



# ***USB2PPM Engineering board***

## Construction Manual

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# 1

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## *Helpful Hints*

Before you start the construction of your USB2PPM, please review these instructions completely. Then you would know what matters and would avoid mistakes that will be hard to fix afterwards.

A basic understanding of electronic parts, their handling, and soldering (including is required for the construction and the commissioning of this engineering board. SMD components are already populated to simplify the construction of the board.

Conduct the soldering and the wiring in an orderly and conscientious manner; do not use acidic solder of any kind. Make sure that there are no cold solder joints. Keep these things in mind, because an unclean or bad joint, a defective contact or a bad construction cause a time-consuming search for faults and could possibly cause a destruction of the components.

You can significantly reduce the chance that something will not work. Check every step before continuing. Follow the instructions! Only do the things written in the manual and do not skip any steps! Check every step twice: once for building and once to check.

Please take the time it needs to build this kit. Tinkering is not task work and should be enjoyable!

Please share with me any errors, unclear instructions, or ideas for improvements. You can reach me at [gregor@pikoder.com](mailto:gregor@pikoder.com). I am looking forward to your feedback.



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# 2

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## ***Contents of the Kit and Tools needed***

The kit in front of you contains all the necessary components needed to build a USB2PPM engineering board including the pre-programmed PIC16F1455. Please verify the completeness with the help of the attached checklist.

### **Parts list: USB2PPM**

<b>Resistors</b>		√
47k, 0,25 W (yellow/purple/orange/gold)	R1	<input type="checkbox"/>
470R, 0,25 W (yellow/purple/brown/gold)	R2, R3	<input type="checkbox"/>
<b>Capacitors</b>		
100 n	C1	<input type="checkbox"/>
470n	C2	<input type="checkbox"/>
<b>Semiconductors</b>		
PIC16F1455-I/P	IC1	<input type="checkbox"/>
LED 3mm bi-color	IC2	<input type="checkbox"/>
<b>Misc.</b>		
IC socket 14 pins		<input type="checkbox"/>
Header male 3 pins	PPM_OUT	<input type="checkbox"/>
PCB partly populated		<input type="checkbox"/>

You also need the following tools:

1. Electronic Soldering Iron
2. Electronic Solder
3. Side cutters

Additionally, to commission your board you will need:

1. USB cable
2. PC with PiKoder Control Center (PCC, downloaded from [www.pikoder.com](http://www.pikoder.com))

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# 3

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## Construction

The following paragraphs will describe how to populate the components on the circuit board. The silk print on the circuit board will support this process. All parts are populated on the top side.

The order of the placement of the components depends on their height; generally, you will place the lower first.

### Step 1: Populate resistors R1, R2, and R3

Now you would place the resistors R1 – R3. In order to do this, bend the connecting wires at a 90 ° angle based on the grid dimensions and then place the component in the designated holes (refer to the image to the right). Please pay attention to the color codes.

To ensure that the part does not fall of the circuit board when turning it around for soldering, bend the connecting wires at a roughly 45 ° angle apart and the solder them carefully with the conducting paths on the back of the circuit board. Afterwards cut off the excess wire.



## Step 2: Populate the capacitor C1

Next, place the capacitor C1 followed by a mild angling of the connection wires to prevent it from falling out. The capacitor is non-polarized; therefore, the alignment is irrelevant.



## Step 3: Populate the IC socket

Place the socket in the position indicated on the top of the circuit board. Once again, verify the positioning: the notch (marked with a red arrow in the following image) needs to point to the left.

To avoid the socket from falling out of its position when turning the board slightly bend the two outer diagonal pins and then go ahead and solder all the other pins.



### Step 4: Populate the capacitor C2

Now, place the capacitor C2 into the respective position followed by a mild angling of the connection wires to prevent the pieces falling out. This capacitor is also non-polarized meaning that the alignment is irrelevant.



### Step 5: Populate the LED

Place the LED. Please note that the LED is polarized and that the shorter wire needs to be on the left-hand side (see red arrow).



## Step 6: Populate the pin header

The last component you would solder on the circuit board would be the pin header.



## Step 7: Insert the IC into the socket

Finally, insert the IC with the notch (or point) fitting the notch of the IC socket (see red arrow in the image to the right).



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# 4

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## ***Commissioning***

Please start of by connecting your USB2PPM engineering board with the USB port of a Windows 10 computer. The PC will install the drivers needed upon the initial connect. Once this step is completed, your board is ready for use.

If you wanted to program USB2PPM settings, then please download the [PiKoder Control Center \(PCC\)](#) from the PiKoder website.

You will find additional information regarding the use and the suitable parameter values in the [PiKoder/USB User's Guide](#).



# A

## Connectors





# B

## Schematics

