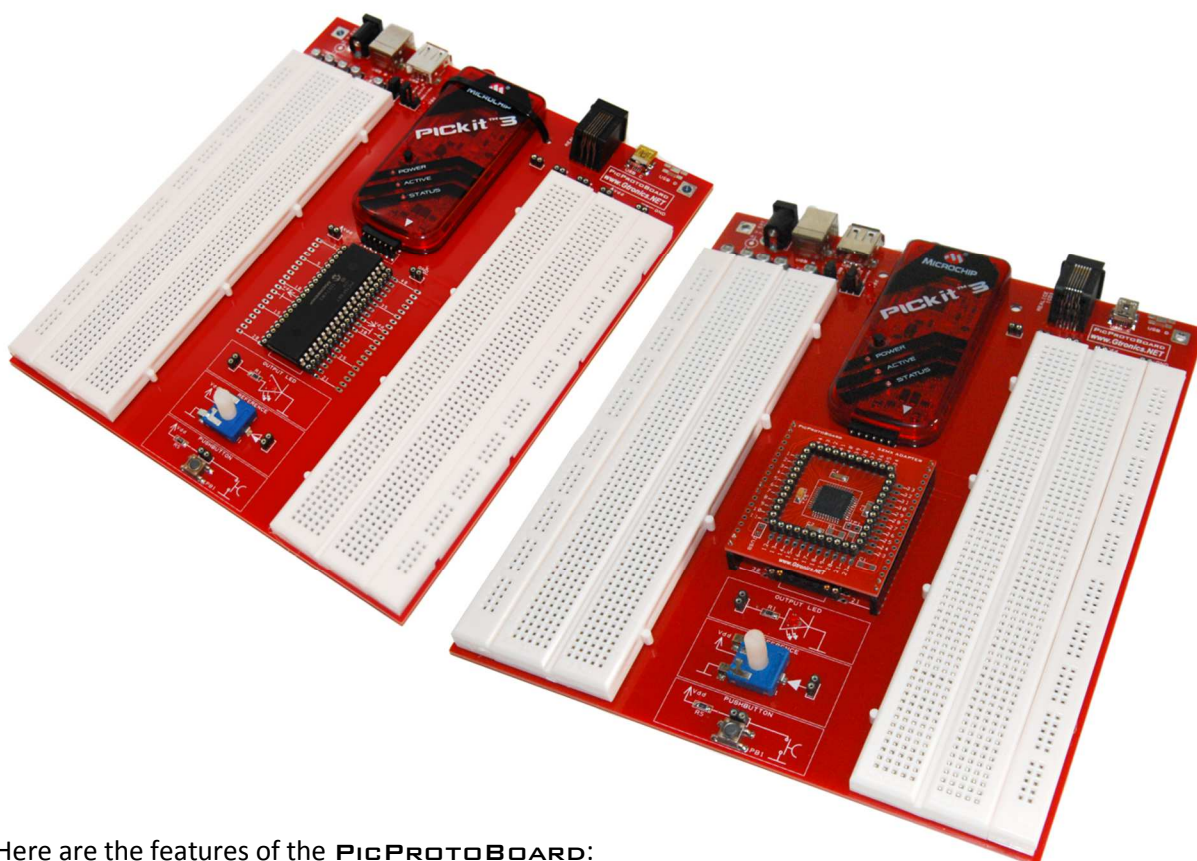


# PICPROTOBOARD 8-BIT / 32-BIT USER MANUAL



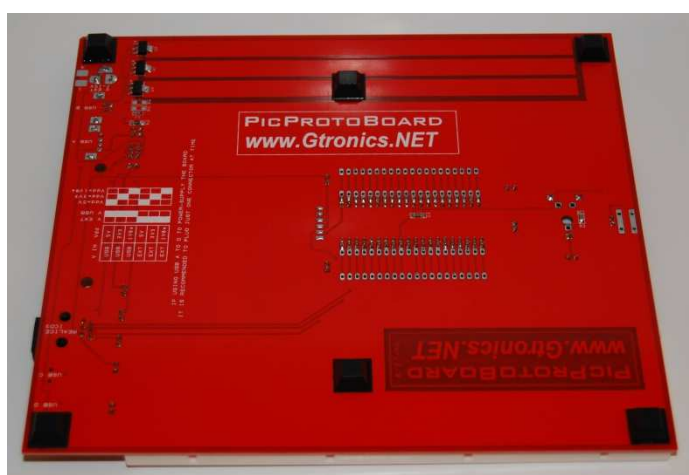
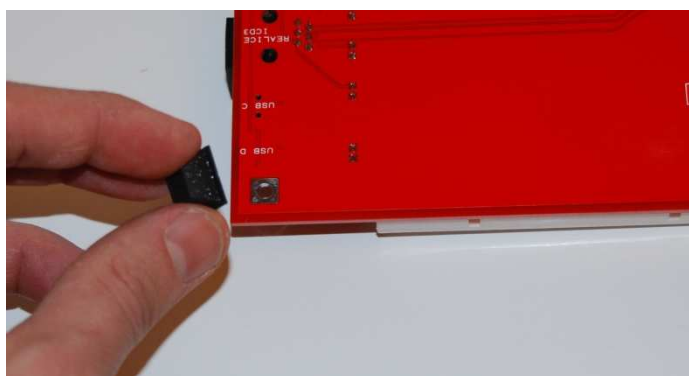
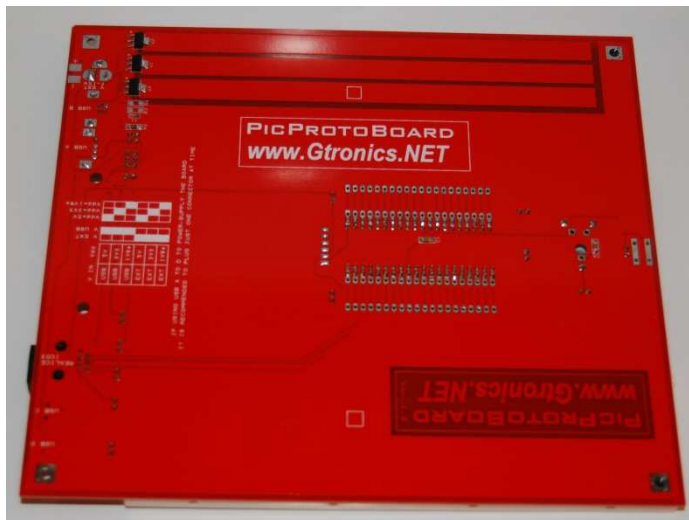
Here are the features of the **PICPROTOBOARD**:

- Power supply: from USB cable (USB A,USB B or USB mini plugs) or external power supply 7-9VDC
- PIC Vdd: 5V, 3.3V or 1.8V
- Works with: PICKIT2<sup>1</sup>, PICKIT3, PICKIT4, ICD2, ICD3 and REAL-ICE
- Works with any PIC16F and PIC18F DIP 40 Pin families with pin-out compatible with the PIC16F887 or the PIC18F45K20
- By means of the **32MX ADAPTER**, works with any PIC32MX TQFP 44 pin with pinout compatible with the PIC32MX130F64D
- No need of an additional debug header (the PIC16F887, PIC18F45K20 and the PIC32MX130F64D have the in-circuit debugger)
- 2x solderless bread-boarding areas 740 contact points each (total 1480 points)
- 1x output LED provided on-board
- 1x 10K potentiometer with knob provided on-board
- 1x Pushbutton provided on-board
- 65x Male to Male Solderless Flexible Breadboard Wires in different colors and lengths
- Dimensions in mm: 180x205x25 (HxWxH)

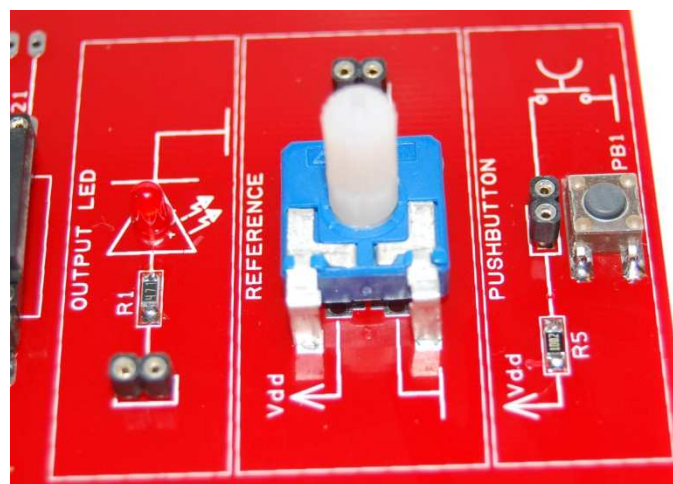
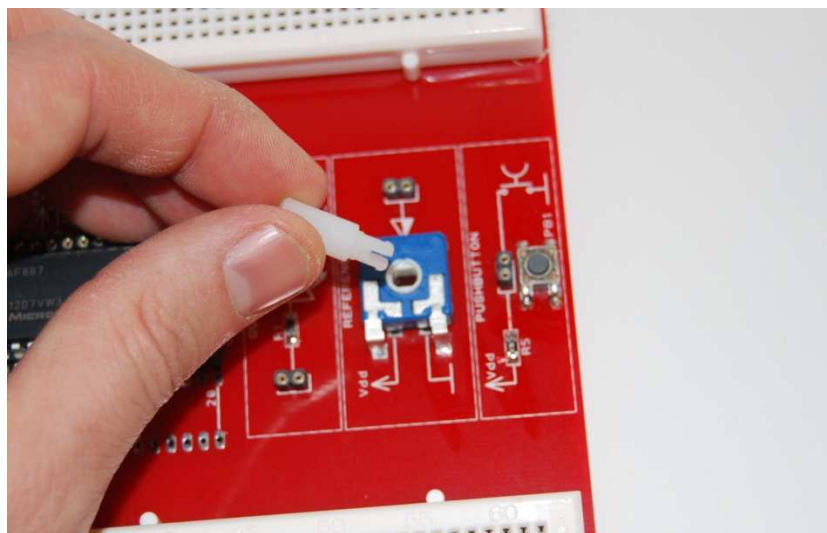
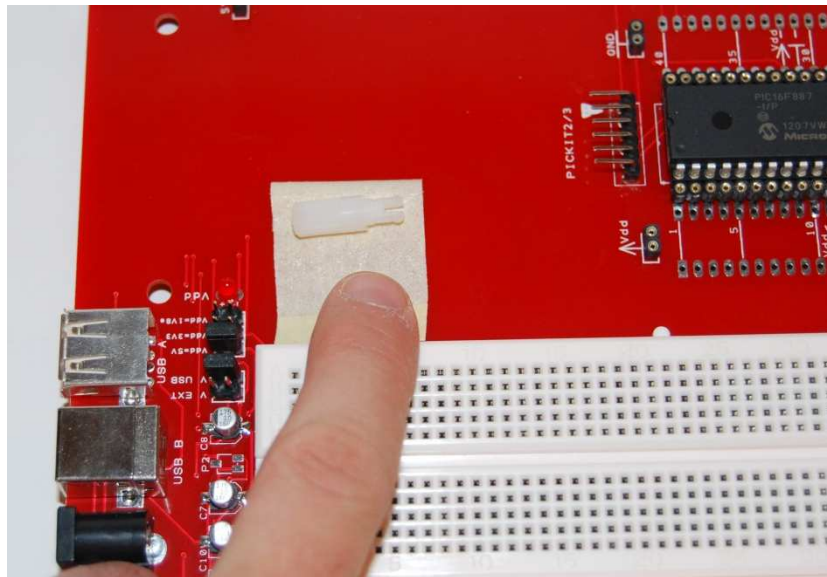
<sup>1</sup> PICKIT2 doesn't work with PIC 32-bit MCUs (see Microchip official documentation for details)

## Getting the PICPROTOBOARD “out of the box”

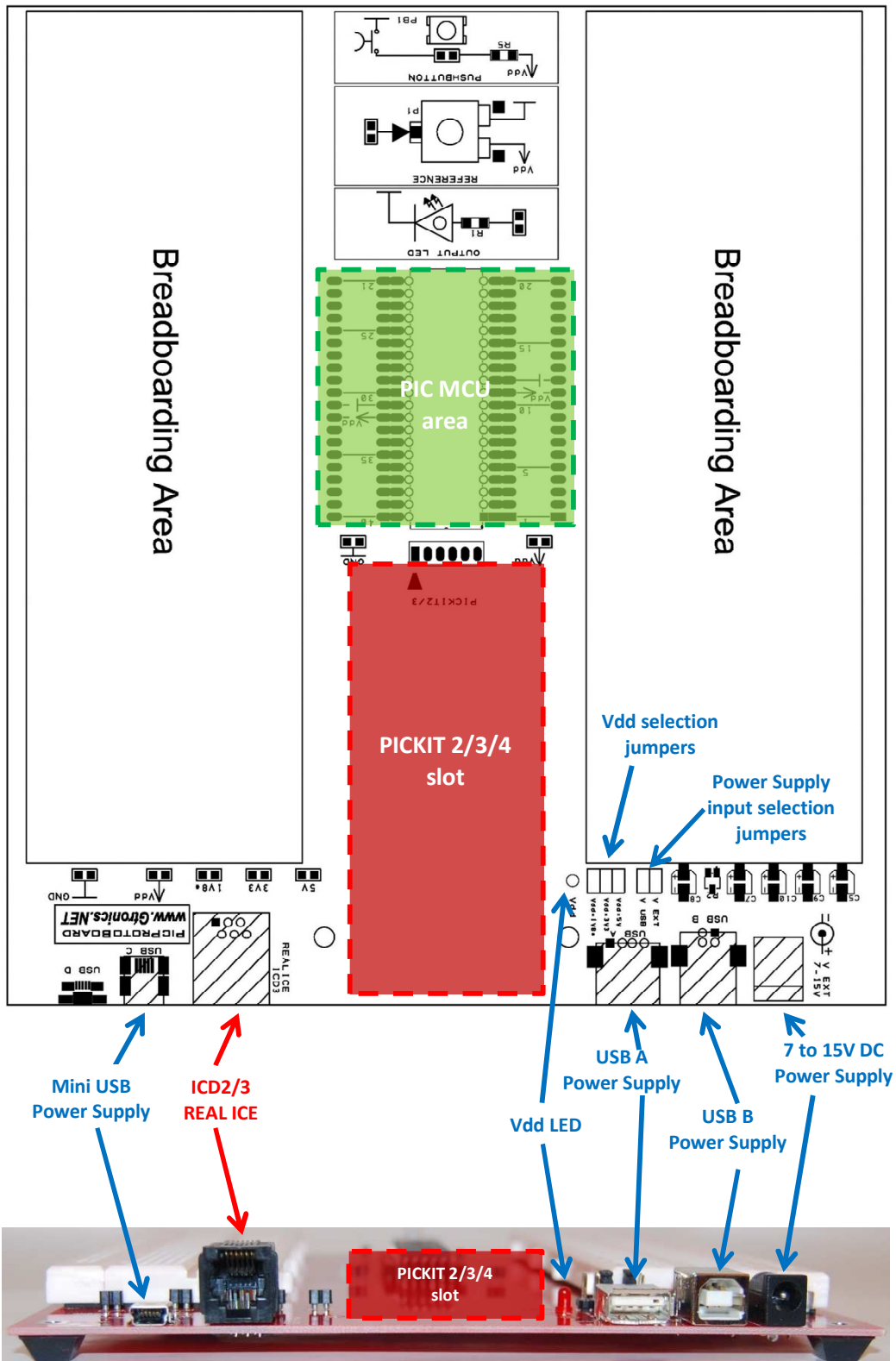
Apply the six stick on feet on the bottom side of the board.



Insert the Potentiometer knob.



# The PICPROTOBOARD



## Connecting and setting the Power Supply

The power supply could be provided from a USB port of your PC or from a 7 to 9V DC Power Supply (**not both at the same time**).

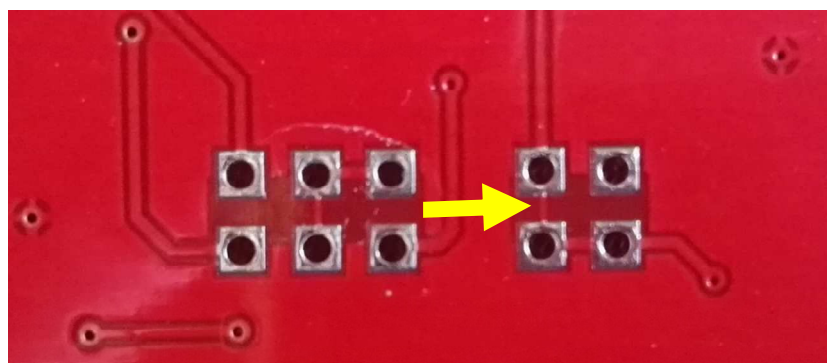
**Starting from PicProtoBoard ver.2.0, Power Supply is set by default to VUSB (see below in this manual how to switch to VEXT)**

- Connect a USB cable to USB B, or USB A or Mini USB (C) connector (depending on the spare cable that you have in your lab/home)
- Connect the USB cable to a free port of your PC

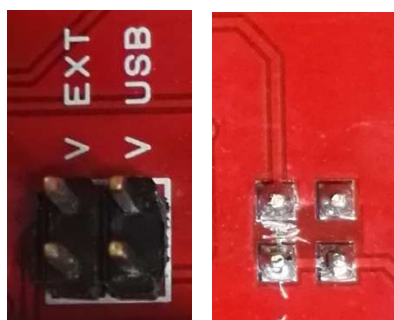
**IT IS RECOMMENDED NOT TO CONNECT MORE THAN ONE USB CABLE AT THE SAME TIME TO POWER THE BOARD**

### SWITCHING TO VEXT

In order to switch to VEXT it is required to mount a 2x2x2 pin header with a jumper. First, you have to cut with a blade the trace shown in the picture below



Then solder the 2x2x2 pin header.



**Now you can easily select VUSB or VEXT by means of a Jumper.**

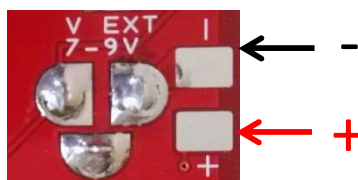
## Selecting power supply from external 7 to 9V DC



- Set the Jumper to V EXT
- Connect the 7 to 9V power supply by means of the circular connector or by means of the soldering pads on the bottom side of the board (**check the polarity!**).

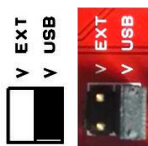


Polarity of the Circular connector



Soldering pads for 7 to 9V DC  
on the bottom side of the board

## Selecting power supply from USB



- Set the Jumper to V USB
- Connect a USB cable to USB B, or USB A or Mini USB (C) connector (depending on the spare cable that you have in your lab/home)
- Connect the USB cable to a free port of your PC

## Board Vdd

The Vdd for the PIC could be set to 5V\*, 3.3V\* or 1.8V\*.

**Starting from PicProtoBoard ver.2.0, Vdd is set by default to 3.3V (see below in this manual how to switch to 5V or 1.8V)**

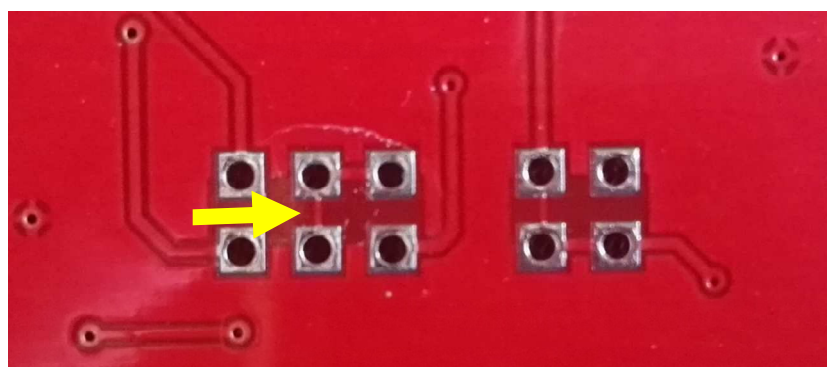
Note:

\*Please check carefully on the datasheet of the MCU you are using the voltage power specs.

### Setting board Vdd with a jumper

In order to set Vdd with a jumper it is required to mount a 2x3x2 pin header with a jumper.

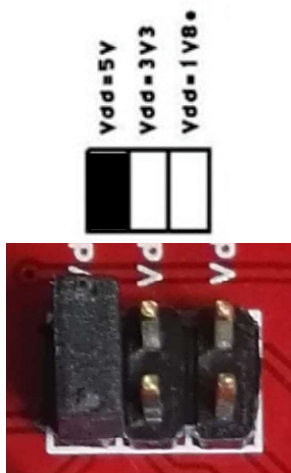
First, you have to cut with a blade the trace shown in the picture below



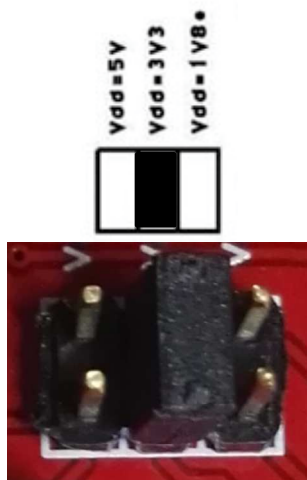
Then solder the 2x3x2 pin header.



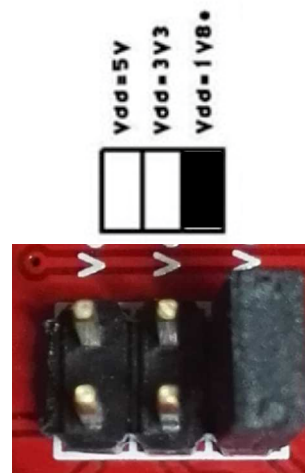
Now you can easily select Vdd by means of a Jumper.



Setting Vdd to 5V



Setting Vdd to 3.3V



Setting Vdd to 1.8V\*



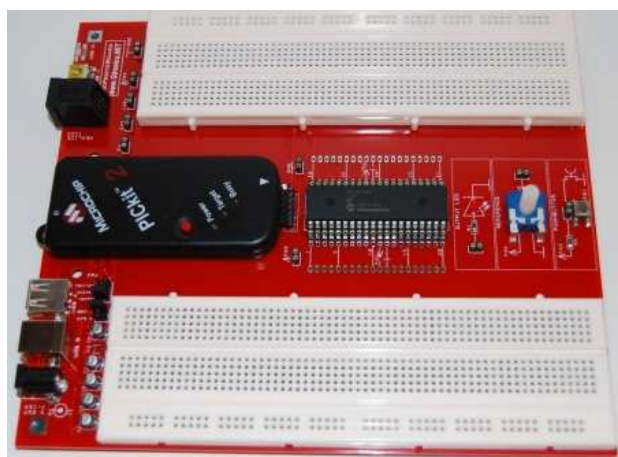
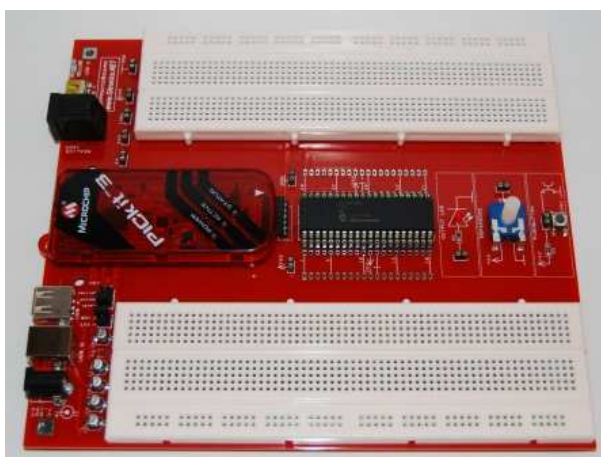
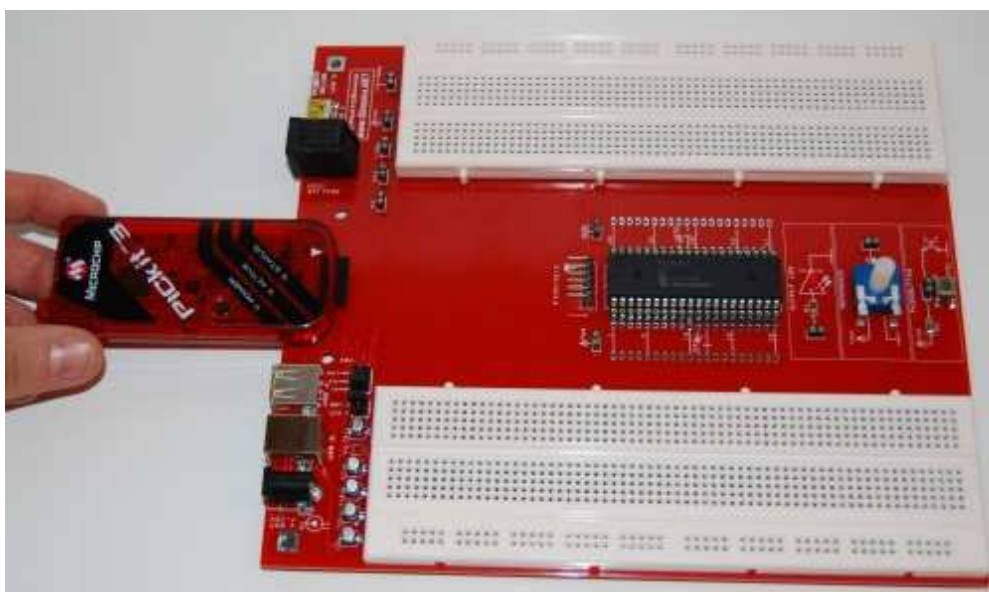
## Connecting the Programmer / Debugger

### Using the PICPROTOBOARD with the PICKIT2<sup>2</sup>, PICKIT3 or PICKIT4

Connect the PICKIT to the SIL 90 deg connector on the top side of the board.

Connect the PICKIT to the PC by means of its USB cable.

Remember to power the board as described in the 'Connecting and setting the Power Supply' chapter of this manual.



<sup>2</sup> PICKIT2 doesn't work with PIC 32-bit MCUs (see Microchip official documentation for details)

If desired, the PICKIT could be fixed to the board by means of a cable tie as shown in the following pictures.

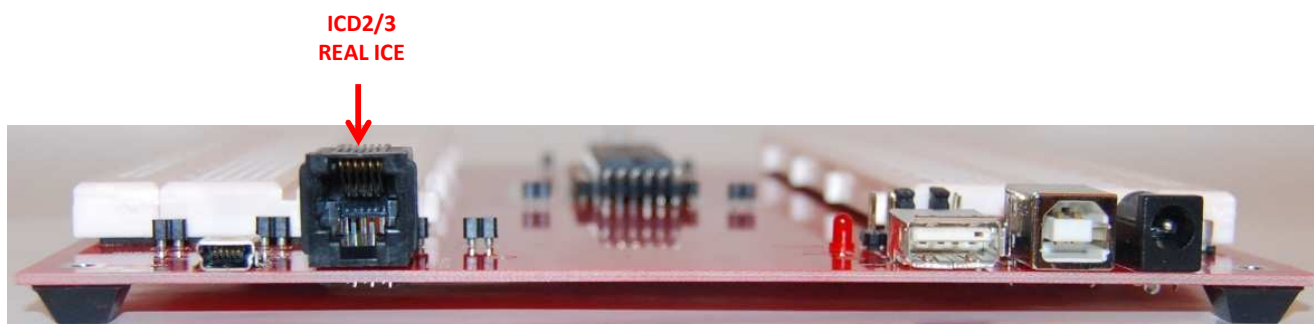


### Using the PICPROTOBOARD with the ICD 2 or ICD 3 or REAL-ICE

Connect the ICD2/3 or the REAL-ICE to the RJ11 6 pin connector on the front side of the **PICPROTOBOARD** by means of the cable provided with the ICD2/3 or the REAL-ICE.

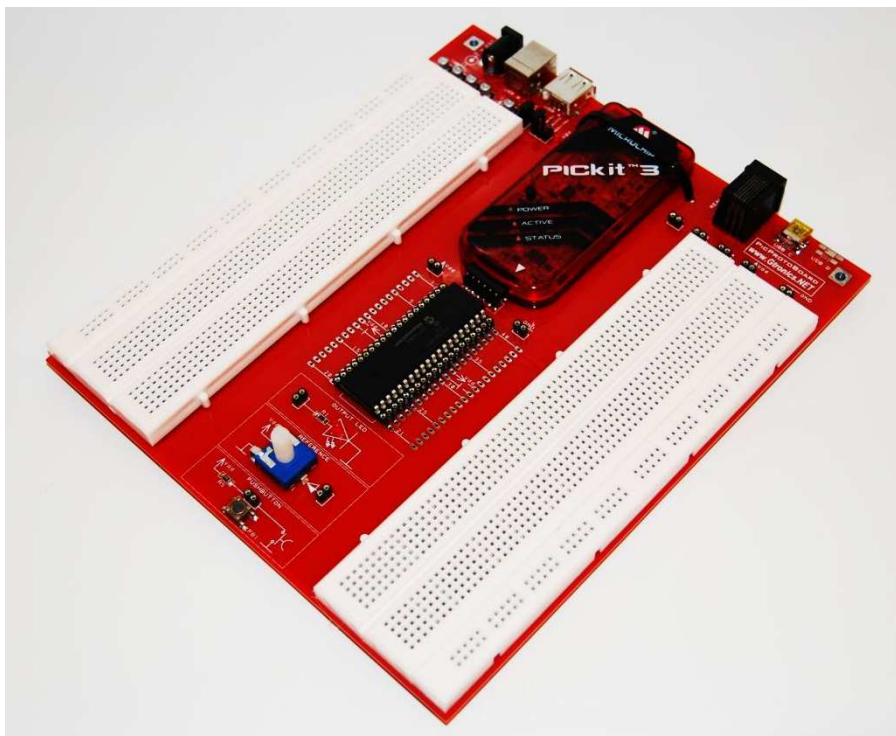
Then connect the ICD2/3 or the REAL-ICE to the PC by means of its USB cable .

Remember to power the board as described in the 'Connecting and setting the Power Supply' chapter of this manual.



**DO NOT CONNECT MORE THAN ONE PROGRAMMER / DEBUGGER AT THE SAME TIME.**

## Testing and Using the PICPROTOBOARD with 8-bit PIC MCUs (16F or 18F)



If the **32MX ADAPTER** is installed on the **PICPROTOBOARD**, you have to first remove the adapter in order to access the 40 pin DIP socket.

Once removed the **32MX ADAPTER**, install the desired 8-bit PIC MCU into the socket.

**This is not intended to be a programming course or a lesson of any kind about the usage of PICs.**

If you are already familiar with PICs, you can probably skip this session.

It is suggested to download the PIC16F88x datasheet from the [www.microchip.com](http://www.microchip.com) website so as to have the full documentation of this device.

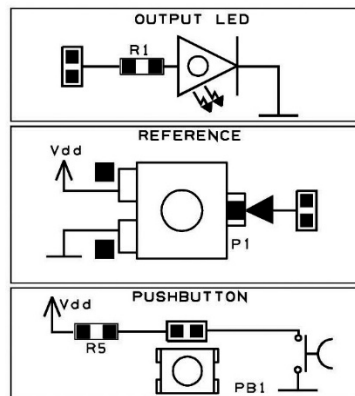
You can download the test projects form the [www.Gtronics.NET](http://www.Gtronics.NET) website.

The projects are developed in MPLABx (ver. 1.60) with XC8 compiler (ver. 1.10), so if you do not already have these software you need to download them from the [www.microchip.com](http://www.microchip.com) website and follow their instructions to install them into your PC.

The demo projects available from the [www.Gtronics.NET](http://www.Gtronics.NET) website are:

1. Blinking LED
2. Switch LED
3. Freq LED

These three projects make use of the three devices provided on board: OUTPUT LED, PUSHBUTTON and REFERENCE potentiometer.



### Blinking LED

This very simple program makes the OUTPUT LED blinking at the fixed frequency of 1Hz.

1. Connect Pin RA0 (#2) of the PIC to the OUTPUT LED.
2. Compile and run the project: the LED starts blinking.

### Switch LED

This program toggles the OUTPUT LED each time that the PUSHBUTTON is pressed.

1. Connect Pin RA0 (#2) of the PIC to the OUTPUT LED.
2. Connect Pin RA1 (#3) of the PIC to the PUSHBUTTON.
3. Compile and run the project: the LED toggles its state each time that the PUSHBUTTON is pressed.

### Freq LED

This program varies the frequency of the blinking OUTPUT LED according to the REFERENCE knob position.

1. Connect Pin RA0 (#2) of the PIC to the OUTPUT LED.
2. Connect Pin RA3 (#4) of the PIC to the REFERENCE potentiometer.
3. Compile and run the project: the blinking LED varies its frequency, according to the REFERENCE knob position.

Since most of the PICs of the 16F and 18F family have a lot of features in common, you can also use the **PICPROTOBOARD** to quickly setup prototyping environment also if your final circuit uses a different PIC from the PIC16F887 or PIC18F45K20 provided with the board.

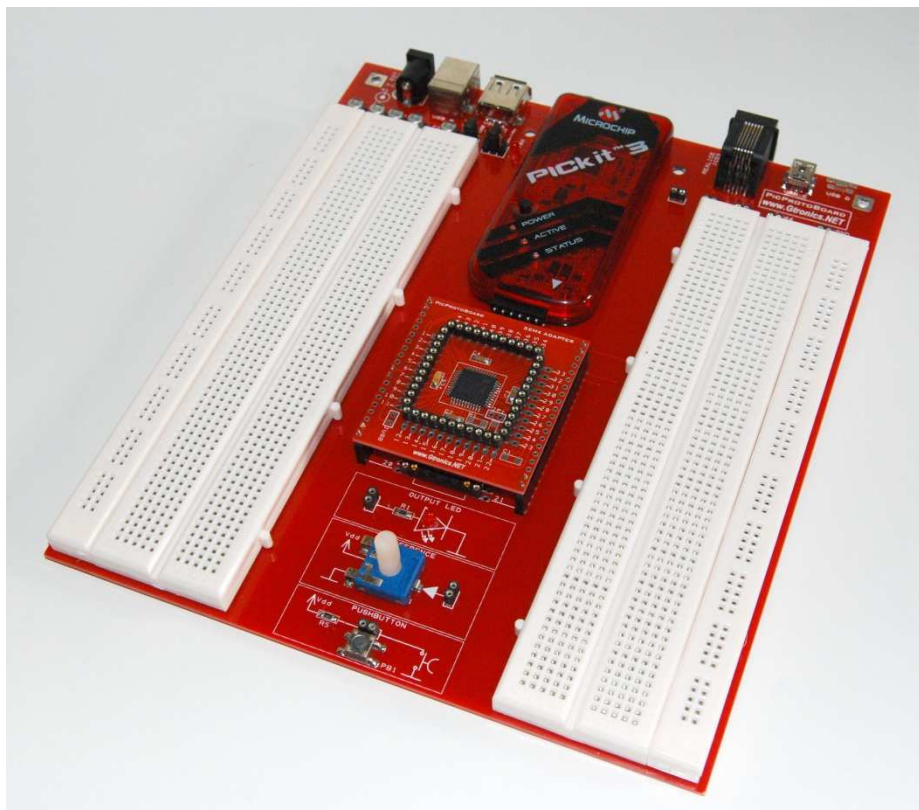
If you are a beginner, the KIT of spare parts provided with the board helps to setup the prototyping environment, otherwise you will surely have all that it's needed to test and prototype with the **PICPROTOBOARD**.

Each pin of the PIC is available for breadboarding connection, just be careful and follow the datasheet instructions if you need to use the ICSPDAT (pin#40) ICSPCLK (pin#39) and MCLR/VPP (pin#1) pins for your circuit.

If you want to use another PIC with the same 40PIN DIP pinout (see the compatibility list at the end of this document), just remove the installed PIC from the board and install the desired one.

**Before changing the PIC, always check the datasheet of the device to be sure of the pin-out and the Vdd.**

## Testing and Using the PICPROTOBOARD with 32-bit PIC MCUs



If you purchased the **32MX ADAPTER** separately, please follow the instruction provided on the *32MX Adapter User Manual* in order to install the adapter.

**This is not intended to be a programming course or a lesson of any kind about the usage of PIC MCUs.**

If you are already familiar with PIC MCUs, you can probably skip this session.

It is suggested to download the *PIC 32MX1XX\_2XX data sheet* and the *PIC 32MX Reference Manual 61132B* from the [www.microchip.com](http://www.microchip.com) website, so as to have the full documentation of this device/s.

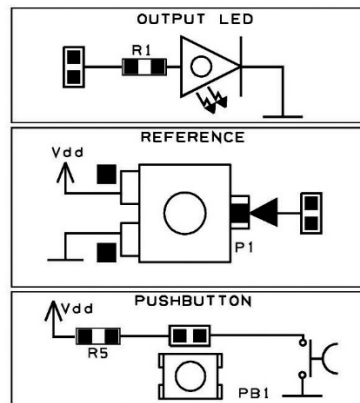
You can download the test projects from the [www.Gtronics.NET](http://www.Gtronics.NET) website.

The projects are developed in MPLABx (ver. 2.00) with XC32 compiler (ver. 1.31), so if you do not already have these software you need to download them from the [www.microchip.com](http://www.microchip.com) website and follow their instructions to install them into your PC.

The demo projects available from the [www.Gtronics.NET](http://www.Gtronics.NET) website are:

4. Blinking LED
5. Switch LED
6. Freq LED

These three projects make use of the three devices provided on board: OUTPUT LED, PUSHBUTTON and REFERENCE potentiometer.



### Blinking LED

This very simple program makes the OUTPUT LED blinking at a fixed frequency.

3. Connect Pin RA0 (pin#19) of the PIC32MX130F64D to the OUTPUT LED.
4. Compile and run the project: the OUTPUT LED starts blinking.

### Switch LED

This program switches the OUTPUT LED on and off according to the PUSHBUTTON state: the OUTPUT LED will be on as long as the PUSHBUTTON is pressed.

4. Connect Pin RA0 (pin#19) of the PIC32MX130F64D to the OUTPUT LED.
5. Connect Pin RA1 (pin#20) of the PIC32MX130F64D to the PUSHBUTTON.
6. Compile and run the project: the OUTPUT LED will be on as long as the PUSHBUTTON is pressed.

### Freq LED

This program makes the OUTPUT LED blinks at variable frequency, according to the REFERENCE knob position.

4. Connect Pin RA0 (pin#19) of the PIC32MX130F64D to the OUTPUT LED.
5. Connect Pin RA1 (pin#20) of the PIC32MX130F64D to the REFERENCE potentiometer.
6. Compile and run the project: the OUTPUT LED starts blinking, the frequency varies according to the REFERENCE knob position.

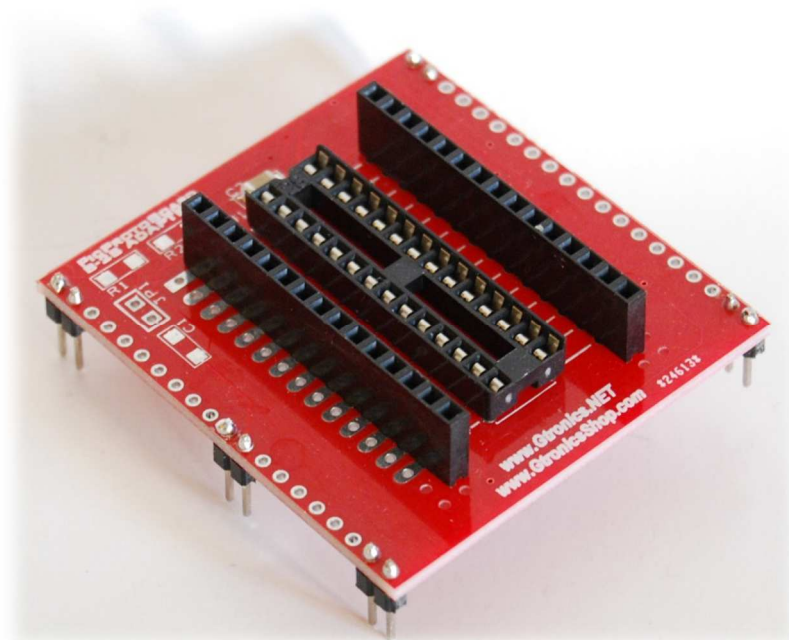
The **32MX ADAPTER** uses pins #21 and #22 for PGED1 and PGEC1 signals, hence PGED1 and PGEC1 must be set in the device configuration for programming and debugging.

Each pin of the PIC is available for breadboarding connection, just be careful and follow the datasheet instructions if you need to use the PGED1 (pin#21), PGEC1 (pin#22), and MCLR (pin#18) pins for your own circuit.

If you want to use another PIC with the same 44 pin TQFP pinout (see the compatibility list at the end of this document), you can purchase the **32MX ADAPTER NAKED** in order to solder the PIC32MX that better suits your needs.

**Before changing the PIC, always check the datasheet of the device to be sure of the pin-out and the V<sub>dd</sub>.**

## Using the PICPROTOBOARD with the 8-28 Adapter board



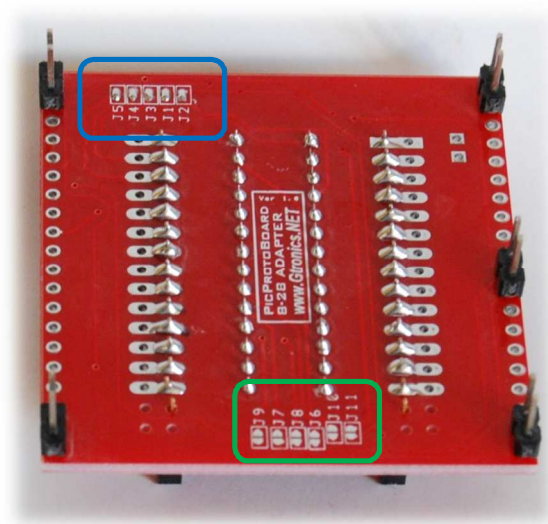
The **8-28 ADAPTER** extends your **PICPROTOBOARD** letting you to prototype with 8, 14, 20 and 28 pins PIC.

It is compatible with any 8, 14, 20 and 28 pin PIC microprocessor.

PLEASE NOTE that the most of the 8, 14, 20 and 28 pin doesn't have an in-circuit debugger, so you cannot debug with code breakpoints and single step mode.

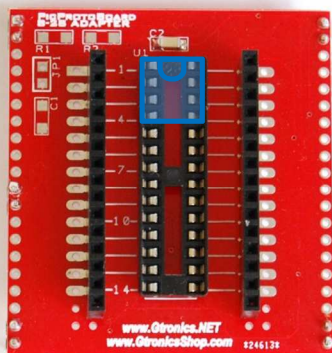
## Preparing the 8-28 ADAPTER to be used with 8, 14, 20 pin PIC

Configure the solder jumpers on the bottom of the 8-28 Adapter board as shown below:

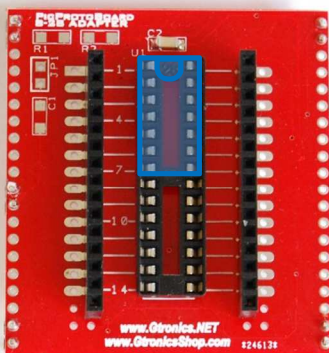


J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11
CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN

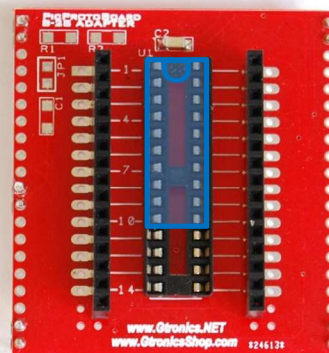
Insert the desired 8, 14 or 20 PIC as shown below



8 pin PIC



14 pin PIC

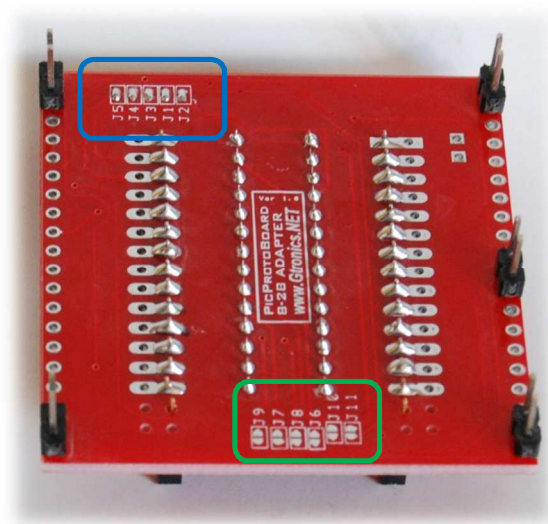


20 pin PIC



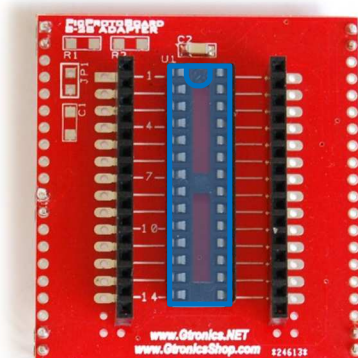
## Preparing the 8-28 ADAPTER to be used with 28 pin PIC

Configure the solder jumpers on the bottom of the 8-28 Adapter board as shown below:



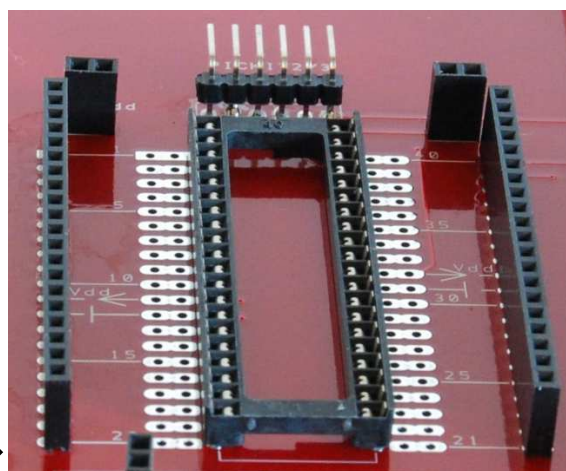
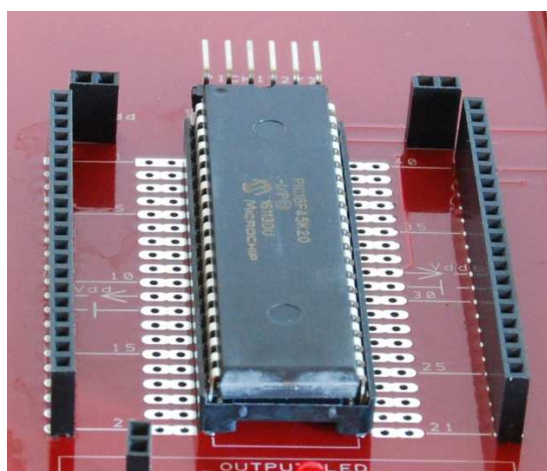
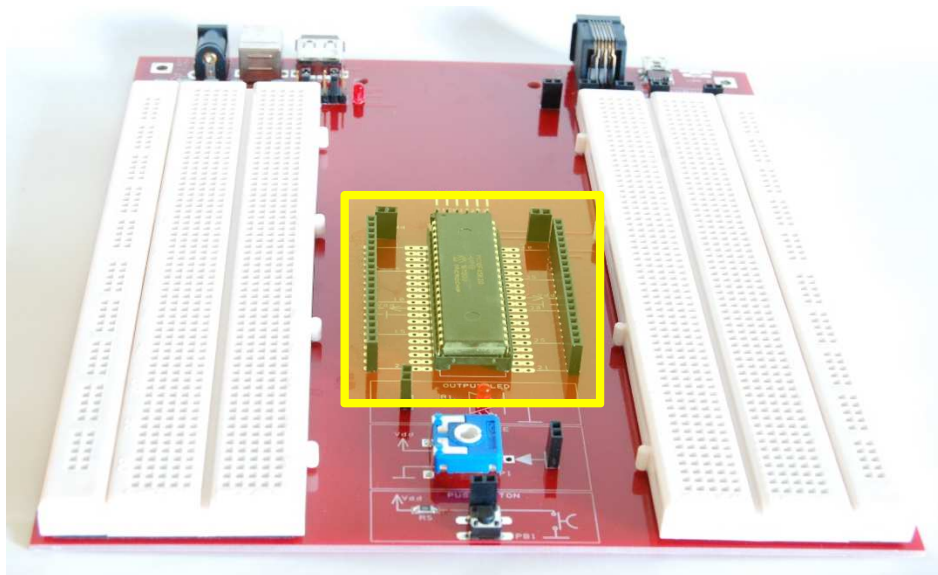
J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE

Insert the desired 28 pin PIC as shown below



## Installing the 8-28 ADAPTER on the PICPROTOBOARD

Disconnect the **PICPROTOBOARD** from the power supply and from the programmer / debugger. Remove the 40 pin PIC or the 32MX adapter from the socket (being careful not to bend the pins).



Insert the **B-28 ADAPTER** as shown in the pictures below.

The **PICPROTOBOARD** is ready for use.

