

Mac II

Eight SIMM sockets in two banks of four each. 120ns SIMMs or faster. Special “PAL” SIMMs required when using 4, 8, or 16MB SIMMs. Special motherboard socket for PMMU. Virtual memory with PMMU, limited 32-bit addressing with MODE32 and PMMU. Can be upgraded to IIx (see “Mac IIx”).

Standard Memory: Uses 256K and 1MB SIMMs. Memory configurations from 1 to 8 megabytes are achieved following the usual rule for Modular Macs: each bank of 4 sockets must be either completely filled with 4 SIMMs of the same size, or left completely empty. Bank A must always be filled.

Virtual Memory: The Mac II is equipped with a Motorola 68020 CPU (not the 68030 of the more recent systems). Because of this it needs a memory coprocessor to run virtual memory—the Motorola MC68851RC16A Paged Memory Management Unit (PMMU). The PMMU allows use of System 7 VM, A/UX, MODE32, Virtual, and MAXIMA on the Mac II. It does not otherwise affect performance and should not be confused with the Motorola 68882 math coprocessor, designed to accelerate mathematical computation. In 24-bit mode the Mac II can address up to 13MB of VM, and in 32-bit mode (MODE32 required), it can address up to 1024MB. Where performance is critical, or hard drive space is limited, we recommend Virtual 3.0.

High Memory: Up to 68MB can be installed, but it is a little complicated. Three distinct issues all limit Mac II memory configurations over 8MB:

1)The Mac II ROMs are not compatible with 32-bit addressing. Extra software must be added in order to access more than 8 megabytes. Under System 7, the best solution is usually MODE32, which overcomes this limitation by enabling standard 32-bit addressing (see “Using Large Amounts of Memory”). 32-bit addressing is also available under System 6 by using OPTIMA (although OPTIMA is not compatible with MultiFinder). In either System 6 or 7, MAXIMA can be used to enhance the 24-bit addressing mode, allowing up to 14MB to be addressed. MODE32, MAXIMA, and OPTIMA all require a PMMU on the Mac II.

2)Special SIMMs are required on the Mac II. The special design incorporates the usual eight 4-megabit DRAM chips as well as a PAL or equivalent logic chip. A logic chip is needed to overcome problems caused by the refresh logic on the Mac II (and IIx). 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 IIx, though they do cost a little more than standard SIMMs. Be sure to specify what Mac you use when you buy 4, 8, or 16 MB SIMMs. These special SIMMs are also compatible with the Classic II, IIcx, IIci, IIsi, SE/30 and Quadras (but not the

IIx), although they are not required on these systems. (The same problem applies to the unusual 1MB SIMMs built from 2 4–megabit DRAM chips, so you should use the much more common 8 1–megabit chip 1MB SIMMs on the Mac II and IIx.)

3) On a standard Mac II, Bank A cannot use SIMMs larger than 1MB. Four, 8, and 16MB SIMMs must only be put in Bank B. Also, Bank A must be filled with SIMMs of 1MB or less if Bank B is to be used. Bank A is the set of four sockets to the right as you face the front of the Macintosh. This is a problem unique to the Mac II, and is caused by problems in the Mac II ROMs which is not overcome by adding MODE32 or MAXIMA. However, you can fix this one problem by installing the HDFD SuperDrive upgrade kit, which includes a set of Mac IIx ROMs. As a result of this limitation the largest memory configuration available on unmodified Mac IIs using 1MB and 4MB SIMMs is 20MB: four 1MB SIMMs in Bank A and four 4MB SIMMs in Bank B. When Mac IIx ROMs are added, the maximum amount of memory the computer will support is 128MB, using eight 16MB SIMMs. To get 68MB, put four 1MB SIMMs in Bank A and four 16MB SIMMs in Bank B.

Mac IIx

Eight SIMM sockets in two banks of four each. 120ns SIMMs or faster. Special “PAL” SIMMs required for 4MB SIMMs or larger. Virtual memory, 32–bit addressing with MODE32. Can be upgraded to IIx (see “Mac IIx”).

Standard Memory: Uses (standard) 256K and 1MB SIMMs. Memory configurations from 1 to 8 megabytes are achieved following the usual rule for Modular Macs: each bank of 4 sockets must be either completely filled with 4 SIMMs of the same size, or left completely empty. Bank A must always be filled.

Virtual Memory: The 68030 CPU in the Mac IIx has a built–in Memory Management Unit. Therefore, the Mac IIx can run virtual memory without requiring any additional hardware. In 24–bit mode, the Mac IIx can address up to 13MB of VM, and in 32–bit mode (MODE32 required), it can address up to 1024MB. In situations where performance is critical, or hard drive space is limited, we recommend Virtual 3.0.

High Memory: Up to 128MB of physical RAM may be installed on a Mac IIx (eight 16MB SIMMs). A common high memory configuration is eight 4MB SIMMs for a total of 32MB. In System 7 MODE32 and/or MAXIMA software must be added. Under System 6 use MAXIMA or OPTIMA. Special SIMMs are always required for high memory:

1) The Mac IIx ROMs are not compatible with 32–bit addressing. Extra software must always be added in order to access more than 8 megabytes. Under System 7, the best solution is usually MODE32, which overcomes this limitation by enabling standard 32–bit addressing (see “Using Large Amounts of Memory”). 32–bit addressing is available under System 6 by using OPTIMA (OPTIMA is not compatible with MultiFinder). In System 6 or 7, MAXIMA can be used to enhance the 24–bit addressing mode, allowing up to 14MB to be addressed.

2)Special SIMMs are required on the Mac IIx. The special design incorporates the usual eight 4-megabit DRAM chips as well as a PAL or equivalent logic chip. A logic chip is needed to overcome problems caused by the refresh logic on the Mac IIx. The IIx was 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 IIx, though they do cost a little more than standard SIMMs. Be sure to specify what Mac you use when you buy 4, 8, or 16MB SIMMs. These special SIMMs are also compatible with the Classic II, IIcx, IIci, IIsi, SE/30 and Quadras (but not the IIfx), although they are not required on these systems. (The same problem applies to the unusual 1MB SIMMs built from 2 4-megabit DRAM chips, so you should use the much more common 8 1-megabit chip 1MB SIMMs on the Mac II and IIx.)

Mac IIcx

Eight SIMM sockets in two banks of four each. Standard 120ns SIMMs or faster. Virtual memory, 32-bit addressing with MODE32. Can be upgraded to IIci or Quadra 700 (see "IIci," and "Quadra 700").

Standard Memory: Uses 256K and 1MB SIMMs. Memory configurations from 1 to 8 megabytes are achieved following the usual rule for modular Macs: each bank of 4 sockets must be either completely filled with 4 SIMMs of the same size, or left completely empty. Bank A must always be filled.

Virtual Memory: The 68030 CPU in the Mac IIcx has a built-in Memory Management Unit. Therefore, the Mac IIcx can run virtual memory without requiring any additional hardware. In 24-bit mode, the IIcx can address up to 13MB of VM, and in 32-bit mode (MODE32 required), it can address up to 1024MB. In situations where performance is critical, or hard drive space is limited, we recommend Virtual 3.0.

High Memory: Up to 128MB of physical RAM may be installed on a Mac IIcx (eight 16MB SIMMs). A common high memory configuration is eight 4MB SIMMs for a total of 32MB. The Mac IIcx ROMs are not compatible with 32-bit addressing. Extra software must always be added in order to access more than 8 megabytes. Under System 7, the best solution is MODE32, which overcomes this limitation by enabling standard 32-bit addressing (see "Using Large Amounts of Memory"). 32-bit addressing is available under System 6 by using OPTIMA (although OPTIMA is not compatible with MultiFinder). In either System 6 or 7, MAXIMA can enhance the 24-bit addressing mode, allowing up to 14MB to be addressed.

Mac SE/30

Eight SIMM sockets in two banks of four each. Standard 120ns SIMMs or faster. Virtual memory, 32-bit addressing with MODE32.

Standard Memory: Uses 256K and 1MB SIMMs. Memory configurations from 1 to 8 megabytes are achieved following the usual rule for Modular Macs: each bank of 4 sockets must be either completely filled with 4 SIMMs of the same size, or left completely empty. Bank A must always be filled.

The SE/30 looks like a Compact Mac, but actually has memory architecture like the Modular Macs. With no additional software, up to 8MB of memory can be addressed in 24-bit mode on the SE/30, while only 4MB can be addressed using the Compact Macs. So, for example, if you put a total of 8MB of RAM (eight 1MB SIMMs) in an SE/30 running System 7 (with 32-bit addressing On or Off), you would get 8MB of application memory. (See "Using Large Amounts of Memory," and "More Than 4MB on Compact Macs")

Virtual Memory: The 68030 CPU in the SE/30 has a built-in Memory Management Unit. Therefore, the SE/30 can run virtual memory without requiring any additional hardware. In 24-bit mode, the SE/30 can address up to 13MB of VM, and in 32-bit mode (MODE32 required), it can address up to 1024MB.

Many SE/30 systems have 40MB hard drives. For these systems we recommend Virtual 3.0 because the DiskSaver option reduces the hard drive space required to run virtual memory by the amount of physical RAM installed.

High Memory: Up to 128MB of physical RAM may be installed on an SE/30 (eight 16MB SIMMs). A common high memory configuration is eight 4MB SIMMs for a total of 32MB. In System 7 MODE32 and/or MAXIMA software must be added to address more than 8MB, but standard SIMMs may be used. Under System 6, use MAXIMA or OPTIMA.

Mac IIsi

1MB soldered on. Four SIMM sockets in one bank. Standard 80ns SIMMs or faster. Virtual memory, 32-bit addressing.

Standard Memory: The bank may either be empty, or filled with four SIMMs, which must all be of the same size. Standard memory configurations of 1, 2, 3, or 5MB are therefore possible using no SIMMs, 256K, 512K or 1MB SIMMs in the bank. The IIsi and IIci are the only Macs that support 512K SIMMs.

Virtual Memory: The 68030 CPU in the Mac IIsi has a built-in Memory Management Unit. Therefore, the Mac IIsi can run virtual memory without requiring any additional hardware. In situations where performance is critical, or hard drive space is limited, we recommend Virtual 3.0.

On the IIsi, System 7 VM will only provide 12MB instead of the usual 13MB in 24-bit addressing mode. Connectix Virtual provides 14MB in 24-bit mode, as usual. In 32-bit mode either virtual memory manager can support up to 1024MB.

High Memory: Up to 65MB of physical RAM may be installed on a Mac IIsi (1MB soldered on the motherboard plus four 16MB SIMMs). A common configuration is 17MB (1MB built-in plus four 4MB SIMMs). The Mac IIsi has 32-bit compatible ROMs, so no additional software is required to address high memory in System 7. Under System 6, use MAXIMA or OPTIMA.

Mac IIvx, Performa 600

4MB soldered on. One bank of four SIMM sockets. Standard 80ns SIMMs or faster. Virtual memory, 32-bit addressing.

Standard Memory: The bank may either be empty, or filled with four SIMMs which must all be of the same size. Standard memory configurations of 4, 5, or 8MB are possible using no SIMMs, 256K, or 1MB SIMMs in the bank.

Virtual Memory: The 68030 CPU in the Mac IIvx and Performa 600 have a built-in Memory Management Unit. Therefore, they can run virtual memory without requiring any additional hardware. In 24-bit mode, the IIvx and Performa 600 can address up to 13MB of VM, and in 32-bit mode, it can address up to 1024MB. In situations where performance is critical, or hard drive space is limited, we recommend Virtual 3.0.

High Memory: Up to 68MB of physical RAM may be installed on a Mac IIvx and Performa 600 (4MB soldered on to the motherboard plus four 16MB SIMMs). Other common configurations are 16MB (4MB built in plus four 2MB SIMMs) or 20MB (4MB built in plus four 4MB SIMMs). They have 32-bit compatible ROMs, so no additional software is required to address high memory in System 7.

Video RAM: The IIvx has two VRAM banks of one slot each. In the standard configuration, one of the banks has 512K of 68-pin VRAM installed in it. This is enough to support 16-bit color on the 12" RGB monitor, or 8-bit color on the 13" or 14" color monitor. This can be expanded up to 1MB by putting another 512K VRAM SIMM in the second bank. This configuration will support 16-bit color on the 13" or 14" color monitor. The IIvx only supports 100ns 512K VRAM SIMMs.

Mac IIci

Eight SIMM sockets in two banks of four each. Standard 80ns SIMMs or faster. Optional add-on cache card (see "RAM Caches, Disks, and Drives"). Virtual memory, 32-bit addressing. Can be upgraded to Quadra 700 (see "Quadra 700").

Standard Memory: Uses 256K, 512K or 1 MB SIMMs. Memory configurations from 1 to 8MB are achieved following the usual rule for Modular Macs: each bank of 4 sockets must be either completely filled with 4 SIMMs of the same size, or left completely empty. Bank A must always be filled. The Ilci and Ilsi are the only Macs that support 512K SIMMs.

Virtual Memory: The 68030 CPU in the Mac Ilci have a built-in Memory Management Unit. Therefore, they can run virtual memory without requiring any additional hardware. In 24-bit mode, the Ilci can address up to 13MB of VM, and in 32-bit mode, it can address up to 1024MB. In situations where performance is critical, or hard drive space is limited, we recommend Virtual 3.0.

High Memory: Up to 128MB of physical RAM may be installed on a Mac Ilci(eight 16MB SIMMs). The Mac Ilci was the first Mac to contain 32-bit compatible ROMs, so no additional software is required to address high memory in System 7. Under System 6, use MAXIMA or OPTIMA.

A unique limitation occurs on the Mac Ilci. Bank A addresses are shared between the on-board video and SIMMs, so using 2, 4, 8, or 16MB SIMMs in Bank A can slow the Mac down a lot. Moreover, intermittent crashes can occur if 2, 4, 8, or 16MB SIMMs are put in Bank A, when on-board video is used. If you use on-board video, put the larger SIMMs in Bank B, and be sure to put some smaller SIMMs (1MB or less) in Bank A. If you do not use on-board video, follow the usual rule: put your largest RAM in Bank A.

Parity RAM: Some Ilci Macs are equipped with an optional PGC chip that supports a memory error detection system called parity checking. These are usually for government applications. They require special parity SIMMs with 9 RAM chips instead of the usual 8.

Mac Ilfx

Eight SIMM sockets in two banks of four each. Special Ilfx-compatible 80ns SIMMs or faster. SIMMs must all be of the same speed within a given bank. 256K SIMMs will not work. Virtual memory, 32-bit addressing.

Standard Memory: Uses only 1MB SIMMs. 256K and 512K SIMMs will not work. The Mac Ilfx requires faster RAM than the earlier Modular Mac systems. The SIMM sockets have 64 connectors instead of the usual 30, so standard SIMMs will not fit in a Ilfx. Memory configurations up to 8 megabytes are achieved following the usual rule for Modular Macs: each bank of 4 sockets must be either completely filled with 4 SIMMs of the same size, or left completely empty. Bank A must always be filled.

Virtual Memory: The 68030 CPU in the Mac Ilfx has a built-in Memory Management Unit. Therefore, the Mac Ilfx can run virtual memory without requiring any additional hardware. In 24-bit mode, the Ilfx can address up to 13MB of VM, and in 32-bit mode,

it can address up to 1024MB. In situations where performance is critical, or hard drive space is limited, we recommend Virtual 3.0.

High Memory: Up to 128MB of physical RAM may be installed on a Mac IIx (eight 16MB SIMMs). A common high memory configuration is eight 4MB SIMMs for a total of 32MB. The Mac IIx has 32-bit compatible ROMs, so no additional software is required to address high memory in System 7. Under System 6, use MAXIMA or OPTIMA.

Parity RAM: Some IIx Macs are equipped with an optional PGC chip that supports a memory error detection system called parity checking. These are usually for government applications. They require special 60ns parity SIMMs which have 9 RAM chips on them instead of the usual 8.