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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 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

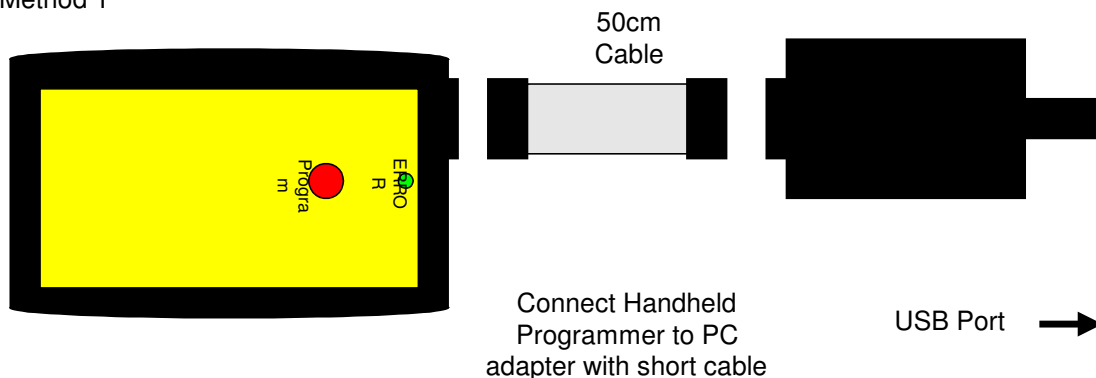
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## **LOADING FROM THE PC**

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.

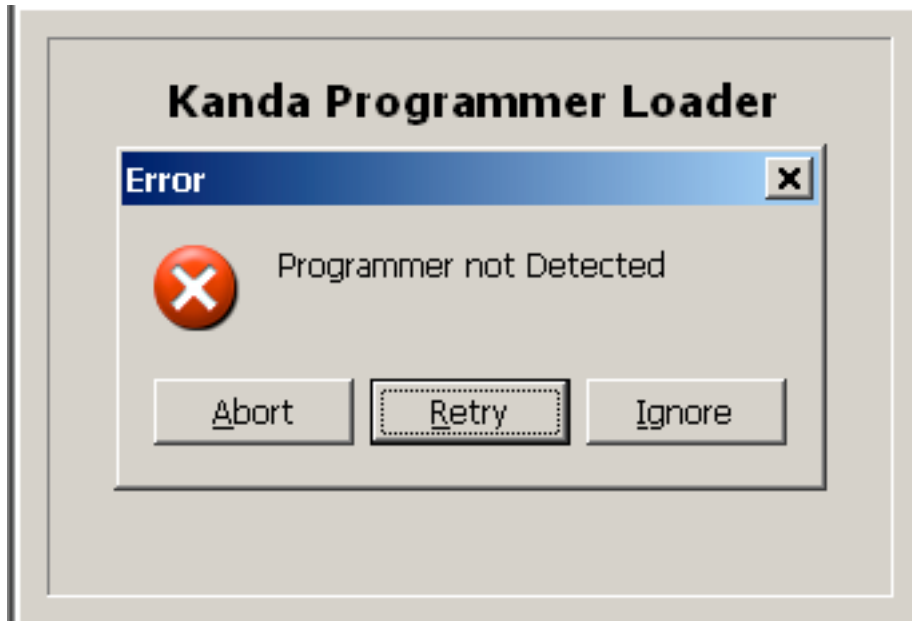
Method 1



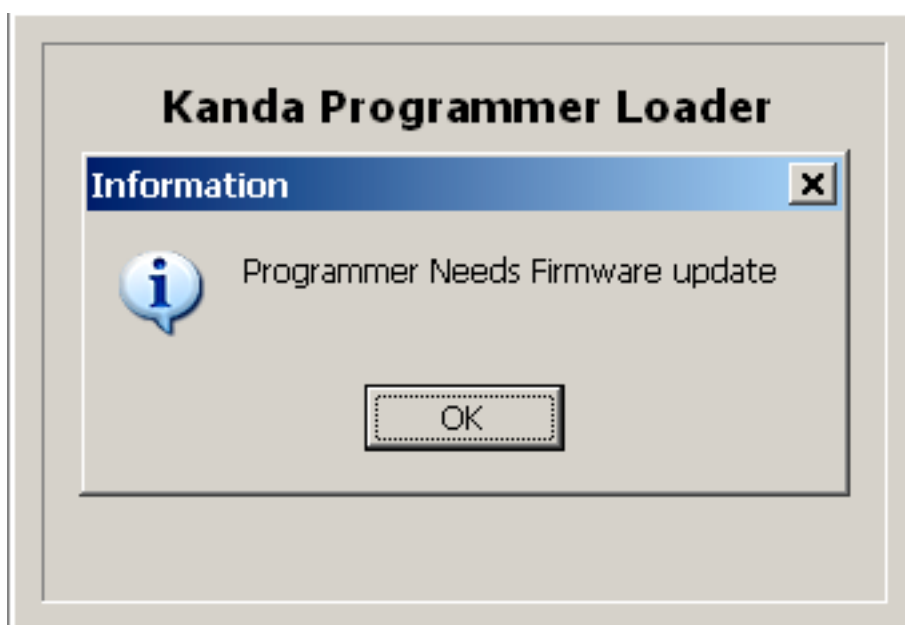
3) To load code, follow the instructions in the software.

## Run the Handheld Programmer software

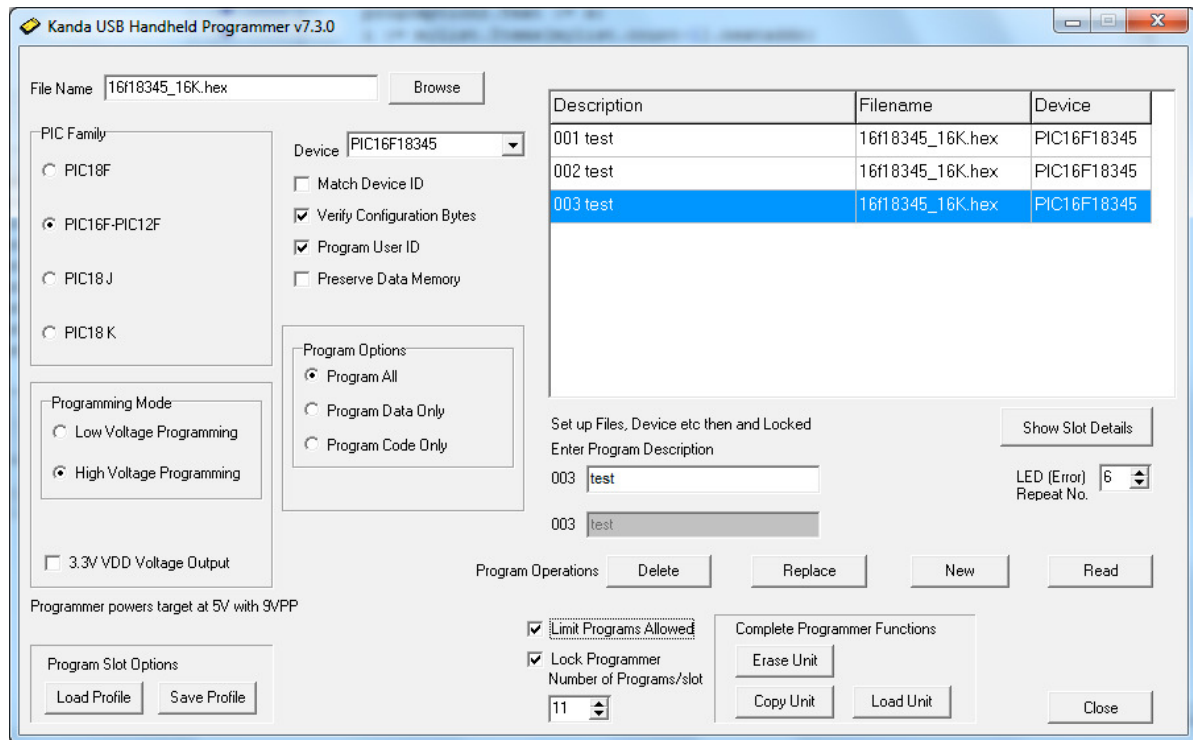
- a) If USB dongle is not detected, or another Kanda dongle is present, then this error appears. Make sure only one Kanda dongle is plugged in.



- b) If the PIC Hand held Programmer is not detected, then this message will appear. Make sure the programmer is connected to the dongle, using method 1 or 2 shown above, 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 a programmer is connected.
- d) If the PIC 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 PIC device, filename, programming method and areas to be programmed or verified.

## Program setup

- Select the file to use in the filename box.

### Notes:

The programmer expects a Microchip type hex file (as produced by MPLAB). The file should contain

- Program Code
- EEPROM data – if PIC device has EEPROM and data is required
- Configuration Bytes including Security information
- User ID if required

***See section on Hex File formats for more details***

- Now select the device family required (16F or 18F) and the device type. Some devices especially J type have LF and F versions with different device ID – make sure you select correct version.
- Choose the Programming Mode, Low voltage (LVP) or High Voltage (HVP). If you choose LVP, you must connect LVP pin – see section on ***Low Voltage Programming.***

**Note:** Not all PIC devices have LVP mode – check device datasheet

- There are also four check boxes.
  1. **Match Device ID.** Checking this box means the programmer will read the device ID and compare it with the ID of the selected device to ensure they match. Some newer device where there is incomplete information could fail this test. ***See section on Error Codes.***
  2. **Verify Configuration Bytes.** Allows configuration byte programming to be verified. ***See section on Error Codes.***
  3. **Program User ID.** User ID bytes are programmed – PIC18F only. The User ID bytes must be included in the Hex file or all locations will be programmed with 0xFF. ***See section on PIC18F Hex File formats for more detail***
  4. **Preserve Data Memory.** Existing contents of device Data EEPROM are preserved.
- **3.3VDD Voltage Output:** For LF devices or circuits where 5V could cause damage. 3.3V is default for PIC18FxxJ and PIC18FxxKxx devices.
- **Load Profile and Save Profile:** If you want to save program settings (Filename, device type, check box settings and description), use Save Profile. This will save a .PRJ file which can be reloaded with Load Profile.

## Programmer Setup

If the Programmer is empty, a message will state this, otherwise the current settings are displayed in the top pane.

- **Error Flash Repeat No:** The green success code or red error codes will repeat this number of times.
- Enter a description for the Program, max 28 characters – the filename and device name are stored automatically
- The final step is to click the **Load Program** button to load the handheld programmer.

Once the programmer is loaded, the program description will be updated.

## Read Button

If you connect a different programmer, then click Read button to update the programmer settings pane.

Once the programmer has been loaded, you have a choice of adding a **New Program, Deleting or Editing** an existing program.

### Important Note

The Load Program button will add a new program to the end of the list, until 8 programs have been loaded. Once this happens a message says that the programmer is full and New Program button is disabled.

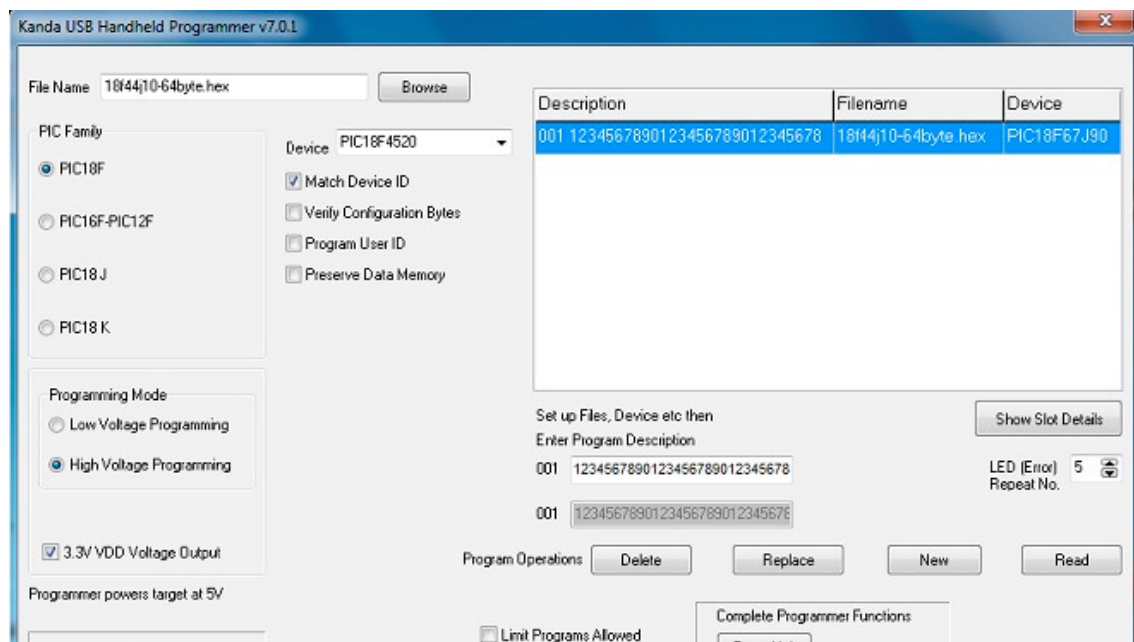
### Edit Program button

The program that will be edited is the program selected in the Programmer list. It will use the Program/Device settings currently selected, and add the description currently shown in the Program Description Box.

### Delete Program button

The program to be deleted is the one selected in top pane. A deleted slot will show as Empty. A new program can be entered later by selecting it and choosing Edit Program.

***The 8-way switch on the programmer is ignored when loading the programmer***



### Show Slot Details

Clicking the Show Slot Details button will update all the settings (filename, device, etc.) with the details in the currently selected slot. To show details of another slot, click on it and click Show Slot Details button again. If programmer is empty, button is disabled.

It can also be accessed by a right mouse click on programmer display box, which gives a Popup menu. This menu also has Copy functions. Selecting a different row by clicking on it will update details from that slot instead. If programmer is empty, the button is disabled.

### **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 below. This is per slot on 8-way programmer

### **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 the first slot, you will not be able to load any more. Locking the last slot used will lock the whole programmer.

## **Complete Programmer Functions**

Operations can be carried out on the whole programmer, so an image of the programmer can be saved and copied to another programmer.

- **Erase Unit** : The whole programmer is erased
- **Copy Unit** : The contents of the programmer, which can be up to 8 slots) is saved to a PRG file where you choose.
- **Load Unit** : A programmer can be loaded with the PRG file saved from another unit to make it easy to duplicate program setup

Kanda can load programmers with target code for a small fee if required before we ship multiple units.

**You Programmer is now loaded and ready for use.**

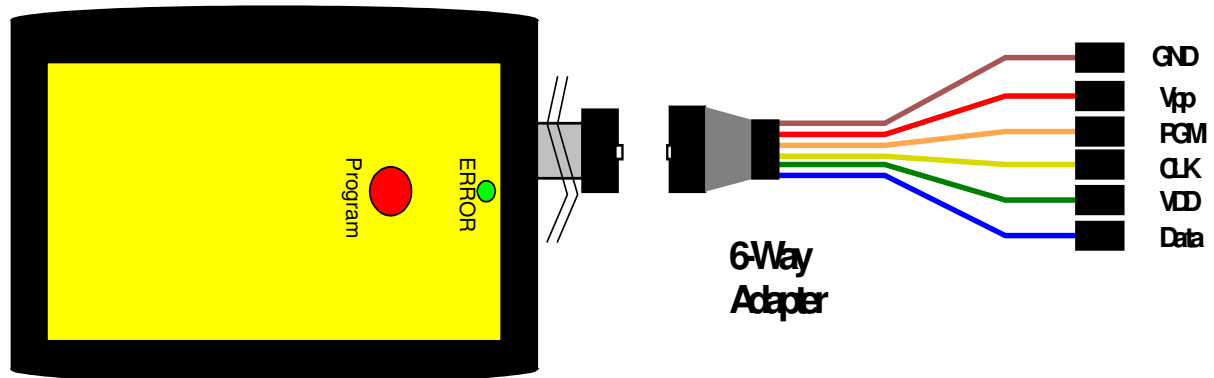
***If you get errors with connecting to the programmer, see the troubleshooting section at the end of this guide.***

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## Connecting to a target

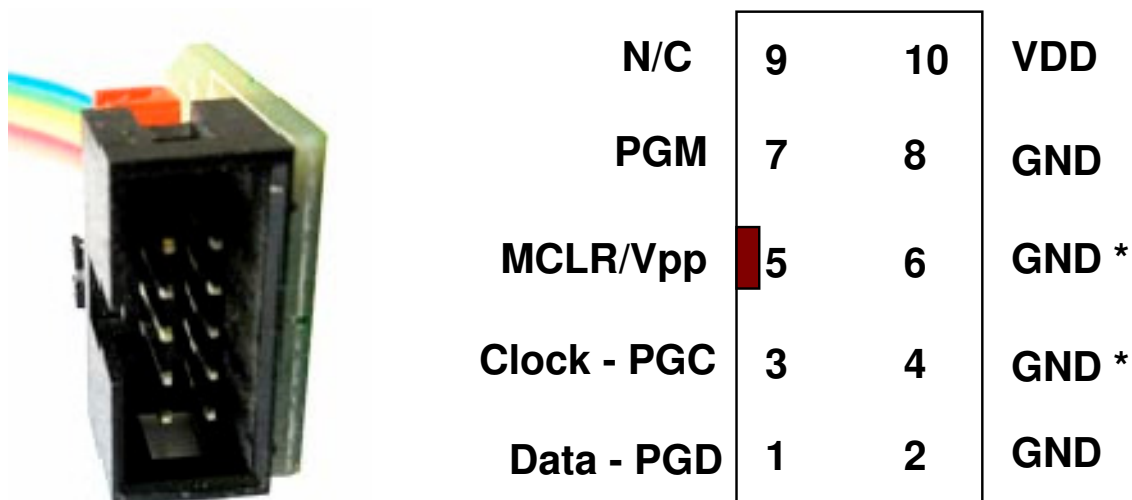
### 6-way Flying lead connector

The programmer is supplied with a 10-way to 6-way flying lead adapter, which provides the standard interface for most PIC ICSP circuits. Only 5 of these connections need to be made for HVP programming, as PGM pin is only used for LVP programming. Connect the adapter to the programmer as shown in the diagram



**Note :** The 10 to 6-way flying lead adapter connects all ground pins on 10-way connector. If you make your own adapter, it should also connect all the GND pins on 10-way connector.

### Adapter 10-way connector



This diagram shows 10-way connector on adapter viewed as shown in the picture. If you make your own adapter instead of using the supplied one, you will need to

- Match this pin-out

- **GND\*** These pins must be connected to target ground
- **GND** One or both must be connected to Target ground
- **VDD** must be connected to target circuit Vdd
- **PGM** pin is only connected for LVP programming

### Connecting Directly to programmer

If you want to make your own lead that connects directly to programmer instead of using the 10-way lead supplied, then please be aware that the supplied lead is NOT wired pin 1 to pin 1 so the connector on the programmer is not the same as the adapter, and is shown below.



|                      |  |  |                        |
|----------------------|--|--|------------------------|
| <b>GND</b>           |  |  | <b>PGD</b>             |
| <b>MODE</b><br>(GND) |  |  | <b>PGC</b>             |
| <b>BAT</b><br>(GND)  |  |  | <b>MCLR/<br/>VPP</b>   |
| <b>GND</b>           |  |  | <b>PGM</b><br>LVP Only |
| <b>VDD</b>           |  |  | <b>N/C</b>             |

### RJ11 Adapter

An adapter is available on our website that connects to the end of the 10-way lead and has a RJ11 plug for connecting to RJ11 socket.

See <http://www.kanda.com/go/10RJ11>

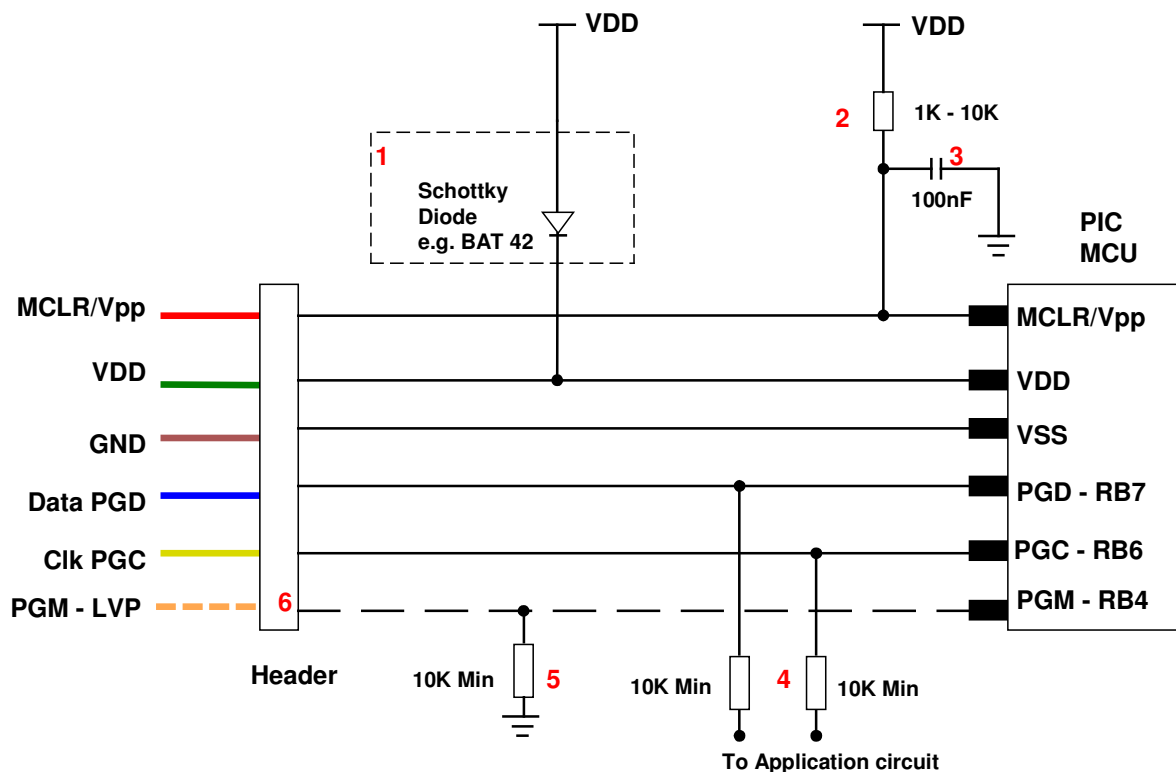




## ICSP CIRCUIT REQUIREMENTS

Microchip do not recommend any particular circuit for ICSP programming. There are diagrams for different tools, such as Pro Mate and PICKit2 with similar circuitry but slight variations.

Kanda have produced a recommended circuit that will work effectively with our programmer. This circuit is shown in the diagram below. Please read the notes that explain the circuit and expand on the effect of extra components such as capacitors.



- 1) The programmer is designed to provide 3.3V or 5V to the target circuit. If your circuit operates at a lower voltage then the diode shown on VDD should be fitted to protect the rest of the circuit. A series resistor may be acceptable instead of the diode in some cases.

The maximum current that the programmer can supply is limited to 150mA, so you should fit this diode on VDD if the programmer over-current circuit trips - see *error codes section*

- 2) MCLR/VPP pin needs the resistor to VDD. A minimum of 1K should work but 10K is the optimum. Supervisory circuits or push buttons on MCLR should be isolated from the VPP voltage, by placing them on the VDD side of the resistor or by fitting a Schottky diode on this line as per note 1.
- 3) The 100nF capacitor shown on this pin is optional for HVP but we do recommend that a capacitor is fitted if possible to avoid glitches on

MCLR. This is the **maximum** value, and we recommend something smaller. Larger capacitors may prevent the PIC from entering HVP mode. Do not fit for LVP mode.

- 4) If possible, the Clock and Data lines should be dedicated to ICSP but where this is undesirable, the application circuit should be isolated from the data and clock lines with series resistors, above 10K. This is especially important if either of these lines forces the pin as an input or output. In exceptional cases, series resistors may not be sufficient and a 4053 multiplexer or similar circuit should be used.

**Capacitors** on these lines should be avoided if at all possible. If they are needed, for noise immunity for example, then the maximum capacitance the programmer can handle is 1nF.

- 5) If LVP mode is used, this resistor must be fitted.
- 6) This line is only needed for Low Voltage Programming – LVP mode.
- 7) PIC18F J parts will not program successfully without a decoupling capacitor between VDDCore/VCAP pin and Ground, typically 100nF to 10uF tantalum or ceramic depending on device type. ENVREG pin must also be connected to VDD, or else a dual voltage supply must be provided. See device datasheet for details of **On-Chip Voltage Regulator** and recommended capacitor values.

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## High Voltage Programming

The High Voltage Programming method or HVP mode uses 12V (or 9V for newer K parts) on the MCLR/VPP pin to enter programming mode. The programmer includes a 9V/12V generator circuit that supplies this voltage.

There are two methods of entering HVP mode, Vpp before Vdd and Vdd before Vpp. Both methods are available on some PIC devices, but others only have one of the methods. The programmer will use Vpp first if it is available as it has advantages such as being independent of code in the PIC. This method will only work if the target is NOT powered.

The PGM line does not need to be connected for HVP mode.

The programming mode must be set to High Voltage Programming (HVP) in the software.

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## Low Voltage Programming

Only some PIC devices have 5V programming – LVP – option. Consult the device data sheet if you are unsure.

Assuming the PIC device has LVP mode, then you need to connect the PGM pin on the PIC to the header and connect the orange programmer line to this header pin. The pull-down resistor on the PGM line must be fitted for LVP to function correctly – see note 5 on diagram.

### Notes:

- 1) The LVP enable fuse must be set – in CONFIG4L register. Factory default is LVP enabled. If you program this fuse off, then only HVP mode can set it again.
  - 2) The programmer software must be set to Low Voltage mode - LVP
- 

## Select the program slot you require with the 8-way switch, from 1 to 8.

If an empty slot is selected, then you will get an error code on LED when button is pressed – 9 red flashes. Choose another slot if this happens. We suggest you attach a label to programmer listing the different slot contents.

## Press the button to start programming.

Once programming is finished, the button can be pressed again to do another programming cycle without unplugging the programmer.

Do NOT leave the programmer connected to target circuits for long periods as this will flatten the battery.

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## LED Codes

### Normal operation:

A single green flash, when first connected to target. Then, after pressing the button, the LED turns green for the duration of programming. At the end of programming the green LED flashes for 5 seconds and switches off, and the target system is powered down.

If there was an error, the LED will flash RED. These codes repeat several times, but with an interval between groups.

**Error codes** – LED turns red:

|                  |  |
|------------------|--|
| 2 flashes        | - General verify error                     |
| 3 flashes        | - Data memory did not verify               |
| 4 flashes        | - Code memory did not verify               |
| 5 flashes        | - User ID words did not verify *           |
| 6 flashes        | - Configuration Bytes did not verify *     |
| 7 flashes        | - Device ID did not match *                |
| 8 flashes        | - Set Program count reached *              |
| 9 flashes        | - Empty Slot selected with switch          |
| Constant Red LED | - Low battery or Over-current trip > 150mA |

\* Only if selected in check box – ***see Loading the Programmer section***

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## HEX FILE FORMAT FOR PIC18F DEVICES

The programmer loads a Microchip format Hex file. This is an extended Intel Hex file with code, data, configuration bytes and user ID included. All PIC tools should follow this format.

Each line in the file has this format:

**:BBAAAATT[DDDDDDDD]CC**

where

: is start of line marker

BB is number of data bytes on line

AAAA is address in bytes

TT is type. 01 means EOF and 04 means extended address

DD is data bytes, number depends on BB value

CC is checksum (2s-complement of number of bytes+address+data)

- **Code:** This is at the top of the file and may be preceded by an extended address line - :020000040000FA, where 04 is the type for extended address. Some compilers include empty code lines (all FF) but others omit these lines to save space.
- **EEPROM Data:** It is preceded by the extended address line - :0200000400F00A. The EEPROM section is optional.
- **Configuration bytes:** These are stored at 300000h and are preceded by the extended address line - :020000040030CA. The correct format is 8 Fuse bytes and 6 Lock bytes all on the same line but different compilers and assemblers have different methods of displaying these bytes. Sometimes lock bytes are omitted if they are not set, sometimes the data is spread over multiple lines. The standard format displays unused bits as 1 (e.g. FF for an unused byte) but on the PIC device they read as 0. The programmer masks unused bits.

to 0 so that the Configuration Byte verify will be correct.

- **User ID:** These are bytes for the user to store data, such as code version numbers. They are stored at 200000h. Again they are preceded by the extended address line :020000040020DA  
The standard format requires 8 bytes but again some compilers omit unused bytes.
- **End of File:** The End Of File marker for all Intel Hex files is :00000001FF

### Example

|  |                    |
|--|--------------------|
| :020000040000FA                              | Not always present |
| :10000000DEAE5A2336A27D0FF6C85C30E50DD29DD8  | Code line          |
| :1000100060B4243B43C9ECB7FC642523C2AFE43B86  | Code Line          |
| :100020002CD2C7AAAA41F7D198FA51DCE5CC3039D5  | Code Line          |
| :0200000400F00A                              | EEPROM Marker      |
| :10000000DDDDDDDDDDDDDD0DFFFFFFFFFFFFFFFFFE0 | EEPROM Line        |
| :10001000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF0  | EEPROM Line        |
| :020000040030CA                              | Config Marker      |
| :10000000FFFBFDFFFEFFFFFFFFFFFFFFFFFFFFF07   | Config Bytes       |
| :020000040020DA                              | User ID marker     |
| :0800000011111111FFFFFFFFFB8                 | User ID bytes      |
| :00000001FF                                  | End of File        |

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## HEX FILE FORMAT FOR PIC16F DEVICES

The programmer loads a Microchip format Hex file. This has a similar format to the PIC18F file but does not use extended addressing as the PIC16F devices are smaller.

- **Code:** Code is always at the top of the .hex file. The layout varies with different compilers and assemblers e.g. amount of data per line, whether blank lines are included etc. Note that the PIC16F devices use 14-bit instructions, so code is stored as Words with low byte first. Therefore, an unused location appears as FF3F. Addressing is in bytes though.
- **EEPROM Data:** If the device has EEPROM, the data is stored at address 0x4200 upwards in the HEX file. It is stored in word format but only the lower byte contains data – the high byte is always 0 and is discarded.
- **Configuration Word:** There is only one 14-bit configuration word, stored at address 0x400E. It is stored high byte first.
- **End of File:** The End Of File marker for all Intel Hex files is :00000001FF

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## 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**

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## 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.

- 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\embres\PICBKFUSB\driver\driver

### Error Message: "Programmer not Detected"

- 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. It will say "Dongle" on it.
- 5) Other USB products can sometimes interfere with the dongle – try removing other USB connections from PC.

## Programming Errors – RED Flashes on LED when programming

- 1) Ensure your target circuit is wired correctly as discussed in the *ICSP Circuit Requirements* section.
- 2) Check you have correct device selected, especially if ID match is turned on
- 3) Ensure you have selected LVP or HVP as appropriate
- 4) Check programmer is powering target PIC with 5V on VDD pin and 12V+ on VPP pin for HVP or 5V on PGM pin for LVP, during programming
- 5) Check lead connections on programming header are correct

## Programming Errors – Constant RED LED

This means a low battery or that the over-current circuit has tripped

- 1) Check battery or power supply to programmer is ok
- 2) Isolate circuitry (with a Schottky diode – see diagram on page 4) that is drawing too much current, as the programmer is limited to 150mA

## Error codes – LED turns red:

|                  |  |
|------------------|--|
| 2 flashes        | - General verify error                     |
| 3 flashes        | - Data memory did not verify               |
| 4 flashes        | - Code memory did not verify               |
| 5 flashes        | - User ID words did not verify *           |
| 6 flashes        | - Configuration Bytes did not verify *     |
| 7 flashes        | - Device ID did not match *                |
| 8 Flashes        | - Set Program count reached *              |
| 9 flashes        | - Empty Slot selected with switch          |
| Constant Red LED | - Low battery or Over-current trip > 150MA |

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## INI File Settings

There is a setting.ini file in the install folder, default path is

*C:\program files\embres\PICHPNEW*

At the bottom of this file are two keys that can change the behaviour of the programmer.

### ResetPulse=0

Value of 1 will create a reset pulse after programming has finished, to reset target PIC microcontroller.

### EraseWholeSlot=0

With default setting (0), the programmer memory is only cleared to the device size, which improves load times but will lead to old code being left

in the programmer. In a few circumstances you may need to clear whole programmer memory, or slot. In this case, change to **EraseWholeSlot=1**.

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## HHP VERSION FOR ATE EQUIPMENT



**Order Code : PIC-HH081ATE**

### ATE CONNECTION - SIGNAL DESCRIPTION

Connection to ATE may be made by taking out 2 signals (HH0120) or 5 signals (HH0820) and GND from the Hand Held programmer

The unit has a 6-pin connector and ribbon cable added to the programmer instead of the eight-way selection rotary switch. The start (red) button will still function but can be operated via the 6-way connector.

The connector is a 3 x 2, 0.1"(2.54mm) pin header socket with this pinout. This view is from the back of the 6-pin socket, and so corresponds to the layout needed on your test equipment.

|      |      |        |
|------|------|--------|
|      |      |        |
| PROG | SEL1 | STATUS |
| GND  | SEL2 | SEL0   |

The STATUS line is marked by the red wire on the ribbon cable.



## PROG (INPUT)

Drive at TTL logic levels, or open drain (just pull low). Pull Low to start programming. The line should be released after 100mS (Not critical, but must be released by the end of programming)

## SLOT SELECTION LINES, SEL0, SEL1, SEL2 (INPUT) - HH0820

Drive at TTL logic levels, or open drain. Pull lines marked "0" low as indicated in the table:

|       | SEL0 | SEL1 | SEL2 |
|-------|------|------|------|
| SLOT1 | 1    | 1    | 1    |
| SLOT2 | 0    | 1    | 1    |
| SLOT3 | 1    | 1    | 0    |
| SLOT4 | 0    | 1    | 0    |
| SLOT5 | 1    | 0    | 1    |
| SLOT6 | 0    | 0    | 1    |
| SLOT7 | 1    | 0    | 0    |
| SLOT8 | 0    | 0    | 0    |

## STATUS (OUTPUT)

TTL output . Goes high when programming, then low when programming finishes. PASS/FAIL is indicated, 100mS after the end of programming. If programming was OK, this line goes high. If it was a fail, the line stays low.

### FAIL

STATUS \_\_\_\_\_ | \_\_\_\_\_ <PROGRAMMING> | \_\_\_\_\_  
PROG \_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_

### PASS

STATUS \_\_\_\_\_ | \_\_\_\_\_ <PROGRAMMING> | \_\_\_\_\_ | \_\_\_\_\_  
PROG \_\_\_\_\_ | \_\_\_\_\_ | \_\_\_\_\_

## 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) > Software Downloads

### Contact details

**Website:** [www.kanda.com](http://www.kanda.com)

**email:** [sales@kanda.com](mailto:sales@kanda.com)

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

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