# Macintosh IIfx Logic Board Update

## Ordering Information

| | | |
|---|---|---|
| Macintosh IIfx Logic Board Upgrade | Order No. M0376LL/A | With your order, you'll receive:<br>· Macintosh IIfx Logic Board Upgrade<br>· Owner's guide<br>· System software and HyperCard software<br>· Limited warranty statement |
| Macintosh IIfx 4MB Memory Expansion Kit* | Order No. M0376LL/A | With your order, you'll receive:<br>· Macintosh IIfx 4MB Memory Expansion Kit |

*Dealer installation required.

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## System Requirements

To use the Macintosh IIfx Logic Board Upgrade, you'll need:

- A Macintosh II or IIX personal computer
- RAM from either the Apple Macintosh IIfx 4MB Memory Expansion Kit (M0376LL/A) or third-party memory expansion kits expressly made for the Macintosh IIfx personal computer.

The following chart shows the possible configurations and the upgrade required for each one.

| Starting configuration | Required upgrade | Upgraded configuration |
|---|---|---|
| · Macintosh II or IIX personal computer with 1, 2, or 4 megabytes of RAM | · Macintosh IIfx Logic Board Upgrade (M0375LL/A)<br>· Macintosh IIfx 4MB Memory Expansion Kit (M0376LL/A) | · Macintosh IIfx personal computer with 4 megabytes of RAM |
| · Macintosh II or IIX personal computer with 5 or 8 megabytes of RAM | · Macintosh IIfx Logic Board Upgrade (M0375LL/A)<br>Two Macintosh IIfx 4MB Memory Expansion Kits (M0376LL/A) | · Macintosh IIfx personal computer with 8 megabytes of RAM |

## Technical Specifications

Processor
- 68030, 32-bit architecture
- 40-megahertz clock speed
- Burst mode RAM access
- Two 256-byte, built-in instruction and data caches (Harvard architecture)

Coprocessor
- 68882 floating-point coprocessor (IEEE standard–80 bits precision)

Static RAM Cache
- Built-in zero-wait-state 32K Static RAM Cache memory architecture

DRAM
- 80-nanosecond, fast-page mode, 64-pin SIMMs
- 1-megabit DRAM (dynamic RAM) package
- 4- or 8-megabyte memory configurations

I/O processor (IOP) chips
- Two IOP chips are standard cell implementations of a 2-megahertz 6502. The IOP chips manage the floppy disk drive(s) (SWIM chip), the Apple Desktop Bus, and the serial ports (SCC chip).

SCSI/DMA controller
- Standard cell implementation of 53C80 SCSI chip and DMA control logic. The SCSI/DMA chip manages the SCSI bus.

Interfaces
- Six internal NuBus slots support full 32-bit address and data buses
- Processor Direct Slot (PDS) provides high-speed, 32-bit access to the system bus
- Two mini-8 serial (RS-232/RS-422) ports
- Two Apple Desktop Bus ports allow daisy-chaining of multiple peripheral devices
- SCSI interface uses a 50-pin internal connector and a DB-25 connector for the first external device; all subsequent SCSI-based peripherals use standard SCSI-to-SCSI interface cables
- Stereo sound jack

Sound generator
- Apple's custom digital sound chip provides 8-bit stereo sampling at 44.1 kilohertz, and includes four-voice wave-table synthesis–capable of driving stereo headphones or other stereo equipment through the sound jack.

Electrical requirements
- Line voltage: 100 to 240 volts AC, automatically configured
- Frequency: 48 to 62 hertz, single phase
- Maximum power: 230 watts, not including monitor power

# Product Details

Product Details

68030 Processor

· Full 32-bit 68030 microprocessor runs at 40 megahertz.
· The 32-bit address bus provides up to 4 gigabytes of data space.
· 256-byte, on-chip address and instruction caches provide high levels of performance.
· Built-in PMMU supports virtual, shared, and protected memory in operating systems that have been designed for it.
· Burst mode RAM access enables groups of instructions and data to be read in fewer clock cycles than are required in normal access mode.

68882 Math Coprocessor

· The 32-bit 68882 math coprocessor runs at 40 megahertz and accelerates the execution of complex math functions, including trigonometric and logarithmic series.

ROM

· A 512K ROM SIMM socket on the logic board provides an easy upgrade path to future versions of ROM SIMMs.

RAM

· A minimum of 4 megabytes and a maximum of 8 megabytes can be installed into a Macintosh IIfx Logic Board Upgrade.
· As denser, 4-megabit and 16-megabit RAM chips become available, RAM can be increased to 32 and 128 megabytes, respectively.
· The Macintosh IIfx Logic Board Upgrade uses 80-nanosecond RAM chips mounted on 64-pin SIMMs. These memory modules differ significally from those used in previsous Macintosh II computers. As a result, only Apple Macintosh IIfx Memory Expansion Kits or third-party memory expansion kits expressly made for the Macintosh IIfx personal computer may be used with the Macintosh IIfx Logic Board Upgrade.

NuBus Expansion Slots

· NuBus provides a multiplexed 32-bit address bus and data bus on a single 96-pin connector.
· NuBus is self-configuring. Cards can be plugged into any slot and the system will automatically identify and configure each card, without DIP switches or jumper wires.
· The NuBus architecture supports data transfer rates of up to 37.5 megabytes per second.

SCSI (Small Computer System Interface)

· SCSI is a high-performance interface bus used to connect hard disks and other SCSI-based devices, such as the Apple CD SC® CD-ROM drive and the Apple Scanner, to the Macintosh IIfx. Up to seven SCSI peripherals, including an internal hard disk, can be connected.
· The Macintosh IIfx SCSI subsystem is managed by a dedicated SCSI/DMA controller, which increases system efficiency.
· The SCSII/O subsystem can provide data transfer rates in excess of 3 megabytes per second.

Network Support

· The Macintosh IIfx provides full ROM support for all AppleTalk protocols, and includes built-in serial ports for LocalTalk network connections.

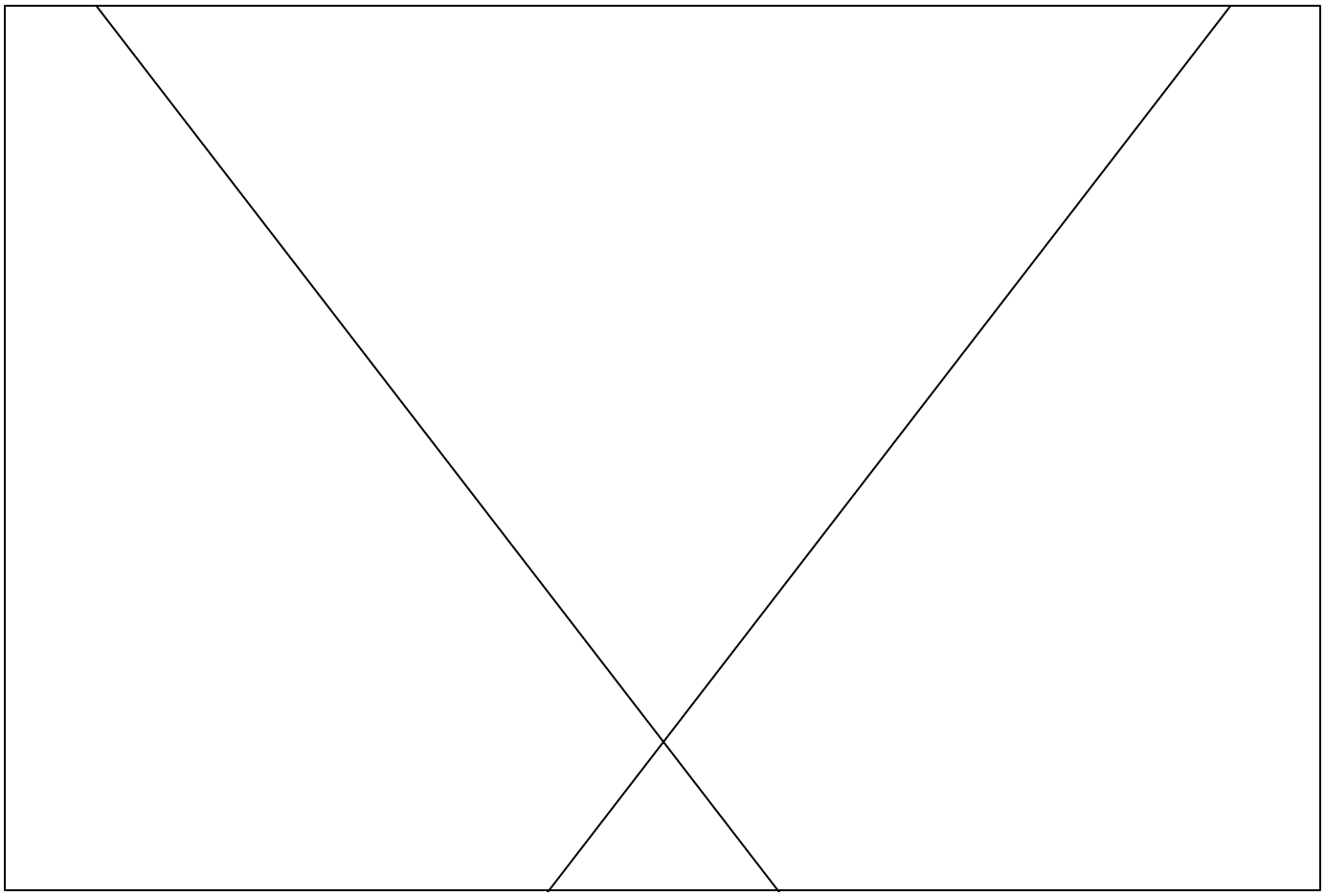
Operating System Support

· Macintosh system software includes:
–System Tools Version 6.0.5 or greater (the Macintosh operating system)
–Printer disk (printer drivers for all Apple printers)
–Utilities disks (include utilities such as the Apple File Exchange, HDSC Setup, CloseView, Disk First Aid™, and Font/DA Mover)
· HyperCard® Version 1.2.5 (or greater) is included.
· A/UX Version 2.0 (optional) is compatible with the Macintosh IIfx.

| Features | Benefits |
| --- | --- |
| · Full 32-bit 68030 microprocessor, running at 40 megahertz<br>–Built-in Paged Memory Management Unit (PMMU) | · Offers increased levels of performance and system responsiveness over other Macintosh II and Macintosh IIx systems.<br>· Supports multitasking operating systems such as A/UX®, Apple's implementation of the UNIX® operating system. |
| · 68882 floating-point math coprocessor, running at 40 megahertz | · Provides fast processing of complex mathematical functions while complying with IEEE 80-bit floating-point standards. |
| · Built-in zero-wait-state 32K Static RAM Cache | · Accelerates system performance. |
| · Two dedicated I/O processors | · Improves system efficiency by handling low-level tasks previously carried out by the 68030 microprocessor and associated with the floppy disk drive(s), Apple Desktop Bus, and serial ports. |
| · Dedicated SCSI/DMA controller | · Improves performance of the SCSI bus. |
| · Built-in Processor Direct Slot (PDS) | · Provides a fast, 32-bit direct interface to the system bus for high-speed, third-party option cards. |
| · Six NuBus expansion slots | · Makes it easy to create custom configurations to meet specific needs. (Cards are self-configuring–they require no DIP switches, and can be placed in any slot.) |
| · Six built-in ports:<br>–Two serial ports<br>–Two Apple Desktop Bus ports<br>–One SCSI port<br>–One sound port | · Provides support for popular peripherals without using NuBus expansion slots.<br>· Provides access to LocalTalk® networks, which allow users to connect Macintosh IIfx systems to other computers and to LaserWriter® printers through the AppleTalk® network system.<br>· Supplies high-quality, four-voice digital sound that is compatible with all applications that use Macintosh sound. |

| Features | Benefits |
| --- | --- |
| · Support for 4 or 8 megabytes of RAM | · Gives users maximum flexibility to configure their system with the amount of RAM that meets their applications requirements.<br>· Gives users a choice of using either Apple Macintosh IIfx RAM or compatible third-party RAM. |
| · 512K of ROM on a SIMM (Single In-Line Memory Module), including:<br>–32-bit addressing<br>–Hierarchical File System<br>–32-bit Color QuickDraw™ | · Enables future 32-bit versions of the Macintosh operating system to address up to 4 gigabytes of memory.<br>· Organizes document storage and allows easy access to files.<br>· Provides a consistent user interface throughout the Macintosh family and enables color systems to display up to 16 million colors simultaneously. |
| · Macintosh user interface, including mouse, icons, windows, and pull-down menus | · Makes most applications intuitive and easy to learn.<br>· Reduces training and support costs.<br>· Provides a consistent user interface across applications. |
| · MultiFinder® operating system | · Allows multiple applications to be opened concurrently.<br>· Lets users easily cut and paste information between applications.<br>· Allows background tasks to be run while users interact with applications in the foreground. |
| · Software compatibility | · Lets users run virtually all Macintosh software. |

# Macintosh IIfx Logic Board Upgrade



## Overview

The Macintosh® IIfx Logic Board Upgrade gives users of Apple® Macintosh II and IIx computers all the advantages–including high-speed system performance and advanced capabilities–of the Macintosh IIfx. Overall, the Macintosh IIfx Logic Board Upgrade enables the system to perform up to four times faster than the Macintosh II or Macintosh IIx.

To provide the extremely fast program execution and calculations that are characteristic of the Macintosh IIfx, the Macintosh IIfx Logic Board Upgrade incorporates a very high-speed, 40-megahertz 68030 microprocessor, a 32K Static RAM Cache memory subsystem, and a 40-megahertz 68882 floating-point coprocessor.

In addition, the Macintosh IIfx Logic Board Upgrade uses custom, dedicated input/output (I/O) processors. These processors significantly boost system performance by managing low-level I/O tasks--for the Apple Desktop Bus,š floppy disk drives, and serial ports--that had been previously handled by the 68030 processor. Also, a dedicated SCSI/DMA (direct memory access) controller improves performance of the SCSI bus.

Like the Macintosh II and Macintosh IIx, the Macintosh IIfx Logic Board Upgrade includes six NuBus š expansion slots that can accommodate a wide range of Apple and third-party expansion cards, such as network interface and graphics cards. Also, a new Processor Direct Slot (PDS) provides a direct interface for third-party options.

The Macintosh IIfx Logic Board Upgrade can be configured with either 4 or 8 megabytes of RAM.* It is compatible with the Macintosh IIfx 4MB Memory Expansion Kit, the full range of NuBus expansion cards, and virtually all current versions of Macintosh applications.

*RAM must be purchased separately. See Product Details for more information.