

Infinite Impulse Response (IIR) Filter Code Modification

Addresses MC3PHAC Switch Movements

Description

The following situation causes a jolt to be observed on the motor:

1. Initial condition: the motor is running.
2. ON/OFF switch input is placed in the OFF state. Simultaneously, the speed command input is brought to zero while acceleration is set to a high level.
3. The motor speed quickly reaches zero.
4. The ON/OFF switch input is immediately changed back to the ON state.
5. A noticeable jerk can be observed on the motor

Cause

There is an internal digital filter which processes the ADC input associated with the speed knob. This filter has a very low cut-off frequency (<0.5 Hz). Therefore, it is possible to turn the knob down to zero speed faster than the filter output can slew. If the ON/OFF switch is turned back to the ON position before the filter output has slewed to zero, the commanded speed (the output of the filter) is non-zero at the moment the switch is flipped to the ON state. Therefore, the motor quickly accelerates up to meet the commanded

speed value, causing a noticeable jerk. The motor speed eventually decays to the zero value of the speed knob at a rate which is commensurate with the time constant of the filter.

Solution

A software solution has been devised such that whenever the ON/OFF switch is in the OFF position, the internal state of the IIR filter is overridden, and held at zero.

This change has been implemented on MC3PHAC devices with date codes of September 2005 and later. Please refer to product bulletin MC3PHACPB (on the MC3PHAC product page) from the Freescale Semiconductor website, <http://freescale.com>.

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