

## Features

- Portable
- Compact
- One button operation
- 9V Battery or PSU
- Comprehensive device support
- Can power target
- Field use
- Production use
- Supports all fuses
- Supports Lock bits
- Supports 0-5V Vcc
- 32KB memory
- 128KB option
- Program EEPROM only option
- Program Flash only option
- Program both Flash and EEPROM
- Automatic verify

## Device Support:

- ATtiny12
- ATtiny13
- ATtiny15
- ATtiny22
- ATtiny26
- ATtiny2313
- AT90S1200
- AT90S2313
- AT90S2323
- AT90S2343
- AT90S2333
- AT90S4414
- AT90S4433
- AT90S8515
- AT90S8535
- ATmega48
- ATmega8
- ATmega88
- ATmega8515
- ATmega8535
- ATmega16
- ATmega161
- ATmega162
- ATmega163
- ATmega168
- ATmega169
- ATmega32
- ATmega323
- ATmega64
- ATmega103
- ATmega128

Including all Low voltage devices

# AVR Hand Held Programmer

# AVR<sup>®</sup>

## A battery powered portable ISP in a hand held case, with PSU option

### Introduction

The ultimate programming tool for AVR microcontrollers, in the field or on the production line - so easy a child can use it! Just load it once and then program target devices again and again and again.

### One Starter Kit = Many Programmers

You need one starter kit to load your Hand Held Programmer with settings and code from a PC or laptop, using the simple Wizard software and the printer port connector supplied in the starter kit. Once your programmer is loaded, you can program as many target

devices as you want. It is ideal for field or production use and it is impossible for inexperienced operators to make errors. The single button operation and clear Red/Green LED error indicator prevents mistakes.

Just connect the starter kit to your printer port and run the wizard software. Select your program and/or EEPROM files, device type, fuse settings and device voltage in the simple Wizard screens and load your program or test code in seconds. As the programmer is battery powered during load, you don't



need any power supplies or cabling, just plug a programmer into the simple adapter supplied with the starter kit.

Once a programmer is loaded, it is completely portable and can be used where you need it, not where your PC is located. The programmer will retain your code even if you remove the battery as it is stored in non-volatile memory.

### Programming your targets

To use your programmer on the production line or in the field is so easy! Plug the programmer lead into the 10-way header on the target and press the big red button. During the program and verify operations, the LED flashes green. Once it is finished, a steady green light shows programming and verify was successful. If there were errors, the LED flashes red with a sequence that shows what error occurred: 1 flash = No response from device, 2 = Erase failed, 3 = Program failed, 4 = Fuse write failed. These codes will repeat if the stay on time is set in the software wizard timing screen.

The programmer can supply power to a target board, provided it doesn't draw more than 150mA which is great for field use or adding QA or configuration data in the AVR EEPROM at different work stations. Alternatively, the programmer can draw power from the target.



MOVE

For field use, you can use the 9V PP3 battery included. It will even power your target circuit with up to 150mA. Alternatively plug in a 9V power supply and save on battery life.



PROGRAM

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- ATmega103
- ATmega128

**Plus all Low Voltage L versions**

**Operating Systems**

- WIN 95/98
- WIN NT/2000
- WIN ME/XP

**Starter Kit Contents**

- Hand Held Programmer
- PC Interface (Printer port)
- Ribbon cables- 10-way connectors
- Adapter for loading programmer
- Software CD
- Supplied in video case



**Software Features**

- Supports Windows 95/98/2000/NT/ME/XP
- Simple Wizard software
- Drop-down device selection list
- Easy file selection for Flash and EEPROM
- Most file formats can be loaded
- Program Flash only to preserve EEPROM data
- Or EEPROM only for configuration or QA data
- Or program both Flash and EEPROM
- Clear Fuse and lockbit setting screen
- New extended Fuse options supported
- Select target Voltage, from 0-5V- 0.02V steps
- Click finish to load your programmer

**Power Options**

There are three power options with the hand held programmer.

**1 Programmer powers target.**

Select Vcc needed in software (0-5V) and plug into un-powered target. Connector pin 2 (Vcc) must be connected to Vcc on your board. Use battery or external PSU

**2 Target Powers Programmer.**

Target circuit Vcc line must be connected to Vcc pin on header (Pin 2). Power target.

**3. Target and Programmer both powered.**

Set Programmer voltage in software to match target voltage. Do NOT connect target Vcc line to Pin 2

**Always connect all 4 GND pins to target ground, 0V**

**Connector**

MISO	SCK	RESET	LED	MOSI
9	7	5	3	1
10	8	6	4	2
GND	GND	GND	GND	Vcc

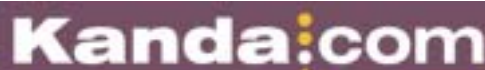
**Programmer Features**

- Programmer Size 106 x 58 x 25mm
- Programmer Size 4.5 x 2.5 x 1 inch
- 9V PP3 battery included
- 9V 2.5mm barrel connector for PSU
- Flexible Vcc range - 0 to 5V

- 32 KB memory capacity for most AVR's
- 128 KB memory option available
- Non-volatile code storage keeps your data
- Supports AT90S and ATmega devices
- Single button operation
- Red/Green error LED

Product	Order Number
Hand Held Programmer Starter kit	HH0010
128 KB Hand Held Programmer Starter kit	HH0010M
Hand Held Programmer	HH0020
128 KB Hand Held Programmer	HH0020M

**YOU MUST HAVE A STARTER KIT TO LOAD THE INDIVIDUAL PROGRAMMERS**



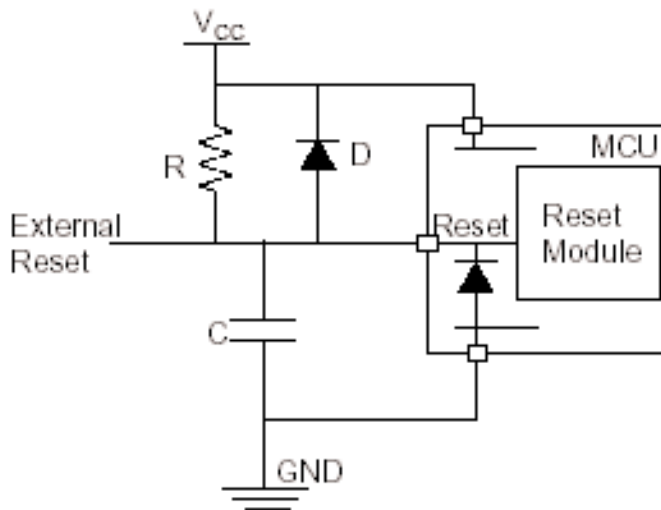
**Embedded Results Ltd**  
**P.O. Box 200**  
**Aberystwyth,**  
**SY23 2WD UK**

**Tel: +44 (0) 8707 446 807**  
**Fax: +44 (0) 8707 446 807**  
**Email: sales@kanda.com**  
**Web: www.kanda.com**

## 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.

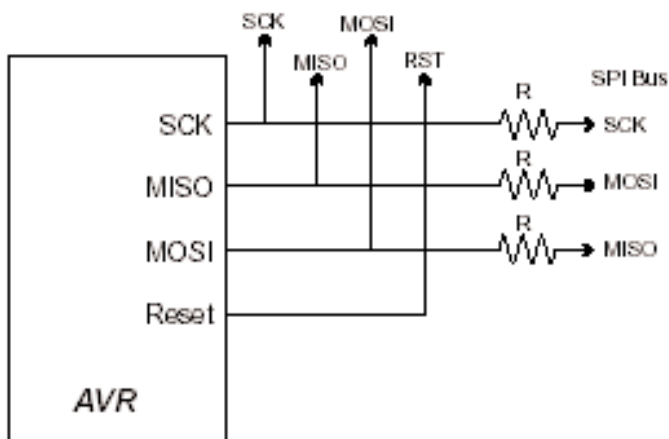


### Atmel's recommended Reset Circuit

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 k $\Omega$   
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 will not cause a problem as long as they are less than 100nF, otherwise programming speeds must be reduced.

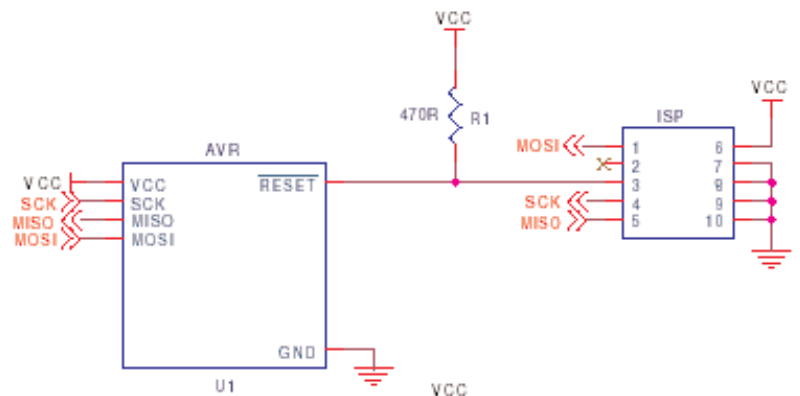
The following diagrams of correct and incorrect circuits do not include any capacitors. As long as capacitors are placed next to the AVR pins, then they will not affect the circuit.

# GENERAL

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

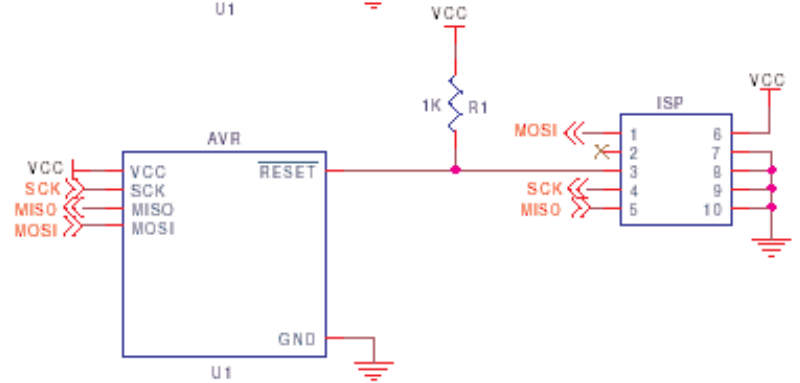
## NO

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



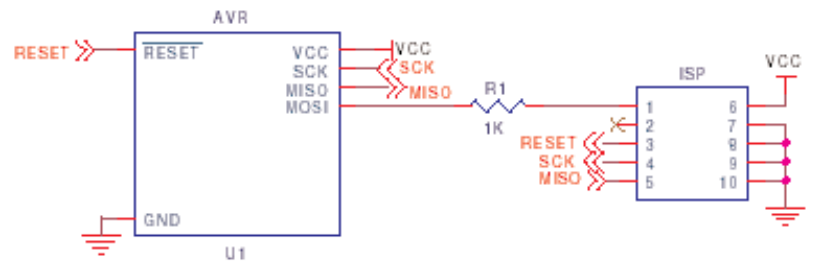
## YES

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



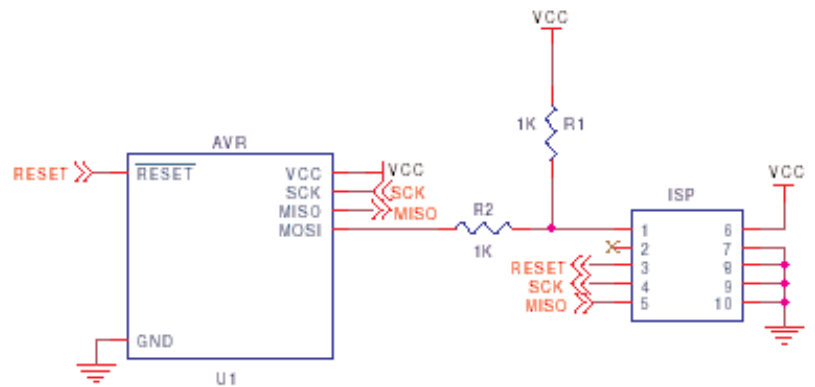
## YES

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



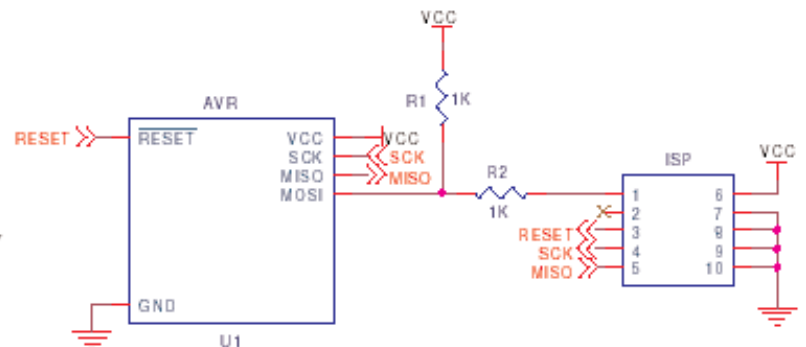
## YES

Again, the series resistor will have no effect.



## NO

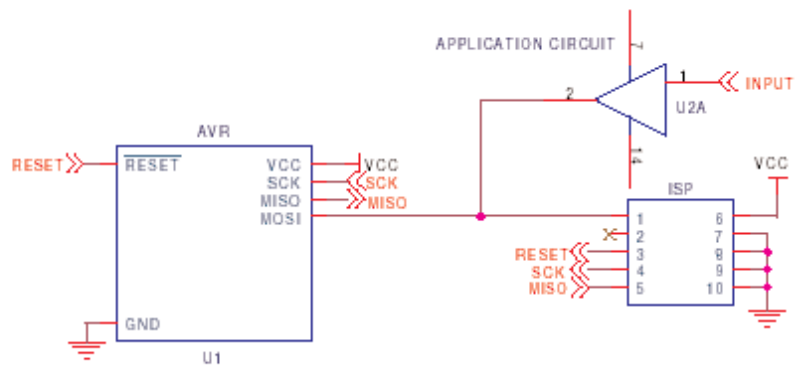
This is a potential problem. As the series resistor will weaken the programmer's ability to act on the programming line.



# APPLICATION CIRCUIT USING ISP PORT PINS

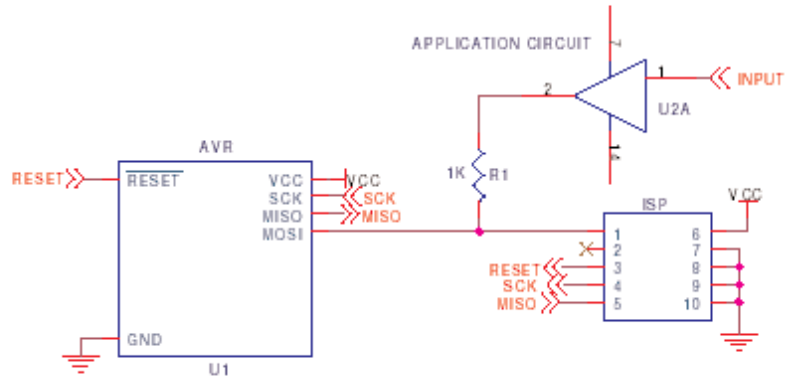
## NO

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



## YES

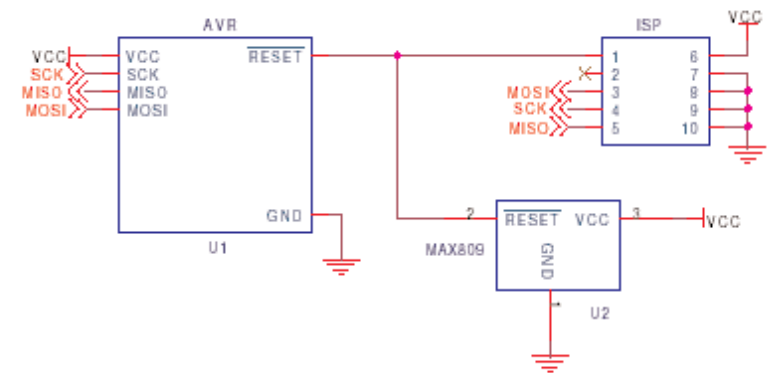
Again, PB5 is used as an INPUT to read the output of U2, but this time; The output of U2 is sufficiently decoupled by R1



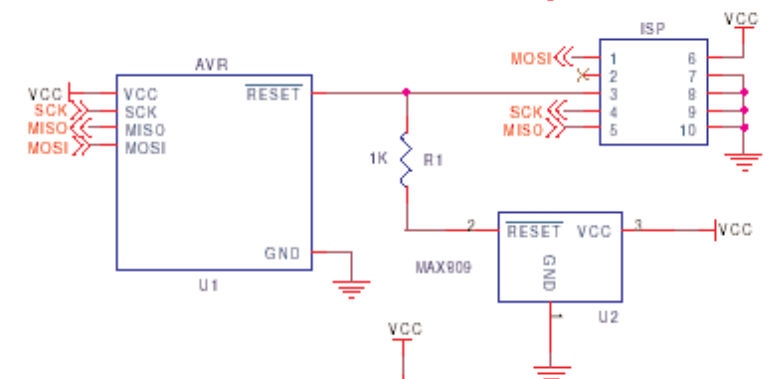
## RESET IC's

## 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.

