Technote 1041

Inside Macintosh: Files Errata

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This Technote discusses known errors and omissions in ***Inside Macintosh: Files***.

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Chapter 1 - Introduction to File Management

`FSpExchangeFiles` and `PBExchangeFiles` - What is exchanged

Page 1-53, FSpExchangeFiles

See the discussion of this topic in the corrections for Chapter 2.

Additional Considerations for `GetVInfo`

Page 1-56, GetVInfo

See the discussion of this topic in the corrections for Chapter 2.

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Chapter 2 - File Manager

Pathname rules are not fully explained

Pages 2-27 through 2-28, Names and Pathnames

The following characteristics of Macintosh pathnames should be noted:

- A full pathname never begins with a colon, but must contain at least one colon.
- A partial pathname always begins with a colon separator except in the case where the file partial pathname is a simple file or directory name.
- Single trailing separator colons in full or partial pathnames are ignored except in the case of full pathnames to volumes.
- In full pathnames to volumes, the trailing separator colon is required.
- Consecutive separator colons can be used to ascend a level from a directory to its parent directory. Two consecutive separator colons will ascend one level, three consecutive separator colons will ascend two levels, and so on. Ascending can only occur from a directory; not a file.

To summarize, if the first character of a pathname is a colon, or if the pathname contains no colons, it must be a partial pathname; otherwise, it is a full pathname.

Missing Row in Table 2-10

Page 2-35, Creating File System Specification Records

Add the following row to Table 2-10:

Working directory reference number	Directory ID	Empty string or NIL	The target object is the directory specified by the directory ID in `dirID`

Description of default directory upon launch wrong

Page 2-36, Manipulating the Default Volume and Directory

Replace the last sentence in the first paragraph with the following:

"When an application starts up, its default directory is set to the directory in which the application resides. Thereafter, the application can designate any directory as its default directory."

Master Directory Blocks `drXTFlSize` and `drCTFlSize` field descriptions are wrong

Page 2-62, Master Directory Blocks

Change the field descriptions to:

`drXTFlSize`	The size (in bytes) of the extents overflow file.
`drCTFlSize`	The size (in bytes) of the catalog file.

Map records in map nodes occupy 492 bytes (not 494 bytes)

Page 2-69, Map Nodes

Replace the second and third paragraphs in the Map Nodes section with the following:

"A map node consists of a node descriptor and a single map record. The map record is a continuation of

the map record contained in the header node and occupies 492 bytes (512 bytes in the node, less 14 bytes for the node descriptor, 2 bytes for each of the two record offsets at the end of the node, and rounded down to a multiple of a longword). (Note: The HFS file system's B*-tree manager reads the bitmap information a longword at a time.) A map node can therefore contain mapping information for an additional 3936 nodes.

If a B*-tree contains more than 5984 nodes (that is, 2048 + 3936, enough for around 25,000 files), the File Manager uses a second map node, the node number of which is stored in the ndFLink field of the node descriptor of the first map node. If more map nodes are required, each additional map node is similarly linked to the previous one."

Volume cache control bit in vcbAtrb

Page 2-79, Volume Control Blocks

Add the following bit definition to `vcbAtrb` for System 7.5 or later:

Bit	Meaning
10	Set if the volume's blocks should not be cached (System 7.5 and later only). This allows access to RAM disk volumes to bypass the File Manager cache. It has the same affect as setting the `noCache` bit (bit 5 of `ioPosMode`) for all File Manager reads and writes to the volume. Non-block aligned requests may still be accessed through the cache.

When a HFS volume is mounted with System 7.5 or later, the File Manager calls the disk driver with a "Return Drive Info" `_Control` call (`csCode`=23). Then if there are no errors, it looks at the low-byte (bits 0-7) of `csParam` to see if the drive type is `ramDiskType` (16, $10) or `romDiskType` (17, $11) and if so, sets the `vcbAtDontCache` bit in the VCB's `vcbAtrb` field. This allows access to RAM or ROM disk volumes to bypass the File Manager cache. It has the same affect as setting the `noCache` bit (bit 5 of `ioPosMode`) for all File Manager reads and writes to the volume. Non-block aligned requests may still be accessed through the cache.

Driver Note: Drivers should not directly modify the `vcbAtDontCache` bit in `vcbAtrb`. If the driver is for a RAM or ROM disk, it should support `_Control` `csCode` 23 and say that it is a RAM or ROM disk by returning `ramDiskType` (16, $10) or `romDiskType` (17, $11) in the low-byte of `csParam`. Other disk drivers should not set the `vcbAtDontCache` bit because any future improvements made to the File Manager cache will be lost on those drives.

Volume Control Blocks `vcbXTAlBks` and `vcbCTAlBks` field descriptions are wrong

Page 2-81, Volume Control Blocks

Change the field descriptions to:

`vcbXTAlBks`	The size (in allocation blocks) of the extents overflow file.
`vcbCTAlBks`	The size (in allocation blocks) of the catalog file.

`dQDrvSiz` fields not used on 3.5" floppy disks

Page 2-85, The Drive Queue

Note:
If the volume is a 3 1/2-inch floppy disk owned by the .Sony driver, the `dQDrvSiz` and `dQDrvSiz2` fields are not valid. To get the size of a 3 1/2-inch floppy disk owned by the .Sony driver, first try the Return Format List (`csCode`= 6) Status call and if Return Format List fails with a `statusErr` (-18), use `DriveStatus` and check the `twoSideFmt` field of the `DrvSts` record to determine if the disk has 800 blocks (`twoSideFmt` = 0) or 1600 blocks (`twoSideFmt` = -1). See the Technical Note "DV 17 - Sony Driver : What Your Sony Drives For You" for more information concerning the Return Format List Status call.

Clarification of `ioFlAttrib` bits in `ParamBlockRec`, `HParamBlockRec`, and `CInfoPBRec`

Page 2-90, Basic File Manager Parameter Block, field descriptions for the `fileParam` variant.
Page 2-96, HFS Parameter Block, field descriptions for the `fileParam` variant.
Page 2-102, Catalog Information Parameter Blocks, field descriptions common to both variants.

For files, the bits in `ioFlAttrib` have the following meanings:

Bit	Meaning
0	Set if file is locked. Can be changed with the `PBHSetFLock` or `PBHRstFLock` functions.
1	Reserved.
2	Set if resource fork is open.
3	Set if data fork is open.
4	Set if directory. (Always clear for files.)
5	Reserved.
6	Set if AppleShare server "copy-protects" the file. Set by the AppleShare foreign file system code when the server sets the `CopyProtect` bit returned by `afpGetFileDirParms`.
7	Set if file (either fork) is open.

For directories, the bits in `ioFlAttrib` have the following meanings:

Bit	Meaning
0	Set if the directory is locked. Can be changed with the `PBHSetFLock` or `PBHRstFLock` functions when volume is shared.
1	Reserved.
2	Set if the directory is within a shared area of the directory hierarchy.
3	Set if the directory is a share point that is mounted by some user.
4	Set if directory. (Always set for directories.)
5	Set if the directory is a share point. Can be set or cleared by `PBShare` and `PBUnshare`.
6	Reserved.
7	Reserved.

`ioACUser` is filler2 in some interface files

Page 2-100 and 2-103, Catalog Information Parameter Blocks
Page 2-191, `PBGetCatInfo`

Note:
The `ioACUser` field is at offset 31 `($1F)` in the `CInfoPBRec` parameter block. In most versions of the Files interfaces (Files.h, Files.p, etc.), the field at offset 31 is `filler2`. This problem is fixed in newer versions of the Files interfaces.

The `VolMountInfoHeader` data structure includes flags word

Page 2-110, Volume Mounting Information Records

The `VolMountInfoHeader` data structure has been extended to include a flags word. The data structure is now defined as:

```
struct VolMountInfoHeader
{
    short       length;  /* length of location data (including self) */
    VolumeType  media;   /* type of media */
    short       flags;   /* high-byte reserved for Apple, */
                         /* low-byte reserved for file system
                            specific use */
    /* Variable length data follows */
};
```

In the flags word, bits 14 and 15 have been defined. All other bits in the high-byte of the flags word should be left clear. Bits in the low-byte of the flags word are file- system specific. For example, the AppleShare foreign file system uses bit 0 to determine if server greeting messages should be shown or suppressed.

Bit 15 in the flags word tells the file system that accepts a `VolumeMount` request if user interaction can be performed. If Bit 15 is set, the file system must not perform user interaction. If Bit 15 is clear, the file system may perform user interaction through the mechanism supplied by the File System Manager (FSM).

Bit 14 in the flags word allows a file system to indicate to the caller of `VolumeMount` that although the `VolumeMount` request was successful, the `VolMountInfo` record passed needs to be updated. Programs should ensure bit 14 of the flags word is clear before calling `VolumeMount` and if bit 14 is returned set, the `VolMountInfo` record should be updated by calling `PBGetVolMountInfoSize` and `PBGetVolMountInfo`. If `VolumeMount` is unsuccessful, bit 14 in the flags word should be ignored.

Observant readers will note that the Alias Manager needs to use bits 14 and 15 in the flags word to interact with file systems when responding to a `MatchAlias` function call.

`ioPosMode` usage by `PBRead` and `PBWrite` requests

Page 2-131, PBRead

Page 2-121, PBRead
Page 2-122, PBWrite

The `PBRead` and `PBWrite` functions give programs much more control over read and write operations than the high-level `FSRead` and `FSWrite` functions because `PBRead` and `PBWrite` allow access to the ioPosMode field.

Bits 0 and 1 of ioPosMode indicate where to start reading or writing data in the file. The values allowed in `ioPosMode` to set bits 0 and 1 are:

constant	value	description
`fsAtMark`	0	`ioPosOffset` is ignored. Operation starts at current mark.
`fsFromStart`	1	`ioPosOffset` is an offset from the beginning of file.
`fsFromLEOF`	2	`ioPosOffset` is an offset from the logical end-of-file.
`fsFromMark`	3	`ioPosOffset` is an offset from the current mark.

Bits 4 and 5 of `ioPosMode` are cache usage hints passed on to the file system that handles requests to the volume the file is on. Bit 4 is a request that the data be cached (i.e., please cache this). Bit 5 is a request that the data not be cached (i.e., please do not cache this). Bits 4 and 5 are mutually exclusive - only one should be set at a time. However, if neither is set, then the program has indicated that it doesn't care if the data is cached or not. The values allowed in `ioPosMode` to set bits 4 and 5 are:

constant	value	description
(no constant)	0	I don't care if this request is cached or not cached.
`pleaseCacheMask`	16	Please, cache this request if possible.
`noCacheMask`	32	Please, I'd rather you didn't cache this request.

Note:
A particular file system may choose to ignore one or both of the cache usage hint bits. File systems may cache when you set the `noCache` bit, may not cache when you set the `pleaseCache` bit, may cache everything, or may cache nothing. However, if a program leaves both bits clear, then file systems which do respect these bits have no way of knowing if the data being read or written will be needed again by your program.

Bit 6 (`rdVerify`) of `ioPosMode` is a request that reads (not writes) come directly from the source of the data and be verified against the data in memory. So, if a file system gets a read request with `rdVerify` set, it should flush any cache it might have of that data and ask its data source (in the case of local volumes, that would be the disk driver) for the data again. If the data source is a disk driver, then the file system should pass the `rdVerify` request on to the disk driver and the disk driver should do the same thing --flush any cache it has of that data (including any cache on the disk hardware) and ask its source (the disk hardware) for the data again. The idea behind `rdVerify` is that a program could write data to a volume, then ask the file system to compare the data from the disk volume to the data in the write buffer. The Finder uses this technique when copying files only when copying files to floppy disks.

WARNING:

There's a bug in current version of the HFS file system that affects `rdVerify` requests. Instead of just comparing the data from a disk to the data in memory, the HFS file system actually reads any full 512-byte blocks in the request from the source device into the buffer overwriting the original data instead of comparing it. In most cases, this is exactly the same data that was just written to the device, but if any data corruption occurs because of media or hardware failures, your original write data buffer could be corrupted. Your code can work around this problem by first making a copy of the write data buffer, then performing the `rdVerify` operation against the copy instead of the original data buffer, and finally comparing the copy and original data buffers to ensure the data written is the same as the data just read.

Bit 7 of `ioPosMode` is a request for `newLine` mode. If bit 7 is set, then the high-byte of `ioPosMode` is the `newLine` character - even if that character is null (`$00`). When bit 7 is set, the read should stop when any one of these conditions is met:

- `ioReqCount` bytes have been read.
- End-of-file is reached.
- The `newLine` character has been read. If the `newLine` character is found, it will be the last character put into `ioBuffer` and `ioActCount` will include it.

When using `newLine` mode, the HFS file system reads the file one block (512-bytes) at a time into a file system cache block (not the user buffer pointed to by `ioBuffer`) and then copies the data into the user buffer one byte at a time looking at each byte for the `newLine` character. Since a file read with `newLine` mode is read one block at a time, `newLine` mode is about the slowest way you can read a file.

Additional Considerations for GetVInfo

Page 2-137, `GetVInfo`

The `drvNum` parameter, which specifies the volume, can be a drive number, volume reference number, 0 (the default volume), or a working directory number. The `volName` parameter must point to a `Str27` buffer or must be set to NIL. The `freeBytes` parameter will not be accurate on volumes with over 2 GB of free space.

Parameter blocks have unnecessary `ioCompletion` field

Page 2-142, `PBOffLine`
Page 2-219, `PBGetVolMountInfoSize`
Page 2-220, `PBGetVolMountInfo`
Page 2-223, `PBVolumeMount`

The parameter blocks for these routines unnecessarily list the `ioCompletion` field as an input field. These routines can only be executed synchronously, so the `ioCompletion` field is always ignored.

Additional Special Considerations for `PBHGetVInfo`

Page 2-145, `PBHGetVInfo`

Add these "Special Considerations":

If the value of `ioVolIndex` is negative, the File Manager uses `ioNamePtr` and `ioVRefNum` in the standard way to determine the volume. However, because `PBHGetVInfo` returns the volume name in the buffer whose address you passed in `ioNamePtr`, your input pathname will be modified. If you don't want your input pathname modified, make a copy of it and pass the copy to `PBHGetVInfo`.

The volume name returned by `PBHGetVInfo` is not a full pathname to the volume because it does not contain a colon.

For compatibility with older programs, some values returned by `PBHGetVInfo` are not what is stored in the volume's Volume Control Block (VCB). Specifically:

- `ioVNmAlBlks` and `ioVFrBlk` are pinned to values which when multiplied by `ioVAlBlkSiz` always are less than 2 Gigabytes.
- `ioVNmAlBlks` may not include the allocation blocks used by the catalog and extents overflow files.
- `$4244` is returned in `ioVSigWord` for both HFS and HFS Plus volumes.

For unpinned total and free byte counts, and for the real `ioVSigWord`, use PBXGetVolInfo instead of `PBHGetVInfo`.

`FSpGetFInfo` does not work with directories

Page 2-160, `FSpGetFInfo`

You can use the `FSpGetFInfo` function to obtain the Finder information about a file, but not a directory.

`FSpSetFInfo` does not work with directories

Page 2-160, `FSpSetFInfo`

You can use the `FSpSetFInfo` function to set the Finder information about a file, but not a directory.

`FSpExchangeFiles` and `PBExchangeFiles` - What is exchanged

Page 2-165, `FSpExchangeFiles`
Page 2-206, `PBExchangeFiles`

The `FSpExchangeFiles` function swaps the data in two files by changing the information in the volume's catalog and, if either of the files are open, in the file control blocks. Specifically, the following changes are made:

The following fields in the two files' volume catalog entries are exchanged (as seen by `PBGetCatInfo`):

`ioFlStBlk`	The first allocation block of the data fork
`ioFlLgLen`	The logical end-of-file of the data fork
`ioFlPyLen`	The physical end-of-file of the data fork
`ioFlRStBlk`	The first allocation block of the resource fork
`ioFlRLgLen`	The logical end-of-file of the resource fork
`ioFlRPyLen`	The physical end-of-file of the resource fork
`ioFlMdDat`	The date and time of the last modification

Both the data and resource forks of the two files are exchanged.

Both the data and resource forks of the two files are exchanged.

The following fields in any open file control blocks to the two files are exchanged:

`fcbFlNum`	The file ID number
`fcbDirID`	The file's parent directory ID
`fcbCName`	The file's name

Note:
Your application will have to swap any open reference numbers to the two files because the file's name and parent directory ID are exchanged in the file control blocks.

Because other programs may have access paths open to one or both of the files exchanged, your application should have exclusive read/write access permission (`fsRdWrPerm`) to both files before calling `FSpExchangeFiles`. Exclusive read/write access to both files will ensure that `FSpExchangeFiles` doesn't affect another application because it prevents other applications from obtaining write access to one or both of the files exchanged.

Note:
`FSpExchangeFiles` does not respect the file-locked attribute; it will perform the exchange even if one or both of the files are locked. Obtaining exclusive read/write access to both files before calling `FSpExchangeFiles` ensures that the files are unlocked because locked files cannot be opened with write access.

`HOpenDF`, `PBHOpenDF` and the `paramErr` result code

Page 2-169, `HOpenDF`
Page 2-169, `PBHOpenDF`

If the `HOpenDF` or `PBHOpenDF` function fail with a `paramErr` result code (indicating that the `HOpenDF` or `PBHOpenDF` function is not available), you should retry your request passing the same parameters to `HOpen` or `PBHOpen`. For example:

```
error = HOpenDF(vRefNum, dirID, fileName, permission, &refNum);
if ( error == paramErr )
{
    /* HOpenDF not supported, so try HOpen */
    error = HOpen(vRefNum, dirID, fileName, permission, &refNum);
}
```

Parameter blocks missing `ioFVersNum` field

Page 2-183, `PBHOpenDF`
Page 2-184, `PBHOpenRF`
Page 2-185, `PBHOpen`
Page 2-187, `PBHCreate`
Page 2-189, `PBHDelete`
Page 2-194, `PBHGetFInfo`
Page 2-196, `PBHSetFInfo`

Page 2-197, PBHSetFLock
Page 2-198, PBHRstFLock
Page 2-199, PBHRename

The parameter blocks are missing the ioFVersNum field. ioFVersNum should be initialized to zero because these calls will fall through to the now-obsolete Macintosh File System (MFS) code if the volume accessed is an MFS volume.

Parameter blocks missing ioMisc field

Page 2-183, PHHOpenDF
Page 2-184, PHHOpenRF
Page 2-185, PBHOpen

The parameter blocks are missing the ioMisc field. ioMisc must be initialized to zero before calling PHHOpenDF, PHHOpenRF, or PBHOpen. Failure to initialize ioMisc to zero on some Macintosh models will cause the system to crash.

PBGetCatInfo ioFDirIndex usage rules

Page 2-191, PBGetCatInfo

Change the description of PBGetCatInfo's ioFDirIndex usage rules to:

The PBGetCatInfo function selects a file or directory according to these rules:

- If the value of ioFDirIndex is positive, ioNamePtr is not used as an input parameter and PBGetCatInfo returns information about the file or directory whose directory index is ioFDirIndex in the directory specified by ioVRefNum and ioDirID (this will be the root directory if ioVRefNum is a volume reference number or a drive number and ioDirID is 0). If ioNamePtr is not NIL, then it must point to a Str31 buffer where the file or directory name will be returned.
- If the value of ioFDirIndex is 0, PBGetCatInfo returns information about the file or directory specified by ioNamePtr in the directory specified by ioVRefNum and ioDirID (again, this will be the root directory if ioVRefNum is a volume reference number or a drive number and ioDirID is 0).
- If the value of ioFDirIndex is negative, ioNamePtr is not used as an input parameter and PBGetCatInfo returns information about the directory specified by ioVRefNum and ioDrDirID (again, this will be the root directory if ioVRefNum is a volume reference number or a drive number and ioDrDirID is 0). If ioNamePtr is not NIL, then it must point to a Str31 buffer where the directory name will be returned.

Parameter blocks missing ioNamePtr field

Page 2-219, PBGetVolMountInfoSize
Page 2-220, PBGetVolMountInfo
Page 2-223,PBHGetLogInInfo

The parameter block is missing the ioNamePtr field. ioNamePtr and ioVRefNum are both used to specify the volume.

ioForeignPrivIDirID is LongInt in PBGetForeignPrivs and

PBSetForeignPrivs

Pages 2-233 and 2-234

The parameter blocks shows ioForeignPrivIDirID as a Integer when it is really a LongInt.

Request execution order

Page 2-239, new information after MyCompletionProc

The File Manager, when the File Sharing or AppleShare file server is active, will execute requests in arbitrary order. That means that if there is a request that depends on the completion of a previous request, it is an error for your program to issue the second request until the completion of the first request. For example, issuing a write request and then issuing a read request for the same data isn't guaranteed to read back what was written unless the read request isn't made until after the write request completes.

Request order can also change if a call results in a disk switch dialog to bring an offline volume back online.

Volume Parameter Variant offsets are off by 2

Page 2-293, Assembly-Language Summary, Data Structures

The offsets for the Volume Parameter Variant are off by 2 starting at ioVClpSiz because ioVAlBlkSiz is a long, not a word. So, the offset for ioVClpSiz should be 52, the offset for ioAlBlSt should be 56, etc.

Detecting if a volume is formatted Macintosh File System (MFS), Hierarchical File System (HFS), or HFS Plus

Three volume formats have been supported by the Mac OS file system: MFS, HFS, and HFS Plus. System software 7.0 through Mac OS 8.0 supported the MFS and HFS volume formats. Mac OS 8.1 and later support HFS and HFS Plus volumes. All three volume formats use the local File System ID, zero (0). So how do you tell them apart? By the volume's signature word returned by PBXGetVolInfo (or PBHGetVInfo if PBXGetVolInfo is not available) in the ioVSigWord field. MFS volumes have a signature of $D2D7; HFS volumes have a signature of $4244; HFS Plus volumes have a signature of $482B.

Important:
For compatibility with some programs, PBGetVInfo and PBHGetVInfo return $4244 in ioVSigWord for both HFS and HFS Plus volumes. You should always use PBXGetVolInfo if it is available.

The following code can be used to get the volume signature and file system ID:

```
OSErr GetVSigWord(short vRefNum, short *vSigWord, short *fsid)
{
   OSErr         result;
   long          response;
   XVolumeParam  pb;

   pb.ioVRefNum = vRefNum;
   pb.ioXVersion = 0;      // this XVolumeParam version (0)
   pb.ioNamePtr = NULL;
```

```
   pb.ioVolIndex = 0;      // use ioVRefNum only
   // Is PBXGetVolInfo available?
   if ( ( Gestalt(gestaltFSAttr, &response) == noErr ) &&
        ((response & (1L << gestaltFSSupports2TBVols)) != 0) )
   {
      // Yes, so use it
      result = PBXGetVolInfoSync(&pb);
   }
   else
   {
      // No, fall back on PBHGetVInfo
      result = PBHGetVInfoSync((HParmBlkPtr)&pb);
   }
   // return the volume's signature word and FSID
   *vSigWord = pb.ioVSigWord;
   *fsid = pb.ioVFSID;
   // return the File Manager's result
   return ( result );
}
```

PBXGetVolInfo

You can use the `PBXGetVolInfo` function to get detailed information about a volume. It can report volume size information for volumes up to 2 terabytes.

```
pascal OSErr PBXGetVolInfoSync(XVolumeParamPtr paramBlock);
pascal OSErr PBXGetVolInfoAsync(XVolumeParamPtr paramBlock);

paramBlock    A pointer to an extended volume parameter block.
```

XVolumeParam			
->	ioCompletion	ProcPtr	Pointer to a completion routine
<-	ioResult	OSErr	Result code of the function
<->	ioNamePtr	StringPtr	Pointer to the volume's name.
<->	ioVRefNum	short	On input, a volume specification; on output, the volume reference number.
->	ioXVersion	unsigned long	Version of XVolumeParam (value = 0).
->	ioVolIndex	short	Index used for indexing through all mounted volumes.
<-	ioVCrDate	unsigned long	Date and time of initialization.
<-	ioVLsMod	unsigned long	Date and time of last modification.
<-	ioVAtrb	short	Volume attributes.
<-	ioVNmFls	unsigned short	Number of files in the root directory.
<-	ioVBitMap	unsigned short	First block of the volume bitmap.
<-	ioVAllocPtr	unsigned short	Block where the next new file starts.

<-	ioVNmAlBlks	unsigned short	Number of allocation blocks.
<-	ioVAlBlkSiz	unsigned long	Size of allocation blocks.
<-	ioVClpSiz	unsigned long	Default clump size.
<-	ioAlBlSt	unsigned short	First block in the volume block map.
<-	ioVNxtCNID	unsigned long	Next unused catalog node ID.
<-	ioVFrBlk	unsigned short	Number of unused allocation blocks.
<-	ioVSigWord	unsigned short	Volume signature.
<-	ioVDrvInfo	short	Drive number.
<-	ioVDRefNum	short	Driver reference number.
<-	ioVFSID	short	File system ID for the file system handling this volume.
<-	ioVBkUp	unsigned long	Date and time of last backup.
<-	ioVSeqNum	short	Used internally.
<-	ioVWrCnt	unsigned long	Volume write count.
<-	ioVFilCnt	unsigned long	Number of files on the volume.
<-	ioVDirCnt	unsigned long	Number of directories on the volume.
<-	ioVFndrInfo	[8] long	Used by the Finder.
<-	ioVTotalBytes	UnsignedWide	Total number of bytes on the volume.
<-	ioVFreeBytes	UnsignedWide	Number of free bytes on the volume.

The PBXGetVolInfo function returns information about the specified volume. It is similar to the PBHGetVInfo function described in *Inside Macintosh: Files* except that it returns additional volume space information in 64-bit integers and does not modify the information copied from the volume's Volume Control Block (VCB). Systems that support PBXGetVolInfo will have the gestaltFSSupports2TBVols bit set in the response returned by the gestaltFSAttr Gestalt selector.

Assembly-Language Information

The trap macro and routine selector for PBXGetVolInfo are:

Trap macro	Selector
_HFSDispatch	$0012

Result Codes

noErr	0	Successful completion, no error occurred
nsvErr	&endash35	No such volume
paramErr	&endash50	No default volume

PBGetXCatInfo

You can use the PBGetXCatInfo function to get the short name (MS-DOS format name) and ProDOS

information for files and directories.

```
pascal OSErr PBGetXCatInfoSync(XCInfoPBPtr paramBlock);
pascal OSErr PBGetXCatInfoAsync(XCInfoPBPtr paramBlock);

paramBlock    Contains a pointer to a XCInfoPBRec.
```

XCInfoPBRec			
->	ioCompletion	ProcPtr	Contains a pointer to PBGetXCatInfoAsync's completion routine.
<-	ioResult	OSErr	PBGetXCatInfo places its result code into this field.
->	ioNamePtr	StringPtr	Contains a pointer to the object name, or nil when ioDirID specifies a directory that's the object.
->	ioVRefNum	short	Contains a volume specification.
<->	ioShortNamePtr	StringPtr	Contains a pointer to a Pascal string buffer (minimum 13 bytes). PBGetXCatInfo places the short name into the field referred to by this parameter. ioShortNamePtr cannot be nil.
<-	ioPDType	short	PBGetXCatInfo places the ProDOS file type into this field.
<-	ioPDAuxType	long	PBGetXCatInfo places the ProDOS auxiliary type into this field.
->	ioDirID	long	Contains a directory ID.

PBGetXCatInfo returns the short name (MS-DOS format name) and ProDOS file/auxiliary type information for files and directories on volumes that support this function. Volumes that support PBGetXCatInfo will have the bHasShortName bit set in the vMAttrib field returned by PBHGetVolParms.

For more information about short names and ProDOS file/auxiliary types, see *Inside AppleTalk*, second edition, Chapter 13 AppleTalk Filing Protocol, and the Apple II File Type Notes.

Assembly-Language Information

The trap macro and routine selector for PBXGetVolInfo are:

Trap macro	Selector
_HFSDispatch	$003A

Result Codes

noErr	0	Successful completion, no error occurred
nsvErr	&endash35	No such volume
fnfErr	&endash43	File not found

fnfErr	&endash43	File not found
paramErr	&endash50	No default volume
dirNFErr	-120	Directory not found

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Chapter 3 - Standard File Package

Activation Procedures Need to call `TECalText`

Pages 3-30 to 3-31, Writing an Activation Procedure
Page 3-59, `MyActivateProc`

Pages 3-30 to 3-31 and 3-59 discuss activation of additional user interface elements in custom standard file dialogs. The parts of that discussion that refer to having multiple edit-text items omit mention that it is necessary for the activation procedure to call `TECalText`, set `myTEHandle^^.crOnly` to 1, and call `TESetSelect` to work properly, as in the code snippet below:

```
IF (activating) THEN
    BEGIN
        {Note DialogPeek not WindowPeek used}
        dlgPeek := DialogPeek(theDialog);

        {Access TEHandle shared in common by all the editText }
        { items in the dialog. This field current at activate time.}
        myTEHandle:= dlgPeek^.textH;

        {Must redo lineStarts on activation}
        TECalText(myTEHandle);

        {Must set crOnly on activation}
        myTEHandle^^.crOnly := 1;

        {Ensure proper setting of selection}
        myTECharLength := myTEHandle^^.teLength;
        selectionLen := myTEHandle^^.selEnd - myTEHandle^^.selStart
                        + 1;
        If (myTECharLength > selectionLen) THEN
        TESetSelect(0,myTECharLength,myTEHandle);
    END;
```

Default Standard File current directory

Page 3-31, Setting the Current Directory

Replace the two bullet points with the following three bullet points:

- If the user launched your application directly (perhaps by double-clicking its icon in the Finder), the default directory is the directory in which your application is located.
- If the user launched your application indirectly (perhaps by double-clicking one of your

application's document icons) and your application is high-level event aware, your application is passed the list of documents to open or print in a `kAEOpenDocument` or `kAEPrintDocument` Apple event; there is no Finder information (`AppParmHandle` will be NIL) and the default directory is the directory in which your application is located.

- If the user launched your application indirectly (perhaps by double-clicking one of your application's document icons) and your application is not high-level event aware, your application is passed Finder information and the default directory is the directory of the last document in listed in the Finder information. The Finder information is the data referenced by `AppParmHandle` and accessed by the Segment Loader routines `CountAppFiles`, `GetAppFiles`, `ClrAppFiles`, and `GetAppParms`.

Listing 3-15 does not set `sfScript` field

Page 3-33, Listing 3-15, Setting the current directory

The code listing does not set the `sfScript` field of the `StandardFileReply` record when returning the pseudo-item `sfHookChangeSelection`. This can cause Standard File to always set the selection to the last file in the directory. Adding the line:

```
myReplyPtr^.sfScript := smSystemScript;
```

before the line:

```
MyDlgHook := sfHookChangeSelection;
```

will fix the problem.

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Chapter 4 - Alias Manager

`ResolveAlias` updates minimal aliases

Page 4-19

At the bottom of page 4-19, it is stated that `ResolveAlias` never updates a minimal alias. This is not true.

`ResolveAlias` calls `MatchAlias` to resolve the alias and if `MatchAlias` returns with `needsUpdate` set to true, then `ResolveAlias` updates the alias by calling `UpdateAlias` (which makes it a full alias) and returns with `wasChanged` set to true. If you require that minimal aliases stay minimal aliases, you can either call `MatchAlias` (which does not update aliases),or you can create a copy of the alias record with `HandToHand`, pass the copy of the alias record to `ResolveAlias`, and then dispose of the (possibly updated) copy of the alias record.

`usrCanceledErr` should be `userCanceledErr`

Page 4-20, `ResolveAlias` 4-23, `MatchAlias`

Just a typo... the title of this says it all.

`kARMSearchMore` and memory available to `AliasFilterProc` warning

Page 4-23, `MatchAlias`
Page 4-25, `MyMatchAliasFilter`

Add this warning:

WARNING:

A call to `MatchAlias` using the `kARMSearchMore` rule will result in a recursive search using `PBGetCatInfo` if the volume being searched doesn't support `PBCatSearch`. Your application should insure there is a reasonable amount of stack space available before calling `MatchAlias` using the `kARMSearchMore` rule, and if a `AliasFilterProc` is used, the `AliasFilterProc` should not use large amounts of stack space. You can eliminate most stack usage in your `AliasFilterProc` by passing a structure containing any large data structures the `AliasFilterProc` might need in the `yourDataPtr` parameter to `MatchAlias`.

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Chapter 5 - Disk Initialization Manager

Extended Disk Initialization Package

An extended Disk Initialization Package is available with System Software 7.5, with Macintosh PC

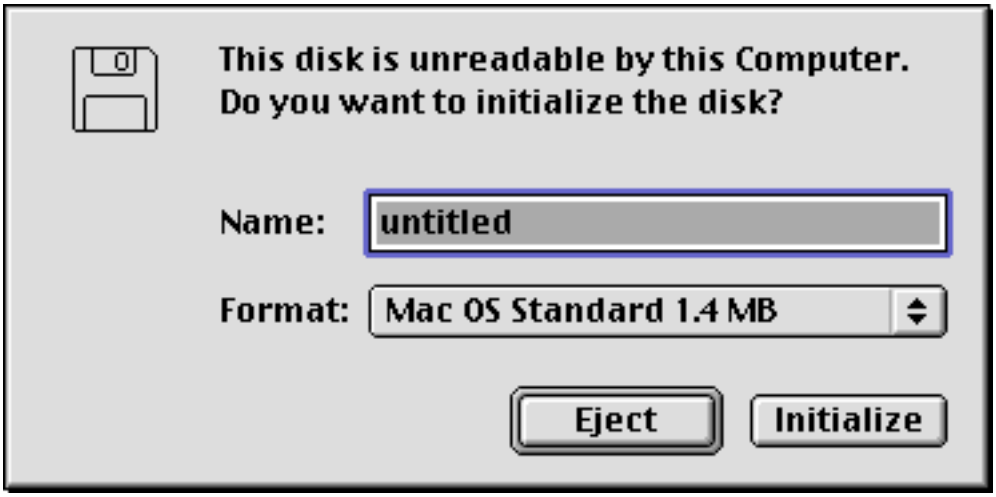
Exchange 2.0 or later, and with the File System Manager. The extended Disk Initialization Package includes three functions not found in Chapter 5 of *Inside Macintosh: Files*.

The existing application program interface to the Disk Initialization Package as described in *Inside Macintosh: Files* will continue to be supported by the enhanced Disk Initialization Package. Applications which wish to initialize only Macintosh disks will continue to work and will require no changes. However, if an application wants to initialize non-Macintosh disks, it must use the new extended `DIXFormat` and `DIXZero` calls.

The Extended Disk Initialization User Interface

The Finder and the Standard File Package both handle disk-inserted events for uninitialized disks by presenting a disk initialization dialog box asking the user whether the disk should be ejected or initialized. Your application too can easily call a Disk Initialization Manager routine that generates such a dialog box when the user inserts an invalid disk. Figure 5-1 illustrates the dialog box:

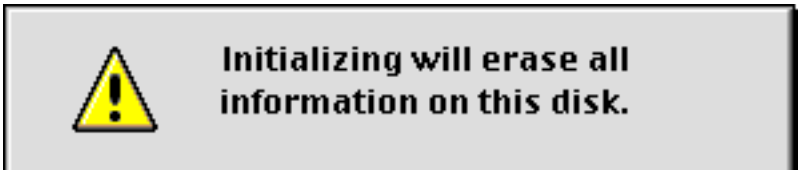
Figure 5-1 The disk initialization dialog box



The disk initialization dialog box allows the user to name and specify the format of the new disk. The appearance of the disk initialization dialog box changes to reflect changing conditions. For example, the icon changes to show which drive contains the disk. The Format menu items change to show what disk formats can be used with the disk and disk drive combination. Also, the text of the dialog box changes according to what is wrong with the disk. The text might read "This disk's format cannot be read by this drive" if the Disk Initialization Manager detects that the disk drive cannot use a disk's format (for example, if a double-sided disk is inserted in a single-sided disk drive, or a high-density disk formatted using GCR instead of MFM is inserted in an Apple SuperDrive).

Regardless of the initial appearance of the disk initialization dialog box, it disappears if the user clicks Eject or Cancel. If, however, the user decides to initialize the disk, the text in the dialog box changes to warn the user that initialization erases any previous data on the disk, as illustrated in Figure 5-2.

Figure 5-2 The disk initialization warning



If the user selects continue, the Disk Initialization Manager attempts to initialize it. If an error occurs and the initialization fails, an alert box notifies the user, and the disk is ejected.

The extended Disk Initialization Manager also provides a mechanism for using the standard interface to reinitialize (reformat) disks that are already formatted. (This mechanism is useful, for example, when the user wants to reinitialize a disk with a different disk format.) The Finder takes advantage of this mechanism with its Erase Disk command, illustrated in Figure 5-3. After the user selects the erase operation from this dialog box, the reinitialization begins immediately, without further warnings. If desired, your application can use this same standard interface to allow users to reinitialize mounted disks (other than the startup volume). Your application can customize the text to be displayed in such a dialog box. Note that only a few utility applications actually need to provide users with this capability.

Figure 5-3 The Reformat dialog box

If you are writing a utility program such as a disk-copying application, you might wish to initialize new disks or reinitialize valid disks without displaying the standard disk initialization dialog box. For example, your application might allow users to initialize multiple disks without having to respond to the standard dialog box each time. The Disk Initialization Manager provides low-level routines that allow you to do so. Unless you are writing a utility program of this type, you don't need to use these routines.

Extended Low-Level Disk Initialization Routines

Extended programmatic interfaces to media formatting and volume initialization functions are required such that applications may specify additional information for the overall formatting operation. This information corresponds to the file system type and disk size information presented in the "Format" menu in the disk initialization dialog box described above. The extended programmatic interface adds three new functions to the Disk Initialization Package: `DIXFormat` and `DIXZero` (for extended `DIFormat` and `DIZero`), and `DIReformat`.

Warning:
Applications should insure that the extended Disk Initialization Package functions are present before making the `DIXFormat`, `DIXZero`, or `DIReformat` calls. This is done by calling `Gestalt` with the

making the DIXFormat, DIXZero, or DIRetFormat calls. This is done by calling Gestalt with the gestaltFSAttr selector. The extended Disk Initialization Package functions is available if the Gestalt function returns a result of noErr and the gestaltHasExtendedDiskInitbit (bit 6) is set in the response parameter. Due to the nature of older versions of the Disk Initialization Package, making the extended requests when they are not available may cause a system crash.

The following code illustrates how you use Gestalt to determine if the extended Disk Initialization Package functions are available.

```
Boolean  HasExtendedDIFunctions(void)
{
   long response;

   if (Gestalt(gestaltFSAttr, &response) == noErr)
      return ((response & (1L << gestaltHasExtendedDiskInit)) != 0);
   else
      return (false);
}
```

DIXFormat

The DIXFormat function performs the same function as the DIFormat function except that drive size may be specified.

```
pascal OSErr DIXFormat(short drvNum, Boolean fmtFlag,
                       unsigned long fmtArg, unsigned long *actSize);
```

drvNum	Contains the driver number of the drive to format.
fmtFlag	Contains a boolean value which specifies the meaning of the fmtArg parameter.
fmtArg	If fmtFlag is true, fmtArg specifies the actual value to be passed to the disk driver in the csParam field of the parameter block when the "format" _Control call is made to initialize the disk media. (The value is an index into the size list. For an explanation of appropriate values for this parameter, see the Technical Note "What Your Sony Drives For You".) If fmtFlag is false, fmtArg specifies the desired size of the media in number of 512-byte blocks. The disk driver is called to get possible sizes and the values in an to attempt to match the requested size. If more than one size list entry exists for the same size, the first entry in the list returned by the driver that best matches the fmtArg parameter will be used. For more information about the size list, see the Technical Note "What Your Sony Drives For You". If the specified size is larger than the largest size in the size list returned by the driver, then the largest size will be used and that size is returned in actSize. If the specified size is smaller than the smallest size in the size list returned by the driver, then the smallest size will be used and that size is returned in actSize. For a specified value that is in between and without an exact match, the value closest to and smaller than the requested size is used.
actSize	Contains a pointer to an unsigned long. Upon completion of a successful formatting operation, DIXFormat places the actual size of the formatted media in number of 512-byte blocks into the field referred to by this parameter.

The formatting of file systems requiring specific media formats should be done by specifying those media formats explicitly and not by counting on disk size alone. Foreign file systems with specific media requirements should use the driver specific information in the size list or should make appropriate driver `_Status` calls for additional information when called upon to "evaluate the size list".

As in `DIFormat`, `DIXFormat` does not unmount the volume. You have to unmount the volume before issuing this call if necessary. If the volume has not been unmounted, then `DIXFormat` will return `volOnLinErr` error.

Result Codes

`noErr`	0	No error
`volOnLinErr`	&endash55	Volume is online
`lastDskErr...firstDskErr`	&endash64...-84	Range of low-level disk errors

`DIXZero`

The `DIXZero` function performs the same function as the `DIZero` function except that the file system, format result, volume type, volume size and extended formatting information may be specified.

```
pascal OSErr DIXZero(short drvNum, ConstStr255Param volName,
                     short fsid, short mediaStatus,
                     short volTypeSelector, unsigned long volSize,
                     void *extendedInfoPtr);
```

`drvNum`	Contains the driver number of the drive to initialize.
`volName`	Contains a pointer to a Pascal string which specifies the name of the volume.
`fsid`	Contains the ID of the file system whose format should be written to the disk. The file system ID can be obtained using the File System Manager `GetFSInfo` function.
`mediaStatus`	Contains a flag to indicate the status of the disk media. Its value is the result code returned from the `DIVerify` function. If `mediaStatus` is non-zero, then the disk contains bad sectors and needs to be spared. If the file system specified doesn't support bad block sparing, the Disk Initialization Package will just return this value as the function result. If the file system supports bad block sparing, then the Disk Initialization Package will gather the defect list and pass it to the file system.
`volTypeSelector`	Contains the volume type selector if the foreign file system supports more than one volume type.
`volSize`	Contains the size in 512-byte blocks of the drive specified by `drvNum`. This is the size returned in the `actSize` field by `DIXFormat`--the amount of space usable by a file system on the specified drive as it is currently formatted. If the specified size doesn't match with the current disk format size, `DIXZero` will return `diCIVolSizeMismatchErr`.
`fsParams`	Contains a pointer to the foreign file system's extended formatting information, or nil.

Warning:

Early versions of the DIXZero code calls the Dialog Manager with a nil DialogPtr when the value passed in the mediaStatus parameter is not noErr. This will almost always cause a system crash. You must check to ensure DIXZero supports bad block sparing before passing anything except noErr as the mediaStatus parameter. The following function, DIXZeroSupportsBadBlocks, shows how to make sure DIXZero supports bad block sparing.

```
Boolean  DIXZeroSupportsBadBlocks(void)
{
   enum
   {
      gestaltBugFixAttrsThree = 'bugx',
      gestaltDIXZeroSupportsBadBlocks = 9
   };
   long response;

   if (Gestalt(gestaltBugFixAttrsThree , &response) == noErr)
      return ((response & (1L << gestaltDIXZeroSupportsBadBlocks))
              != 0);
   else
      return (false);
}
```

As in DIZero, DIXZero does not unmount the volume but it will, however, mount the volume if the operation is successful. You have to unmount the volume before issuing this call if necessary. If the volume is mounted when DIZero or DIXZero is called, then a volOnLinErr error will be returned.

Result Codes

noErr	0	No error
diCIVolSizeMismatchErr	24	Specified volume size doesn't match with formatted disk size
ioErr	&endash36	I/O error
paramErr	-50	Drive number specified is bad
volOnLinErr	-55	Volume is already online
nsDrvErr	-56	No such drive
firstDskErr...lastDskErr	-84...-64	Range of low-level disk errors
memFullErr	-108	Not enough memory

DIReformat

The DIReformat function reformats disk volume.

```
pascal OSErr DIReformat(short drvNum, short fsid,
                        ConstStr255Param volName,
                        ConstStr255Param msgText);
```

drvNum	Contains the driver number of the drive to format.
fsid	Contains the ID of the file system whose format should be written to the disk. The file system ID can be obtained using the File System Manager GetFSInfo function. (Use $0000 for the Macintosh HFS volume format.)
volName	Contains a pointer to a Pascal string which specifies the name of the volume.
msgText	Contains a pointer to a Pascal string which specifies the explanatory text to be displayed in the disk initialization dialog box.

In the past, reformatting disk was accomplished by calling the DIBadMount function with the high word of the evtMessage parameter set to noErr and the explanatory text was set with the ParamText function. The DIReformat function provides the caller the ability to provide the explanatory text, the default file system ID, and the default name for the reformatted disk.

Note:
The volume in the drive specified by drvNum must be mounted when calling DIReformat.

Result Codes

noErr	0	No error
diCINoMessageTextErr	28	msgText was not provided
ioErr	&endash36	I/O error
paramErr	-50	Drive number specified is bad
nsDrvErr	-56	No such drive
firstDskErr...lastDskErr	-84...-64	Range of low-level disk errors
memFullErr	-108	Not enough memory

Formatting HFS and HFS Plus Volumes

The Disk Initialization Package provides several ways a program can initialize a disk drive for use by a file system. If the drive is not a mounted file system volume, a program can call DIBadMount and let the Disk Initialization Package provide the user interface with the disk initialization dialog box (see The Extended Disk Initialization User Interface). If the drive is already formatted and mounted by the file system, a program can call DIReformat and let the Disk Initialization Package provide the user interface with the Reformat dialog box. If a program wants to initialize or reinitialize a volume's data structures with no user interface, if can use either DIZero or DIXZero. DIZero always formats the disk as an HFS volume. If you want to initialize a disk as an HFS Plus volume, or initialize a disk for use by a foreign file system, you must use DIXZero. The rest of topic describes how to initialize a disk as an HFS or HFS Plus volume using DIXZero.

The fsid parameter tells DIXZero which file system to use to initialize a volume. For both HFS and HFS Plus volumes, pass $0000 (the file system ID of the local file system) as the fsid parameter.

The volTypeSelector parameter is used to select between different volume types supported by a single file system. Pass 1 as the volTypeSelector parameter to create an HFS volume; pass 2 as the

`volTypeSelector` parameter to create an HFS Plus volume.

The `extendedInfoPtr` parameter is a pointer to an optional structure that adjusts how the volume is formatted. When formatting an HFS volume, this should point to a structure of type `HFSDefaults`; for an HFS Plus volume, this should point to a structure of type `HFSPlusDefaults`. Passing NIL as the `extendedInfoPtr` parameter will cause the file system's default values to be used.

`HFSDefaults`

```
struct HFSDefaults {
  char   sigWord[2];  /* signature word */
  long   abSize;      /* allocation block size in bytes */
  long   clpSize;     /* clump size in bytes */
  long   nxFreeFN;    /* next free file number */
  long   btClpSize;   /* B-Tree clump size in bytes */
  short  rsrv1;       /* reserved */
  short  rsrv2;       /* reserved */
  short  rsrv3;       /* reserved */
};
typedef struct HFSDefaults HFSDefaults;
```

The `HFSDefaults` structure allows you to change several of the parameters used when formatting an HFS volume. For each of the fields, a value of zero or an invalid value indicates that the default value should be used.

Set `sigWord` to the bytes `$4244` ('BD').

The `abSize` field sets the volume's allocation block size. This value must be a multiple of 512 bytes. The default and minimum value is the smallest multiple of 512 bytes greater than or equal to the volume size (in bytes) divided by 65535 (`$FFFF`).

The `clpSize` field sets the volume's default clump size. This value is used when allocating space to extend a file; the allocated space is rounded up to a multiple of the clump size if sufficient free space is available. The clump size should be a multiple of the allocation block size. The default value is 4 times the allocation block size if the allocation block size is 256K or less, or equal to the allocation block size for larger allocation blocks.

The `nxFreeFN` field sets the `drNxtCNID` field of the MDB. It is the starting value for catalog node IDs allocated to files and folders on that volume. This value is actually an unsigned 32-bit integer. The default and minimum value is `fsUsrCNID` (16), the minimum valid catalog node ID for user files and folders.

The `btClpSize` field sets both the clump size and initial space allocated to the catalog and extents B-trees. This clump size should be a multiple of the allocation block size. The default value varies by volume size, but is typically 1/128 of the volume size.

`HFSPlusDefaults`

```
enum {
  kHFSPlusDefaultsVersion = 1
};
```

```
struct HFSPlusDefaults {
  UInt16  version;             /* version of this structure */
  UInt16  flags;               /* currently undefined; pass zero */
  UInt32  blockSize;           /* allocation block size in bytes */
  UInt32  rsrcClumpSize;       /* clump size for resource forks */
  UInt32  dataClumpSize;       /* clump size for data forks */
  UInt32  nextFreeFileID;      /* next free file number */
  UInt32  catalogClumpSize;    /* clump size for catalog B-tree */
  UInt32  catalogNodeSize;     /* node size for catalog B-tree */
  UInt32  extentsClumpSize;    /* clump size for extents B-tree */
  UInt32  extentsNodeSize;     /* node size for extents B-tree */
  UInt32  attributesClumpSize; /* clump size for attributes B-tree */
  UInt32  attributesNodeSize;  /* node size for attributes B-tree */
  UInt32  allocationClumpSize; /* clump size for allocation bitmap
                                  file */
};
typedef struct HFSPlusDefaults HFSPlusDefaults;
```

The `HFSPlusDefaults` structure allows you to change several of the parameters used when formatting a Sequoia volume. For each of the fields, a value of zero or an invalid value indicates that the default value should be used.

The version field indicates the version of the `HFSPlusDefaults` structure you are passing. The current version is `kHFSPlusDefaultsVersion`. If the value passed is larger than that recognized by the current implementation, `paramErr` will be returned. Implementations will typically support older versions of `HFSPlusDefaults`.

The flags field is currently reserved. If you pass a value other than zero, `paramErr` will be returned.

The `blockSize` field sets the volume's allocation block size. Valid values are powers of two, and at least 512. The default value varies with the volumes size &endash 512 bytes for volumes 256 MB or smaller, up to 4KB for volumes over 1 GB. If the volume's device supports the `GetMediaInfo` control call, then the default size will be greater than or equal to the device's block size.

Note:
Future versions of the HFS Plus file system will be performance-optimized for 4KB allocation blocks, so the default should be used unless there's a really good reason to override it.

The `rsrcClumpSize` and `dataClumpSize` fields set the default values for clump sizes for resource and data forks, respectively. The value must be a multiple of the allocation block size. For both, the default value is four times the allocation block size.

The `nextFreeFileID` field sets the first catalog node ID to be assigned to newly created files and folders. The default and minimum value is `fsUsrCNID` (16), the minimum valid catalog node ID for user files and folders.

The `catalogClumpSize` and `extentsClumpSize` fields set the clump size and initially allocated space for the catalog and extents B-trees, respectively. For both, the default value varies by volume size, but is typically 1/128 of the volume size.

The `catalogNodeSize` and `extentsNodeSize` fields set the size of the B-tree nodes for the catalog and extents B-trees, respectively. Valid values are powers of two, up to and including 32,768 (32 K). The

extents B-trees, respectively. Valid values are powers of two, up to and including 32,768 (32 K). The minimum and default size for `catalogNodeSize` is 4 KB. The minimum size for `extentsNodeSize` is 512; the default is 1024.

Some Sample Code

This sample shows how to use `DIReformat` to reinitialize a disk using the standard interface. When `DIReformat` is available, this code can be used instead of the code shown in Listing 5-2 on page 5-11 of *Inside Macintosh: Files.*

```
// Reinitializing a valid disk using the standard interface
OSErr ReformatDisk(short drvNum, ConstStr255Param msgText)
{
  OSErr  result;
  Str255  volName;
  short  vRefNum;
  long  freeBytes;

  DILoad();
  // Get the current volume name
  result = GetVInfo(drvNum, volName, &vRefNum, &freeBytes);
  if ( result == noErr )
  {
    // Reformat using FSID $0000 (HFS or HFS Plus)
    result = DIReformat(drvNum, 0x0000, volName, msgText);
  }
  DIUnload();
  return ( result );
}
```

This sample shows how to use `DIXZero` to reinitialize a disk without using the standard interface. It uses `DIXZero` so that the volume can be initialized with HFS Plus if possible.

```
// Reinitializing a valid disk without using the standard interface
OSErr ReinitializeDisk(short drvNum, Boolean tryHFSPlus)
{
  OSErr  result;
  Str255  volName;
  short  vRefNum;
  long  freeBytes;
  short  mediaStatus;
  UInt32  actSize;

  DILoad();
  // Get the current volume name
  result = GetVInfo(drvNum, volName, &vRefNum, &freeBytes);
  if ( result == noErr )
  {
    // Unmount the volume
    result = UnmountVol(NULL, vRefNum);
    if ( result == noErr )
    {
      // Format the disk. (note: the actual disk size
      result = DIXFormat(drvNum, false, 0, &actSize);
      if ( result == noErr )
```

```
      if ( result == noErr )
      {
        // Verify the disk and use the result as the mediaStatus
        mediaStatus = (short)DIVerify(drvNum);

        // Should we try formatting HFS Plus?
        if ( tryHFSPlus )
        {
          // Yes, initialize using HFS Plus
          // (fsid = 0; volTypeSelector = 2)
          // The extendedInfoPtr is NULL so the default volume
          // characteristics are used.
         result = DIXZero(drvNum, volName, 0x0000, mediaStatus, 2,
                   actSize, NULL);
        }

        // If HFS Plus wasn't requested or the attempt with HFS Plus
        // failed because the disk was too small (paramErr)
        if ( !tryHFSPlus || (result == paramErr) )
        {
          // Initialize using HFS (fsid = 0; volTypeSelector = 1)
          // The extendedInfoPtr is NULL so the default volume
          // characteristics are used.
          result = DIXZero(drvNum, volName, 0x0000, mediaStatus, 1,
                   actSize, NULL);
        }
      }
    }
  }
  DIUnload();
  return ( result );
}
```

This sample shows how to use `DIXZero` to initialize a disk without using the standard interface. It uses `DIXZero` so that the volume can be initialized with HFS Plus if possible.

```
// Initializing an uninitialized disk without using the
// standard interface
OSErr InitializeDisk(short drvNum, ConstStr255Param volName,
                     Boolean tryHFSPlus)
{
  OSErr  result;
  short  mediaStatus;
  UInt32  actSize;

  DILoad();
  // Format the disk
  result = DIXFormat(drvNum, false, 0, &actSize);
  if ( result == noErr )
  {
    // Verify the disk and use the result as the mediaStatus
    mediaStatus = (short)DIVerify(drvNum);

    // Should we try formatting HFS Plus?
    if ( tryHFSPlus )
    {
```

```
    {
      // Yes, initialize using HFS Plus
      // (fsid = 0; volTypeSelector = 2)
      // The extendedInfoPtr is NULL so the default volume
      // characteristics are used.
      result = DIXZero(drvNum, volName, 0x0000, mediaStatus, 2,
               actSize, NULL);
    }

    // If HFS Plus wasn't requested or the attempt with HFS Plus
    // failed because the disk was too small (paramErr)
    if ( !tryHFSPlus || (result == paramErr) )
    {
      // Initialize using HFS (fsid = 0; volTypeSelector = 1)
      // The extendedInfoPtr is NULL so the default volume
      // characteristics are used.
      result = DIXZero(drvNum, volName, 0x0000, mediaStatus, 1,
               actSize, NULL);
    }
  }
  DIUnload();
  return ( result );
}
```

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Further References

- Inside Macintosh: Files
- Guide to the File System Manager

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Downloadables

 Acrobat version of this Note (how many K?)

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Change History

Overview

- Originally written in February 1995, as Technote 1041 -- Inside Macintosh: Files Errata by Jim Luther.
- In June 1995, this Technote was updated by Jim Luther to document more known errors and omissions.
- In February 1996, this Technote was updated by Jim Luther and Pete Gontier to document more known errors and omissions.
- In February 1999, this Technote was reformated and updated by Jim Luther to include additional

HFS+ information.

Specific

Chapter 1 - Introduction to File Management

- `FSpExchangeFiles` and `PBExchangeFiles`-- What is exchanged, February 1995
- Additional Considerations for `GetVInfo`, February 1995

Chapter 2 - File Manager

- Pathname rules are not fully explained, February 1995
- Missing Row in Table 2-10, February 1995
- Description of default directory upon launch wrong, February 1996
- Master Directory Blocks `drXTFlSize` and `drCTFlSize` field descriptions are wrong, February 1995
- Map records in map nodes occupy 492 bytes (not 494 bytes), February 1995
- Volume cache control bit in `vcbAtrb`, June 1995
- Volume Control Blocks `vcbXTAlBks` and `vcbCTAlBks` field descriptions are wrong,
- `dQDrvSiz` fields not used on 3.5" floppy disks, June 1995 February 1996
- Clarification of `ioFlAttrib` bits in `ParamBlockRec`, `HParamBlockRec`, and `CInfoPBRec`, June 1995
- `ioACUser` is `filler2` in some interface files, June 1995
- The `VolMountInfoHeader` data structure includes flags word, February 1995
- `ioPosMode` usage by `PBRead` and `PBWrite` requests, June 1995
- Additional Considerations for `GetVInfo`, February 1995
- Additional Special Considerations for `PBHGetVInfo`, February 1995
- `FSpGetFInfo` does not work with directories, February 1995
- `FSpSetFInfo` does not work with directories, February 1995
- `HOpenDF`, `PBHOpenDF` and the `paramErr` result code, February 1995
- Parameter blocks missing `ioFVersNum` field, February 1995
- Parameter blocks missing `ioMisc` field, February 1995
- `PBGetCatInfo` `ioFDirIndex` usage rules, February 1995
- Parameter blocks missing `ioNamePtr` field, February 1995
- `ioForeignPrivIDirID` is `LongInt` in `PBGetForeignPrivs` and `PBSetForeignPrivs`, February 1995
- Request execution order, February 1995
- Volume Parameter Variant offsets are off by 2, February 1995
- Detecting if a volume is formatted Macintosh File System (MFS), Hierarchical File System (HFS), or HFS Plus, February 1999
- `PBXGetVolInfo`, February 1999
- `PBGetXCatInfo`, February 1999

Chapter 3 - Standard File Package

- Activation Procedures Need to call `TECalText`, February 1995
- Default Standard File current directory, February 1995
- Listing 3-15 does not set `sfScript` field, February 1995

Chapter 4 - Alias Manager

- `ResolveAlias` updates minimal aliases, February 1995
- `usrCanceledErr` should be `userCanceledErr`, February 1995
- `kARMSearchMore` and memory available to `AliasFilterProc` warning, February 1995

Chapter 5 - Disk Initialization Manager

- Extended Disk Initialization Package, February 1995
- Extended Disk Initialization User Interface, February 1999
- Extended Low-Level Disk Initialization Routines, February 1999
- `DIXFormat`, February 1999
- `DIXZero`, February 1999
- `DIReformat`, February 1999
- Formatting HFS and HFS Plus Volumes, February 1999

Acknowledgments

Thanks to the usual suspects.

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