HAND HELD PROGRAMMER QUICK START GUIDE

IMPORTANT INFORMATION

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

Installing Software

1) Run the executable file on the CD. This will install software and pre-install USB drivers.

2) Plugin PC dongle to a USB port. The drivers should install automatically. If they do not, see Troubleshooting section

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.

Method 1

50cm Cable

Program   ERROR

Connect Handheld Programmer to PC adapter with short cable

USB Port →
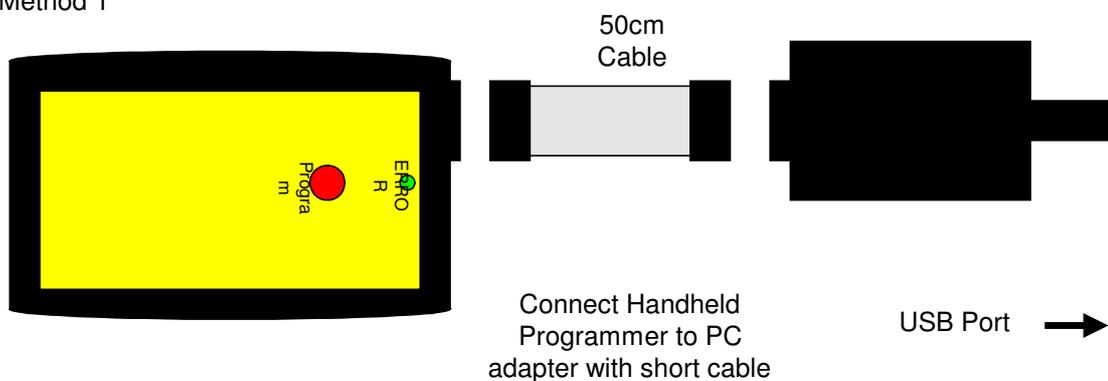
3) To load code, follow the instructions in the software.

Run the Handheld 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.
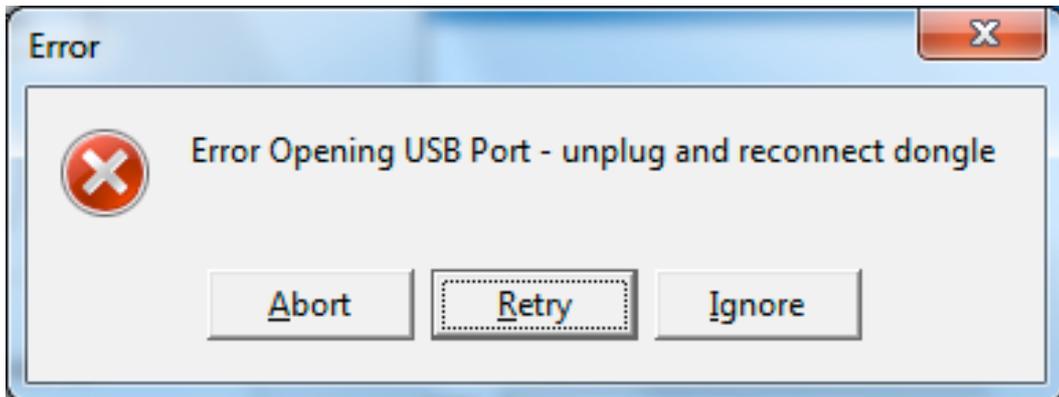

b) If the AVR Hand held Programmer is not detected, then this message will appear. Make sure the programmer is connected to the dongle, and the programmer is powered, or battery is Ok.

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.

Information

Programmer Needs Firmware update or Flat battery
Version:$DB
Firmware:C:\Program Files (x86)\Kanda\PICHHP\firmware\bkfpicusb.upd
Click Cancel to Exit and check battery or OK to do Update

OK
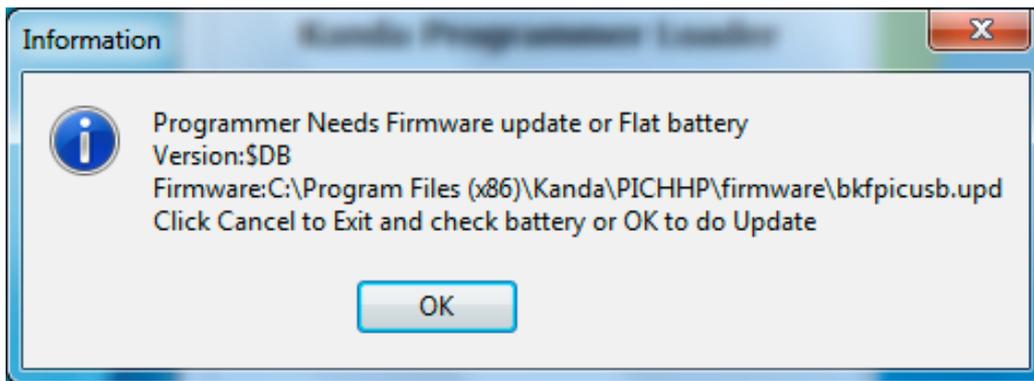
Once the programmer is detected and any firmware update necessary has been carried out, the main programmer window will appear.
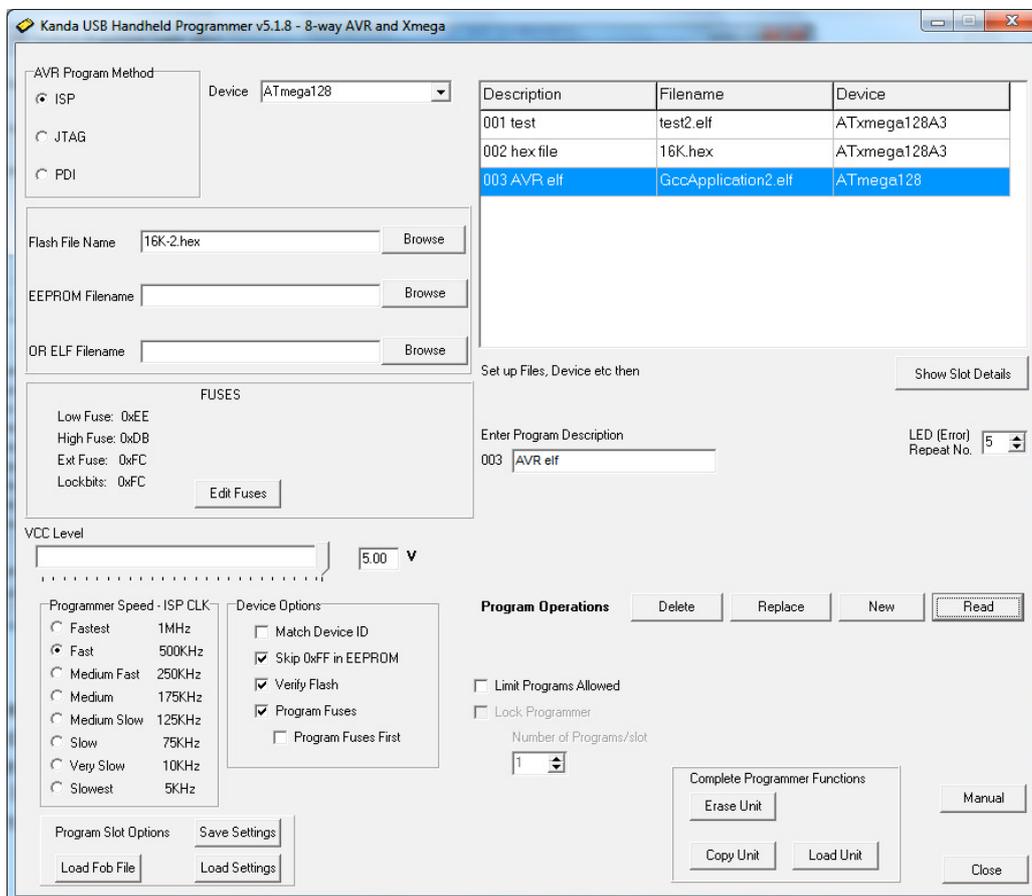
The right-hand side of the screen shows the Programmer settings, and the left-hand side shows details about the AVR device, filename, programming method and other details that will be used to load the programmer. This is 8-way screen, simple programmer omits some buttons (Delete and Replace).

Programmer and Device Setup

- Select **Program Method** - ISP or JTAG (PDI for Xmega)
- Select **Device**
- **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
- **ELF filename** box. Load a production ELF file (produced by Atmel Studio 7) *instead* of flash and EEPROM files. This file includes flash, EEPROM, fuses, lockbits and User Row for Xmega.
- **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. JTAG and PDI do not use this.
- **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 or use faster programming speed on new AVR microcontrollers. **This will not work on locked AVR microcontroller.**

Other Setup Features

- **Program Description**. You must enter a program description of up to 16 characters. This is displayed in pane at top when programmer is read.
- **LED (Error) repeat No**. If there is an error, a number of red flashes will indicate the cause of the error. This box sets the number of times this code is repeated. Holding mouse over this box will show what error codes are.

Note: You can press button to program again while error codes are flashing.

- **Limit Programs Allowed**. If this is checked, the programmer can only be used to program the number of target devices set in the **Number of Programs** box. This is per slot on 8-way.

Lock Programmer

This is enabled when **Limit Programs** is checked. It will prevent the programmer being copied or reloaded to prevent alterations to the number of programs allowed. The only way to clear it is by choosing **Erase Unit** button.

On 8-way programmer, only the last slot loaded should be locked. If you lock first slot, you will not be able to load any more. Locking the last slot used will lock the whole programmer.

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**. They are different on one way, 8-way and empty 8-way programmers

One way (standard) Programmer

Click **Load Button** to load the programmer with all the settings, fuses and files we have already selected. This will clear any old settings.

Click **Read** to examine the contents of the programmer. **Show Slot details** button will give more information, see section below.

8-Way Loaded Programmer

The 8-way programmer has more buttons because we can delete, replace or add new programs. Once the programmer is loaded with 8 programs the New program button is disabled.
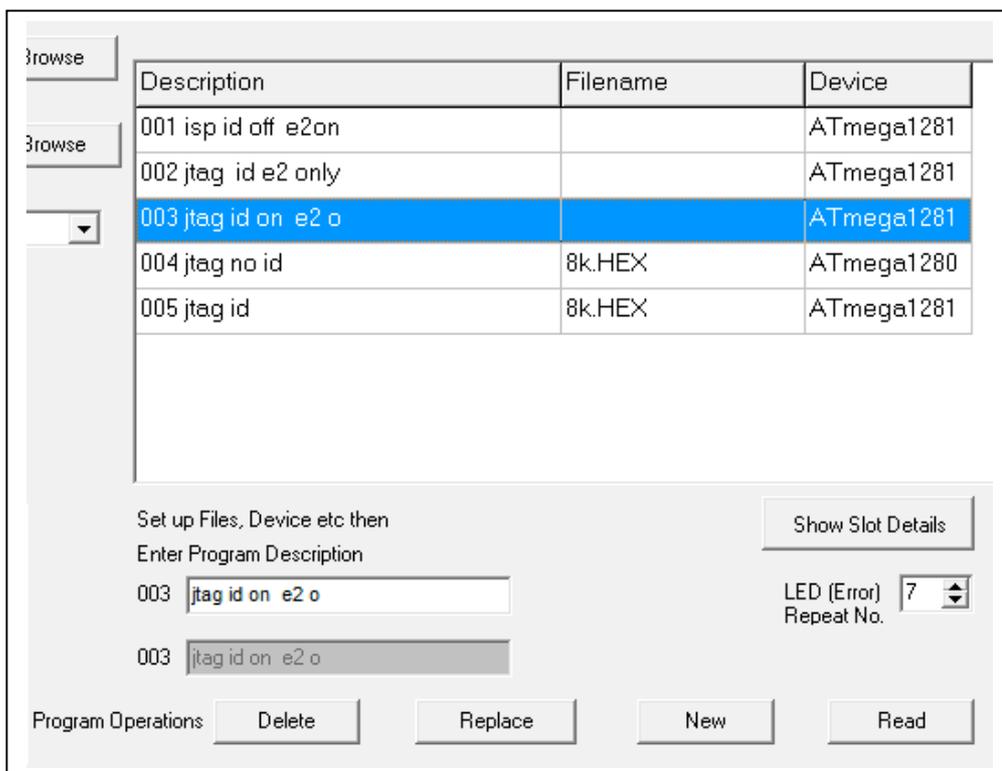
New Button. This will add the program to the next free slot

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.

8-way Empty Programmer

If the 8-way programmer is empty, only New and Read buttons are shown. Clicking on these buttons will load the programmer or the current slot on the 8-way unit. This PC software ignores the slot selector switch on the programmer its self.

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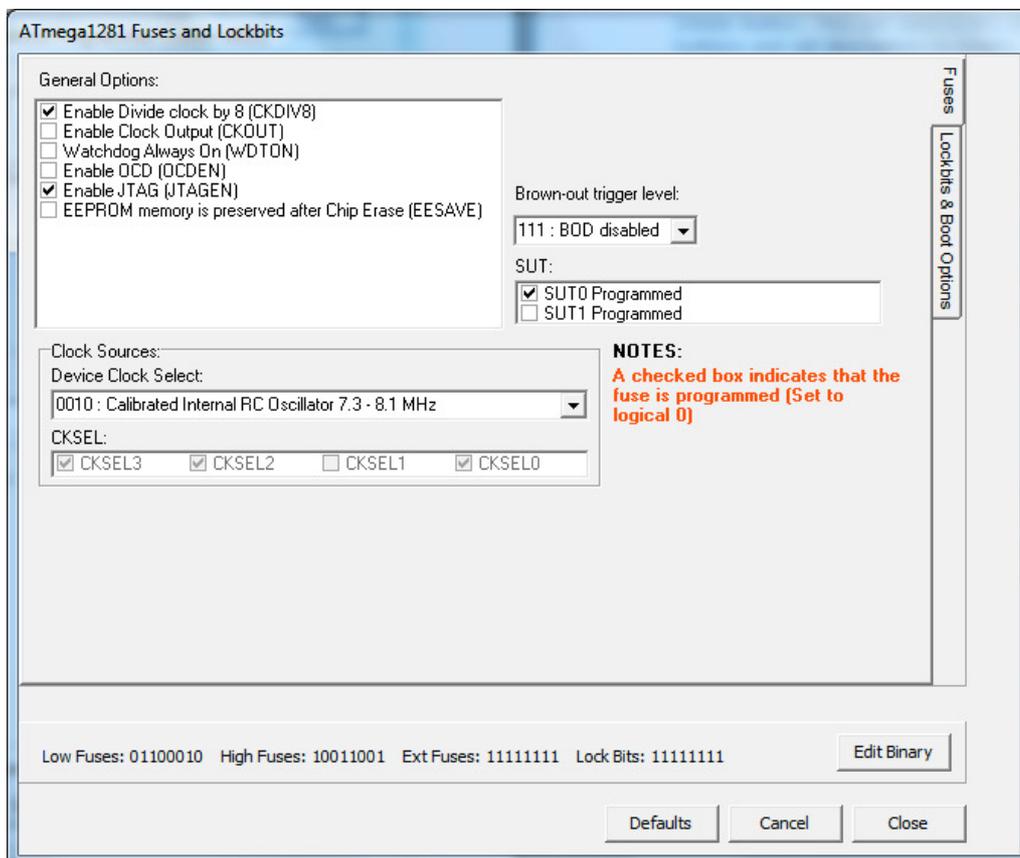
The available fuses and lock bits for the currently selected AVR are displayed. Click on the tab on the right of the screen to **see Lockbits and Boot Block** options.

Enabled AVR fuses (programmed) are actually 0 value. The binary values of each available fuse are displayed at the button 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 the contents of the programmer.

Clicking on this button will update all the settings to those used in the programmer slot that is currently selected in the display pane, including fuses.

Program Options
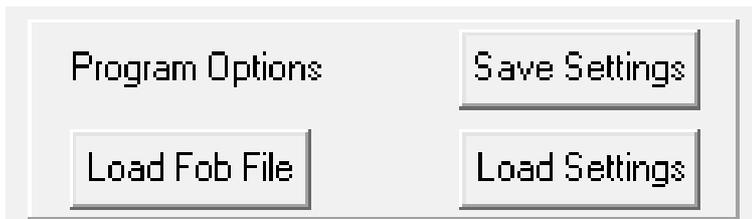
Located at button left of the screen, the **Load Fob File** button allows all the settings to be updated from a Fob file (.fob) that has been saved from earlier versions of AVR Handheld software.

Save Settings creates an Inifile where you want to save it and **Load Settings** will open an Inifile.

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

Complete Programmer Functions
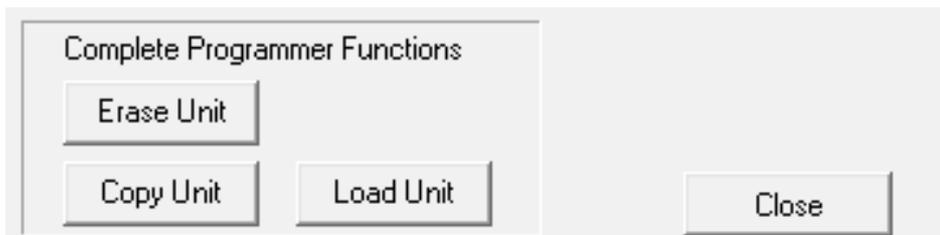
These are at bottom right of screen.

Erase Unit button. This will erase all programs and settings from the programmer. The programmer will then be empty. This is the only way to reset a locked programmer.

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. Just create a PRG file with Copy Unit, send the file to another user and they just use Load Unit button to recreate all the programmer settings, including your code and data.

This replaces the Fob file mechanism used on old AVR handheld software.

Load from Command line or Process
The software can be launched from a command line or another process by calling avrHHP.exe with a Load parameter and optional .PRG filename parameter, for example

avrHHP Load

This will open PRG open file dialog box. Select file to load programmer

Call it with a second parameter, a .PRG filename eg

avrHHP.exe Load "C:\Test Files\test1.prg" will load this file

The software will run, load the programmer and then close.

To keep the software open after load add a third parameter called SHOW, for example

avrHHP.exe Load "C:\Test Files\test1.prg" SHOW

Programming Target

POWER OPTIONS
There a 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 selector (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 Selector, 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 selector (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 - 10-way IDC header

- 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.
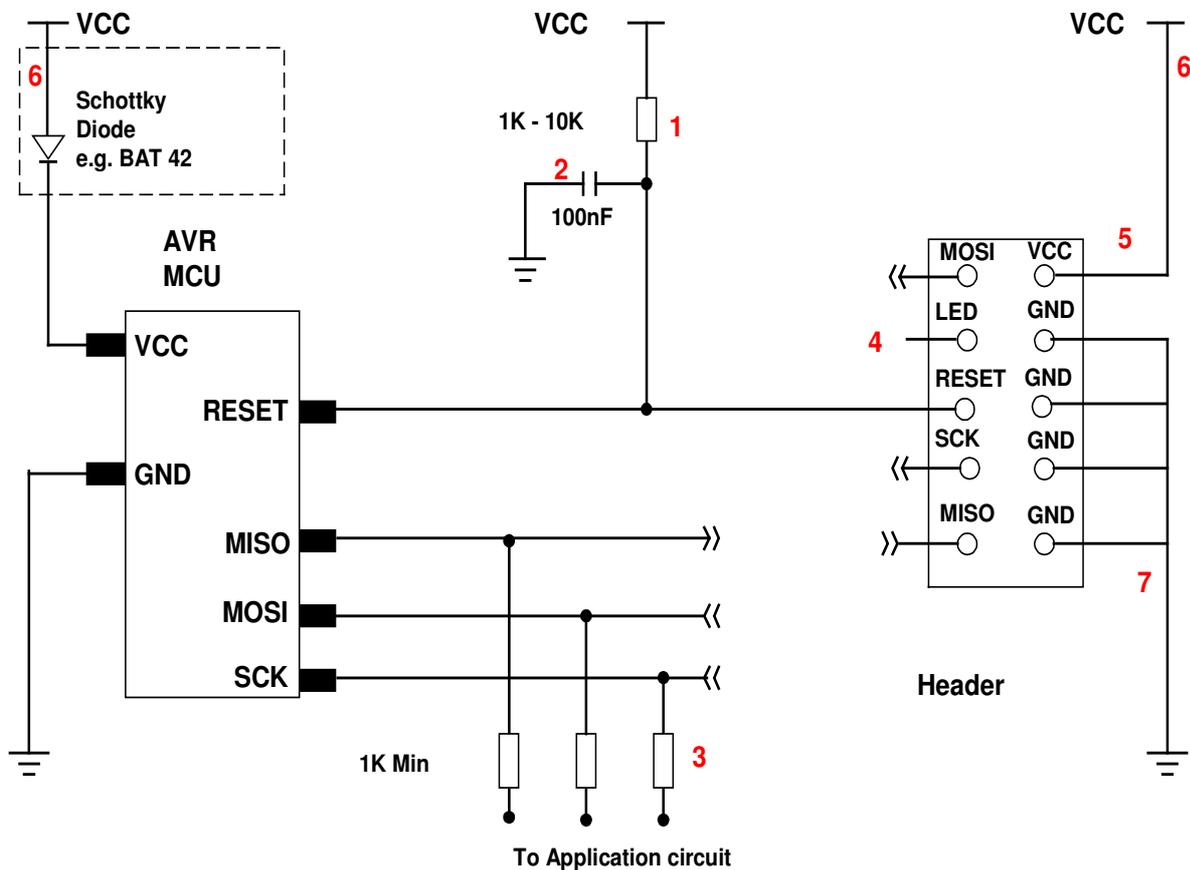
1) This resistor should be fitted. It can larger than 10K if required, but not smaller than 1K

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. AVRs that use RX/TX pins for programming eg ATmega128 need at least a 1K resistor for RX line if UART is used.

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 shown below is NOT the end of the 10-way lead.

10-way Connector on Programmer

HAND HELDPROGRAMMER
CONNECTOR (AVR)

GND	1	2	MISO
MODE CONNECT TO GND	3	4	CLK
BAT - CONNECT TO GND	5	6	RESET
GND	7	8	LED OPTIONAL
VCC	9	10	MOSI

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 (Atmel 3 x 2 0.1" pin header), and 6-way Micromatch connectors are available from Kanda.

Order Codes are:
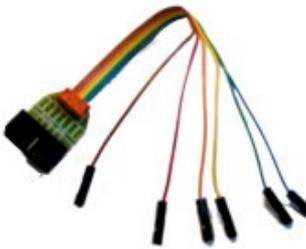
10FLEX6   10DIL6   10MICR6

TARGET CONNECTOR FOR AVR
PROGRAMMERS (ATMEL 6WAY)

| MISO	1	2	VCC
SCK	3	4	MOSI
RESET	5	6	GND

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)

Order Code: AVRHHP-JTAG
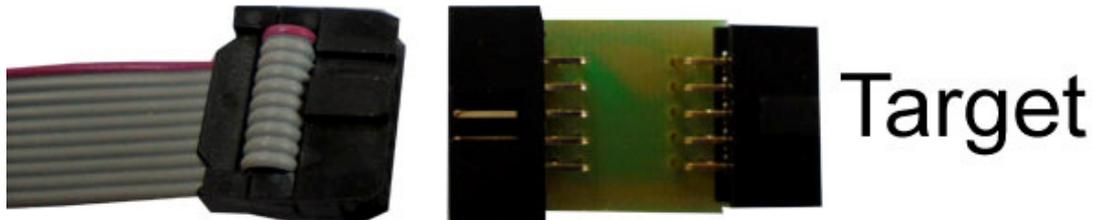
If you want to make your own JTAG adapter, the pin outs on the programmer are shown below

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.

4) Misconnection (to JTAG without adapter or ISP with adapter) will NOT damage programmer, you will get solid red over-current LED. It may damage 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

ATXMEGA PDI Programming

Only available on ATxmega version - HH0110X, HH0120X, HH0810X and HH0820X.

Connect the flying lead adapter to the end of the 10-way lead.

These wires need connecting to the target for XMEGA PDI programming

Yellow - PDI Clock
Blue   - PDI Data
Green - VCC
Brown - GND

If you want to make your own connector from the programmer, this is the 10-way connector on the programmer in PDI mode.

Important: All GND pins must be connected

HANDHELD PROGRAMMER
CONNECTOR (XMEAGA PDI
MODE)

GND	1	2	DATA
GND	3	4	CLOCK
GND	5	6	N/C
GND	7	8	N/C
VCC	9	10	N/C
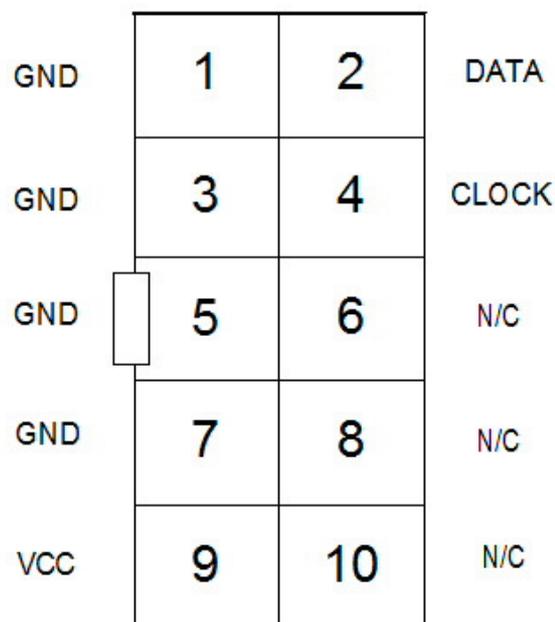
TOP VIEW OF THE CONNECTOR ON
THEPROGRAMMER
This is not end of 10-way lead

0.1" PITCH 2*5 BOXHEADER
WITH POLARISING NOTCH

ATxmega Programming interface

Reset (PDI-CLOCK)

Any pull-up resistor should be a minimum of 10K or removed altogether.

Any reset decoupling capacitor should be removed.

Any other load on RESET should be removed.

PDI-DATA

This pin should be dedicated to programming only. It should only be connected to the programming header.

Typical PDI Connection

Figure 3-1. PDI connection.
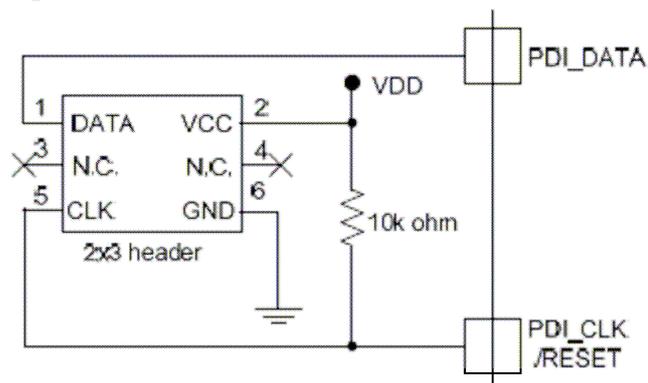
PDI programming default speed is 230,400 baud so any capacitance on programming lines will create problems. Slow it down if you get 2 red error flashes.
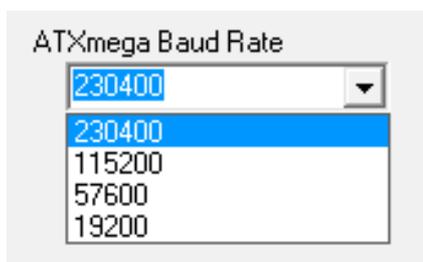
You will also need to slow down baud rate for lower voltage applications e.g. 57,600 at 1.9V.

LED Codes

The programmer will give a brief green flash when plugged in to target. When button is pressed, LED will flicker green during programming. When programming has finished, these codes appear.

Green Flashes, 1 second interval: Programmed OK

Solid Red: Current limit (150mA) exceeded. Try powering the target. This can also be caused by large capacitance on target, see troubleshooting section or contact Kanda support for advice.

2 Red Flashes: Failed to enter ISP, JTAG or PDI. Possible causes:
• No device connected
• Wrong programming method selected
• JTAGEN fuse disabled on JTAG
• No adapter or faulty adapter for JTAG or PDI
• Programmer speed too fast for target clock (ISP)

3 Red Flashes: EEPROM did not verify

4 Red Flashes: Flash did not verify

5 Red Flashes: Fuses/Lockbits did not verify

6 Red Flashes: Program Limit reached

7 Red Flashes: Device ID did not match

8 Red Flashes: Empty slot selected

9 Red Flashes: Header checksum mismatch

10 Red Flashes: Flash checksum mismatch

If you get either 9 or 10 flashes, the user program has become damaged, possibly by firmware updater. Reload the programmer (or first slot on 8-way) to correct this.

11, 12, 13, 14 Red Flashes: JTAG or PDI timeout problem, usually caused by removing lead during programming.

You can press button again to start programming when error or success codes are still flashing.

BATTERY AND POWER SUPPLY

The Handheld Programmer uses a standard 9V PP3 battery. These are commonly available.

The Handheld Programmer can also be powered from an external Power Supply. The power supply should be

- 2.1mm barrel connector (coaxial plug), centre positive.
- Ideally 9V DC regulated but 9-15V will work. Do not exceed 15V.
- 300 mA plus

A universal PSU or Wall Transformer is available on the Kanda shop – **Order Code PSU9V-UNI**

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.
5) Remove other USB devices that may be conflicting

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

Programming Errors – Solid RED on LED when programming

1. If using JTAG or PDI, check adapter is connected

2. If target is unpowered, check it is not drawing more than 130-150mA

3. Check for bad connections

4. Low battery indication

FURTHER INFORMATION

Please contact support@kanda.com for technical support or go to our website support pages for latest software.

See **www.kanda.com/support**

Contact details

Website: www.kanda.com

email: sales@kanda.com

Phone/Fax: +44 (0)1974 261 273

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