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# **HAND HELD PROGRAMMER QUICK START GUIDE**

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## **IMPORTANT INFORMATION**

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

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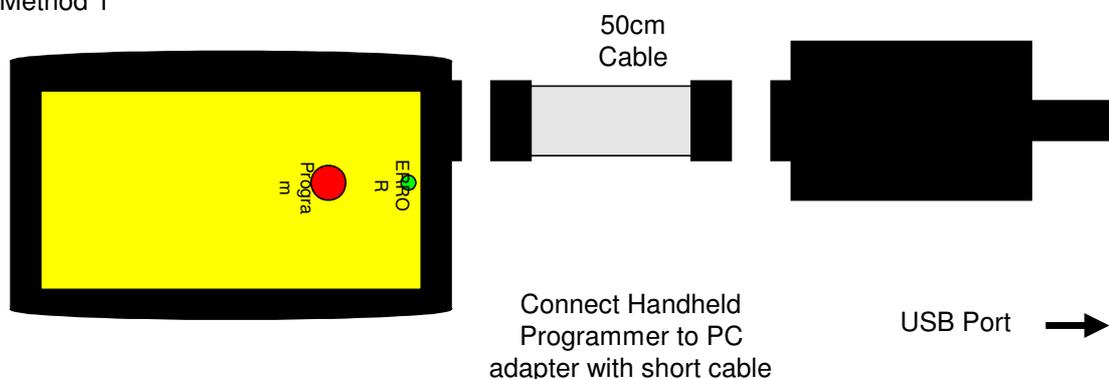
## **Installing Software**

- 1) Run the executable file downloaded. 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.

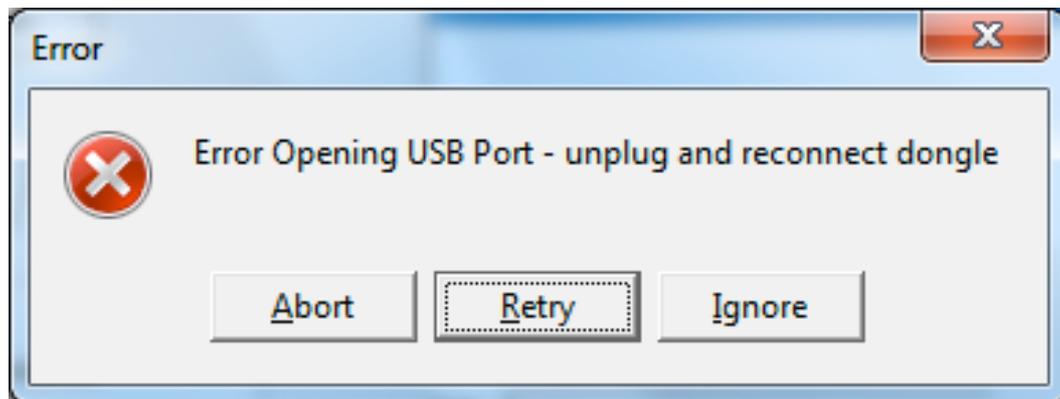
Method 1



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

## Run the Handheld Programmer software

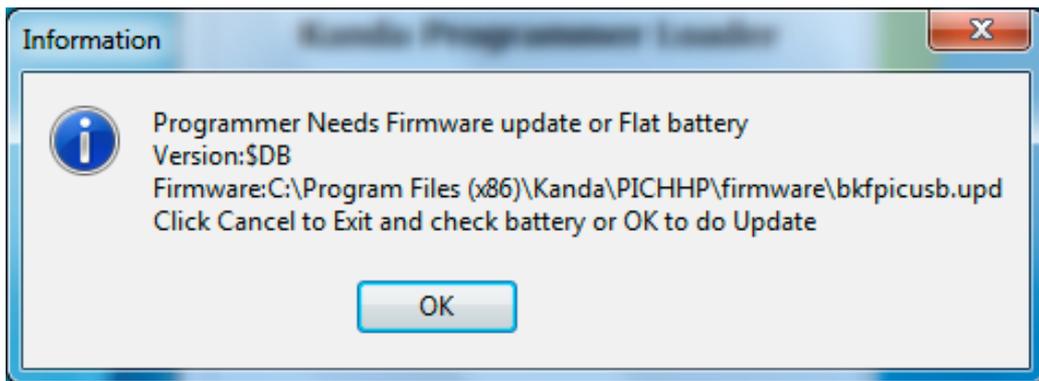
- a) If USB dongle is not detected, or another Kanda dongle is present, then this error appears. Make sure only one Kanda dongle is plugged in.



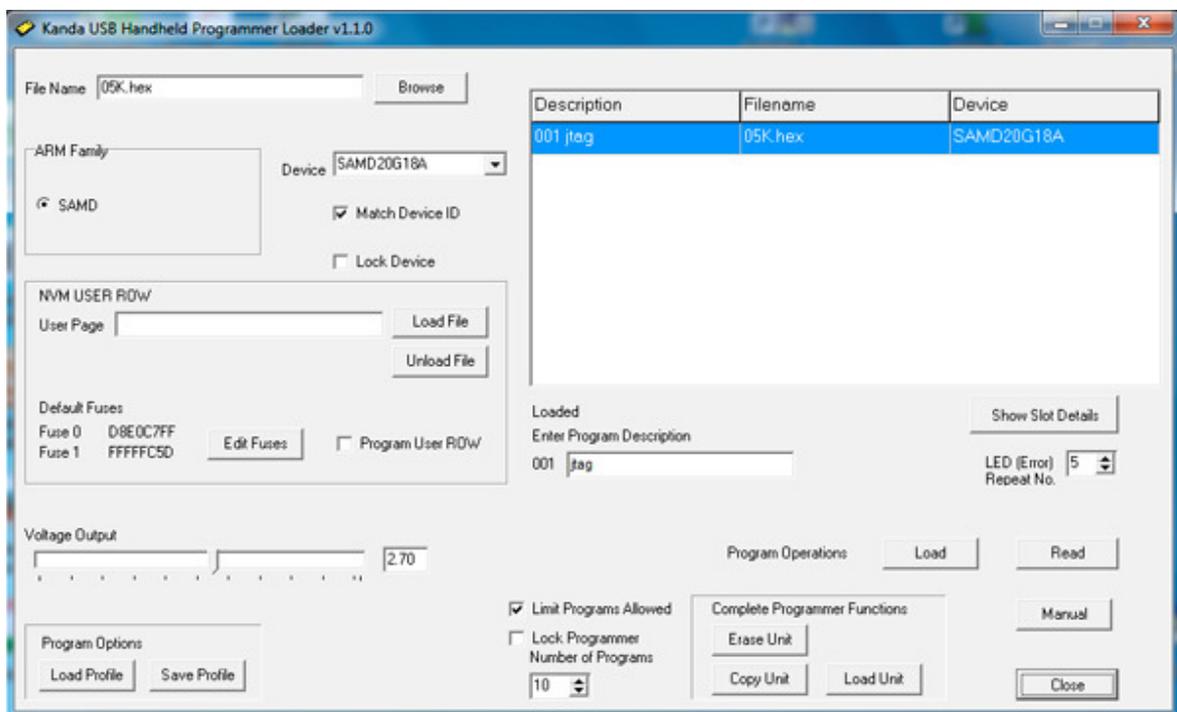
- b) If the Hand held Programmer is not detected, then this message will appear. Make sure the programmer is connected to the dongle, and the programmer is powered, or battery is Ok.



- 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 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 SAM device, filename, programming method and other details that will be used to load the programmer.

This is 1-way programmer screen, 8-way programmer adds some buttons (Delete and Replace).

## Programmer and Device Setup

- **File Name** box. Enter your flash filename
- Select **Family** - SAMD
- Select **Device** - all devices have a different device ID
- **NVM User Row** - load or change fuses, see section below.
- **VCC Level** - use slider to select voltage of target circuit
- **Device Options**
  - **Match Device ID.** If checked, programmer checks that target device ID matches device selected. Error code for mismatch is 7 red flashes.
  - **Lock Device.** Check to lock device after programming. This is separate from sector Lock bits in fuses.

## Other Setup Features

- **Program Description.** You must enter a program description of up to 28 characters. This is displayed in the 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

Description	Filename	Device
001 Test Program	kitcar.hex	ATmega8515

Loaded Show Slot Details

Enter Program Description

001  LED (Error) Repeat No.

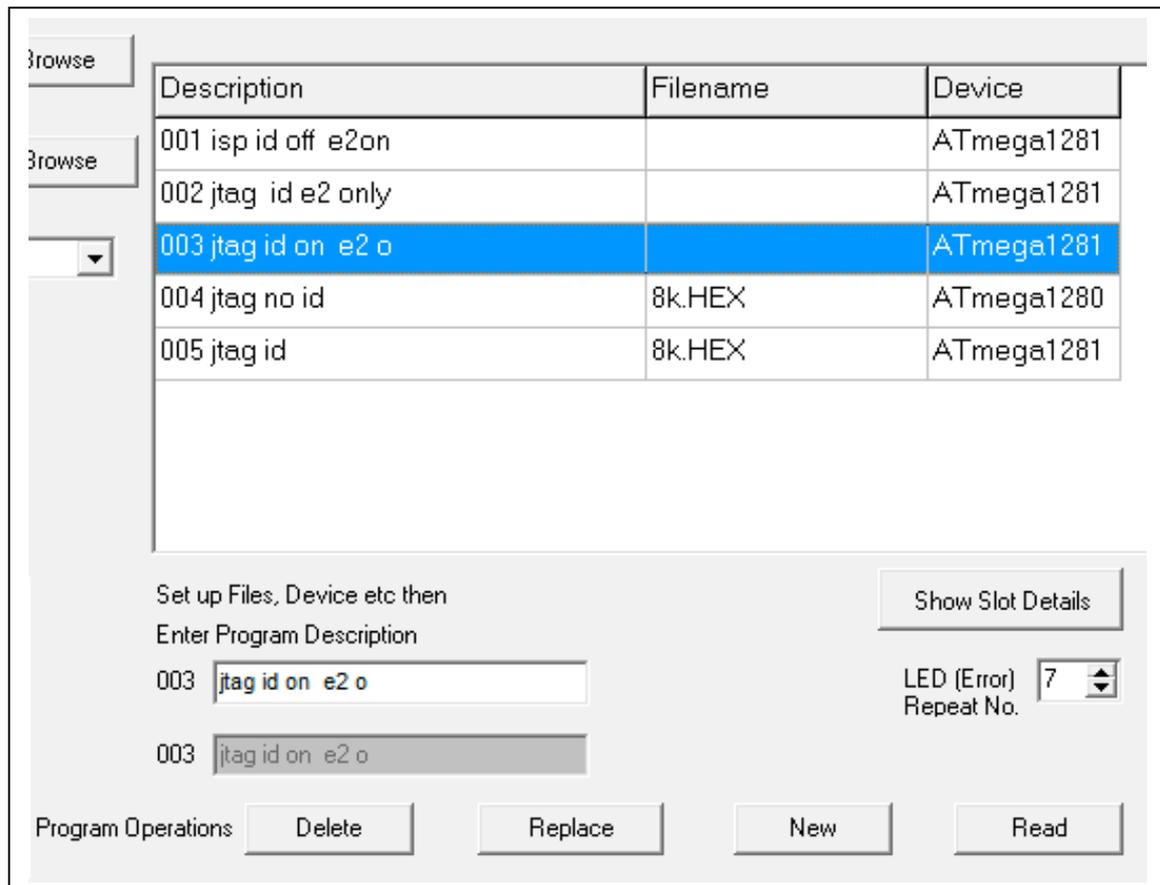
**Program Operations** Load Read

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.

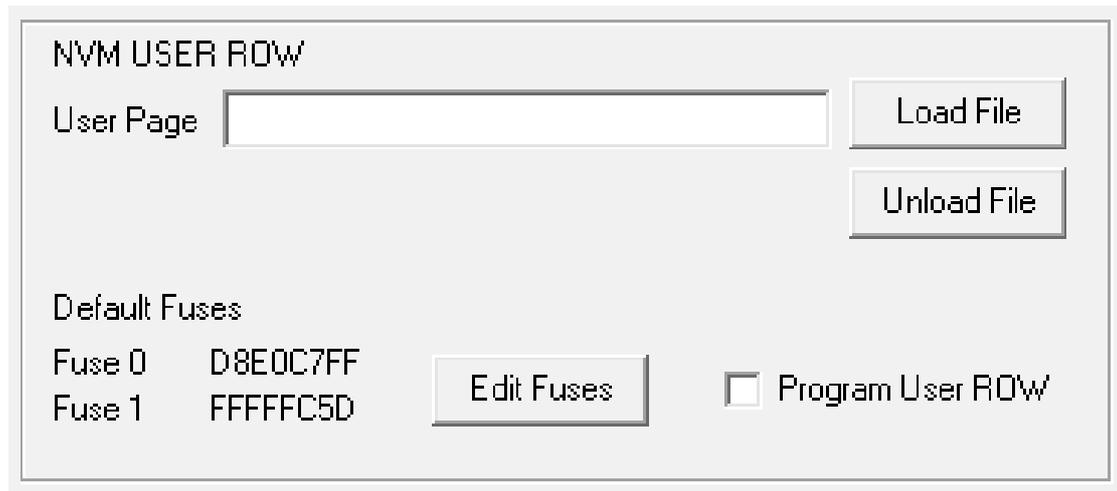
**Read Button.** This will read the programmer and display description, filename and SAM device selected in the pane above buttons.

**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.

## NVM User Row



The screenshot shows a software window titled "NVM USER ROW". It contains a "User Page" text box, a "Load File" button, and an "Unload File" button. Below these is a "Default Fuses" section with two rows: "Fuse 0" with value "D8E0C7FF" and "Fuse 1" with value "FFFFFC5D". To the right of these values is an "Edit Fuses" button and a checkbox labeled "Program User ROW" which is currently unchecked.

The NVM User Row (at address 0x80400) is used to store device fuses that control the Brownout detector and Watchdog Timer. The NVM User Row is 64 Double Words (DW) or 256 bytes. The first 2 DW are the fuses, the rest are for user data, if required.

It can be loaded from a User Page file (.userpage) created in Atmel Studio or the default fuses for each device can be edited. Either operation will set the **Program User Row** checkbox.

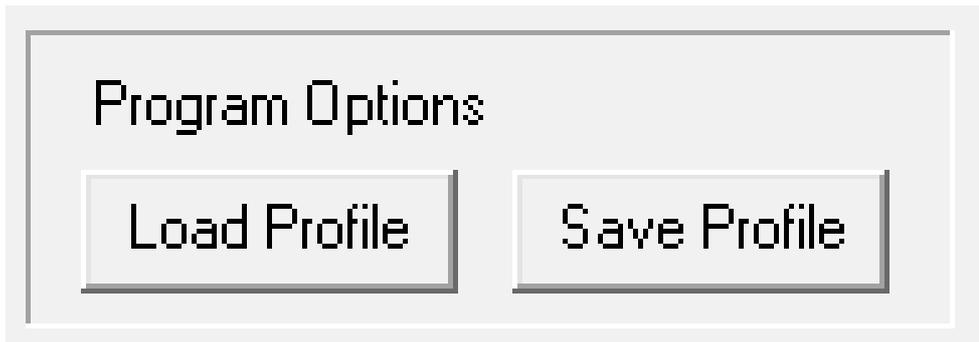
The fuse order in the user page file is reversed compared with the display and how data is stored in the device.

## 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

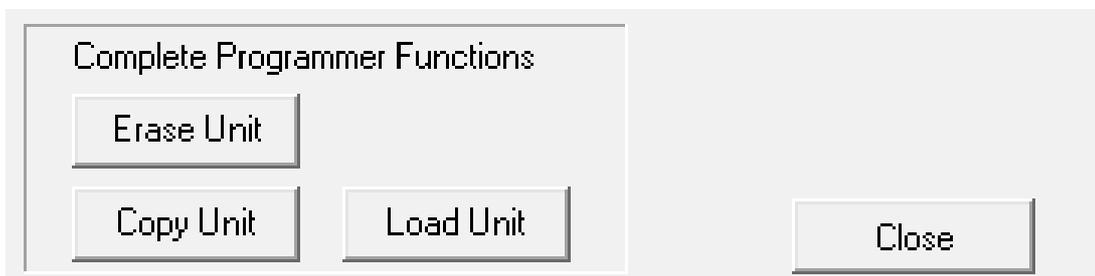


Located at button left of the screen, these buttons allow the programmer settings to be saved to a profile.

**Save Profile** creates an Inifile where you want to save it and **Load Profile** 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.

## Programming Target

### POWER OPTIONS

There are three power options with the Handheld Programmer

#### 1) Programmer powers target

Plug into unpowered target. Connector pin 1 (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 (1.63-3.63V)*

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

If target Vcc is connected to ISP header – Pin 1, 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 1 – Vcc on ISP header,

*In Software, select Vcc on Target Voltage selector (1.63-3.63V) to match target circuit voltage.*

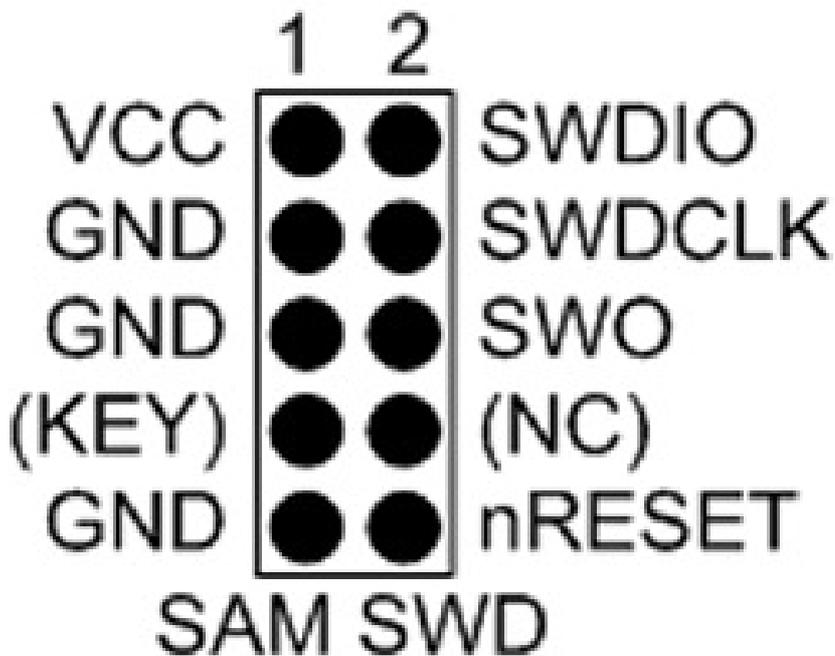
Do connect all four GND pins to target ground. Power Target

## TARGET Connection - SWD

1) Connect the programmer to the target system using the short ribbon cable and the 6-way flying lead.

Line Colour	Signal
Blue	SWDIO
Yellow	SWDCLK
Red	RESET
Brown	GND
Green	VCC/VTref

## Atmel ARM SWD Interface - 10-pin



This is the standard Atmel ARM 10-way layout, in 0.1" (100 mil or 2.54mm) format.

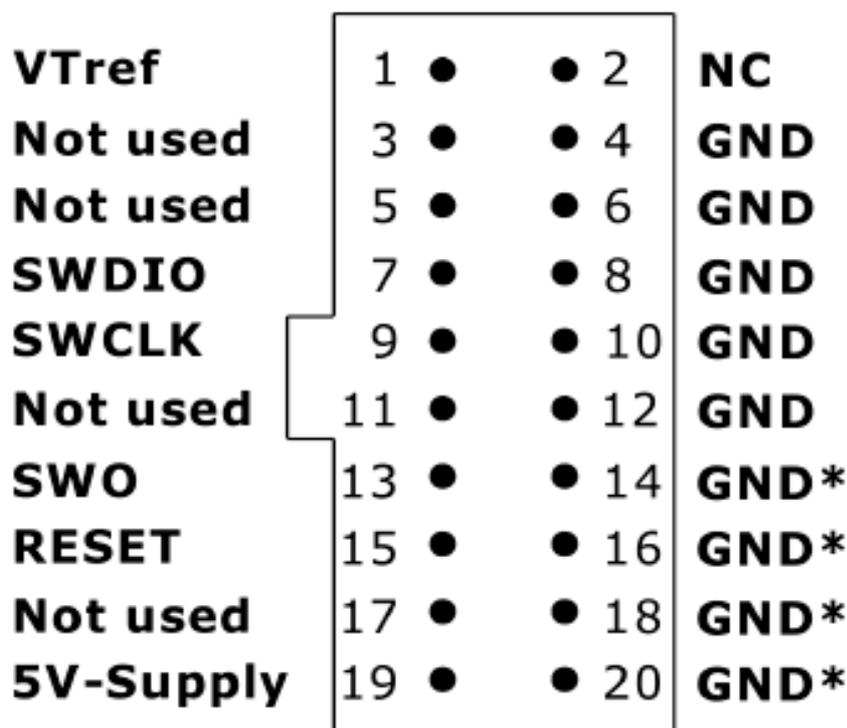
The Cortex Debug Header is also this layout but it is 0.05 (50mil or 1.27mm) pitch.

SWDCLK needs a pull-up resistor, 1K recommended.

SWDCLK is pin PA30 and SWDIO is pin PA31 on SAMD devices.

## ARM Serial Wire Debug (SWD)

The other connector type that you may have is ARM 20-pin Debug header. This is also 0.1" (100 mil or 2.54mm). Connect the flying lead to the correct pins. Here is the layout.



Pin	Signal	Description
1	VTref	Target Voltage Reference or VCC
4,6,8,10,12,14,16, 18	GND	Common Ground
7	SWDIO	Single bi-directional data pin. A pull-up resistor is required. ARM recommends 100kΩ.
8	SWDCLK	Clock signal to target CPU. It is recommended that this pin is pulled to a defined state on the target board.
15	RESET	Target CPU reset signal
19	5V-Supply	Not Connected

## Handheld Programmer Connector

**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

GND	1	2	SWDIO
GND	3	4	SWDCLK
GND	5	6	RESET <i>/nSRT</i>
GND	7	8	N/C
VCC/ VTG	9	10	N/C

## 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 SWD. Possible causes:

- No device connected
- Programmer speed too fast for target clock (SWD)

**3 Red Flashes**: ERASE Error

**4 Red Flashes**: FLASH Program Error

**5 Red Flashes**: NVM USER ROW Program Error

**6 Red Flashes**: COUNT Limit Reached

**7 Red Flashes**: DEVICE ID Error

**8 Red Flashes**: EMPTY Slot

**9 Red Flashes**: HEADER Checksum Error

**10 Red Flashes**: FLASH Checksum Error

If you get either 9 or 10 flashes, the user program has become damaged, especially after firmware update. Reload the programmer or first slot on 8-way to correct this.

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**

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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 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.

- Plug-in 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\SAMHHP\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. Check connections
  2. If target is unpowered, check it is not drawing more than 130-150mA
  4. Low battery indication
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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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