

MODE32 is provided free of charge courtesy of Apple Computer through a special distribution agreement with Connectix Corporation. It will enable Macintosh II, IIx, IIcx and SE/30 computers to use standard System 7 32-bit addressing. It is not functional on other types of computers. Please read the licensing section before installation and use.

If you have questions about this software please call Apple Customer Assistance (800/776-2333) in the United States, or your local Apple office outside the US.

MODE32 is licensed for your use at no charge on any Macintosh II, IIx, IIcx or SE/30 computer. You may freely copy and distribute this software. Connectix also offers a full range of commercial memory enhancement and productivity utilities including HAND-Off II, MAXIMA, Virtual and OPTIMA which are licensed for single user, single system use and may not be freely distributed. For more information on these and other Connectix products, please call 800/950-5880, international 415/571-5100, fax 415/571-5195, or AppleLink "CONNECTIX".

Summary Description

MODE32 is the utility for Mac II, IIx, IIcx, and SE/30 users who would like to use System 7 32-bit mode to access more than 8 contiguous megabytes of real or virtual application memory. It is especially useful for pre-press, image processing, desktop publishing, animation, CAD, scanning, other memory-intensive applications, or use of large numbers of applications.

MODE32 enables the use of the standard 32-bit addressing mode of System 7.0. This new mode allows direct access to up to 128 megabytes of standard RAM or up to one gigabyte of virtual memory, eliminating the traditional "eight megabyte barrier." 32-bit addressing would normally not be possible on the SE/30, II, IIx, and IIcx systems because of the software built into their ROMs. Those ROMs are only compatible with the less powerful 24-bit addressing mode which was standard in System 6.0. By extending the compatibility of the ROMs to the new 32-bit mode, MODE32 provides full System 7.0 32-bit functionality to these earlier machines.

Some applications and INITs are not "32-bit clean," that is, they are incompatible with 32-bit mode. Such software will usually cause your system to crash immediately when run in 32-bit mode. When you need to work with any non 32-bit clean INITs or applications we recommend using MAXIMA. MAXIMA extends addressing of your physical memory to 14 megabytes without resorting to 32-bit addressing, so it is compatible with essentially all applications.

Installation

MODE32 is simple to install. Just drop MODE32 in your System 7 Control Panels folder. Next, open the Control Panels folder and double-click the MODE32 icon. Click the "Enabled" radio button inside the MODE32 Control Panel and close this window. MODE32 is now fully installed,

but your machine is still set to start up in 24-bit mode. From now on, whenever you wish to switch memory modes from 24- to 32- or back again, use the Memory control panel (which is a standard part of Apple's System software, also in the Control Panels folder). You will see a new pair of radio buttons that let you turn on or off the new 32-bit mode. To change into 32-bit mode, click the "On" button and Restart. Please remember that when you are running in 32-bit mode, all of the INITs, cdevs, and application software you use must be 32-bit clean.

Quick Tips

- After you install MODE32, remove all the Startup, Control Panel, and Chooser documents (INITs, cdevs and rdevs) that you are not sure are 32-bit clean and Restart your system before you switch into 32-bit mode. You can then go back and add ones in question one by one.
- If you have a problem with a particular INIT or application, make sure that you have the most recent version. Many software products that were originally not 32-bit clean are being re-released in a 32-bit compatible version. Contact the publisher for compatibility details.
- If you wish to temporarily disable MODE32 hold down the ESC key (the upper left key on your keyboard) during boot. Your system will automatically launch in 24-bit mode. The 32-Bit Addressing portion of the memory control panel will still be "On," so your system will automatically return to 32-bit mode after the next reboot.
- MODE32 will only work on Mac-II family systems with non 32-bit clean ROMs (II, IIx, IIcx, or SE/30). It is not needed on Macintoshes with 32-bit clean ROMs (IIci, IIsi, IIfx, LC, etc.) and it will not work on systems that have early ROM designs (128, 512, Plus, SE, Classic, Portable, etc.)
- MODE32 only works with System 7.0 and later. If you want to use 32-bit addressing mode with System 6.0 you will need to use the Connectix product, OPTIMA™.
- Do not forget to Restart your system after you change your addressing mode.

Choosing Between 24-Bit and 32-Bit Modes

Even though your system now has a powerful 32-bit mode, you may still wish to use 24-bit mode from time to time because of its more complete compatibility. Which mode you should use depends on how much memory you need.

32-bit Mode:

The System 7.0 implementation of 32-bit mode allows up to one gigabyte (1024 megabytes) of directly addressable memory. However, the motherboards of the modular Macintosh systems are not wired to accept more than 128 megabytes of standard RAM. So you can access up to 128MB of physical memory or 1 gigabyte of virtual memory in 32-bit mode.

You should be aware that 32-bit mode is only compatible with "32-bit clean" applications so you may not want to use it unless you need a lot of memory. It will only take one incompatible INIT or application to crash the system in 32-bit mode.

"32-bit addressing mode" means that all 32 bits of each address generated by the processor are interpreted by the Macintosh to be part of the address. It is often confused with 32-bit

Color QuickDraw and 24-bit color video monitors, neither one of which is at all related to memory addressing modes. The 32-bit mode on your system will function in the same manner as the standard 32-bit mode on the Ilci, Ilsi, Ilfx and LC.

24-bit Mode:

The standard 24-bit mode allows you to access up to eight megabytes of physical RAM or up to 13 megabytes of virtual memory. The advantage of 24-bit addressing mode is that it is compatible with the full range of Macintosh software, whereas only “32-bit clean” applications and INITs will run in the more powerful 32-bit mode. So, whenever your memory requirements can be adequately served by 24-bit mode, the increased compatibility of this mode may make it easier to use.

By adding MAXIMA or Virtual to your system you can access 14 megabytes of physical or virtual application memory, respectively, in 24-bit mode. However, any of this memory over eight megabytes will be fragmented, with the result that no single application can use all 13 or 14 megabytes. (In 32-bit mode, all of the memory up to one gigabyte is contiguous so that each application can access all the application memory.) Generally, if eight (or 14) megabytes of application memory is sufficient for your needs, you should consider using 24-bit mode because of its superior compatibility.

How to Change Memory Addressing Modes

Once you have installed MODE32 you can select 32-bit mode exactly the same way you would on the latest Macintosh systems. Open the standard System 7 “Memory” control panel (under the Apple menu) and click the “On” button in the 32-Bit Addressing portion. (This portion of the panel will only appear if you are using MODE32.) Then Restart your system. You can switch back to 24-bit mode at any time by following the same procedure, clicking the “Off” button instead of the “On” button.

Which Software is 32-Bit Clean?

The current versions of most applications are already 32-bit clean and many more clean versions will be released as System 7 becomes more widely used. However, there are enough incompatible products in use that you may still have to do some work to get your own system ready for 32-bit mode.

Start by running Apple’s System 7 Compatibility Checker to see what you are using that may cause a problem. Eliminate anything it identifies as not 32-bit (or System 7) compatible. Then, temporarily strip your system down to the bare essentials, putting the non-critical INITs in a Temporarily Disabled folder, or by turning them off with a 32-bit clean INIT chooser. It is much faster to start with a minimal set of INITs and add things one-by-one than it is to try everything and then eliminate the ones that don’t work. (One of the best ways to do this is to start with a fresh System Folder in a 32-bit environment and add Startup, Control Panel and Chooser documents a few at a time.) Reboot and check the functionality of the software by exercising it a little, then add back a few more items.

If you get a crash or can't boot when you try to Startup in 32-bit mode, don't panic. Just reboot, holding down the ESC key (to temporarily switch to 24-bit mode) and start looking for the incompatible software. If you crashed while the INITs were loading, remember the last one that posted an icon to the DeskTop. The next one in alphabetical sequence is the most likely culprit. If you were running an application, don't use or even launch it for a while and get the rest of the system running smoothly. Then go back to that application and confirm that it was the problem.

When you identify a product as non-32-bit compatible check to see if you have the current version. If not, contact the vendor as you may be entitled to a free or inexpensive upgrade. If they do not have a 32-bit clean version yet, find out if and when they plan to release one.

Even the NuBus and Process Direct Slot (PDS) cards in your machine must be running code which is 32-bit clean. Some NuBus cards have code that gets executed when the machine starts. These problems will exist even with a clean System Folder when you are in 32-bit mode. If you believe that you may have a incompatible NuBus or PDS card, try using a different card with the same functionality (eg. another video card), test the suspect card in a 32-bit clean system (Ilic, Ilsi, IIfx, and LC), or contact the manufacturer.

Special SIMMs for Mac II and Mac Ix

You can take advantage of 32-bit mode by using large amounts of virtual memory, lots of physical RAM, or both. Although you do not need 4MB SIMMs to enjoy some of the benefits of 32-bit mode you may want to add them now that you can use them.

Standard 4MB SIMMs will work properly on the SE/30 and IICx. But if you decide to add 4MB SIMMs to your Mac II or Mac Ix you should be aware that special SIMMs are required for compatibility with these two systems whether or not you use MODE32. The special design incorporates the usual eight 4-megabit DRAM chips as well as a 9th PAL (Programmable Array Logic) chip or other, similar logic chips. These chips are needed to overcome problems caused by the refresh logic on the Mac II and Ix. These two systems were designed before 4MB SIMMs became available and turned out not to be compatible with the final standard design of 4MB SIMMs. (Do not confuse these special SIMMs with the somewhat similar 9-chip "parity" SIMMs used for government and other applications, where the 9th chip is also DRAM. Parity SIMMs will not overcome the memory problem.) Many vendors now offer compatible SIMMs for the Mac II and Ix at roughly the same price as standard SIMMs. Be sure to specify what Mac you use when you buy 4 (or 16) MB SIMMs.

A second issue relates only to the original Mac II. A RAM test conflict at boot time prevents the Bank A SIMM slots from using SIMMs larger than 1MB each. Moreover, Bank A must be filled with 256K or 1MB SIMMs before any RAM can be put into Bank B. So, the most common Mac II high-memory configuration is four 1-megabyte SIMMs in Bank A and four 4MB SIMMs in Bank B (for a total of 20MB), but the reverse configuration, four 4MB in A and four 1MB in B will not work. Also, you must have a PMMU installed in your Mac II in order to take advantage of this extended memory recognition feature of MODE32, and to take advantage of the virtual

memory features of System 7. This issue of putting the larger SIMMs in Bank B does not apply to the Mac IIX, and is also eliminated on the original Mac II with the HDFD Superdrive/ROM upgrade.

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Other Memory Management Products

Connectix offers a full line of memory management products for the entire range of Macintosh systems. For more information, please call us at 800/950-5880 (international 415/571-5100), fax 415/571-5195, AppleLink "CONNECTIX" or on the CompuServe Macintosh Forum (GO "MACAVEN").

MC73 PMMU

The original Mac II requires this Motorola 68851 Paged Memory Management Unit, (PMMU) in order to run System 7.0 VM, Connectix Virtual, or Connectix MAXIMA, unless the Mac II has been upgraded with a 68030 or 68040 processor. The original 68020-based Mac II incorporates a motherboard socket specifically designed for this memory coprocessor. MC73 includes the current (Mask 73) version of the processor, a grounding strap, and a detailed installation manual. The MC73 is not strictly required on a Mac II to run MODE32, but with or without MODE32, the MC73 will be required on a Mac II to access more than 8MB of real or virtual memory in any addressing mode.

MAXIMA 2.0

The standard 24-bit mode of System 7.0 is limited to addressing 8 megabytes of physical RAM. For systems that contain more than 8 megabytes of physical RAM, MAXIMA is software that extends 24-bit mode memory access to as much as 14 megabytes of application memory. MAXIMA is compatible with 4, 8, or 16 megabyte SIMMs. Any installed RAM beyond 14 megabytes is used by MAXIMA to create a sophisticated RAM disk. MAXIMA can also create a RAM disk in 32-bit mode. To use MAXIMA on a Mac II you must also install MC73.

MODE32 and MAXIMA have been designed to make the transition between 24-bit MAXIMA features and standard 32-bit mode as simple as possible. You may accomplish the switch just by using the memory control panel device without accessing MAXIMA. To set this up, install MAXIMA, enable its Memory Extension feature, and, if you like, set up the RAM disks. Then Restart and install MODE32. Now, when you switch to 24-bit mode using the standard memory control panel, the 24-bit features of MAXIMA will automatically be enabled. Conversely, when you switch back to 32-bit mode, MAXIMA will create the 32-bit RAM disk (if you have selected this option in the MAXIMA control panel.)

Virtual 3.0

Connectix introduced virtual memory to the Macintosh in January, 1989 with Virtual 1.0. Today's Version 3.0 offers similar features to System 7.0 VM but is optimized to provide exceptional speed, especially in certain high virtual memory situations. It can also provide virtual memory using substantially less hard drive space than VM in many cases. Virtual 3.0 is also available in versions that will run on 68030- and 68040- accelerated Macintosh systems (on which System 7 VM will not run.)

OPTIMA

OPTIMA is an INIT which allows Macintosh systems to operate in 32-bit mode under System 6.0. OPTIMA/32 is the version that allow access to up to 32 MB of contiguous application memory, while OPTIMA/128 extends this range to 128MB. OPTIMA is not compatible with MultiFinder or System 7, and requires 32-bit clean applications under the same restrictions as MODE32. OPTIMA is compatible with Mac II, IIx, IIcx, SE/30, IIci, IIsi, IIfx, and LC.