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How to Configure the Reset Pin on the MC68HC11

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Introduction

The ideal way to control the reset pin on the MC68HC11 is with a low-voltage inhibit (LVI) circuit.

However, many designers want to use an RC circuit, and they wonder why the *MC68HC11 Reference Manual* Rev. 3 (Motorola document order number M68HC11RM/AD) specifically forbids use of an RC (resistance-capacitance) circuit to reset the MC68HC11.

This engineering bulletin explains why a capacitor should never be connected to the reset pin and describes the correct configuration of reset.



Problems Using an RC Circuit

Connecting a capacitor to the reset pin can cause these two serious problems:

1. Brownouts
2. Long startup times

Brownouts

The worst of the two problems that can occur is a “brownout,” which is a corruption of EEPROM locations during an uncontrolled loss of power. This occurs because as voltage ramps down during a power loss, different parts of the MC68HC11 shut down at different voltage levels. The address and data lines become indeterminate, and it is possible to overwrite several bytes of the EEPROM array before it shuts off.

The only way to prevent this brownout from happening is to assert the reset line before the voltage on the device drops below the specified minimum operating level.

Long Startup Times

The second problem with RC reset circuits is that the MC68HC11 may not start at all because the reset line may not come up fast enough. A capacitor as small as 0.01 μF on the reset line tends to cause unreliable startup because the MC68HC11 can be powered up by the 5-volt V_{DD} before the capacitor is fully charged.

The device’s internal circuitry can haphazardly start in an indeterminate state that causes the MC68HC11 to act as if it should assert reset. This can cause the MC68HC11 to begin asserting reset at about the same time that the capacitor finally finishes charging, thus forcing the reset pin to cross the 4.5-volt threshold. If this happens, the reset line is simultaneously driven by both the RC network and the internal reset circuitry on the MC68HC11. This deadlock cannot be resolved, and it may even cause the reset line to oscillate. To avoid this conflict, reset must be held low during power-up until V_{DD} is above 4.5 volts and steady.

Correct Reset Configuration

The solution to both of these problems — brownouts and long startup times — is the complete elimination of any capacitors on the reset line.

reset should be controlled by a low-voltage inhibit (LVI) circuit. In the *MC68HC11 Reference Manual Rev. 3*, Figure 2-12 shows the recommended reset circuit using the Motorola MC34064 LVI. This device provides an open-drain output to directly drive the reset line. It holds reset low until V_{DD} reaches 4.5 volts on power-up. On a power down, the LVI pulls reset low as soon as V_{DD} drops below 4.5 volts and keeps reset low throughout power down.

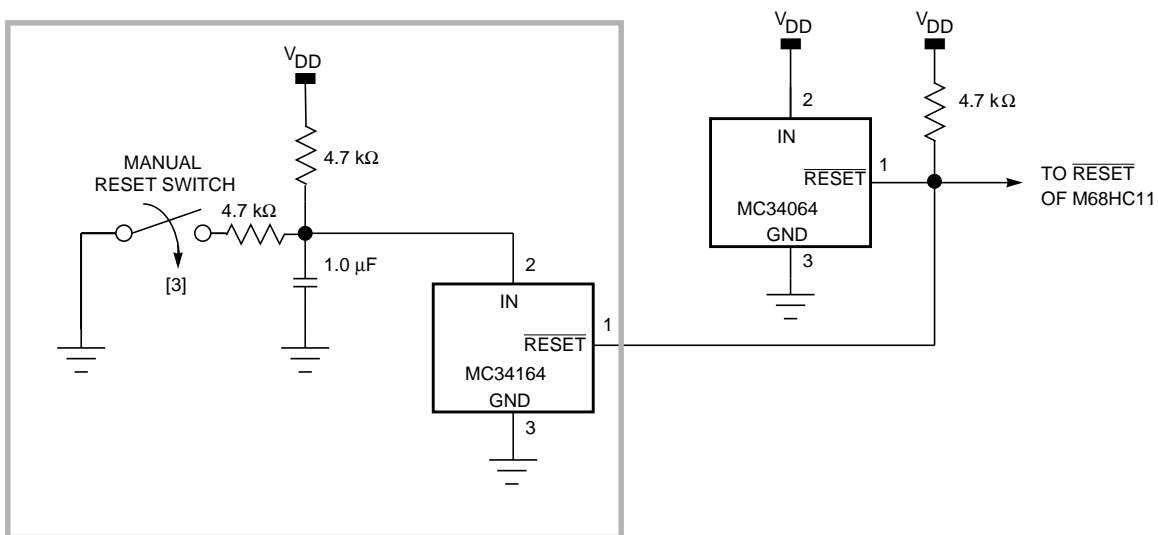



Figure 1. Reset Circuit Example

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