

Technical Note TN1090

Mac OS 7.6

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Mac OS 7.6 offers a number of important performance enhancements, including

- Virtual memory and memory management
- The File Manager's caching scheme
- The PowerPC Resource Manager routines

In addition to improvements in performance,

- The system's memory allocation scheme for some of its more frequently used shared libraries has been streamlined to take advantage of file mapping when virtual memory is turned on.
- New functionality in Extensions Manager, documented in [Technote 1091: Extensions Manager 4.0](#), which lets you add comments, version, and package information to your extensions.
- A new "umbrella" installer, which walks the user through a safer, saner installation process. This includes disk-integrity checking and fewer restarts.
- Support for volume sizes up to 2 terabytes on all PowerPC and 68040 models.

A number of important Apple technologies have also been integrated in Mac OS 7.6, including

- QuickTime 2.5
- OpenDoc 1.1.2
- Open Transport 1.1.1
- Cyberdog 1.2.1

Updated: [Jan 23 1997]

Hardware Requirements

Mac OS 7.6 can be installed on any Mac OS-compatible computer that is 32-bit clean and has at least a 68030 microprocessor. It cannot be installed, however, on machines that meet these requirements as a result of a hardware or software upgrade.

More specifically, Mac OS 7.6 cannot be installed on the following models: llcx, llx, PowerBook 100, Classic, II, LC, SE/30, Portable, Plus, SE, 512ke, 512, 128, and Mac XL. Also, current versions of Mode32 from Connectix do not allow Mac OS 7.6 to be installed on older Macintosh computers utilizing this extension for 32-bit compatibility.

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Installation

- Note that Mac OS 7.6 cannot be installed over System 6.

Install Mac OS 1.0

In addition to the usual collection of Installer scripts, there is now a new "umbrella" installer. This is called **Install Mac OS**, and it walks the user through a safer, saner installation process, including painless disk-integrity checking and fewer restarts.

Installer 4.0.6

This new version of Installer:

- Fixes some critical bugs.
- Provides a dialog box for a "clean" install, i.e., it lets the user choose whether or not to upgrade an existing System Folder, or install a new one.

In addition, the new version of the Installer supports several new AppleEvents for interoperation with Install Mac OS. Note: Currently, use of these AppleEvents is only supported for Apple products.

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Finder 7.5.6

The Finder provides a graphical interface for the user along with other AppleEvent-based services for applications utilizing the file system.

Finder 7.5.6 is the first step towards an OS-licensee-friendly Finder. Toward that end, the following changes have been made:

- The "About This Macintosh..." menu item has been replaced with "About This Computer...".
- In other places, occurrences of the word "Macintosh" have been replaced with the word "Mac OS".

The new Finder recognizes two new application file types: 'APPD' and 'APPC'. Both file types are used to store application code in the same way as normal applications; however, they have special meaning in the context of the Finder.

When a user drags a file of type 'APPC' to the System Folder, he or she is asked whether to have the file placed in the Control Panels folder just as users would be prompted for the old control panel files of type 'cdev'.

Files of type 'APPD' are auto-routed to the Apple Menu Items folder in the same way control panels are auto-routed to the Control Panels folder. APPD type applications are the new way to implement desk accessories, as the older DRVR method may not be supported in future system software releases.

Note:

Although both APPC and APPD files can be run in System 7.5.3 and 7.5.5, APPC's are not completely supported under system software releases prior to Mac OS 7.6 (see the Control Panels section below). Also, since users won't be able to launch application files of type 'APPD' and 'APPC' from the Finder under versions of the Mac OS prior to system 7.5.3, it is strongly recommended that developers include 'hfdv' -5696 balloon help resources in such files, so users can use Balloon Help to discover what they are for.

Some other changes to the Finder include:

- The ability to display a larger number of files in a single window.
- The Finder's Get Info window now displays correct values for volumes larger than 2 gigabytes.

- Sometimes, the PCMCIA card icons were not reappearing on PowerBook 540, 190, and 5300 models after waking up from Sleep state. This problem has been corrected.

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Inside the System File

The System file contains routines and resources responsible for running the computer. This section describes system features and corrections built into the System file. These items are always present under System 7.6, even when the shift key is held down at system startup.

General Features

Some of the system's more frequently used shared libraries have been moved from resources in the System file into the System file's data fork. This change allows the system to use file mapping on these libraries when virtual memory is turned on, thus allowing the space they occupy in memory to be used for other purposes when necessary. The benefits from this change are twofold:

- There is more memory available for applications and other services.
- For debugging purposes, when virtual memory is enabled, applications making calls that are illegal at interrupt time are more likely to cause bus errors, making it easier for developers to find problems in their software.

A problem in the interrupt dispatching code on PCI-based systems where it was possible for a level 4 interrupt handler to be called with interrupts masked only to level 3 has been corrected. This correction was previously provided by the PowerPC Interrupt Extension.

Assistant Toolbox 1.3

The Assistant Toolbox provides the user with assistance or warnings when the user attempts to do something that may cause internal system configuration conflicts. In some cases, the Assistant Toolbox performs actions automatically if no user intervention is required.

The Assistant Toolbox has been moved to the System file, so it cannot be disabled when the system starts up. If the Assistant Toolbox extension is present while Mac OS 7.6 is being installed, it will be removed.

In some cases, when returning from Sleep, the volume remounting code was attempting to remount volumes that had already been mounted. The Sleep mounting code now appropriately checks to see if a volume has already been mounted when returning from Sleep before attempting to remount it.

Code Fragment Manager

The Code Fragment Manager (CFM) is responsible for the retrieval of executable PowerPC instruction sequences on PowerPC computers. Almost all of the PowerPC Mac OS and all PowerPC applications depend on or utilize the services of the CFM in some way.

CFM's algorithm for finding shared libraries has been simplified. The last three stages of the searching strategy used by CFM, as described in *Inside Macintosh: PowerPC System Software 3-7* (the Extensions folder in the System Folder, the ROM registry, and then CFM's internal file and directory registry), have been combined into a single step. This change in search strategy ensures that the most recent version of an import library will be loaded by CFM when there are multiple versions of the same library present in the System file, the Extensions folder, the ROM, or all of the aforementioned.

See also *Inside Macintosh: PowerPC System Software 3-7* at <http://developer.apple.com/techpubs/mac/PPCSoftware/PPCSoftware-41.html>

Disk Initialization Package

The Disk Initialization Package provides formatting services for disk drives.

HFS does not support 720K diskettes. The dialog box informing the user that he or she cannot reformat a 720K DOS disk as a 720 HFS disk now draws correctly.

Display Manager

The Display Manager provides software services for managing changes in both the display settings and the arrangement of monitors attached to Mac OS-compatible computers.

DisplayLib has been moved to the data fork of the System file.

Drag Manager

Macintosh Drag and Drop provides standard communications and user interface services for applications and other parts of the system that are used when users "drag and drop" objects between locations.

DragLib has been moved to the System file's data fork.

File Manager

The File Manager provides services for storage and retrieval of disk-based information on Mac OS-compatible computers. Mac OS 7.6 includes several changes in the File Manager's implementation, providing improved performance and reliability. The following describes new features and facilities provided in the Mac OS 7.6 File Manager implementation:

Cache-Related:

- A task has been added to the File Manager's disk cache that periodically flushes dirty cache blocks to disk. With this change, data that should be written to disk will never be left in the cache for an extended period of time. The task runs once a second when there is no other disk activity. One file's dirty cached blocks are flushed each time the task runs. Cached volume blocks - files with file numbers less than 16 and cached blocks not associated with any files (such as the master directory block and the volume bitmap blocks on HFS volumes) - are flushed as a set.
- If extensions are disabled (i.e., the shift key is held down at startup), the new file system cache will be loaded, replacing the ROM cache, and its size will be temporarily set to 96K. Previously, when extensions were disabled, the ROM version of the disk cache would be used.
- Many high-performance disk drives and some disk drivers utilize a private write cache mechanism independent of the File Manager's cache to enhance performance. Because of this, it is possible that even though the file system has carried out appropriate writes to a disk driver when flushing a volume, some of the information may still reside in the disk drive's or disk driver's cache and can be lost in the event of a power failure. In response to this possibility, a disk driver that supports the `DriverGestalt 'flus'` selector is called with the `DriverConfig 'flus'` selector whenever that disk volume's cache is flushed in response to a File Manager `FlushVol` or `UnmountVol` request.

Other File Manager Changes:

- `FlushFile` was updating the reserved system area in the first block of resource forks on HFS volumes, which caused problems for certain third-party caching software and WORM disk drivers. That behavior has been removed for both compatibility with those software packages, and to improve HFS file system performance. The reserved system area in the first block of a resource fork is still updated when a resource fork is closed on an HFS volume.
- The File Manager supports volume sizes up to 2 terabytes on all Macintosh systems with an 68040 or PowerPC processor. Macintoshes with 68030 processors are still limited to 4 gigabyte volumes.
- To reduce the long boot times after an improper system shutdown, the mount-checking code for HFS volumes was rewritten. In some cases, it was taking up to 5 minutes to mount a drive. With the new mount check, the worst case time is on the order of seconds. However, a change was needed in the method used to detect volumes which must be checked.

The original mount check code (in ROM) uses the `vcbAtVOK` bit (bit 8) in the `drAtrb` field of an HFS volume's master directory block (MDB) to determine if a volume was unmounted correctly. The `vcbAtVOK` bit was cleared on disk when the volume was mounted and set on disk when the volume was unmounted correctly. If `vcbAtVOK` was clear when a volume was mounted (meaning the volume was not unmounted correctly), then the mount check code quickly checks for, and corrects if necessary, inconsistencies between the volume bitmap, the master directory block, and the catalog files.

The new mount check code uses the same mechanism to detect when a volume was not unmounted correctly. However, because the boot volume is mounted and would be checked by the original mount check code before the new mount check code can be loaded from the System file, a new volume attribute `kBootVolumeInconsistent` (bit 11) has been introduced. When the boot volume is mounted, the `kBootVolumeInconsistent` bit is set and the `vcbAtVOK` bit is set in the MDB. When the boot volume is unmounted, `kBootVolumeInconsistent` bit is cleared. After the new mount check routine is loaded, the first thing it does is check the boot disk to see if the `kBootVolumeInconsistent` bit is set and if so, it checks for, and corrects if necessary, any inconsistencies found.

Table 1 illustrates how the new mount check code uses the `vcbAtVOK` and `kBootVolumeInconsistent` bits on both boot and non-boot volumes.

Table 1. Mount check codes for boot and non-boot volumes

Boot Volumes			
Interpretation:	unmounted OK	unmounted bad	mounted
<code>vcbAtVOK</code>	1	0	0
<code>kBootVolumeInconsistent</code>	0	1	1
Non-boot Volumes			
<code>vcbAtVOK</code>	1	0	0
<code>kBootVolumeInconsistent</code>	n/a	n/a	n/a

Note:

Copies of Disk First Aid earlier than version 7.2.3 assume that `kBootVolumeInconsistent` is reserved and should be zero and incorrectly report the volume as damaged when it is probably not damaged and instead was only unmounted incorrectly.

- `PBCatSearch` usage of the File Manager cache has been changed, so that it can now search a volume's catalog up to four times faster (when compared to System 7.5.3).
- The Mac OS file system uses the `EqualString` (now `CmpString`), `RelString`, and `UprString` routines for file name searching and comparison. In every call to these routines, the File Manager sets the `diacSens` parameter to TRUE, so that diacritical marks are significant in comparisons. However, `PBCatSearch` was setting the `diacSens` parameter to FALSE, in some cases leading to inconsistent behavior relative to the rest of the File Manager's routines. `PBCatSearch` now always sets the `diacSens` parameter to TRUE for all comparisons.

Font Manager

The Font Manager provides services for retrieval of glyphs used in the display of textual information on Mac OS-compatible computers. There is one correction in the Font Manager:

Previously, calls to `RealFont` would release and reload the current '`sfnt`' resource, possibly invalidating the Font Manager's cache, since parts of the cache depend on the handle not changing. This problem was only apparent in multi-byte character systems.

Memory Management

Memory management includes the Memory Manager, virtual memory and other operating system services. The following changes to memory management have been implemented:

- On PowerPC computers, the Modern Memory Manager is always active and the classic 68K Memory Manager is not available.
- System 7.6 only supports 32-bit addressing. 24-bit addressing is no longer supported. If the computer's Parameter RAM (PRAM) settings indicate that the machine is in 24-bit mode at system startup, the PRAM is set to 32-bit addressing and the computer is restarted.

- Since 24-bit mode is no longer supported, most checks for 24-bit mode and calls to `SwapMMU` have been removed from the virtual memory routines, thus reducing the calling overhead.
- Virtual memory page fault execution times have been shortened by removing 24-bit runtime code.
- The Modern Memory Manager on PowerPC computers now communicates directly with the Virtual Memory Manager to greatly reduce page fault disk accesses to the VM backing store file.
- Allocating and deallocating temporary memory is much faster.

Menu Manager

The Menu Manager is responsible for drawing the menu bar and drawing menus and pop-up menus on the screen while the mouse is being held down. The following changes have been implemented:

- The system MDEF=0 was calling `GetMaxDevice` specifying a boundary in local coordinates of the current GrafPort rather than in global screen coordinates. Normally, on multiple monitor systems, this means menus would be drawn according to the features of the main screen, rather than the screen containing the menu. However, by specifying the boundary passed to `GetMaxDevice` in local coordinates of the current GrafPort, it was possible for `GetMaxDevice` to return NULL, the one case the MDEF=0 did not handle correctly. The new MDEF=0 passes the global coordinates to `GetMaxDevice` and handles the NULL result correctly.
- It was possible for calls to `CalcMenuSize` to call through to an MDEF with `ResLoad` set to FALSE. In the event that the MDEF attempted to access resources that were not already in memory by calling `GetResource`, empty handles would be returned to the MDEF, which may not have been what the MDEF expected. `CalcMenuSize` has been corrected, so `ResLoad` is set to TRUE before the MDEF is called.
- A problem in the Standard MDEF where color icons drawn in popup menus were not appearing on some monitors has been corrected.
- The Menu Manager normally saves the image under a menu in an off-screen buffer before drawing the menu, so it can be restored immediately after the menu is removed from the screen. For menus drawn outside of the screen's visible area, there is no image under the menu to save and the off-screen buffer is not created. But, in such cases, the routine's epilogue mistakenly assumed that the off-screen buffer was created and attempted to reclaim the memory it would have occupied. This would cause a system crash when the mouse was released after tracking a pop-up menu that was drawn completely outside of the screen's boundary. This possibility has been removed and the routine's epilogue no longer attempts to dispose of the nonexistent buffer in such cases.
- A problem where the MDEF was calculating the size of icons appearing in the Apple Menu incorrectly has been corrected.

PictWhap FKEY

FKEYs are code resources in the System file which are invoked by command-shift-number key sequences, where the number is the ID of the resource. For example, FKEY=3 is invoked by typing the number 3 while the command and shift keys are held down. It captures the contents of all screens into a PICT file in the root directory of the startup disk.

- PictWhap is a new FKEY=4 for capturing screen shots as PICT files. When invoked via command-shift-4, PictWhap presents the user with a small crosshair cursor to allow the user to select a rectangular area of the screen to capture as a PICT file. When invoked via Command-Shift-4 while the caps lock key is down, it presents the user with a bullseye cursor. When the user clicks on a window, its contents are saved as a PICT file. If the control key is held down, the image is captured to the Clipboard instead of a PICT file.
- The Screenshot FKEY=3, Command-Shift-3, has been revised so that when the control key is held down, it will capture contents of all screens to the Clipboard instead of a PICT file.

Process Manager

The Process Manager shares the processor among multiple applications. Some corrections to problems found in the Process Manager have been provided in Mac OS 7.6 as follows:

- A visual anomaly of launching applications from the Finder where the Finder's menus would reappear briefly has

been corrected.

- When `ExitToShell` was called, the CFM termination routines for code fragments were being called after the Process Manager had changed the A5 world to something else. This placed those code fragments calling the Toolbox in their termination routines into an indeterminate state usually resulting in a system crash. Now, the CFM termination routines are called before the A5 world is changed by the Process Manager.
- The High Level Event size limitation of 64K per High Level Event has been removed. This means that High Level Events and AppleEvents can now contain more than 64K of data. AppleScript already provided this ability, but it is now available for all clients even if AppleScript is not installed, or an application is using High Level Events directly.

NOTE: It is still the application's responsibility to check for low-or out-of-memory conditions before sending events, and to properly check for out-of-memory errors after calls to `AESend` or `PostHighLevelEvent`.

- "Fake" keystrokes generated by the Text Services Manager (TSM) are now passed through the JGNEFilter chain.
- Process Manager routines has been simplified, providing better throughput of High Level Events and AppleEvents.

Resource Manager

The Resource Manager is used for storage and retrieval of information stored in the resource fork of many Mac OS files. Almost all programs make use of the Resource Manager.

The PowerPC Resource Manager has been improved in the following ways:

- The Resource Manager has been moved into the data fork of the System file to allow for file mapping when virtual memory is turned on.
- Routines have been simplified to reduce execution time. This does not mean there will be a drastic improvement in Resource Manager execution speed; however, since many parts of the operating system utilize the Resource Manager services, there is an overall improvement in system performance.
- A resource size cache has been added to retain information about frequently accessed resources in memory. This does not mean a major performance gain for all application resources in general; however, performance improvements are noticeable for some system resources (such as color tables), which are accessed repeatedly by the system and applications.
- The Resource Manager "knows" to flush the Font Manager's cache when sfnt's are released by calling `ReleaseResource`. Parts of the Font Manager's cache depend on the font handle for the active sfnt not changing when it could be changed by a call to `RealFont`.
- Calls to `HOpenResFile` failing with some result other than `opWrErr` (-49, File already open with write permission) would leave 40 bytes of handle data floating on the heap. Note: Some developers may not have noticed this problem when running with debuggers that patch low-level Resource Manager vectors and later fall through to the 68K Resource Manager (which does not contain this bug).

The 68K Resource Manager has been improved in the following ways:

- A `GetResource` patch was calling `FlushCodeCacheRange` on every call. This has been corrected, so `FlushCodeCacheRange` is called only when necessary.

Script Manager 7.5

The Script Manager provides facilities for display and retrieval of number, date, time, and other information in a language-independent way.

- The routine `StringToExtended` has been updated to provide better error checking for strings that do not match the format string.

- The routines `StringToFormatRec` and `StringToExtended` are now installed in a way that avoids unnecessary mixed mode switches when they are called.
- An error in `StringToFormatRec` where a unpredictable memory location was being modified by the routine has been corrected.

SCSI Manager (PowerPC)

The PowerPC SCSI Manager is responsible for communicating with connected SCSI devices on PowerPC computers.

On some systems with the Power Macintosh Card 1.0 installed, a SCSI Manager hang could occur during periods of high network activity. This problem occurred because the SCSI Manager was only polling for interrupts when the interrupt level was 2 or higher, leaving a SCSI Manager deferred task pending. Now, to correct this problem, the SCSI Manager polls for interrupts when the interrupt level is set to 1 or higher on those machines.

Sound Manager 3.2.1

The Sound Manager provides services for playing and recording sounds on Mac OS computers. The new Sound Manager is built into the System file. If there is a Sound Manager extension in the Extensions folder when Mac OS 7.6 is being installed, it will be removed.

- `SPBSetDeviceInfo`, when passed the `siVoxRecordInfo` selector, now starts recording even if the trigger value is 255. (See also *Inside Macintosh: Sound* at <http://developer.apple.com/techpubs/mac/Sound/Sound-149.html>, p. 3-25.)
- On some models, code maintaining the volume control buttons on the front of the machine was calling `SetSoundVol` at interrupt time, which could lead to a system crash. Previously, installing the Video Startup system extension would correct this problem, and it has been corrected in Mac OS 7.6.
- `SPBGetDeviceInfo`, when passed the `siStereoInputGain` selector, now correctly returns two 16-bit (8.8) fixed point numbers on PCI-based machines. Previously, this call would attempt to return two 32-bit (16.16) fixed point numbers, trashing the stack.
- The `siVoxStopInfo` selector used with `SPBGetDeviceInfo` was returning incorrect values on some PCI-based machines (e.g., Power Macintosh 7500, 8100, and 8500 computers) running system 7.5.2 or 7.5.3. This problem has been corrected and `siVoxStopInfo` now returns the correct values on those machines.

Standard File

Standard File provides a consistent user interface for accessing files by way of the Open and Save As dialog boxes.

A problem where `CustomPutFile` would crash when an additional `editText` item was added to the dialog has been corrected.

StdCLib 3.4.3

StdCLib is a shared library located in the ROM on all PowerPC-based Macintosh computers that provides functionality for programs compiled using the C language. Mac OS 7.6 includes a new version of this library that replaces the ROM library, providing many corrections and improvements. Previous updated versions of the StdCLib shared library were available in the StdCLibnit extension, which is no longer needed and will not install itself during the Mac OS 7.6 startup sequence. The new StdCLib shared library now resides in the data fork of the System file.

Most of the features and corrections provided by the StdCLib 3.4.3 have to do with the handling of invalid parameters, so applications calling the routines with correct parameters may not have noticed any problems.

The following changes have been implemented:

- macros `LDBL_EPSILON`, `LDBL_MAX`, and `LDBL_MIN` defined in `<float.h>` (corresponding to entry points `"_LDBL_EPSILON"`, `"_LDBL_MAX"`, and `"_LDBL_MIN"`) are now correct for the PowerPC. The versions contained in the ROM-based StdCLib were not valid.

- The number of files that can be simultaneously open using the StdIO routines `fopen()`, `fdopen()`, and `freopen()` has been increased from 20 to 40 files (the value of `_NFILE` in `<stdio.h>`).
- `strftime()` now conforms to the ANSI standard recognizing an uppercase `%P` rather than a lowercase `%p` for the AM/PM format character.
- `setvbuf()` now returns `USHRT_MAX` if too large a buffer is requested. The `setbuf()` function never allocates a buffer larger than 65535 bytes.
- `fread()` performance has been improved on unbuffered streams.
- The `sscanf()` function's `%n` option was corrected to return the correct number of characters when the matching item goes to the end of the string (with no spaces following the item).
- The `PLstrpbrk()` function was updated to handle empty strings correctly.
- The `bsearch(key, base, nmemb, size, compar)` function was corrected so it no longer hangs when the value of `nmemb` is zero.
- The `strncpy()` function no longer copies 65K characters when called with `n = 0`.
- The creator and type for files of type TEXT is set to SimpleText. And, in particular, the creator and type for the output files "stdout" and "stderr" are now 'ttxt' and 'TEXT', respectively.
- `fopen` now sets `errno` `EACCESS` when an attempt to open a locked file with write permission ("w") is made when file sharing is turned on. This problem only occurred when file sharing was turned on--the `afpAccessDenied` (-5000) result code was being ignored.
- `strlen()` now returns zero when the NULL pointer is passed as a parameter. Previous versions read data from location zero.
- `strtol(const char *nptr, char **endptr, int base)` was corrected to comply with the ANSI standard in cases where no conversion is performed. The ANSI standard says: "If the subject sequence is empty, does not have the expected form, no conversion is performed; the value of `nptr` is stored in the object pointed to by `endptr`, provided that `endptr` is not a null pointer." (page 153) `nptr` is now correctly copied to the object pointed to by `endptr` when no conversion occurs.
- The `strcmp()` and `strncmp()` functions have been updated to use unsigned comparisons.
- `PLpos()` has been corrected to return zero instead of one when passed two empty strings as arguments.
- `PLstrcat()` now handles the case where the destination string already contains the maximum number of characters correctly.
- `PLstrchr()` has been corrected to handle the case where the target string is empty.
- `fclose()` now sets `errno` to `ENOENT` when passed a closed file descriptor.
- `fcntl(F_DUPFD)` calls now set `errno` to `EBADF` rather than `EINVAL` when bad file descriptors are passed in.
- A problem related to parsing long path names containing embedded folder aliases has been corrected.
- `strncat()` will now copy no characters from the source string if the `n` parameter is zero. Previously, it would copy up to `LONG_MAX` characters from the source to the destination if the `n` parameter was zero.
- The routine `mbtowc()` now returns -1 when the number of characters to examine is zero.

Known problems and limitations:

- The character inquiry routines `isalpha()`, `isupper()`, `islower()`, `isdigit()`, `isalnum()`, `isspace()`, and `isprint()` will only

function correctly for 7-bit characters and the value EOF. They do not support the Macintosh extended character set.

- If `abort()` is called, routines registered with `atexit()` and C++ destructors are still called even though they shouldn't be.
- `malloc()` is limited to about 8 megabytes per call. If more than 8 megabytes are requested, NULL will be returned.
- Reading past the end of a file using `fread()` does not cause an appropriate error to be reported in the global variable `errno` or by the function `ferror()`, although `fread()` does correctly return the number of bytes actually read.
- An attempt to `raise()` an invalid signal does not report an error.
- An attempt to install a signal handler for an invalid signal does not cause `signal()` to report an error.

System Error Alert

The System Error Alert box is displayed as a last ditch attempt to inform the user that a serious, often unrecoverable, system error has occurred. In some cases, because of how certain low-memory structures were arranged when the alert was invoked, the alert was not being displayed correctly.

The System Error Alert was causing a system error and calling itself repeatedly when certain low-memory font structures were not yet initialized. The net effect was the appearance of a continually flashing error alert box on the screen. The system now makes greater effort to ensure these structures are set up correctly at all times, especially during the system startup sequence and during the launching of applications.

QuickDraw

QuickDraw is used for drawing and displaying information on the screen. MacOS 7.6 provides the following corrections in QuickDraw:

- A problem in the 68K implementation of `MakeTable` with color tables containing exactly three entries has been corrected.
- The PowerPC implementation of `GetGWorldPixMap` has been updated, so its behavior is consistent with the 68K implementation. `GetGWorldPixMap` would return NULL if the high order bits of the `rowBytes` field were cleared.
- NOTE: This change was made so `GetGWorldPixMap` works the same on both PowerPC and 68K. Developers modifying the `rowBytes` field in `Pixmap` structures should ensure that the high order bits of `rowBytes` are set correctly as in the following:

```

    /* SetPixMapRowBytes sets the rowbytes
OSErr SetPixMapRowBytes(
    PixMapHandle pixmap,
    unsigned short newRowBytes) {
    /* rowbytes must be even and less than 0x4000.
    for best performance, it should be a multiple of 4. */
    if (newRowBytes >= 0x4000 || (newRowBytes % 2) != 0) {
        return paramErr;
    } else {
        (**pixmap).rowBytes = (newRowBytes | 0x8000);
        return noErr;
    }
}

```

- A problem in the Palette Manager where a division by zero error occurred when calculating the best matching color on a direct device has been corrected. This would only happen in calls to `SetDragImage()` when at least two monitors were attached to the system with one monitor in direct mode and another in indexed mode. This is a problem related to both the 68K and the PowerPC implementation of the Palette Manager, although it could only happen during a Translucent drag.
- The memory allocation strategy used by `GetPictInfo` could cause the routine to hang if insufficient memory was available to allocate at least one scan-line of a pixel map. `GetPictInfo` has been corrected to return a `memFullErr` when there is insufficient memory for it to run.

Power Manager

The Power Manager provides facilities for controlling power to the internal hardware devices in battery-powered Mac OS-compatible computers.

PowerMgrLib has been moved to the data fork of the System file.

Telephone Manager

The Telephone Manager works in conjunction with the Communications Toolbox to provide telephone services for the Mac OS, such as ISDN connectivity.

TelephoneLib 3.0 now resides in the System file's data fork.

Thread Manager

The Thread Manager provides multi-programming services for use within application programs.

ThreadsLib 2.1.3 has been moved to the data fork of the System file.

Window Manager

The Window Manager provides facilities for drawing and maintaining windows on the screen.

It was possible for `GrayRgn` to be allocated in the current heap zone the first time `InitWindows` was called, making it possible for the `GrayRgn` to be allocated in the application heap zone by an extension during the system startup sequence. In this case, the region handle would be destroyed after the startup sequence had completed, leaving `GrayRgn` undefined. `InitWindows` now takes care to allocate the `GrayRgn` in the system heap zone only once, the first time it is called. This problem may have occurred in conjunction with extensions displaying windows at system startup.

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Apple Menu Items

Apple System Profiler 1.1.2

Apple System Profiler provides a convenient and easy-to-use interface for information about the current system configuration. Its primary purpose is to act as an aid for telephone-based support representatives in providing user assistance.

Apple System Profiler 1.1 has been promoted from the Apple Extras folder to the Apple Menu Items folder.

Apple System Profiler is not installed on 68030 machines.

Stickies 1.0.2

The memory partition size for Stickies has been increased to 150K, which corrects some out-of-memory problems found in 1.0.1.

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Control Panels

Control panels are typically located in the Control Panels folder inside of the System Folder. Some control panels contain executable resources of type 'INIT' that the system runs at system startup time, so the control panel can install its facilities in the system.

At system startup time during the extension execution sequence, 'INIT' resources residing inside of 'APPC' type files are executed. Although APPC files are auto-routed by the Finder to the Control Panels folder in System 7.5 and later versions of the system software, they cannot be launched using the Finder in system software releases prior to Mac OS 7.5.3, and INIT resources residing in these files are not executed in system software releases prior to Mac OS 7.6.

Auto Power On/Off 1.1

The Auto Power On/Off Control Panel no longer executes a synchronous PPC Toolbox call in its patch to `SetDateTime`. This was rendering `SetDateTime` unsafe to call at interrupt time even though it was documented as being safe. This change affects most desktop models from the Macintosh Quadra 840av forward.

ColorSync 2.1.1

ColorSync is a color management system that enables the graphics system, applications, and color devices to present the most accurate and consistent colors to users.

Key new features in 2.1 include Named Color System support, hifi color support, embedding profile by reference, and expanded bitmap formats.

Extensions Manager 4.0

The new Extensions Manager control panel provides an enhanced user interface with facilities for developers to provide descriptive information for extensions and to group related extensions together in packages.

See [Technote 1091: Extensions Manager 4.0](#) for further details.

See also:

- *Inside Macintosh: Macintosh Toolbox Essentials* (7-38), Providing Balloon Help for non-document icons at <http://developer.apple.com/dev/techsupport/insidemac/Toolbox/Toolbox-458.html>

Mac OS Easy Open 1.1.3

Mac OS Easy Open provides translation services for users opening documents in one application that have been created by other applications. MacLinkPlus 8.1, bundled with Mac OS 7.6, provides many different translators that can be used with

Mac OS Easy Open.

Macintosh Easy Open has been renamed and is now called Mac OS Easy Open.

Map 7.5.1

This new Map control panel adds Cork and Munich to the cities database.

Memory 7.5.7

The new Memory control panel attempts to prevent the user from setting the combination of RAM disk, VM and disk cache to levels which do not leave the system enough memory to perform subsequent boots. Along with the user configuration safety checks, the Memory control panel includes the following changes:

- The Modern Memory Manager control is no longer displayed. On PowerPC computers, the Modern Memory Manager is always on.
- The "Use 24 Bit Addressing" control is no longer displayed. 24-bit addressing is no longer available.
- Table 2 explains virtual memory settings provided by the installer and the Defaults button in the Memory control panel.

Table 2. Virtual memory settings

Architecture	Physical RAM	
	16 MB or more	less than 16 MB
68K	preserve the current setting	turn VM on and set to 16 MB
PowerPC	physical RAM + 1 MB	turn VM on and set to 16 MB

- A memory leak in the Memory control panel's Defaults button-handling routine has been corrected.
- The minimum disk cache setting is now 96K.

Monitors 7.6.6

The Monitors control panel provides user interface services for configuring and adjusting various settings for monitors attached to the computer. Some corrections in the new Monitors control panel are as follows:

- On some Macintosh computers, a problem would occur when two attached monitors were configured at different numbers of color (Thousands and 256). This problem has been corrected.
- The Monitors control panel was not saving the configuration settings for all attached monitors on systems with more than one monitor attached. This has been corrected.

QuickTime Settings

The QuickTime 2.5 installation provides a new control panel allowing you to configure various QuickTime parameters. See the QuickTime 2.5 Release notes for more information.

Startup Disk 7.5.3

The Startup Disk control panel provides a user interface for choosing the disk that will be used to run the computer the next time it starts up.

- This new version sets the PRAM values properly on the Quadra 660av and Quadra 840av. Previously, on these machines, the system would ignore whatever the user set in the Startup Disk control panel and fall back to the default startup disk selection.
- Multiple disks with the same name but different custom color icons now display correctly. Previously, the

incorrect icon would be displayed for all identically named disks but one.

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Control Strip Modules

Control Strip modules reside in the Control Strip Modules folder inside the System Folder. Any Control Strip modules appropriate for the hardware configuration will appear in the control strip when it is active.

CD Strip 1.0

This new control strip module interfaces with the CD drive.

Printer Selector 2.0

Allows you to select from multiple desktop printers if Desktop Printing is installed.

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System Extensions

System extensions are located in the Extensions folder inside the System Folder.

An error in earlier versions of System 7.5 allows invisible extensions to be executed at startup time. This has been corrected and invisible extensions are no longer executed at startup time.

Apple CD-ROM 5.3.1

The SCSI CD-ROM driver contains some enhancements for support of new Apple products and corrects problems found in previous versions of the driver:

- Adds generic support for 6x and beyond SCSI CD-ROM drives.
- Corrects some incompatibility problems with some third-party drives.
- Corrects a problem that could occur when pausing an Audio CD during playback.
- The `GetSpindleSpeed` driver control call now returns 0xFF when the relative speed of the CD-ROM drive is unknown (indicating the fastest speed--1x on single-speed-only drives; 2x and greater on drives which support greater than single speed).
- Corrects a problem where the sleep timer would never expire and the drive would never be put to sleep.
- The internal driver cache is now flushed whenever a read error occurs.
- The driver now checks for pending asynchronous calls with interrupts disabled when returning from synchronous calls correcting a problem that could occur when sharing a CD over a network.
- Corrects a problem where the CD-ROM could go to sleep while playing an Audio CD

Apple Guide 2.1.1

Apple Guide provides system wide help services for users. For more information, check http://www.macos.apple.com/Apple_Guide/.

This release adds support for multi-process guide files, so AppleGuide can be used in conjunction with OpenDoc documents.

Apple Remote Access Client 2.1

The Apple Remote Access Client allows users to dial in and connect to AppleTalk networks from remote locations.

The Mac OS 7.6 installation ships with Apple Remote Access Client 2.1.

IMPORTANT:

ARA Client 2.1 must not be installed over the Open Transport/PPP installation included with Mac OS 7.6. Installing the ARA Client 2.1 will replace the Open Transport/PPP Modem Files, which can cause connection problems for Open Transport/PPP. However, although it is not safe to install the ARA Client 2.1 after you have installed Open Transport/PPP, it is perfectly safe to install Open Transport/PPP after installing the ARA Client 2.1.

Apple Script 1.1

AppleScript provides a scripting interface for users to automate actions that would normally require use of the mouse and keyboard. AppleScript 1.1 is installed with MacOS 7.6. More information can be found at the AppleScript ftp site at

[/cgi-bin/ftpchooser.pl?partialURL=Development_Kits/AppleScript](http://cgi-bin/ftpchooser.pl?partialURL=Development_Kits/AppleScript).

AppleShare Workstation Client 3.6.4

AppleShare Workstation Client provides file sharing services for the Finder and applications on Mac OS-compatible computers networked with file servers.

- The AppleShare client driver was installing a VBL task redundantly, which caused a loop in the VBL queue and could orphan some entries. The symptoms were an intermittent freeze on any machine or a crash on one of the slower 68K machines. This has been corrected.
- AppleShare was incorrectly allocating temporary memory for its caches. In some cases, this was responsible for the incorrect disposal of handles. AppleShare 3.6.4 now allocates temporary memory for its caches correctly, and this problem no longer occurs.

Desktop Printing 2.0.2

Desktop Printing provides a simplified user interface for accessing printing services provided by Mac OS.

OpenDoc 1.1.2

OpenDoc is Mac OS's implementation of the OpenDoc open, multiplatform architecture for component software. For more information, see <http://opendoc.apple.com/dev/dev.html>

OpenDoc Essentials 1.0.1

This includes an assortment of parts and editors for use in OpenDoc.

Open Transport 1.1.1

OpenTransport 1.1.1 is the only supported networking technology for Mac OS 7.6. Several additions to the programming interfaces along with corrections in the implementation are provided with this release. Interested developers should consult the OpenTransport release notes and Developer notes, or check <http://developer.apple.com/dev/opentransport/>.

OpenTransport 1.1.1 provides corrections in the following areas:

- General OpenTransport functionality
- Backward-compatibility for the original AppleTalk API
- Backward-compatibility for the original TCP/IP API
- AppleTalk
- TCP/IP

- Links

Classic networking APIs are emulated under OpenTransport.

Open Transport 1.1.1 is installed with Mac OS 7.6.

IMPORTANT:

Although it is possible to run the Network Software Installer 1.5.1 and end up with classic networking enabled on machines which did support it in previous releases, this option is not recommended, since it places the operating system in an undefined and unsupported state.

Although it is still possible to use the Network Software Selector from System 7.5.3 to switch a 68K computer to classic networking, this option is not recommended, since it places the operating system in an undefined and unsupported state.

Open Transport/PPP 1.0

Open Transport/PPP provides Point to Point Protocol connection services for users dialing in and connecting to the internet. For more information, check <http://developer.apple.com/dev/opentransport/ppp.html>.

QuickTime 2.5

QuickTime provides various multimedia services for the Mac OS, including the ability to display movies and facilities for the translation and display of various audio and visual data file formats. For more information, check <http://quicktime.apple.com/>.

QuickTime has been enhanced in several areas, providing more features for both developers and end users. QuickTime 2.5 supports the following new key features:

- Enhancements to the QuickTime Music Architecture
- Better quality movie playback
- Support for more types of hardware accelerated video decompression.
- Support for multiple processors
- Rendering of QuickDraw 3D images
- Support for closed-captioned text into a text track
- Enhanced text import/export descriptors
- Support for low data rate audio capture
- Graphics mode and modifier track support for Sprites
- CODEC API extensions to support reliable video field extraction
- Enhanced Alpha channel support
- New native component manager dispatching mechanism
- Improved video/sound synchronization
- Asynchronous JPEG display
- CD Auto start for audio CD's

Interested developers should consult the QuickTime 2.5 Developers Guide.

QuickDraw 3D 1.0.6

QuickDraw 3D provides 3D drawing services for the Mac OS. For more information, check <http://quickdraw3d.apple.com/>.

QuickDraw GX 1.1.5

QuickDraw GX provides imaging, printing, and typography services for the Mac OS. QuickDraw GX 1.1.5 supports the following changes:

- Quickdraw GX 1.1.5 is compatible with ColorSync 2.x.
- ColorSync is no longer installed with the GX installer, since it is now installed with the system.
- Corrects a network-related PAP problem that could cause crashes on PCI-based computers.
- Corrects a PostScript problem where the machine could hang when used with certain third-party spoolers.

Known Problems:

- Specific bug fixes in QuickDraw GX 1.1.4dx are not present in QuickDraw GX 1.1.5. Users of QuickDraw GX 1.1.4dx may wish to continue using that version if they are dependent on those bug fixes. Future versions of QuickDraw GX will include these bug fixes. See the QuickDraw GX 1.1.4dx and the GX 1.1.5 Release notes for further information.

For more information, check <http://support.info.apple.com/gx/gx.html>.

Speech Manager 1.5

The Speech Manager provides services for the translation of text into speech. For more information, check <http://speech.apple.com/speech/dev/dev.html>.

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Apple Extras

Cyberdog 1.2.1

Cyberdog is an application and a set of OpenDoc components which provide access to Internet and Intranet services including the World Wide Web, e-mail, file servers and more. Updated software developer packages and documents describing Cyberdog features available to developers are available at <http://Cyberdog.apple.com/developer.html>.

Disk First Aid 7.2.3

As mentioned above in the File Manager section, the system now sets a previously reserved bit in the drAtrb field of the boot volume's MDB while that volume is mounted. Disk First Aid 7.2.2 and earlier assume this bit should be set to zero and report boot volumes that have been mounted by the new File Manager as damaged when in fact they are not. Disk First Aid 7.2.3 is aware of the system's use of this bit and does not report volumes mounted by Mac OS 7.6 as damaged.

Drive Setup 1.2.2

Drive Setup provides low-level disk formatting services and driver updates for Apple hard disks connected to Mac OS-compatible computers.

Drive Setup 1.0.4 fixes a problem where three SCSI drives were marked as able to disconnect/reconnect when they could not. This would lead to random system hangs.

Drive Setup 1.2.2 includes a patch correcting a problem that could cause a hang on PowerPC models employing a MESH SCSI controller.

MacsBug 6.5.4

MacsBug is a low-level debugger providing disassembly and memory inspection services for programmers. MacsBug is not included with the Mac OS 7.6 installation package; however, developers should be aware that on some Mac OS-compatible computers this new version of MacsBug is needed.

Note:

On PCI-based computers running MacOS 7.6, MacsBug 6.5.4 (or later) is required; prior versions of MacsBug may not function correctly on these machines.

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Items No Longer Supported

Classic Networking

Support for classic networking has been removed from the system. Neither MacTCP nor classic AppleTalk are included in the installation. These features and facilities are now emulated by OpenTransport, so older applications should still function correctly.

PowerTalk

PowerTalk is neither installed nor supported. If the PowerTalk extensions are present in the System Folder at system startup, they will not be loaded. If the PowerTalk extensions are found during installation, they are removed.

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