **Destination Volume** selects which volume these files will be moved to. Clicking on the control button will cause it to cycle through all of the mounted disk volumes.

Advanced users can make their own patch files if they have a patch for a disk. See the Mac Write Document 'Patcher types' on the Mac Zap Disk in the Patches Folder.

To generate a patch for a disk requires a knowledge of Assembly language, Inside Macintosh and some experience with Mac Programming. Our book on 'Software Protection' describes how software protection is implemented and removed.

NOTE: There are several pull down menus and controls not documented. The Patcher program resides inside an older version of the Mac Zap Tools. The new tools supersede these controls and menus. They are left in for historical detail.

5.0 Mac Zap Copy

Mac Zap Copy can backup protected software disks.
NOTE: Mac Zap Patcher Can make Backup Copies Also!!!

Quick Operating Instructions for **Block Copy Mode**

A) Run Mac Zap Copy
B) If Double Sided Disk then click **Double Sided Disk**
C) Click **Start**

Mac Zap will prompt you for the source disk in the internal disk drive.

Mac Zap will prompt you for the destination disk in the external disk drive.

When the copy is done both disks will eject.

Quick Operating Instructions for **Track Copy Mode**

A) Run Mac Zap Copy
B) Click **Track Copy**
B) If Double Sided Disk then click **Double Sided Disk**
C) Click **Start**

Mac Zap will prompt you for the source disk in the internal disk drive.

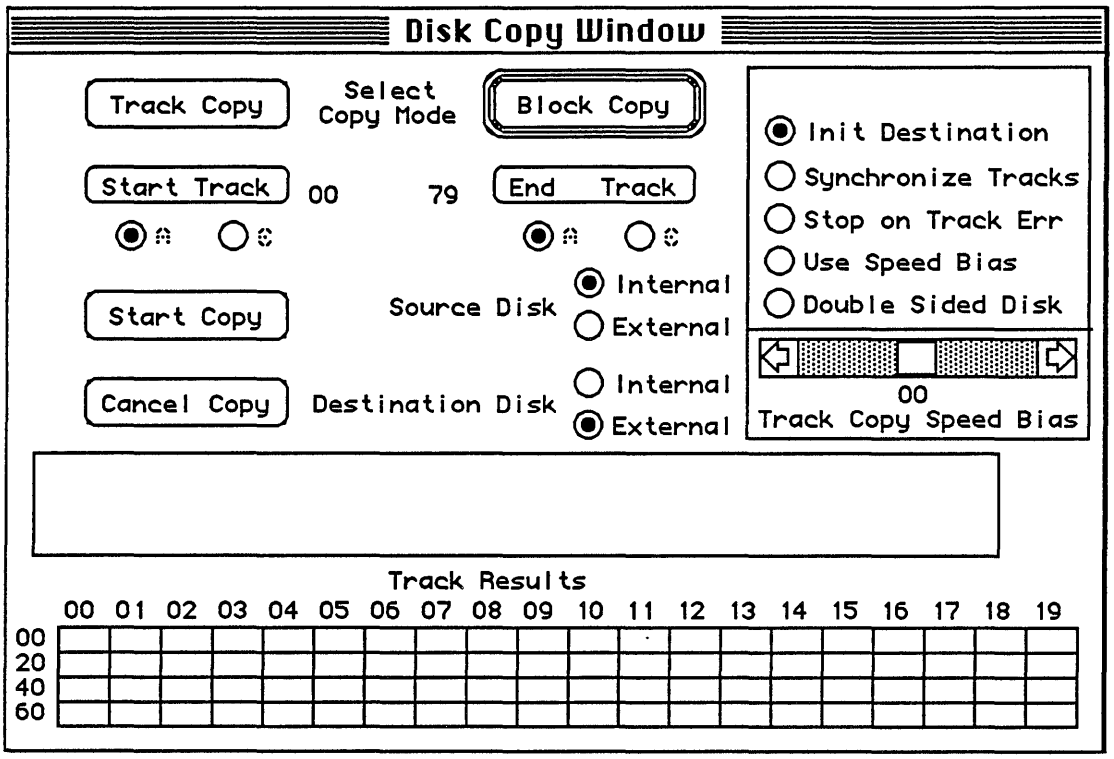
Mac Zap will prompt you for the destination disk in the external disk drive.

When the copy is done both disks will eject.

5.1 Disk Copy Window

Mac Zap Copy is used to make backup copies of protected (and unprotected) disks. This copy is a 'xerox' of the original disk and still contains the protection system intact.

To make a copy the user would first select the Copy Mode, either **Block Copy** or **Track Copy,** by clicking on those controls. We recommend trying Block Copy first as it will copy a lot of the software and makes a good copy. If you cannot make a good copy then use Track Copy mode on those tracks that give errors (in Block mode an error message will tell you what track errors are on), or over the entire disk.



Start Track

Select the starting track (displayed to the right of the control). A dialog box will ask you for the starting track (enter a decimal 0-79). It is used to tell Track Copy Mode which track to start copying on.

A and *B* beneath **Start Track**

This tells Mac Zap which side of the Start Track to start copying (Double sided disks only).

End Track

Similiar to Start track. The current value is to the left of the control.

A and *B* beneath **End Track**

This tells Mac Zap which side of the End Track to quit copying (Double sided disks only).

Track Copy

Clicking on this control will make the disk copy mode use a Track Copy system. We recommend trying a Block Copy first as it is more reliable. If that does not work then copy any tracks with errors or copy the whole disk with the Track Copy mode.

Block Copy

Clicking on this control will make the disk copy mode use a Block Copy system. This system can copy many of the protection systems used and produces a very reliable disk.

Source Internal *Source External*

Clicking on these radio button controls will decide where the source disk is read from.

Destination Internal *Destination External*

Similiar to the previous control, this decides where the destination (or Duplicate) disk is written to.

Start Copy

This will start the copy process. If you are using a single disk drive the number of swaps is printed in the window. You will be prompted for all disk insertions. Any errors or protection detected will be documented in the data window.

Cancel Copy

Click on this control to stop the copy process once it starts.

Init Destination

In Block Copy mode this decides if the destination disk is initialized.

Synchronize Tracks

If set this tells the Mac Zap Copy program to copy the tracks in a synchronized manner. Few protection systems use this method. This control only matters if you are using Track Copy mode.

Stop on Track Error

If set Mac Zap Copy will stop the copying process when it detects an error. The possible errors are listed below.

Use Speed Bias

If set the speed bias is used in reading and writing a track to the disk during copy. This is only valid if you are using Track Copy.

Double Sided Disk

This control tells Mac Zap whether to copy single or double sided.

Speed Bias Scroll Bar

This control gives you the ability to set a +-400 bias to the speed of the Sony disk drive. The Sony disk drive has a 400 step speed control. The current bias is printed beneath the scroll bar. It is used only if Use Speed Bias is set.

Mac Zap Copy Error Codes

When using Mac Copy the track map will show error messages if it has trouble copying a block or a track. If a space or a dot is displayed then there is no error code for that track. An error code will be a two digit number as described next.

If number > $80 then it is a system error returned by operating system
example: AF Sector not found B9 No data marker found
If number <$80 then it is a Mac Zap error codes as described below. Also if the control 'Stop on Trk Error' is set (Button is on) Mac zap will stop on those errors below with stop printed next to them.

First Character
0x No error
1x Length of Track Wrong
2x Number of Sectors Wrong
4x No Data Marker Trailer

Second character
x0 no error
x1 Find Length using d5aa96
x2 Find Length from user Address Marker
x3 Find Length using DEAA trail
x4 Set Track Length by Pattern Matching
x6 Set Track Length Manually

example:
23 2=number of sectors wrong
3=find length using DEAA trail

The track map at the bottom of the Disk Copy window has a box for each of the 80 tracks (0-79) that can be copied.

These error codes are feedback on any disk protection Mac Zap encounters.

Main Window Controls

Sector Address

This routine will take the 5 bytes at the edit cursor (black box) in the main window and decode them for a track and sector address. An address marker is followed by 5 bytes and then a DE AA. The 5 bytes are the track and sector address of the block and a checksum. The following example is for Block 1 on track 0: D5 AA 96 96 9F 96 9A 9D DE AA

Track Start

This control has a value printed next to it that is the start of a track image in memory for the track just read into memory using the Track pull down menu. A user can manually set a track start by setting the edit cursor (black box) on the byte to begin the track and clicking on the Track Start control.

Track End

This control is similiar to Track Start described above.

Track Length

This is the length of (Track End - Track Start).

5.2 Menu Bar Options

Track

This menu allows the user low level track access with analysis and information display.

Read Track (No Analysis)

This option will read in a track (first using a dialog box to ask the track number) and then set the main display window to the track buffer. No analysis or track modification is done except for finding a track start, track end, and track length.

Read Track (Analysis and Modified)

This option will read in a track, set track start, track end, track length and give an analysis of the address and data markers used, spacing and any detectable anomalies. The track image in memory is modified to ready it for writing as if the copy program was doing multiple track read, analysis and track write.

Read Track (Timing Information)

The current option will read in a track and obtain timing information on the data as it is read in. Sync bytes will be marked with the high bit being 0. This is for advanced users who are familiar with track formatting etc.

Write Track

Write the Track back to disk, use Track start and track length. If the Use Speed Bias control is set the speed bias will be used for this write operation also.

Double Sided Disks

For double sided disk drives there are two options in the pull down menu to select Side A or Side B to read/write a track. The current side being used is checkmarked.

Markers

This pull down menu can change the data and address markers used by the system for reading and writing floppy disk blocks.

Data Marker

Two options are available, one uses a dialog box to obtain a new data marker entered by the user. This marker will then be used by the operating system when reading or writing blocks.

The other option will reset the data marker to the standard operating system marker of $D5AAAD.

Address Marker

Two options are available, one uses a dialog box to obtain a new address marker entered by the user. This marker will then be used by the operating system when reading or writing blocks.

The other option will reset the address marker to the standard operating system marker of $D5AA96.

Note: The disk window has controls to read and write blocks to a disk. The block is displayed in the Main window and can be edited before writing back out.

6.0 Fast Disk Copy

Using this program a user can copy unprotected software disks or files.This program is compatible with MFS or HFS and single or double sided disks. When the program is run the following window will open on your macintosh.

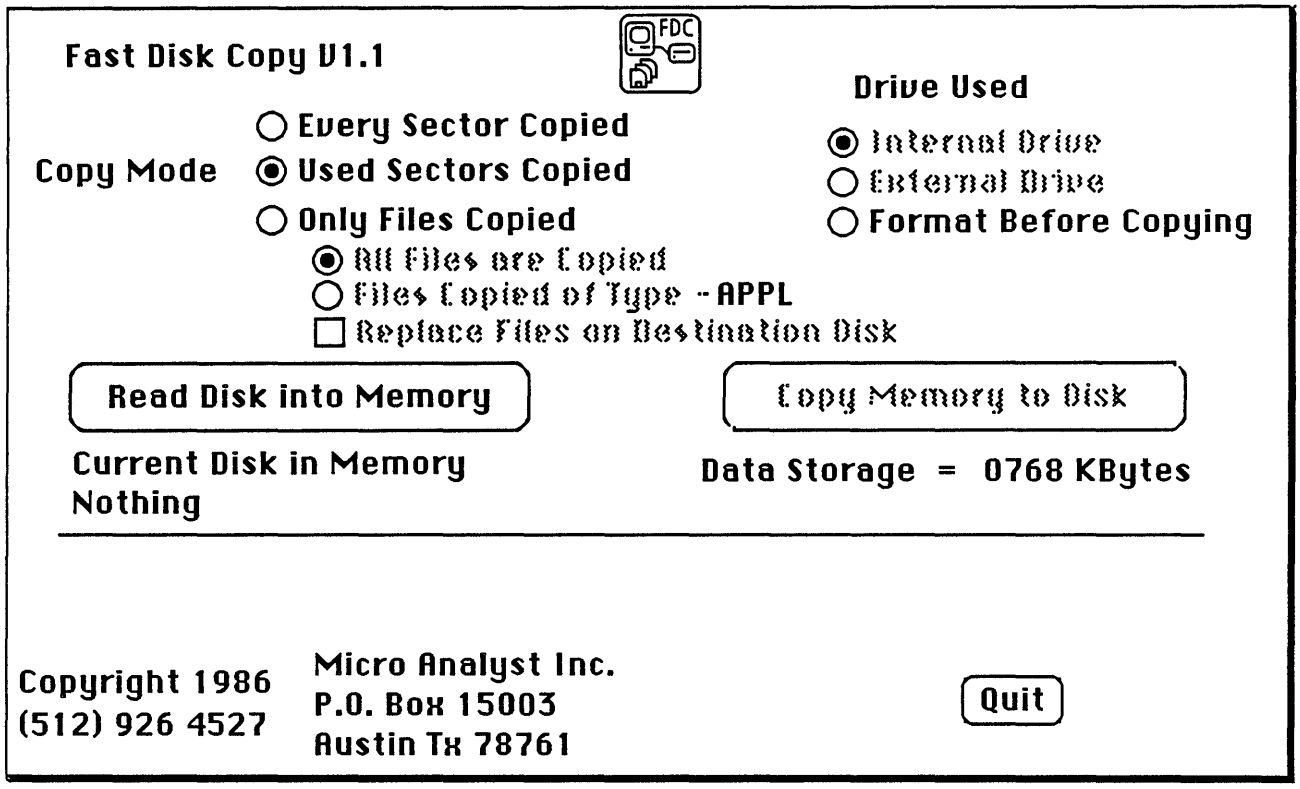
Quick Operating Instructions for **Copy Disk**

A) Run Fast Disk Copy
B) Click on 'Read Disk into Memory'
C) Insert Disk into the Internal Disk Drive.
    Disk will be read into memory and ejected.
    Disk Type and size etc will be printed.
D) If you want the destination disk formatted before copying then
    click on 'Format before Copy'
E) Insert the destination disk into the internal disk drive.
    Click on 'Copy Memory to Disk'.
    Loop to E for as many copies you want.

Quick Operating Instructions for **Copy Files**

A) Run Fast Disk Copy
B) Click on 'Only Files Copied'
    Default is all files, if you want only certain types then click on
    'Files Copied of Type', you will be prompted for what type.
    Also Default is that files with same name will not be overwritten
    on the destination disk. If you want them overwritten set true.
C) Click on 'Read Disk into Memory'.
D) Insert Disk into the Internal Disk Drive.
    Files on disk will be read into memory and disk ejected.
    Number of files and size is printed.
E) Insert a disk into the internal drive. NOTE: Must be formatted.
    Click on 'Copy Memory to Disk'.
    Loop to D for each disk that you want the files on.

Shown below is the Fast Disk Copy window.



Below the **Copy Memory to Disk** button is the size of buffer that was allocated for copying. The buffer size will vary with the amount of memory available. NOTE: To obtain the **most** memory possible you can boot disks without macsbug or unneeded device drivers and then run Fast Disk Copy.

There are 3 copy modes available:

Every Sector Copied

This mode will copy every sector on a disk. If there is not enough buffer space to copy the inserted disk it will be ejected and a message telling you this is printed.

Used Sectors Copied

This mode will copy every sector on a disk that is being used. Those sectors that are free or unused are not copied. This is a faster copying method that also uses less buffer space. The source disk will be duplicated onto the destination disk.

Only Files Copied

This mode will copy the files on a disk, not the sectors. There are three options with this copy mode.

1) All Files Copied

2) Files Copied of Type - XXXX

You can select one of the two selections above to decide which files are copied. If the first is selected all of the files (Except the desktop) are copied to the destination disk. If you select the second then you are prompted for a 4 byte TYPE to enter. All files of that TYPE are then copied to the destination disk. The default setting is APPL which is for Applications. File info in Mac Zap Tools can tell you the TYPE for any file.

3) Replace Files on Destination Disk

If this option is selected in File Copy mode then a file with the same name will replace a file on the destination disk. Otherwise files with the same name will not be overwritten.

On the right side of the window are the buttons that decide which disk drive is to be used and a button that selects whether the destination disk is formatted before being written to.

Copy Disk to Memory

Using the Copy mode, described above, copy the disk or files into memory.

Copy Memory to Disk

Using the Copy mode, described above, copy what is in memory to the disk.

7.0 Bulletin Board Support

There is a bulletin board that users can log onto for patch file downloads and support of other Mac Zap areas. Some of the sections are:

Disk and file recovery.
Patch file Downloads (150+)
Developers/Programmers Section.
Public Domain Program downloads.

There is a 512k Mac with 20 Meg hard disk and a 300/1200 baud modem attached.

Owners of Mac Zap can access this bulletin board by calling the number:

(512) 926 9582 **The LifeBoat**

To be validated on this board you need to send in the following:

Registration Fee
$15 for six months validation
or
$25 for 12 months validation
Name address
Phone number
Mac Zap serial Number
The Mac Zap serial number can be found in the About Mac Zap dialog box under the Apple pull down menu in Mac Zap Tools or Copy.

Send the above to:

Mac Zap Bulletin Board
P.O. Box 15003
Austin Tx 78761

or Call: (512) 926 4527 (Voice) Visa/Mastercard Accepted

Contact us with the above information and then using the same name log onto the bulletin board. Once we have your registration notice and fee we will look on the board for a user with that name and validate him. Until you are validated you will have limited access to the sections on the bulletin board. Allow 2 weeks from mailing the registration until you are validated.

Appendix A Moving Programs to Hard Disk

The patcher program will remove the protection from programs so that they can be copied for backups. Some of these programs can then be put onto a hard disk or ram disk for faster operation. Unfortunately not all of the programs can be moved to hard disk. The reasons why they cannot are usually due to memory considerations or assumptions made by the original programmer that do not allow execution off of a hard disk. See section 4.0 for using patcher program. Two other techniques for executing programs off of a hard disk without the master floppy being present are described next.

1) Some programs reference a file that needs to be moved onto the hard disk for the main program to work. Look for these files and move them to your hard disk drive volume. For example help files or invisible data files. A patch file will remove the protection so that the special files do not have to be moved to the hard disk. This documentation is for some programs that do not have patches. To move invisible files to a hard disk:

Boot Mac Zap Tools, insert a copy of the application being moved to hard disk.
Use File pull down menu and get a list of files on that disk. Use volume file list.
Make any invisible I or protected P files Visible and Unprotected.

Use File Info Window.

Quit from Mac Zap Tools and drag these files to the hard disk.
Boot Mac Zap Tools and make these files Invisible and Protected again.

Some of the Programs that use this technique are:

MSOFT Multiplan	Needs Neil Konzen
MSOFT Chart	Needs Ed&Mike on Hard Drive
Hayden Speller	Pinot Mac
Factfinder	Bryan and Rudy

2) Some programs have a hard disk install program such that they can be installed to a hard disk a limited number of times. Using the following steps you can install some of these programs to hard disk repeatedly.

A)Make a block copy of the original disk. We will call this disk B and the original will be called disk A.Write protect disk A.
B)Boot disk A and do a hard disk install. When the disk A is ejected and they ask you to Un-Writeprotect the disk insert disk B. The counter (number of times installed) will then be decremented on disk B which is a block copy of the original which you can make over an over.

Appendix B

Boot Blocks

The first two blocks on every volume are called the Boot Blocks. These two blocks contain the program code, called the 'Boot code' needed to 'Boot' in the system and finder on the volume.

On power up the Macintosh Roms load in these two blocks and execute them. The boot code performs several tasks such as system initialization, default global setups, memory initialization and executing the startup program. Usually the startup program is the Finder but this can be changed to any program on the volume.

The First Part of the Boot Block is a Data Area and its structures are:

0000	word	$4C4B LK for Larry Kenyon
0002	long	Branch to the boot code
0006	word	version number of boot block
0008	word	flags
000A	16	Name of System File (System)
001A	16	Name of Program to run when leaving application (Usually Finder)
002A	16	Debugger Name (Macsbug) Loaded if present
003A	16	Name of Disassembler (Disassembler), Loaded if present
004A	16	Name of file for Startup Screen (Startup), Loaded and displayed
005A	16	Name of program to run after bootup (Usually Finder)
006A	16	Name of clipboard file (Clipboard)
007A	word	Number of File Control Blocks (FCB's) to allocate This is Max Files that can be opened.
007C	word	Max number of elements in event queue
007E	long	System heap size on 128k Mac
0082	long	System heap size on 256k Mac
0086	long	System heap size on 512k Mac

Appendix C

Disk Volume Blocks

The following information is on MFS volumes (Finder 4.1 or before). After this is some documentation on HFS volumes (Finder 5.0 or later).

Block 2 on an MFS Macintosh volume contains the volume information and the first part of the allocation map. This allocation map extends into block 3, and beyond if needed. The number of blocks needed for the allocation map is determined by values in the first part of block 2, the information area. These values change for different size disks or hard disk volumes.

The first area contains information about the volume such as its name, size, and creation date. The listing below shows the layout of the information:

0	Sig bytes for MFS Mac Disk $D2D7	word
2	Date and time of initialization	long word
6	Date and time of last update	long word
10	Volume Attributes	word
12	Number of files on volume	word
14	First logical Block of Directory	word
16	Number of logical blocks in directory	word
18	Number of Allocation blocks on volume	word
20	Size of allocation blocks, $400 normal	long word
24	Number of bytes to allocate, $2000 normal	long word
28	Logical Block # of 1st Alloc Blk $10 normal	word
30	Next Unused file number	long word
34	Number of unused Alloc blocks	word
36	Length of Volume (disk) Name	byte
37	Volume name goes here	up to 23 bytes
	Previous information takes up 64 bytes	
64	Allocation Block Table	

Starting at byte 64 of the volume information is the Allocation Block Table. Space on a disk is allocated to files in blocks of 1024 bytes (2 logical disk blocks). This makes up to 400 different allocation blocks (800 disk blocks divided by 2 disk blocks per allocation block) on a disk. The table has $187 hex or 391 entries with the entries starting at 2 and going to $189. Each entry is 12 bits long so in this case 586 bytes are needed. 586 = 391(entries)*12(bits/entry)/8(bits/byte)

This example is for a single sided floppy.

The value of any entry is :	0	Free allocation block
	1	Ending Allocation block for this file fork
	2-$189	Next Allocation Block in this linked list.

A file is a linked list of allocation blocks. The entry in a file directory points to the first allocation block of a fork and the value of that allocation blocks points to the next allocation block entry in the linked list etc..... When a 1 is encountered that is the end of the fork.

For example:

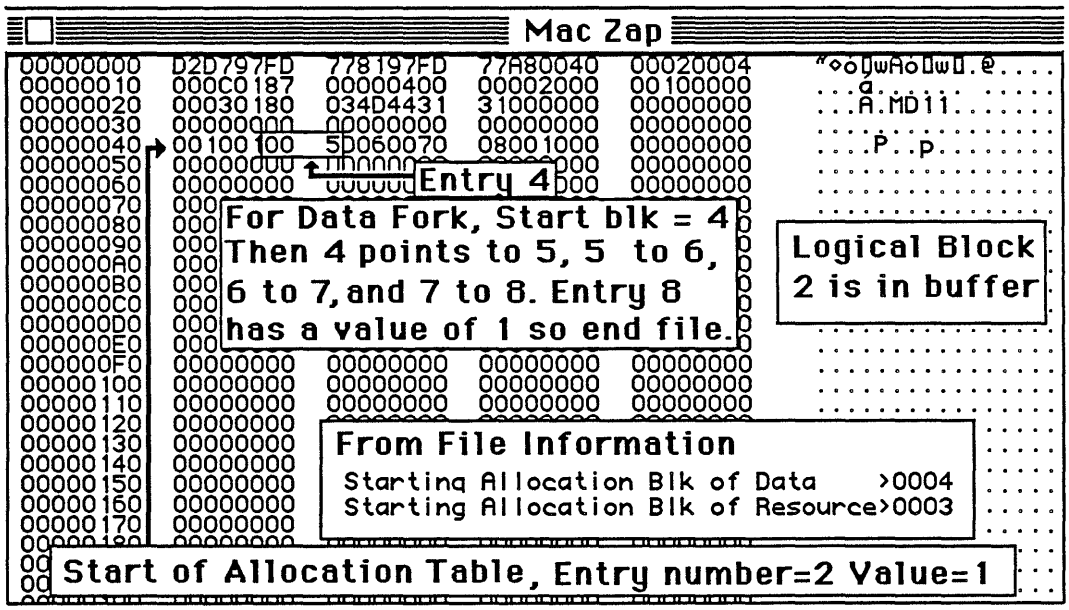
We display the file information for file Example1 and we see:

First Allocation Block of Data Fork :04

First Allocation Block of Resource Fork :03

We read in logical block 2 of the disk and we can refer to the block allocation table starting at relative byte 64 ($40 hex). The picture below shows the example. The first allocation block is 2. It does not start at 0 or 1 because of the significance of the values of 0 and 1 shown above. The values of allocation blocks 2 - 9 for this example are given below:

Alloc Blk	Value	Comment
2	001	final allocation block of a file
3	001	final allocation block of a file
4	005	next allocation block is 5
5	006	next allocation block is 6
6	007	next allocation block is 7
7	008	next allocation block is 8
8	001	final allocation block of this file
9	000	Free allocation block



HFS Volume Information

The HFS disks can be recognized by a sig byte of $4244 instead of $D2D7. Finder 5.0 and above will format double sided disks with an HFS format. Single sided disks are usually MFS although they can be forced into an HFS format on rare cases. The volume info block contains the structure below:

0	Sig bytes for Mac Disk $4244	word
2	Date and time of initialization	long word
6	Date and time of last modification	long word
10	Volume Attributes	word
12	Number of files in root directory	word
14	First block of volume bit map, 3 normal	word
16	used internally	word
18	Number of Allocation blocks on volume	word
20	Size of allocation blocks, $200 normal	long word
24	default clump size, $2000 normal	long word
28	first block in bit map, 4 normal	word
30	Next Unused file number or directory ID	long word
34	Number of unused Alloc blocks	word
36	Length of Volume (disk) Name	byte
37	Volume name goes here	up to 23 bytes
64	Date and time of last backup	long
68	Used internally	word
70	Volume write count	long
74	Clump size of extents tree file	long
78	Clump size of catalog tree file	long
82	number of directories in root	word
84	number of files on volume	long
88	number of directories in volume	long
92	Finder info	32 bytes
124	used internally	6 bytes
130	length of extents tree file	long
134	first 3 extent descriptors for extents tree	12 bytes
146	length of catalog tree file	long
150	first 3 extent descriptors for catalog tree	12 bytes

The HFS structures are much more complex and require greater overhead of bookkeeping and management, what are its benefits?? For hard disk drives with hundreds or thousands of files it allows a better management of directories. All of the files do not need to be online or in one directory at once , yet they can all be accessed if need be by parsing through the binary tree. MFS disks with hundreds of files could take several minutes to manipulate the desktop, find a file etc.

How the files are stored on a disk and their allocation methods have also been changed for HFS. This eliminates the need for one giant allocation table that must reside in memory. Very large drives now exceed 100 megs for the Macintosh. An MFS allocation table for a 100 Meg drive would require around 90,000 bytes or 175 disk blocks, no small amount.

The allocation table on MFS disks handles two different tasks. The first is the allocation of disk blocks, free or used. With the allocation table free disk blocks can be located because an entry of 0 means that allocation block and its associated disk blocks are unused. The second task of the allocation table is file mapping. The allocation table is made up of linked lists of allocation blocks. A file is 'Mapped' onto the disk via these linked lists.

On HFS disks these two tasks have been split up into two separate structures. The allocation of disk blocks is now done with an allocation table of bits. The volume information block has an entry 'First block of Volume Bit Map'. This block, and as many more as needed, makes up the allocation table. Each bit in the table represents one allocation block. If the bit is set then the allocation block is used, if zero then it is free.

The file mapping structures are stored in the file's directory entry and the extents tree file. Files are stored in extents, a contiguous series of allocation blocks. The first three extents of a file are stored in the file's directory storage and any overflow is stored in the extents tree file.

See page 4 for a book covering HFS and MFS disk structures in more detail.

Appendix D

DIRECTORY BLOCKS AND FILE STRUCTURE

The following is on MFS Finder 4.1 or before. See the documentation after this for HFS Finder 5.0 or later.

Data is store on a volume in a file structure. A master list of the files and information on each file is stored in the volume directory. The directory is made up of several blocks in a specific location on a volume, see Appendix C for location as it can vary. Usually the directory is made up of 12 blocks going from $4 to $0F on a Macintosh disk. Each block has 0-9 file entries stored on the block. Each file has an entry in the directory and its structure looks like:

0	File Flags normally $80	byte
1	File Type	byte
2	Finder Data	16 bytes
18	File Number	long word
22	First Allocation Block Data Fork	word
24	Data Fork Logical end of file	long word
28	Data Fork physical end of file	long word
32	First Allocation Block Resource Fork	word
34	Resource Fork Logical end of file	long word
38	Resource Fork Physical end of file	long word
42	File's creation date	long word
46	File's last modification date	long word
50	Length of File Name	byte
51	File Name	
	one byte 00 if needed to force next entry to word boundary	

A file has two forks, a Resource Fork and a Data Fork, and either one can be empty. An application program may only have a resource fork that contains a resource of type CODE. The two forks are stored separately and have different hooks in a file entry on a directory block. Each has a value in the file entry called 'First Allocation Block' and this is the header of a linked list pointing to the rest of the fork.

Allocation Blocks are not disk blocks!! A disk block is 512 bytes while an allocation block on a microfloppy is usually 1024 bytes. Note the usually, as it can be changed. The key word is allocation, this denotes the difference. Space on a floppy disk is allocated in blocks of 1024 bytes! For more information on allocation blocks see appendix C and the allocation table in the volume information area (MFS volumes).

When a file is created the information described above is put into a directory block. If the file is deleted all of this information is overwritten with zeroes. For any directory block all of the file entries are packed such that one entry follows another with no space between. This means that if a file is deleted the following entries are moved up in the block to pack against the other file entries.

This system creates a problem for file recovery as all information on a file is removed from the directory blocks when it is deleted (empty the trash). The only information left is the file tag data, which eventually will not be supported.

When a file is created or moved onto a volume several blocks are allocated to it from the pool of free blocks. A disk block is 512 bytes of storage for data or information and an additional 12 bytes for file data called TAGDATA, see below:

0	File number	Long word
4	Fork Type (bit1 = 1 if Resource)	byte
5	File Attributes	byte
6	File Sequence (Relative block)	word
8	Date of last modification	Long Word

When a file is deleted this information is not updated or removed. The blocks that were allocated to the deleted file are put back into the free block pool. The way part of our recover program works is to rebuild (by scanning all tag datas on a disk) the Data and Resource Forks of a given File number and then build these forks into a dummy file entry in the directory.

HFS Structures

File Directory entries on an HFS disk have similiar structures as above but their location on the disk and links between entries is quite different. The file Tags described above are the same for both MFS and HFS.

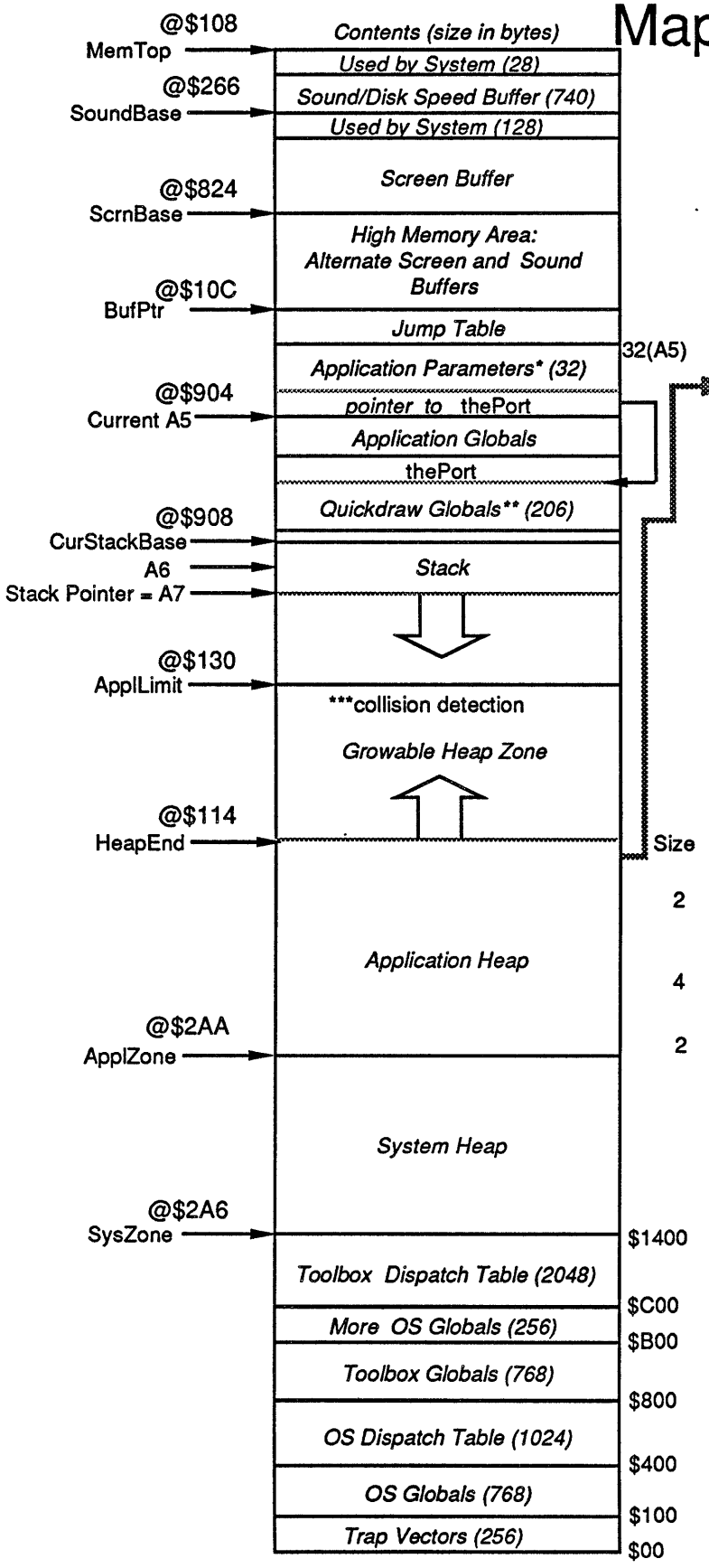
The directory or Catalog of an HFS volume is not stored in the directory blocks (usually the first few blocks on MFS system). There is a special file called a catalog tree file, its internal structure is a binary tree.

The catalog tree file is organized as a binary tree with the nodes being index nodes or leaf nodes. Index nodes have pointers to other nodes and a key value used in searching for an entry. Leaf nodes have the actual data used for file entries.

The volume information block (Block 2) contains enough information for the operating system to access the first part of the catalog tree file. From there you can link or parse forward to the file/directory that you want. See the appendix on volume information for more. See the latest release of Apple's File Manager documentation for more information. However the File Manager does not go into enough detail for file and disk recovery.

See page 4 for information on a book about Disk Structures.

Appendix E
Macintosh RAM Memory Map



Screen and sound buffers are at fixed offsets from end of RAM.

128k ROM Addresses: $400000 - $41FFFF

BufPtr defines the top of the Application Global Space (the "A5 world"). Initialized to point at bottom of Screen Buffer, BufPtr can be lowered to create room for Alternate Sound and Screen Buffers, or code that remains between applications. Many drivers now load in above Bufptr to reduce the loading and fragmentation in the System heap.

The Application Heap contains resources used by the application. Examples of these are window definitions, dialogs, text messages, icons, fonts, menus and many others. The Mac System also loads many temporary resources into the application heap. An example would be a desk accessory or a disk initialization package. The application program code is loaded in Code Segments, see below for more detail on code segments.

Application Code Segments are loaded into the application Heap. Since they may load into different memory locations they need to be linked by a jump table. When a segment is loaded its jump table entries are set to the appropriate addresses.

JUMP TABLE ENTRY for an externally referenced routine.

	Unloaded State	Loaded State
2	Offset to this routine from the beginning of segment.	Segment # 2 bytes
4	Instruction that moves segment number onto stack.	nstruction that jumps o the address of his routine. 6 bytes.
2	LoadSeg Trap	

* only 2 parameters are still used.
0(A5) contains pointer to the first QD global
16(A5) contains Finder startup handle

**The location pointed to by A5 will always contain a pointer to the first QD global (thePort) even if not in the location shown here. Other QD globals can be referenced via negative offsets from thePort.

*** 60 times a second a stack sniffer looks for stack and heap collision. It will generate an error if detected.

Appendix F
Tutorial

Mac Zap Tools

This tutorial will show you how to use Mac Zap Tools to edit disk volumes and files. We will search the disk for a target string and search a file for a target string.

Disk Search

When your Macintosh disk boots in, the screen shows a message saying 'Welcome to Macintosh'. In this tutorial we will show you how to modify that message to say anything you want.

We recommend that you use a copy of a disk to perform this tutorial and the disk that you modify needs to be a booting disk, one that has a system file on it. Once you are more comfortable with Mac Zap you can use original disks with safety. If you happen to inadvertently write a block where it shouldn't be written you may loose some data, that is why you should use a copy for this tutorial.

The message printed on bootup has 'Welcome to' in it so we will search for this on the disk. Do the following:

1) Insert the disk you want to use in a disk drive. Click on  until your disk name is displayed under the words 'Current Volume'. This is now the current volume where we will read/write blocks.

2) Under the Search pull down menu select **Enter Ascii Search String** and a dialog box will appear. Type in the search string Welcome to and click **OK.**

3) Now under the Search pull down menu select **Enter Search Range.**
Click on the **All Disk** control and then **OK.** Mac Zap will set the Search Range values 'From' and 'To' for the entire disk.

4) In the Search pull down menu select **Search Disk,** Mac Zap will find the Welcome to on the disk. Any blocks found containing this word will have their block number printed in the Data Window. The search is done when the menu bar option 'Search' is not highlighted anymore. The data window will appear something like the following:

Search Disk For 57656C636F6D6520746F Welcome to
0122001A

The first line tells us that we are searching the disk and then gives the hex and ascii search string that we searched for. The next line is where any matches are

printed. Each match will be 8 characters. The first four characters are the relative location in the block of the search string and the next location is the block that the search string was found in. There could be multiple matches.

Lets take the match 0122001A which means that block $001A (0122001A) has the search string Welcome to and when that block is loaded into the buffer the word welcome is at $122 (0122001A).

Note: When you do this tutorial on your disk you will have a different match number.

Now, to modify the welcome message we would read in the disk block, click on the 'Welcome' message and type whatever we want. To do this:

5) Select the **Disk & File** Window

6) Make sure you are in Volume mode, the arrow ➡ should be next to the  . If it is not, click in the empty box ☐ next to the disk icon and it will appear there.

7) Click on **Disk Block,** a dialog box appears.
Click on **Hex** in the dialog box, we will enter the block number in hex.
Enter 001A and click **OK.** (Remember you will have a different number.)

8) Click on **Read Disk Block**

9) Select the **Main Window**

10) Now locate the message Welcome to Macintosh in the main window display screen, it will be on the right in the ASCII area. To modify the message position the mouse over the W in Welcome and click to put the input cursor there. Then type in what you want the message to be. Be sure not to write in the memory before or after the regular message of 'Welcome To Macintosh' as this memory is used for other purposes.

Once you have modified the message you can write it back to disk by:

11) Select the **Disk & File** Window
12) Click on 🔒 (unlock write control)
13) Click on **Write Disk Block** (write the block back out)
14) Click on 🔓 (Lock the disk backup)

The disk is now personalized with your message, boot the disk and see.

File Search

When your Macintosh disk boots in, the screen shows a message saying 'Welcome to Macintosh'. In this tutorial we will show you how to modify that message to say anything you want.

Sounds familiar? In the previous tutorial we searched an entire disk for this message and modified it. This message is contained in the 'System' file on the disk, it is part of the Macintosh startup sequence. Now we are going to search the 'System' file and modify the welcome message. A disk is made up of files. Therefore we could search the entire disk and find the message, or we could search a file (assuming we know which file) and find it.

We recommend that you use a copy of a disk to perform this tutorial and the disk that you modify needs to be a booting disk, one that has a system file on it. Do not use the modified disk we made in the previous tutorial, start fresh again. Once you are more comfortable with Mac Zap you can use original disks with safety. If you happen to inadvertently write a block where it shouldn't be written you may loose some data, that is why you should use a copy for this tutorial.

Insert the disk you want to use in a disk drive. The message printed on bootup has 'Welcome to' in it so we will search for this in the file. Do the following:

1) Under the Search pull down menu select **Enter Ascii Search String** and a dialog box will appear. Type in the search string Welcome to and click **OK.**

2) Under the Extra:File pull down menu select **Search File.** A standard file select dialog appears, click the drive button until you are looking at the disk just inserted. Now select the file 'System', this is where the 'Welcome to' message is stored as a resource. Mac Zap will search the file, any matches it finds will be printed in the data window. The data window will appear something like the following:

Search File For 57656C636F6D6520746F Welcome to
00000180

The first line tells us that we are searching a file and then gives the hex and ascii search string that we searched for. The next line is where any matches are printed. Each mach will be a long word (8 characters). There could be multiple matches.

In our case the match was $00000180, this is the offset from the beginning of the file where the message 'Welcome to' starts.

Note: When you do this tutorial on your disk you will have a different match number.

Now, To modify the welcome message we would read in the part of the file containing $0180, click on the Welcome message and type whatever we want. To do this:

3) Select the **Disk & File** Window

4) Click on the  to open a file. A standard file select dialog box will appear. Click on the drive control until you are looking at the disk you just inserted. Select the file 'System'. You have just opened the file 'System' for Editing.

5) Click on **File Position,** a dialog box appears.
Click on **Hex** in the dialog box, we will enter the file position in hex.
Enter 00000180 and click **OK.** (Remember you will have a different number.)

6) Click on **Read File Block**

7) Select the **Main Window**

8) Now locate the message Welcome to Macintosh in the main window display screen, it will be on the right in the ASCII area. To modify the message position the mouse over the W in Welcome and click to put the input cursor there. Then type in what you want the message to be. Be sure not to write in the memory before or after the regular message of 'Welcome To Macintosh' as this memory is used for other purposes.

Once you have modified the message you can write it back to disk by:

9) Select the **Disk & File** Window
10) Click on  (unlock write control)
11) Click on **Write File Block** (write the file block back out)
12) Click on  (Lock the disk backup)

13) Click on  and when the file select dialog box appears click Cancel. This will close the file 'System'. Mac Zap no longer has the file open for editing.

The disk is now personalized with your message.

NOTE: We just edited the system file on a disk. We could not edit the system file on the disk that we booted from because it is currently open for editing (read/write) by the Mac Operating system. There cannot be two programs with write privileges to the same file (normally). Mac Zap will not open a file for editing that already is open for editing.

Mac Zap Features

Mac Zap Recover

Recovers crashed Disks and Files.
Compatible with all MFS and HFS Hard disks.
Compatible with Single and Double Sided Floppy Disks.
Compatible with Logical File Volumes such as Mac Serve.
Bulletin Board Support.
SCSI Support.

Mac Zap Tools

Compatible with MFS and HFS.
Disk and File editor.
Edit File Attributes.
Memory Editor.
Disassembler with Trap Names.
Volume Allocation Maps for MFS and HFS.
File Allocation Maps for MFS and HFS.
Make File Storage Contiguous, Faster Disk Use.
File Resource Maps.
Search & Compare Files or Disks.
Search Memory.
Full SCSI Support, Read/Write ANY block on a SCSI.
Graphics Display.
MORE!!!

Mac Zap Patcher

Install Protected Programs to Hard Disk.
Compatible with all Hard Disks.
Bulletin Board Support.

Mac Zap Copy

Backup Protected Programs.
Block Mode and Track (Bit Copy) Mode
Track Editor
Single or Double Sided Disks.

Fast Disk Copy

FAST Disk and File Duplication.
Compatible with MFS and HFS.
Single or Double Sided Disks.