Macintosh IIcx: General Description (Discontinued)

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TOPIC ----------

This article describes the Macintosh IIcx.

DISCUSSION ----------

The Macintosh IIcx computer is a modification of the Macintosh IIx design that uses a Motorola MC68030 microprocessor and a MC68882 numerics coprocessor. The Macintosh IIcx uses the Apple SuperDrive (formerly Apple FDHD) 1440K floppy drive.

Because the Macintosh IIcx is the first computer that Apple has produced with this physical form factor, there will not be an upgrade kit for any of the current members of the Macintosh family to the IIcx.

MC68030

The Macintosh IIcx uses the Motorola MC68030 at 15.6672 MHz, the same speed as the existing Macintosh II/IIx. The MC68030 is Motorola's second-generation 32-bit microprocessor, and combines a central processing unit, a data cache, an instruction cache, an enhanced bus controller (NOT the NuBus controller), and a memory management unit into a single VLSI device. Internal function blocks of the microprocessor are designed to operate in parallel, allowing instruction execution to overlap.

The MC68030 integrates the functionality of the MC68020 32-bit microprocessor with a subset of the MC68851 Paged Memory Management Unit (PMMU). Commonly called the 030 (pronounced "oh-three-oh"), the MC68030 is compatible with Macintosh IIx timing and software.

MC68882

The MC68882 numerics coprocessor (also called the Floating Point Unit, or FPU) provides high speed, extremely accurate, floating-point computation to IEEE standards.

The processor operates in parallel with the MC68030 and is clocked at 15.6672 MHz, using the same clock signal as the MC68030. Calls to the Apple SANE routines will use the MC68882. The MC68882, also called the 882 (pronounced "eight-eighty two"), is pin- and electrically-compatible with the MC68881 coprocessor in the Macintosh II.

Both processors use the same base instruction set--the major advantage of the MC68882 is increased speed. With the MC68882, you can perform both memory moves and chip operations in parallel--as long as they don't conflict--thus boosting floating point performance by about 15%.

Memory Management

Macintosh IIcx can support the A/UX operating system without adding the PMMU, thanks to on-chip memory management by the MC68030. The MC68030 allows true 32-bit address translation with hardware page replacement. The built-in memory unit is also capable of ignoring the high 8-bits of the address to allow Macintosh software to run in 24-bit mode.

(NOTE: The MC68030 PMMU is a subset of the MC68851 PMMU, rather than an exact replacement.)

Wait States

- The Macintosh IIx/IIcx uses one wait state to access the RAM.

- The Macintosh II has two wait states, one for RAM, and one for the HMMU or PMMU.

Given the CPU clock speed, you need one wait state to make sure you read from RAM at 120ns. The 15.6672 clock frequency has an active period of 63.8276ns. If the CPU reads without wait states, you would need 60ns RAM. Given the limited availability of these 60ns chips, Apple has chosen one wait state and 120ns RAM chips.

Apple SuperDrive (formerly Apple FDHD)

The Apple SuperDrive can read from and write to any of the major 3.5-inch disk formats, including Macintosh (GCR 400K, 800K, and MFM 1.44MB), Apple II (800K), MS-DOS and OS/2 (MFM 720 and 1.44MB).

GCR stands for Group Code Recording; MFM stands for Modified Frequency Modulation. MFM and GCR only effect how the bits are placed on the disk, not the directory structure. The drive is supported by the SWIM (Sander, Woz Integrated Machine) chip.

(NOTE: There is special 1.44MB media that should NOT be used in the older 400K or 800K drives.)

SWIM Chip

The SWIM chip is a single-chip combination MFM/GCR controller for internal and external floppy drives. It was designed for the SuperDrive, but is compatible with the current 400K and 800K drives. The SWIM chip replaces the IWM chip, and is pin- and function-compatible with that device.

Logic Board ROM and ROM SIMM

The Macintosh IIcx comes with 256K of ROM, which is soldered to the logic board. The code in those four ROM chips is the same as the code in the IIx ROM SIMM chips. For update and upgrade purposes, the IIcx logic board has a ROM SIMM slot. When the ROMs in a IIcx unit are updated or upgraded, a ROM SIMM card with the new ROM chips is placed in the SIMM slot, and the jumper block on jumper W1 is removed. Removing this block disables the logic board ROM and enables the ROM SIMM.

Programmer's Switches

The programmer's switches (Reset and NMI) are located in the front of the Macintosh IIcx. This allows the IIcx to be placed on its side without restrictions regarding user access to the switch. This also makes it easier to move the computer off the desk to a more convenient location. As long as the user has access to the front of the computer, which is necessary to gain access to the drive port and to view the power-on and HD-activity lamps, the user can reach the programmer's switches.

Internal Hard Disk

As with the Macintosh II and IIx, the Macintosh IIcx supports an internal hard disk drive. However, because the IIcx has less internal space, the IIcx only supports 3.5-inch mechanisms.

Functional Differences Between IIcx and IIx

- NuBus Slots: Unlike the Macintosh IIx, the Macintosh IIcx has three NuBus slots instead of six. The IIcx NuBus slots use the exact same technology as the NuBus slots in the Macintosh II and IIx computers. As a result, the IIcx NuBus slots are compatible with most of the NuBus cards that have been developed for the II and IIx. The IIcx NuBus slots map to the first three NuBus slots in the II and IIx. Their slot numbers are 9, A, and B.

- Locking Power-On Switch: The power-on switch on the back of the Macintosh IIcx can be locked in the on position. This feature is for IIcx units that will function as routers, fileservers, mailservers, etc. After power resumes after a black-out, IIcx units with their power switch locked in the on position will re-boot and resume their functions.

- Power-On Signal: The power-on signal comes from the power supply on the Macintosh IIcx. With the Macintosh II and IIx computers, this signal came from the logic board battery. The advantages of this feature are that the

IIcx can power-up when the battery is dead, and there is less of a power drain on the battery.

- Resetting Fuses: On the Macintosh IIcx logic board, there are three fuses. These fuses protect the ADB, serial, and SCSI circuitry. To reset one of these fuses after it has blown, power-down the IIcx and power-up. When the unit is turned off, the blown fuse will reset. The advantage of this feature is that the logic board does not have to be replaced if a fuse is blown.

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