# Apple II
# Technical Notes

## Mouse
## #4:     Mouse Firmware Bug Affecting ServeMouse

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This Technical Note documents a bug in the mouse firmware on the AppleMouse card which
affects the way `ServeMouse` works.

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There is a bug in the AppleMouse II 6805 firmware which may affect the way `ServeMouse`
works in an application.  If the application takes more than one video cycle (normally about 16
ms) to respond to a mouse-generated interrupt, then `ServeMouse` will not claim the interrupt.
The 6805 returns an interrupt status byte of $00 (i.e., no mouse interrupt pending), and the 6502
firmware sets the carry bit (although the interrupt is also cleared by the `ServeMouse` call).
This situation can be confusing, and under ProDOS or Pascal it can be lethal.  We have identified
the following solutions, any of which should work:

If you are **not** working under an established operating system (i.e., ProDOS or Pascal):

1.  Do not allow unclaimed interrupts to be fatal to your application.  Ignore them.
2.  Always service mouse interrupts within 1/60 of a second.  If you are forced to
    disable interrupts for a longer period, first use `SetMouse` to set the mouse mode
    to 0, then call `ServeMouse` to clear any existing mouse interrupt.  After
    interrupts are re-enabled, restore the mouse mode.

If you **are** working under an established operating system (i.e., ProDOS or Pascal) for which
unclaimed interrupts are fatal and the mouse is **not** the only interrupting device:

1.  Write the mouse interrupt handler to claim all unclaimed interrupts and make sure
    the mouse interrupt handler is installed last, otherwise the interrupt will never get
    through to any interrupt handlers which follow that of the mouse.

**Note:**  This solution may cause cursor flicker by delaying the application's response to
          VBL interrupts.

2.  Write a spurious interrupt handler (also known as a "daemon"), not associated
    with any device, which claims all unclaimed interrupts (i.e., clears the carry bit
    then exits).  For the reason just mentioned, this interrupt handler must be installed
    **last**.

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**Note:**   Under ProDOS, this limits the number if interrupting devices to three.

This bug exists in the AppleMouse card, therefore you must deal with it when you are writing eight-bit programs for the Apple ][+, IIe, IIc and IIGS which use the mouse.  The Apple IIGS does not have this bug in its internal mouse firmware, so sixteen-bit "native" mode programs are not affected by it.