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.

LOADING FROM THE PC

1) Connect the PC adapter (dongle) to a PC USB port.

2a) Connect the long extension cable, using the end black socket, to the PC adapter. Then connect the programmer to the end grey plug of the extension cable - using the short ribbon cable. This method is useful where access to the PC adapter is poor.

Male 10-pin
Connector

50cm Lead

PC USB Port ➡
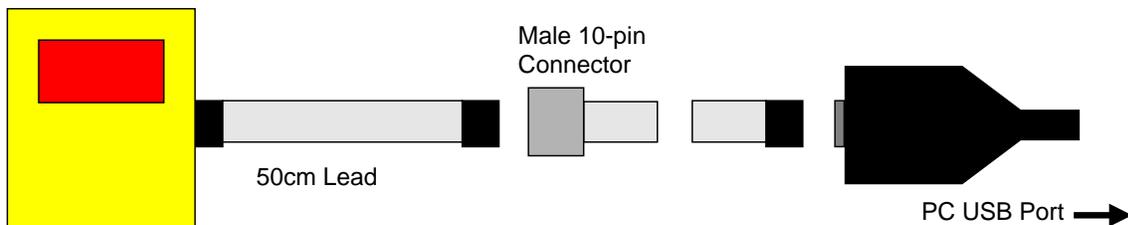
1) Connect 50cm lead to Handheld Programmer
2) Connect black 10-way female connector (on end of lead) to PC adapter
3) Plug 50cm lead into Male 10-way connector

2b) Or, simply connect the PC adapter directly to the programmer using the short ribbon cable.

Method 1

50cm Cable

Connect Handheld
Programmer to PC
adapter with short cable

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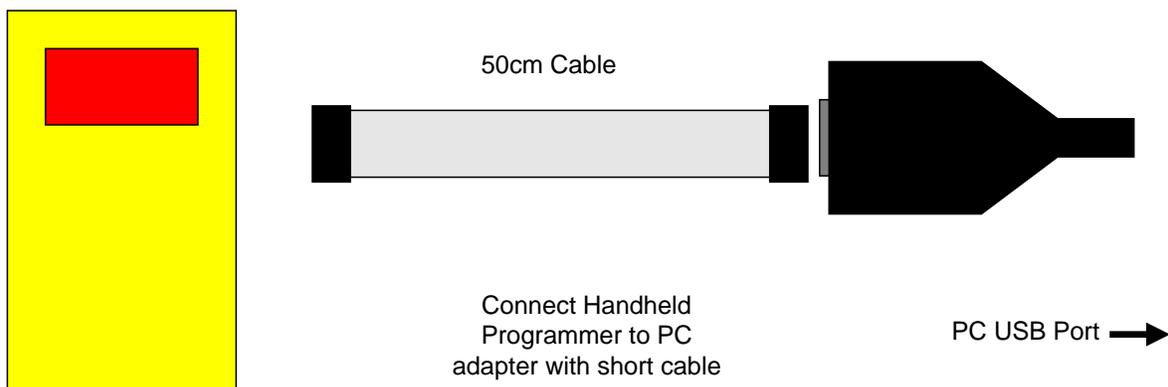
3) To load code, follow the instructions in the software.

PROGRAMMING THE TARGET SYSTEM

3) Install and Run the Handheld Programmer software

- Select the AVR device you want to use on the device screen

- The next screen allows you to select whether the Fuses (not Lockbits which will always appear) should be programmed. Check the **Fuse Enable** box to program fuses.

   Notes:
   - The whole AVR is erased (Flash and EEPROM) when a Flash file is selected
   - To preserve the EEPROM data, the EESAVE fuse must be enabled. This fuse prevents the EEPROM from being erased. Do not select an EEPROM file if you want to keep EEPROM data
   - To program EEPROM only, select an EEPROM file but no Flash file. This will NOT work if device is locked.
   Note: The EEPROM is not fully erased, so if your new data is smaller than the existing data in the EEPROM, some of the old data will be left. To avoid this happening, see **Skip FF in EEPROM** section

   - Fuses can be programmed before erase – *see below*. This means you can set the EESAVE fuse to preserve EEPROM data if it is not already set. Again this will not work if device is locked.

- The next screens are Lockbits followed by Fuses (if Fuse Enable is checked).
   Notes:
   DWEN (Debugwire Enable) and **RSTDISBL** (Reset Disable) Fuses are omitted because setting either of these fuses disables further serial programming of the AVR. Contact support if you need to set these fuses.

- The screen after Fuses screen is for Startup Time and Bootblock settings.

- The next screen is for setting the **target voltage**.
   Notes:
   This setting will change depending on whether the target is powered or not. *See section below on Power Options*. As a general rule:
   1) If Programmer powers target, set voltage to required target voltage
   2) If target is powered and Vcc is connected to ISP header, set voltage to 0V
   3) If target is powered and Vcc is **NOT** connected to ISP header, set voltage to match target voltage – Vcc

- The next screen is more programmer settings
   Notes:
   - Speed Settings: The programmer should work on **Fastest** setting unless you have a very slow clock (<1MHz) or you have capacitors on programming lines. If you get programming errors when using the programmer, try a slower setting.
   - Check **Program fuses before erase** if you want to alter behaviour, e.g. set EESAVE fuse.

- **Skip FF in EEPROM**
  Checking **Skip FF in EEPROM Program** will stop locations with 0xFF in your EEPROM file from being programmed. This can be used to increase programming times, or to preserve locations with ID numbers, for example.

  If you want to skip FF to increase programming speed, you should not Skip FF on EEPROM Verify, to ensure that your EEPROM has programmed correctly.

  However, if you want to use Skip FF to mask locations, you will need to check Skip FF on EEPROM Verify as well. This use of Skip FF will only work if
  You only load an EEPROM file
  OR Preserve EEPROM Fuse is enabled
  AND device is not locked

- Almost there! The time selection on this screen allows error light to stay on for a shorter or longer time, default 5 seconds.
  Note:
  The error code (1, 2, 3 etc. flashes – *see below*) will repeat once a second, for as long as this time – default 5 seconds.
- On the last screen, click the **Upload** button to load the handheld programmer.

Your Programmer is now loaded and ready for use.
If you get errors when loading the Handheld Programmer, please see *Troubleshooting* section.

PROGRAMMING A TARGET

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 gr

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

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 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

Recommended ISP Circuit

This diagram shows a typical ISP circuit that will work with the Handheld Programmer. Please read the notes for more detail.
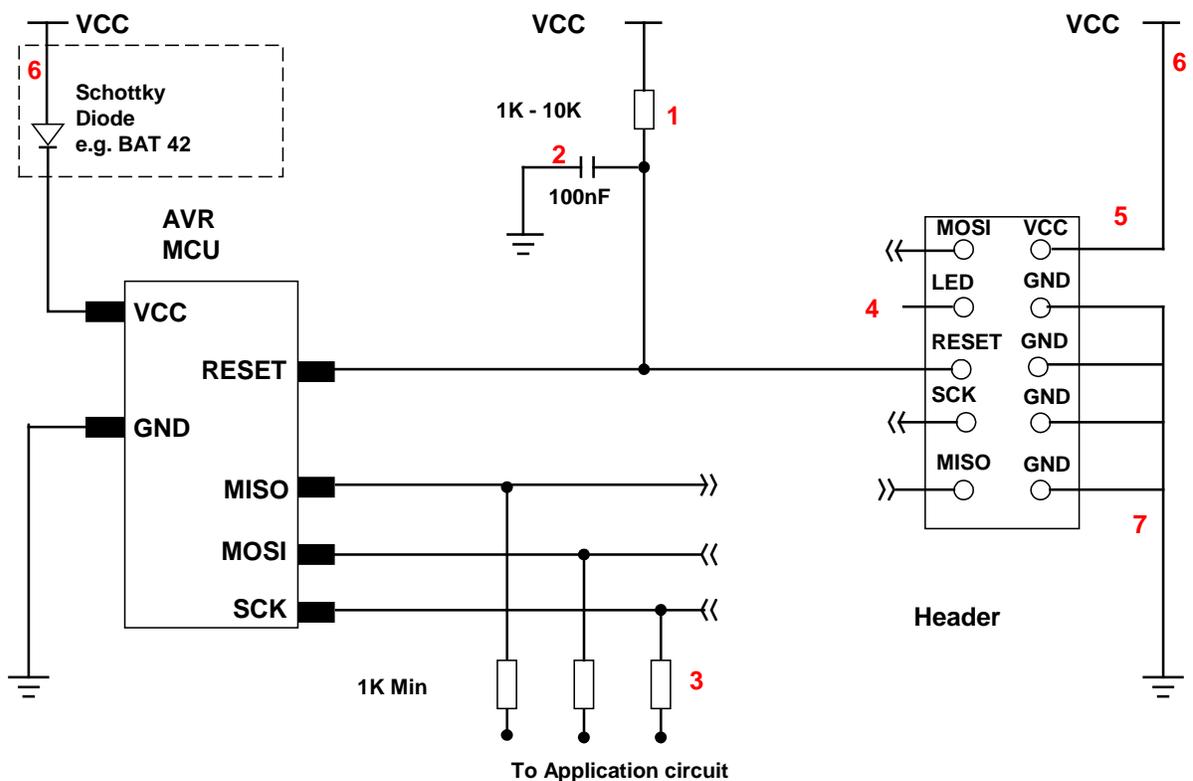
1) This resistor should be fitted. It can larger than 10K if required, but not smaller than 1K

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.

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.

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2) Press the button to start programming.

3) LED Codes

Normal operation:
A single green flash (red on v1.06), when first connected. Then, after pressing the button, the LED turns green for the duration of programming. At the end of programming the green LED switches off, and the target system is powered down.

If there was an error, the LED will flash RED.
Error code – LED turns red:

|	
2 Flashes	– Device did not respond
3 Flashes	- EEPROM Verify Failed
4 Flashes	- Flash Verify Failed
5 Flashes	- Fuse Verify Failed
Constant Red LED	– Low battery or Over-Current trip > 150MA

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.

Order Codes are:
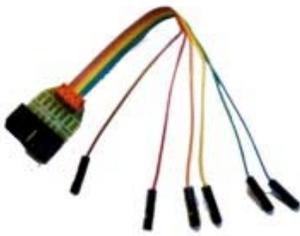
10FLEX6   10DIL6   10MICR6

USING STK200 AND 300 with HAND HELD PROGRAMMER

1) STK200's and STK300's have two supply rails. Vcc and +5V. Vcc is the supply to the AVR microcontroller, while pin2 of the ISP connection is connected to the +5V rail. A result of this, is that the programmer can not be used to power these boards during programming. They must be powered independently.

2) The original design of the STK300 reset circuit does not comply with the requirements of the programmer. To allow programming of older STK300's, a small modification to the STK300 is required.
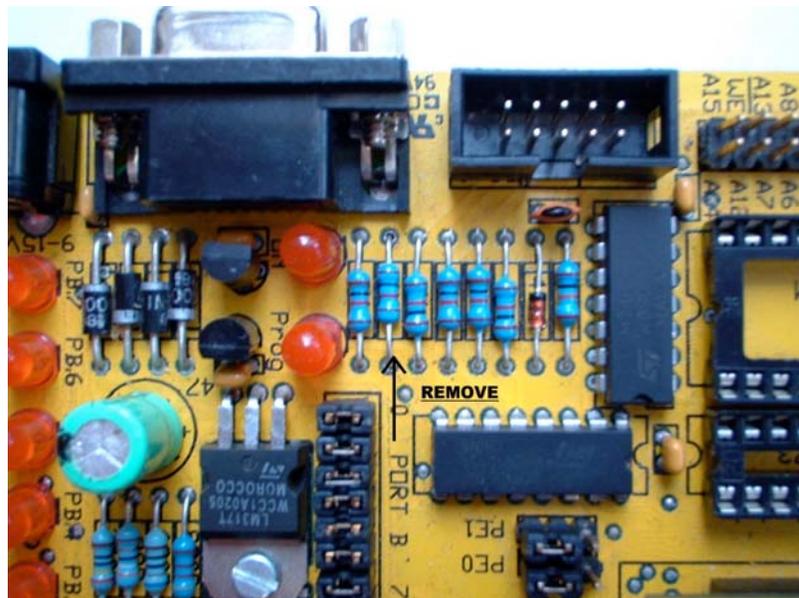
Check the value of the resistor indicated. If the value is 1K, it should be removed. STK200's requires no modification.

SAVING SETTINGS

The settings you have used can be saved for use again, in a FOB (.fob) file.
To save settings, click on **Save Fob button** on last page, and give the file a name.
To load a FOB settings file, click on **Browse button** on first screen and select the FOB file to load.

Note:
If you try and change device with a FOB file loaded, you may get unpredictable results. We advice you to NOT load a FOB file if you intend to change device as the fuses could be very different.

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.
- 9V DC regulated
- 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, 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\embres\AVRBKF-U\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 "Dongle" on it.

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

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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This shows the possible values for Start-up timer fuses **(SUT1:0).** The effect of these fuses changes with the type of clock selected with **CLKSEL** fuses

External Clock (CLKSEL 0000)

SUT1:0	Start-up Time from Power-down and Power-save	Additional Delay from Reset (Vcc = 5.0V)	Recommended Usage
00	6 Clock	-	BOD enabled
01	6 Clock	4.1 ms	Fast rising power
10	6 Clock	65 ms	Slow rising power
11	Reserved		

Internal RC (CLKSEL 0001 - 0100)

SUT1:0	Start-up Time from Power-down and Power-save	Additional Delay from Reset (Vcc = 5.0V)	Recommended Usage
00	1K Clock	4.1 ms	BOD enabled
01	1K Clock	65 ms	Slow rising power
10	32K Clock	65 ms	Stable at start-up
11	Reserved		

External RC (CLKSEL 0101 - 1000)

SUT1:0	Start-up Time from Power-down and Power-save	Additional Delay from Reset (Vcc = 5.0V)	Recommended Usage
00	18 Clock	-	BOD enabled
01	18 Clock	4.1 ms	Fast rising power
10	18 Clock	65 ms	Slowly rising power
11	6 Clock	4.1 ms	BOD or Fast

External Low Frequency (CLKSEL 1001)

SUT1:0	Start-up Time from Power-down and Power-save	Additional Delay from Reset (Vcc = 5.0V)	Recommended Usage
00	1K Clock	4.1 ms	BOD enabled
01	1K Clock	65 ms	Slowly rising power
10	32K Clock	65 ms	Stable power
11	Reserved		

External High Frequency crystal/resonator (CLKSEL 1010-1111)

CLKSEL 0	SUT1:0	Start-up Time from Power-down and Power-save	Additional Delay from Reset (Vcc = 5.0V)	Recommended Usage
0	00	258 CK	4.1 ms	Ceramic resonator, fast rising power
0	01	258 CK	65 ms	Ceramic resonator, slowly rising power
0	10	1K CK	-	Ceramic resonator, BOD enabled
0	11	1K CK	4.1 ms	Ceramic resonator, fast rising power
1	00	1K CK	65 ms	Ceramic resonator, slowly rising power

1	01	16K CK	-	Crystal Oscillator, BOD enabled
1	10	16K CK	4.1 ms	Crystal Oscillator, fast rising power
1	11	16K CK	65 ms	Crystal Oscillator, slowly rising power

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0	01	258 CK	65 ms	Ceramic resonator, slowly rising power
0	10	1K CK	-	Ceramic resonator, BOD enabled
0	11	1K CK	4.1 ms	Ceramic resonator, fast rising power
1	00	1K CK	65 ms	Ceramic resonator, slowly rising power

1	01	16K CK	-	Crystal Oscillator, BOD enabled
1	10	16K CK	4.1 ms	Crystal Oscillator, fast rising power
1	11	16K CK	65 ms	Crystal Oscillator, slowly rising power