Apple IIGS: A Descriptive List of Interrupts (2/95)

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TOPIC ----------

This article describes the list of interrupts on an Apple IIGS.

DISCUSSION ----------

To take advantage of the power of the Apple IIGS, its designers installed a new set of interrupts. An interrupt is a hardware signal that tells the computer to stop what it is doing and devote its attention to a more important task. Print spooling and mouse handling are examples of interrupts: they don't take up all the time available to the system, but they should be taken care of promptly.

When an interrupt occurs, the microprocessor jumps to an interrupt- handling routine through a fixed vector in the computer's memory. This routine has to put the state of the machine into a standard configuration, determine the type of interrupt that occurred, and then (if appropriate) command a jump to the user's interrupt-handling routine.

Many types of interrupts are handled automatically for the user. For instance, the serial ports and keyboard can generate interrupts that make it easy to use data buffering. Routines in ROM handle the new user interface, detecting mouse interrupts and moving the mouse around the screen.

Here are the Apple IIGS interrupts and their causes, the actions during the interrupt, and the devices causing the interrupt:

RESET: Caused by startup or RESET keypress. Forces emulation mode. The interrupt is processed by firmware, then vectors to user link. Cold start attempts to boot a disk. Warm start vectors to user links; this link normally points to a BASIC cold start routine. Device: Power switch or RESET key.

NMI: Non-maskable interrupt. Vectors to user link. No NMI interrupts are used by the Monitor.

ABORT: Vectors to user link. If none, then vectors to break handler that displays the address and opcode of the code being executed at the time the abort pin on the 65816 was being pulled low. The ABORT interrupt can be activated by hardware installed in the memory expansion slot only.

COP: Vectors to COP manager vector in RAM, which points to firmware. If the COP manager is not installed, the firmware displays the COP message. This occurs via a software COP instruction only.

BRK: In emulation mode, the interrupt vectors to the interrupt (IRQ) handler and then to the break handler. In native mode, it vectors directly to a break handler. This occurs via a software BRK instruction only.

IRQ: Interrupt request. The remainder of this list describes the IRQ interrupts:

IRQ - AppleTalk: This interrupt has the highest priority because its code is very timing-intensive; data can be lost if the SCC is not read within 104.167 microseconds (230K bd) after an AppleTalk SCC interrupt occurs.

IRQ - Serial Ports: If in interrupt mode, data will be lost if the SCC is not read within 1.094 ms (19.2K bd) after the interrupt occurs.

IRQ - Scan Line: Interrupts, at the most, every 63.694 ms. The interrupt is caused by the video counters counting down to zero, which occurs when the beam reaches the right side of the scan line.

IRQ - Ensoniq Chip: Interrupts when the waveform buffer has been depleted. Because there are 32 oscillators in the chip, there are 32 possible interrupts from the chip.

IRQ - VBL: Interrupts every 16.67 ms. Interrupt occurs when the beam is retracing from the bottom-right corner to the upper-left corner of the screen.

IRQ - Mouse: Interrupts only if the interrupt option is chosen. The interrupt options are movement, button press, or VBL.

IRQ - Quarter-second Timer: Interrupts every 0.2667 seconds. Used by AppleTalk to trigger event processing.

IRQ - Keyboard: Interrupts if a key is pressed.

IRQ - SRQ: If an Apple DeskTop Bus device requires servicing, an SRQ is issued. Control is passed to the SRQ Manager.

IRQ - Desk Accessory Manager: This is called at a simultaneous press of the keys OPEN-APPLE, CTRL, and ESCAPE.

IRQ - Flush: If OPEN-APPLE/CTRL/DELETE is pressed, the keyboard micro clears its internal type-ahead buffer, issues a Flush command to

external keyboards, and causes an interrupt.

IRQ - Micro-abort: If the keyboard micro detects a fatal error and the fatal-error interrupt occurs, the system is interrupted.

IRQ - Clock-chip: Interrupts every second.

IRQ - EXTINT: Interrupt generated by a special device connected to the VGC.

IRQ - External cards: Interrupt as defined by the card manufacturer.

Article Change History:
03 Feb 1995 - Corrected reference to AppleTalk and updated format.

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