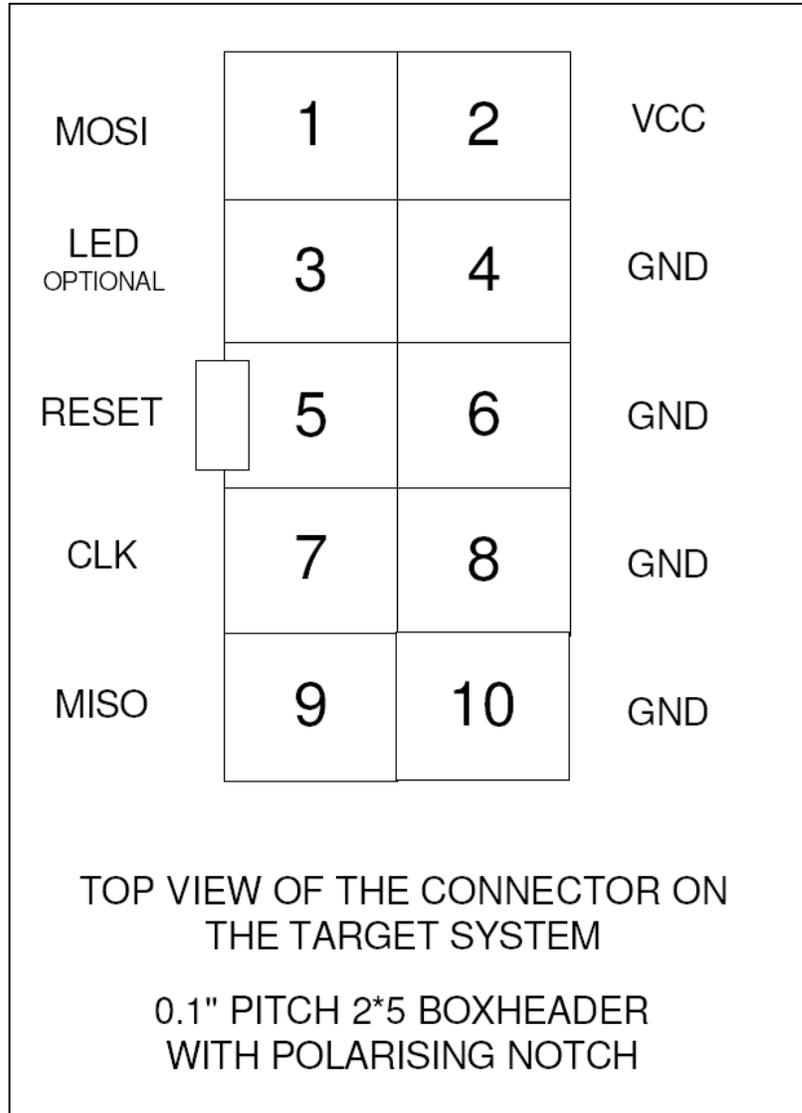


## ISP Circuits for Kanda Programmers

The standard 10-way ISP connector required for Kanda Programmers is shown here. Please note that this is the layout required on your target circuit.

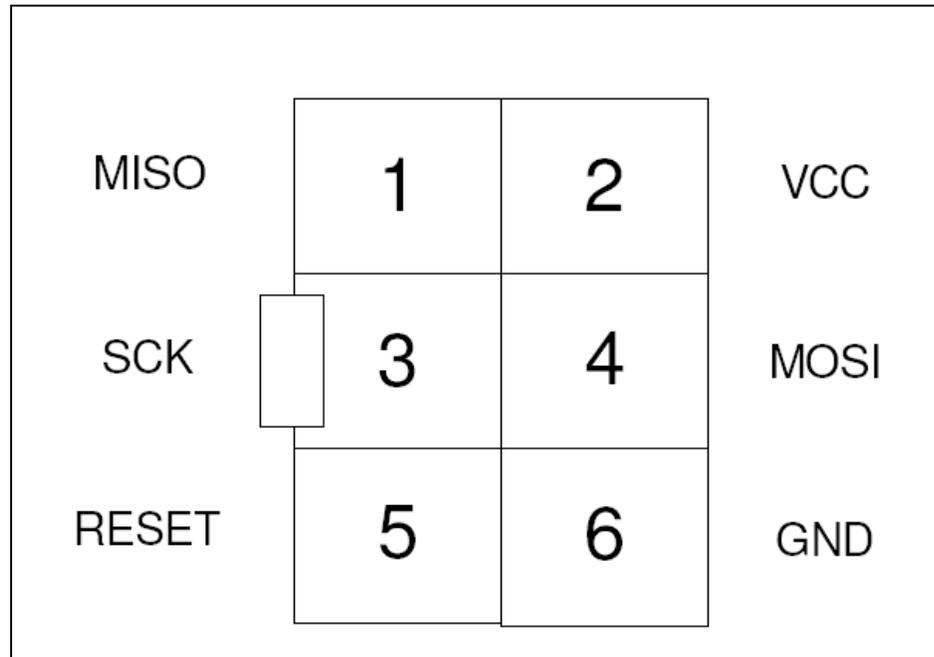


### Notes

1. All grounds should be connected to target ground to improve electrical noise immunity in the programming lead.
2. LED line goes Low when programmer enters ISP mode, and can be used for an LED or to control a multiplexer
3. This is target view, and is NOT the same as the end of the programming lead, which is swapped about vertical axis
4. The 10-way connector on the programmer is also different. If you want to make your own leads, then the connection is swapped on both vertical and horizontal axes.

## Atmel 6-way ISP connection

Atmel have now introduced a 6-way recommended connector. The target pinout of this connector is shown here



Kanda supply a 10-way to 6-way adapter, which plugs into the end of the programmer lead, for use with targets with this connector. Please see

<http://www.kanda.com/go/10DIL6>

## Other ISP layouts

If your target ISP connector does not follow these formats, you can use our 10-way to 6 separate flying lead adapter to connect lines to separate pins.

<http://www.kanda.com/go/10FLEX6>

## Required ISP connections

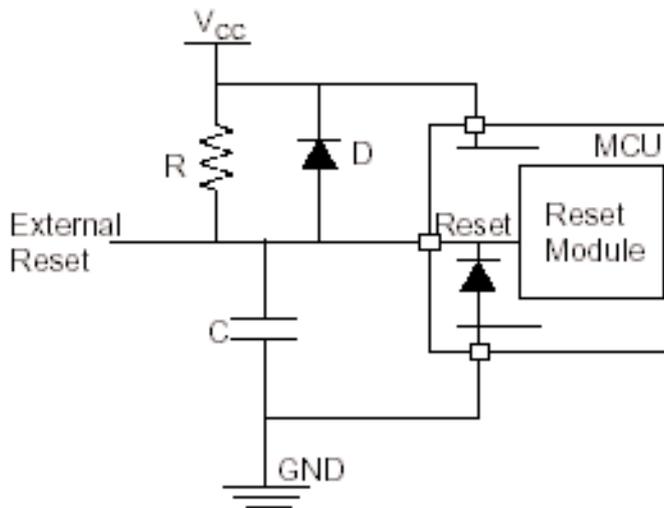
The programmer needs 6 connections as a minimum. These are 4 programming lines plus VCC and GND.

- MISO, MOSI and SCK lines (PDO, PDI and SCK on Atmega128)
- Reset
- VCC and GND to give voltage reference for programmer

## Target Circuit Layouts

This section deals with connections to the AVR microcontroller for In System Programming. The rules and suggestions given do not have to be followed in all circumstances but failure to include some features may lead to problems with In System Programming.

Different programmers have more or less tolerance to deviation from these rules, but in general they should be followed. Atmel give recommendations for circuits connected to reset pin and programming lines that err on the side of caution. These circuits are shown here with Kanda recommendations on the following pages.

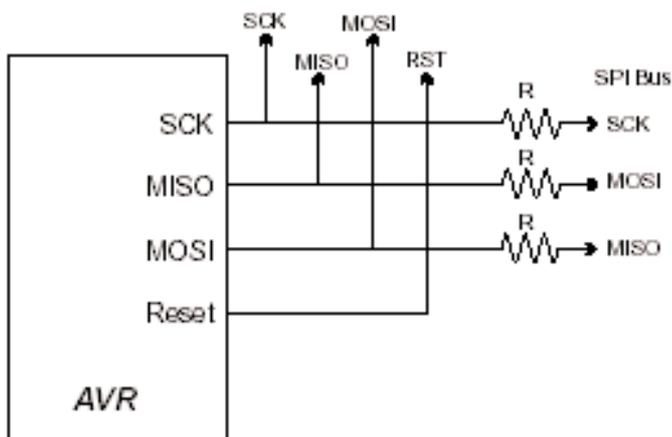


### Atmel's recommended Reset Circuit

Note that Atmel recommend a diode in the reset circuit. This is not generally required for Kanda programmers.

Atmel recommend a 10 nF capacitor and a 4K7 resistor. We favour a 100nF capacitor and 10K resistor. Choose something in this range.

Note: 1. Typical values are:  
R = 4.7 kΩ  
C = 10 nF  
D = 1N4148



### Atmel's recommended Programming Lines Circuit

The recommended resistor values are 4K7 to isolate user applications from programming lines.

## Capacitors on Reset Line

We do recommend that a capacitor is included on the Reset line. It should be placed as close as possible to the Reset Pin on the AVR i.e. it should be closer to the Reset Pin than any resistor. We recommend a 100nF capacitor and a 10K resistor. Larger capacitors may mean that the programming speed must be reduced. Capacitors on the programming lines should be avoided where possible, otherwise programming speeds may have to be reduced. If you must include them, then less than 10nF is suggested.

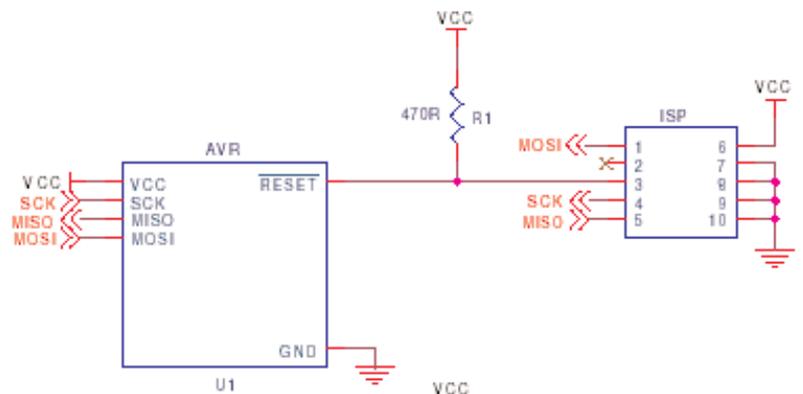
The following diagrams of correct and incorrect circuits do not include any capacitors. As long as capacitors are placed next to the AVR pins, then they will not affect the circuit, but see previous paragraph.

# GENERAL

Examples apply to all programming lines (MOSI, MISO, SCK and RESET). Applies equally to pulldown resistors.

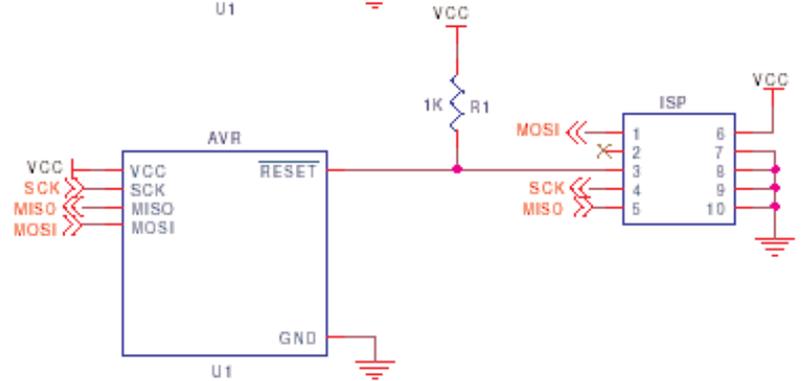
## NO

The Pull-up resistor, R1, is too strong.



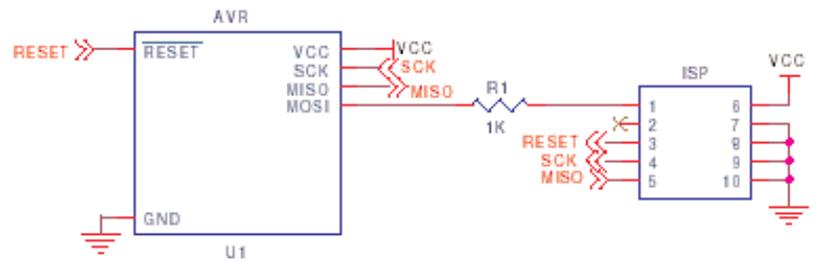
## YES

The Pull-up resistor, R1, is no stronger than 1K



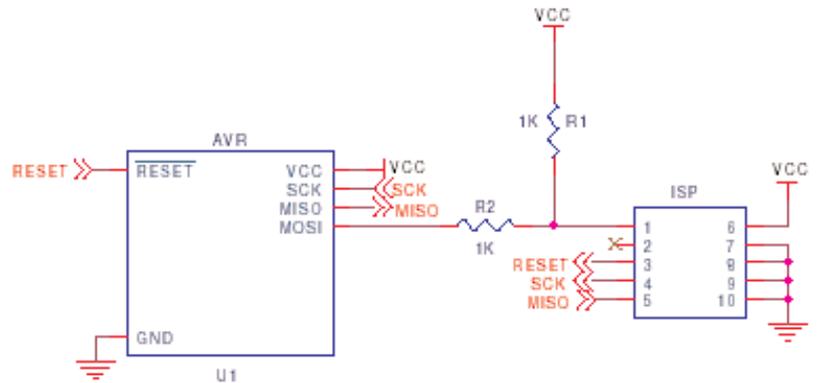
## YES

A resistor in series; by its's self, will have no effect.



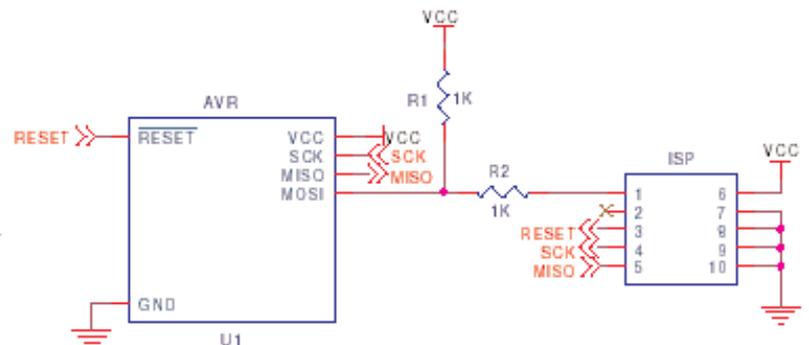
## YES

Again, the series resistor will have no effect.



## NO

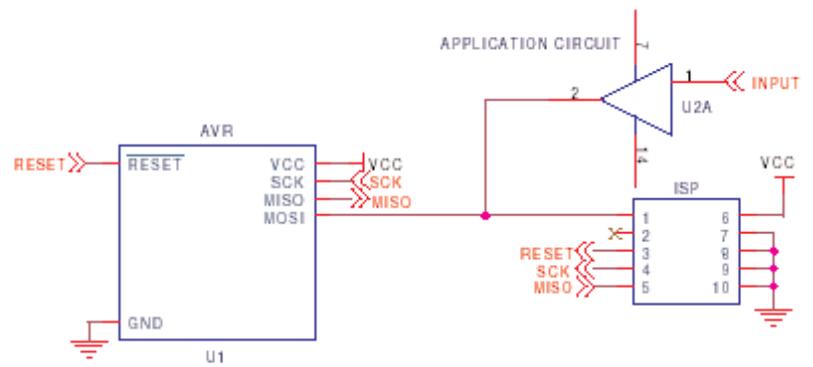
This is a potential problem. As the series resistor will weaken the programmer's ability to act on the programming line.



# APPLICATION CIRCUIT USING ISP PORT PINS

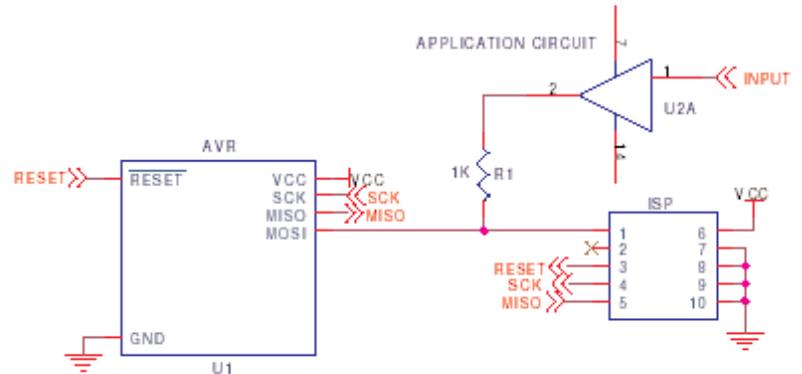
## NO

Here, the application uses PB5 as an INPUT to read the output of U2. The state of the line is held by U2.



## YES

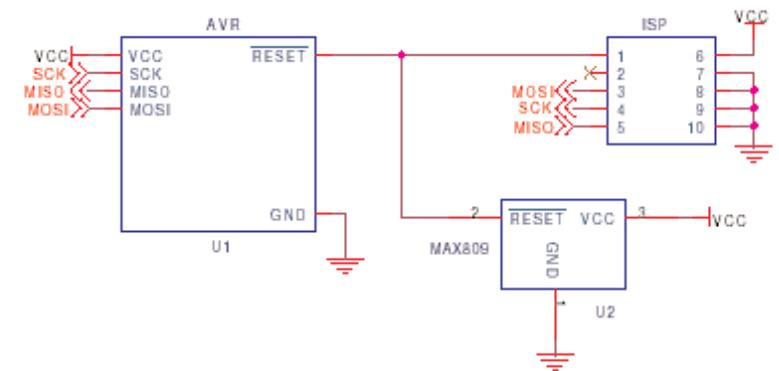
Again, PB5 is used as an INPUT to read the output of U2, but this time; The output of U2 is sufficiently decoupled by R1



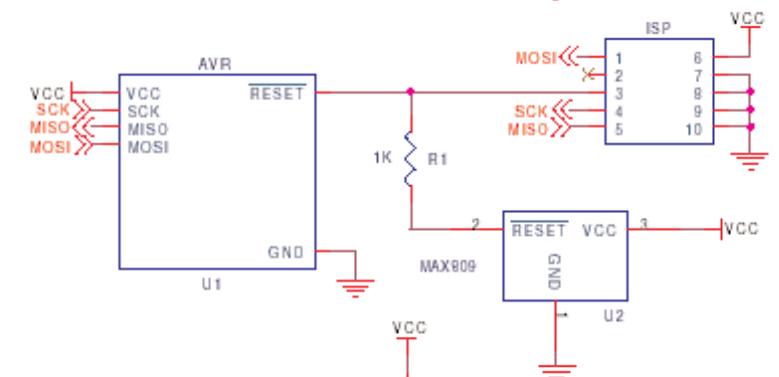
## RESET IC's

## NO

The commonly used brown-out IC MAX809 as a PUSH-PULL output. It will hold the RESET line high.



## YES



## YES

The MAX803 IC is equivalent to the MAX809 - BUT as an OPEN DRAIN output.

