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# **PORTABLE PROGRAMMER QUICK START GUIDE**

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## **IMPORTANT INFORMATION**

1) Do not leave the programmer connected to the PC adapter or a target system, as this will drain the battery.

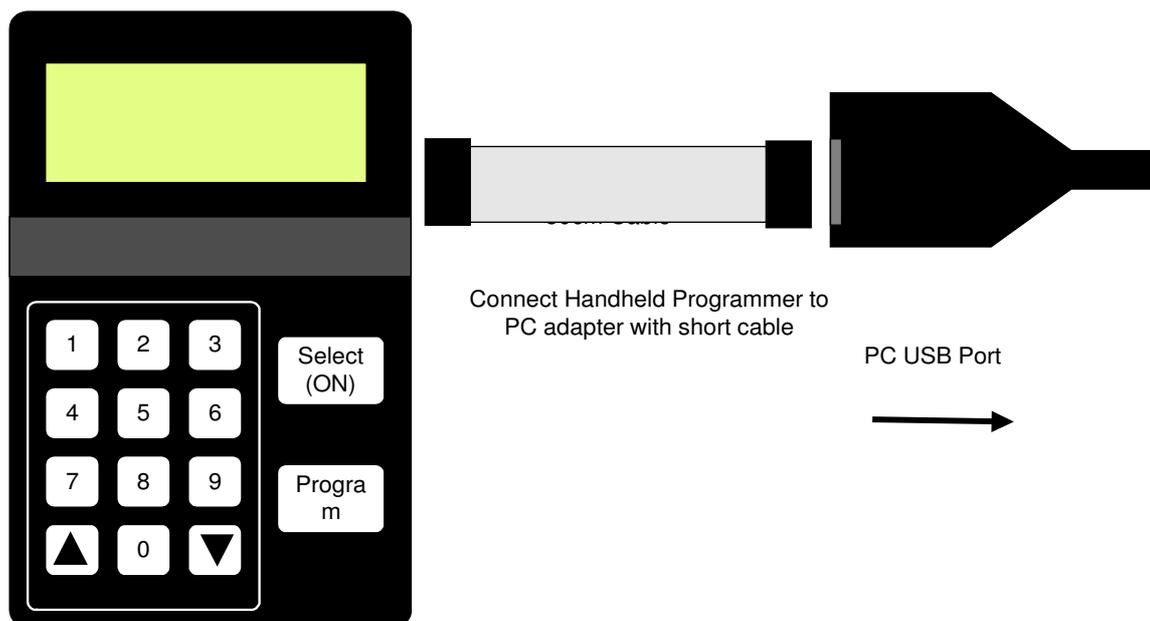
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## **Installing Software**

- 1) Run the executable file on the CD. This will install software and pre-install USB drivers.
  - 2) Plug in PC dongle to a USB port. The drivers should install automatically. If they do not, see Troubleshooting section
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## **LOADING FROM THE PC**

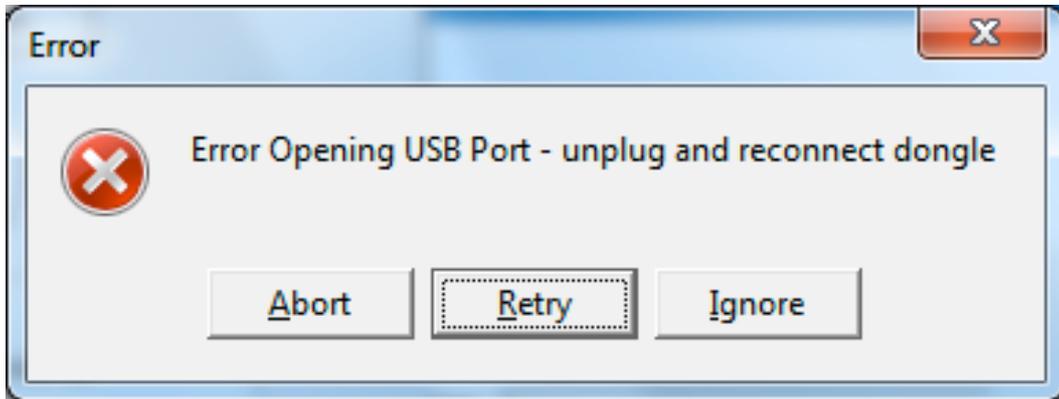
- 1) Connect the PC adapter (dongle) to the PC USB port.
- 2) Connect the PC adapter directly to the programmer using the short ribbon cable.



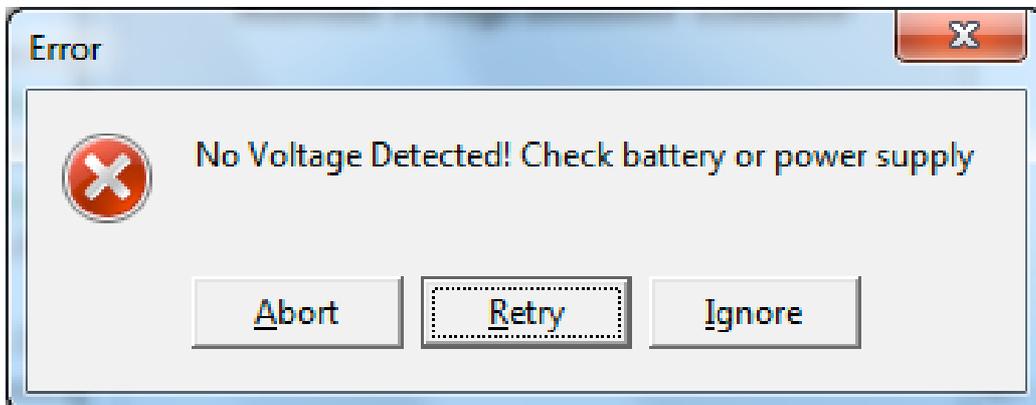
- 3) To load code, follow the instructions in the software.

## Run the Portable Programmer software

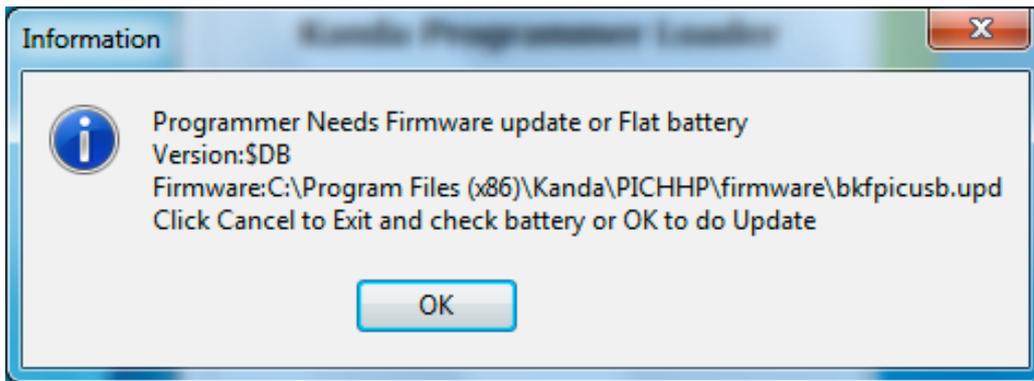
- a) If USB dongle is not detected, or another Kanda dongle is present, then this error appears. Make sure only one Kanda dongle is plugged in or close other software.



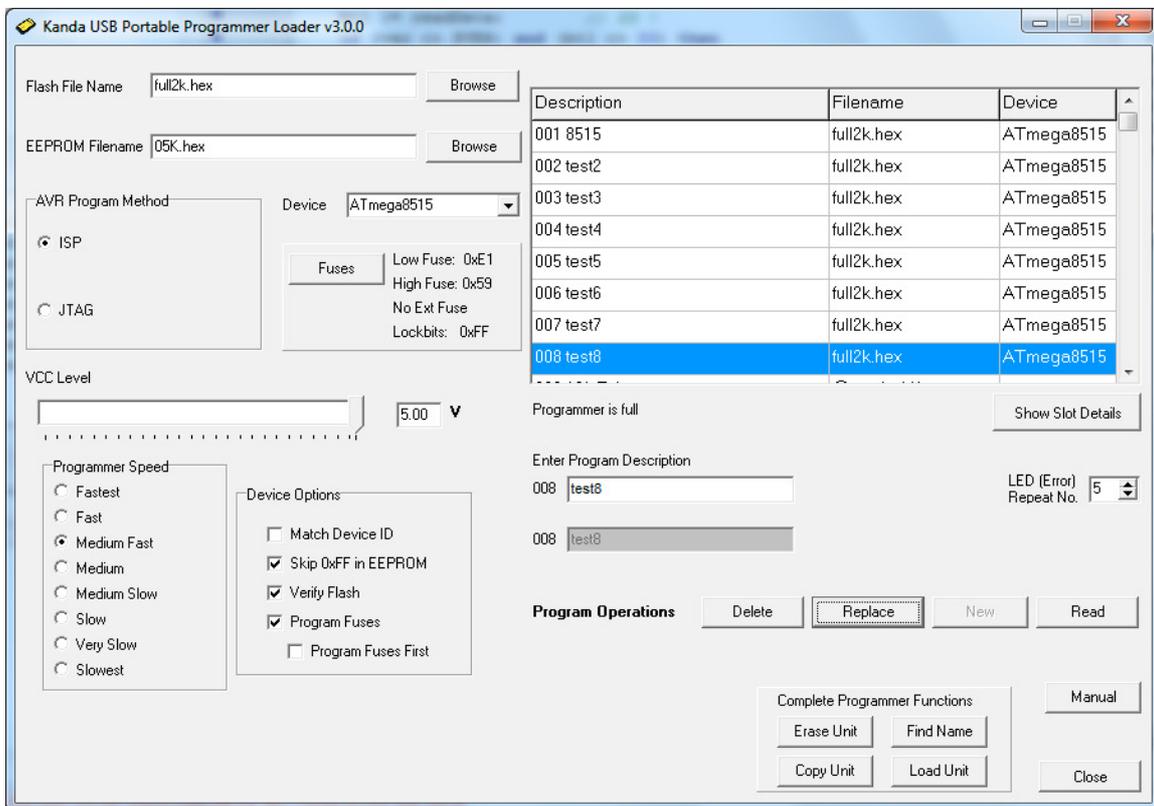
- b) If the AVR Portable Programmer is not detected, then this message will appear. Make sure the programmer is connected to the dongle, and the programmer is powered, or battery is Ok.



- c) To run programmer in Demo mode, Click Ignore. The programmer software will load but you will not be able to Read or Program a programmer until one is connected.
- d) If the AVR Programmer requires a firmware update, this message appears. Click OK to carry out firmware update.



Once the programmer is detected and any firmware update necessary has been carried out, the main programmer window will appear.



The right-hand side of the screen shows the Programmer settings, and the left-hand side shows details about the AVR device, filename, programming method and other details that will be used to load the programmer.

The programmer LCD will say "**Loader Connected**" and keypad is ignored.

## Programmer and Device Setup

- **Flash Filename** box. Enter your flash filename or leave blank if you want to only program EEPROM.
- **EEPROM Filename** box – if AVR device has EEPROM and data is required, then select your EEPROM file
- Select **Program Method** - ISP or JTAG
- Select **Device**
- **Fuses button** - click to change fuses, see section below.
- **VCC Level** - use slider to select voltage of target circuit
- **Programmer Speed** - Select speed of ISP clock. As a guide, Fastest is for 16MHz target clock, Fast is 8MHz target clock, Medium Fast is 1MHz target clock. Fuse settings on new AVR devices give 1MHz clock by default.
- **Device Options**
  - **Match Device ID.** If checked, programmer checks that target device ID (signature bytes) match device selected. Error code for mismatch is 7 red flashes.
  - **Skip 0xFF in EEPROM.** If checked, locations set to 0xFF in EEPROM file are not programmed. This increases programming speed but old data can be left in EEPROM
  - **Verify Flash.** Check to verify flash memory, which is best practice. If unchecked, flash is not verified, which is faster.
  - **Program Fuses.** Check to program fuses and lock bits, with values set by Fuse button.
  - **Program Fuses First.** Check to program fuses before device is erased. This is useful for setting EESAVE fuse to preserve EEPROM, for example.

## Other Setup Features

- **Program Description.** You must enter a program description of up to 28 characters. This is displayed in pane at top when programmer is read and on LCD.
- **LED (Error) repeat No.** A message will flash on LCD when programming has finished, showing success or reason for failure. This setting will set how many times the message is repeated. Press 0 key to clear message.

## Loading the Programmer

Once all these settings have been selected, the programmer can be loaded. The buttons to load the programmer are labelled as **Program Operations**.

The portable programmer has buttons to delete, replace or add new programs. Once the programmer is loaded with 32 programs the New program button is disabled and Programmer Full message shows.

The screenshot shows a software interface for a programmer. It features a table with three columns: Description, Filename, and Device. The table contains five rows of program data. Row 3 is highlighted in blue. Below the table, there are input fields for program description and a 'Show Slot Details' button. At the bottom, there are four buttons labeled 'Delete', 'Replace', 'New', and 'Read' under the heading 'Program Operations'.

Description	Filename	Device
001 isp id off e2on		ATmega1281
002 jtag id e2 only		ATmega1281
003 jtag id on e2 o		ATmega1281
004 jtag no id	8k.HEX	ATmega1280
005 jtag id	8k.HEX	ATmega1281

Set up Files, Device etc then  
Enter Program Description

003

003

LED (Error)

Repeat No.

Program Operations

**New Button.** This will add the program to the next free slot

**Replace Button.** This will replace the slot selected in the pane above.

**Delete Button.** This will remove the slot selected in pane above the buttons and set description to Empty.

**Read Button.** This will read the programmer and display description, filename and AVR device selected in the pane above buttons.

**Show Slot Details button.** This will show more details, see section below.

## Empty Portable Programmer

If the programmer is empty, only New and Read buttons are shown. Clicking on these buttons will load the currently selected slot on the unit. This PC software ignores the programmer keypad.

## Fuse Button

Click the Fuse button to edit the Fuses for the currently selected device. If you select a different device, the default fuses will be loaded, other wise the fuse values you select will be saved.

ATmega1281 Fuses and Lockbits

General Options:

- Enable Divide clock by 8 (CKDIV8)
- Enable Clock Output (CKOUT)
- Watchdog Always On (WDTON)
- Enable OCD (OCDEN)
- Enable JTAG (JTAGEN)
- EEPROM memory is preserved after Chip Erase (EESAVE)

Brown-out trigger level:  
111 : BOD disabled

SUT:  
 SUT0 Programmed  
 SUT1 Programmed

Clock Sources:  
Device Clock Select:  
0010 : Calibrated Internal RC Oscillator 7.3 - 8.1 MHz

CKSEL:  
 CKSEL3  CKSEL2  CKSEL1  CKSEL0

**NOTES:**  
A checked box indicates that the fuse is programmed (Set to logical 0)

Low Fuses: 01100010 High Fuses: 10011001 Ext Fuses: 11111111 Lock Bits: 11111111

Edit Binary

Defaults Cancel Close

The available fuses and lock bits for the currently selected AVR are displayed. Click on the tab on the right of the screen to **see Lockbits and Boot Block** options.

Enabled AVR fuses (programmed) are actually 0 value. The binary values of each available fuse are displayed at the bottom of the screen. Click **Edit Binary** button to enter fuse values as binary numbers.

**Default** button will load defaults for the AVR device selected

**Cancel** button will close Fuse box without saving changes

**OK** button will close Fuse box and save your changes.

### **Show Slot Details button**

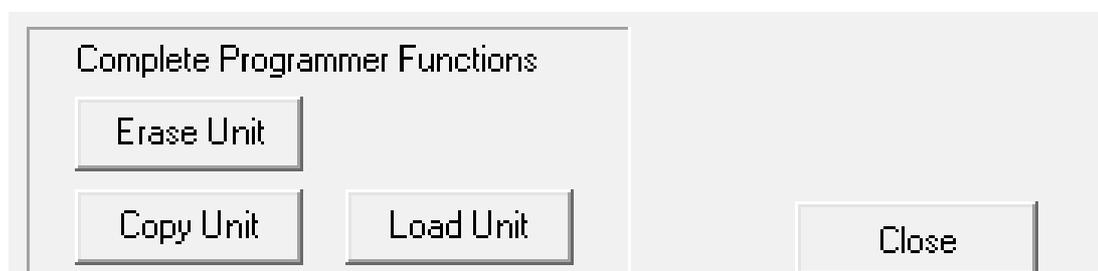
This button (at right hand side below display pane) will give more details of what the programmer is loaded with. If this feature is enabled, the button has a green tick on it.

When enabled, clicking on a slot will update all the settings to those used in that programmer slot, including fuses.

### **Program Options**

The programmer settings are saved to the registry and when software is run again, these settings will be loaded.

### **Complete Programmer Functions**



These are at bottom right of screen.

**Erase Unit** button. This will erase all programs and settings from the programmer. The programmer will then be empty.

**Copy Unit** button. This allows the contents of the programmer to be saved to a file (.prg). All the settings and data are saved.

**Load Unit** button. This allows the settings and data from one programmer previously saved as a PRG file to be loaded into another programmer.

This is the easiest way to load multiple programmers. Load the first one with all the slots you need, then Copy Unit. Use Load Unit to transfer the contents to other programmers.

This is also the simplest way to transfer settings to another user. This replaces the Fob file mechanism used on old AVR handheld and keyfob software.

## Programming Target

### POWER OPTIONS

There are three power options with the Handheld Programmer

#### 1) Programmer powers target

Plug into unpowered target. Connector pin 2 (Vcc) must be connected to Vcc on your board and all 4 GND pins must be connected to target ground. Use battery or external PSU.

**There is a 150mA current limit for powering the target.**

*In Software, select Vcc needed by target circuit on Target Voltage screen (0-5V)*

#### 2) Target Powered and Vcc connected to ISP Header

If target Vcc is connected to ISP header – Pin 2, then *Set voltage in software, on Target Voltage Screen, to 0V (or less than target voltage)*. All 4 GND pins must be connected and target must be powered.

#### 3) Target Powered and Vcc NOT connected to ISP header

If target Vcc line is NOT connected to Pin 2 – Vcc on ISP header,

*In Software, select Vcc on Target Voltage screen (0-5V) to match target circuit voltage.* Do connect all four GND pins to target ground. Power Target

## TARGET Connection -ISP

1) Connect the programmer to the target system using the short ribbon cable.

- Target Layout – not end of lead view
- Header is 0.1" (2.54mm) box header in 5 x 2 format, with polarising notch
- See section below for *Six Way adapters*
- GND\* These pins must be connected to target ground
- GND One or both must be connected to Target ground

### TARGET CONNECTOR FOR AVR PROGRAMMERS

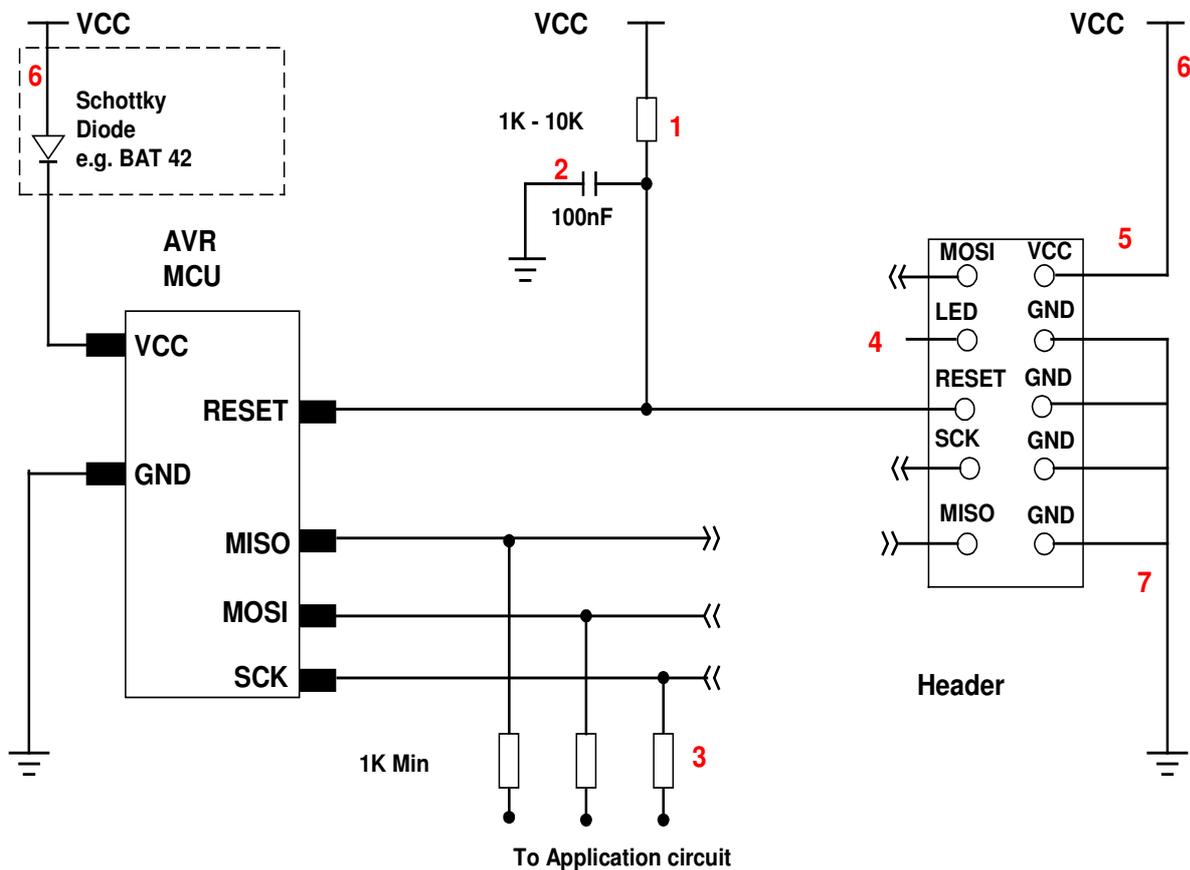
MOSI	1	2	VCC
LED OPTIONAL	3	4	GND
RESET	5	6	GND*
CLK	7	8	GND*
MISO	9	10	GND

### TOP VIEW OF THE CONNECTOR ON THE TARGET SYSTEM

0.1" PITCH 2\*5 BOXHEADER  
WITH POLARISING NOTCH

## Recommended ISP Circuit

This diagram shows a typical ISP circuit that will work with the Handheld Programmer. Please read the notes for more detail.



- 1) This resistor should be fitted. It can be larger than 10K if required, but not smaller than 1K
- 2) Again 100nF is a typical value. We suggest a minimum of 10nF.
- 3) Programming lines should be isolated from application circuit with series resistors, especially if application circuits force the state of the AVR pins. In exceptional cases, a multiplexer may be needed to isolate these lines. Capacitors on these lines may mean that a slower programming speed should be selected.
- 4) Optional LED line. This can be connected to an indicator LED if desired, or used to drive a multiplexer. It is LOW during programming

- 5) If Vcc is not connected to header, see **Power Options** section for programmer setup.
- 6) If the programmer is powering the target, it is current limited to 150mA. If the rest of your circuit draws too much current, then fit this diode, and connect VCC to header and AVR through it.
- 7) GND pins. We recommend that all GND pins are connected. If not, then either pin 4 or pin 10 MUST be connected – these are programmer Ground. Pin 6 is connected to programmer battery but can be omitted. Pin 8 MUST be connected as it is the mode pin. The programmer uses this pin to check if it is connected to a PC or a target.

**Note:** The 10-way lead is not wired Pin 1 to Pin 1, so the connector on the programmer is mirrored.

## 10-way Connector on Programmer

HAND HELD PROGRAMMER  
CONNECTOR (AVR)



TOP VIEW OF THE CONNECTOR ON  
THE PROGRAMMER

0.1" PITCH 2\*5 BOXHEADER  
WITH POLARISING NOTCH

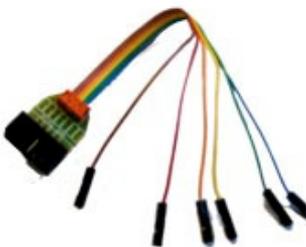
## SIX WAY ADAPTERS

Because of the need to connect more than 1 GND pin, the adapter should connect GND pins together. So, the adapter is not as straight forward as it first appears.

Adapters from the 10-way DIL interface to 6-way flying leads, 6-way DIL (3 x 2 0.1" pin header), and 6-way Micromatch connectors are available from Kanda. 10-DIL6 is included in this kit.

### Order Codes are:

10FLEX6



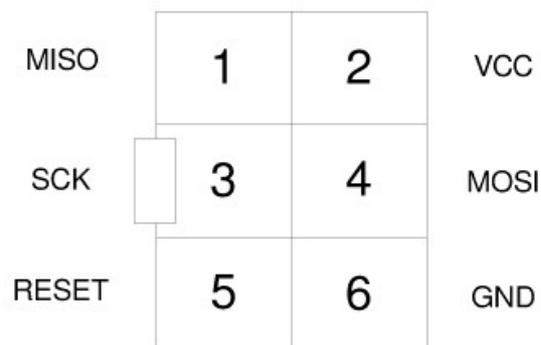
10DIL6



10MICR6



TARGET CONNECTOR FOR AVR  
PROGRAMMERS (ATMEL 6WAY)



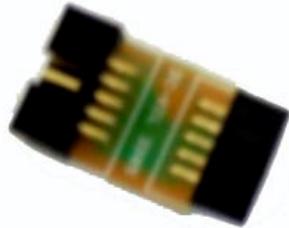
TOP VIEW OF THE CONNECTOR ON  
THE TARGET SYSTEM

0.1" PITCH 2\*3 BOXHEADER  
WITH POLARISING NOTCH

## JTAG Programming

Everything is the same for JTAG programming except the programmer needs a JTAG adapter. These are available on our shop ([www.kanda.com](http://www.kanda.com)) but is also included in this kit.

Order Code: AVRHHP-JTAG



If you want to make your own JTAG adapter, the pin outs on the programmer are shown below

**Note:** These are NOT the same as the end of the 10-way lead, which is not wired pin 1 to pin 1. We recommend that you make up your own lead and use the 10-way connector on the programmer. All the GND pins on this connector must be wired to ground.

The second diagram is an Atmel JTAG layout usually used on target PCBs.

Atmel JTAG Header	Handheld Programmer
1: TCK	6 : TCK
2: GND	1,3,5,7: GND
3 TDO	2: TD0
4: Vtref	9: VCC
5: TMS	4: TMS
6:SRST	8 : NsRST
7: Vsup	9: VCC
8: TRST	N/C
9: TDI	10: TDI
10: GND	1,3,5,7 : GND

- 1) TRST is not available
- 2) VCC pin 9 on programmer needs connecting to both Pin 4 AND Pin 7 on target end
- 3) All 4 GND pins on programmer must be connected to either Pin 2 or Pin 10 or both, depending on which are connected to Ground on your target.

HANDHELD PROGRAMMER  
CONNECTOR (AVR-JTAG MODE)

GND	1	2	TDO
GND	3	4	TMS
GND	5	6	TCK
GND	7	8	NsRST
VCC	9	10	TDI

TOP VIEW OF THE CONNECTOR ON  
THE **PROGRAMMER**

**This is not end of 10-way lead**  
TRST Pin is not available

0.1" PITCH 2\*5 BOXHEADER  
WITH POLARISING NOTCH

ATMEL JTAG CONNECTOR

TCK	1	2	GND
TDO	3	4	Vtref
TMS	5	6	SRST
Vsup	7	8	TRST
TDI	9	10	GND

TOP VIEW OF THE CONNECTOR  
ON TARGET BOARD

0.1" PITCH 2\*5 MALE BOXHEADER  
WITH POLARISING NOTCH

## Errors

During programming, the LCD screen will say **Programming...**

When programming has finished it will say **Programmed OK**

If there is an error, the error cause will be displayed. These are

- **'ISP Entry FAIL'** - check connections
- **'EEPROM verify FAIL'** - check skip FF setting or slow programmer
- **'FLASH verify FAIL'** - slow down programmer
- **'FUSE verify FAIL'** - slow down programmer
- **'Count LIMIT Reached'** - Number of programs limit reached
- **'Device ID WRONG'** - check correct AVR selected
- **'Empty Slot'** - selected slot is empty
- **'VCC Over-Current'** - current limited exceeded. Power target or isolate extra circuits and check for faulty board

The error or OK message will flash repeatedly, the number of times is set by LED (Error) Repeat No on set up screen. Wait until error message stops or press 0 key to clear message and re-enable programming.

## BATTERY AND POWER SUPPLY

The Portable Programmer uses a rechargeable 9V PP3 battery. These are commonly available.

**ONLY FIT RECHARGEABLE BATTERY** as programmer contains a charging circuit! The programmer must always have a battery in it even if power supply is connected, as power supply just charges battery.

Current output may be limited when battery is charging, approximately 100mA rather than 150mA.

The programmer battery is charged from the external Power Supply Unit included. This power supply is

- 2.1mm barrel connector (coaxial plug), centre positive.
- 15V DC regulated
- 300 mA plus

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## **TROUBLESHOOTING**

### **Windows driver problems**

If you get a driver error or FTDIxx.DLL not found, make sure that you have run the install software on CD and then plugged in programmer, NOT the other way round.

The driver should appear as a "USB Serial Converter" in USB section of Device Manager. Windows should do this automatically. If it does not, please follow this procedure.

- Plugin Programmer and ideally remove other USB devices
- Go to Control Panel > System > Hardware screen
- Click on Device Manager button
- Open USB section and select "USB Serial Converter"
- Right click on it, and select Update Driver
- Driver location is (default install path)  
C:\Program Files\Kanda\AVRHHP\driver\driver

### **Error Message: "Programmer is not responding – check connections and battery power"**

- 1) Check dongle is attached to USB port
- 2) Check that programmer is connected to PC as shown on Page 1
- 3) Check battery or power supply to the programmer
- 4) Make sure you have a Handheld Programmer dongle, not a standard AVRISP-U/STK200 dongle. The unit will say "Dongle2" on it.

### **Programming Errors – RED Flashes on LED when programming**

- 1) Ensure your target circuit is wired correctly as shown in connection diagrams
- 2) Check power options are correct – see Power
- 3) Slow down programmer speed in software – especially if you have capacitors on programming lines or other unusual circuitry.
- 4) Check battery voltage

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## **FURTHER INFORMATION**

Please contact [support@kanda.com](mailto:support@kanda.com) for technical support or go to our website support pages for latest software.

See [www.kanda.com/support](http://www.kanda.com/support)

## Contact details

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