

Function Generator mkII v1.0

Design and Instruction

Manual for Hobbyists and Engineers

**Part 2 – Software Operation and
Installation**

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1 - Software Installation

To begin using the software you first must install it to your computer. The reason for the install is to transfer and accurately place driver files and software required files to your computer to run the software effectively.

The first consideration is the software environment. The function generator software was generated using Visual Basic 2010, and requires Microsoft dot net environment version 4.0 to be installed onto your computer. While the installation package will check to see if your computer has dot net v4.0, it will not install it for you.

The package installer is a step by step system and is easy to follow.

To begin go to the project folder you downloaded, go to folder 'PC software' in there should be a .zip file. Open the .zip file and double click 'Function Generator mkII v1.0 Installation.exe'

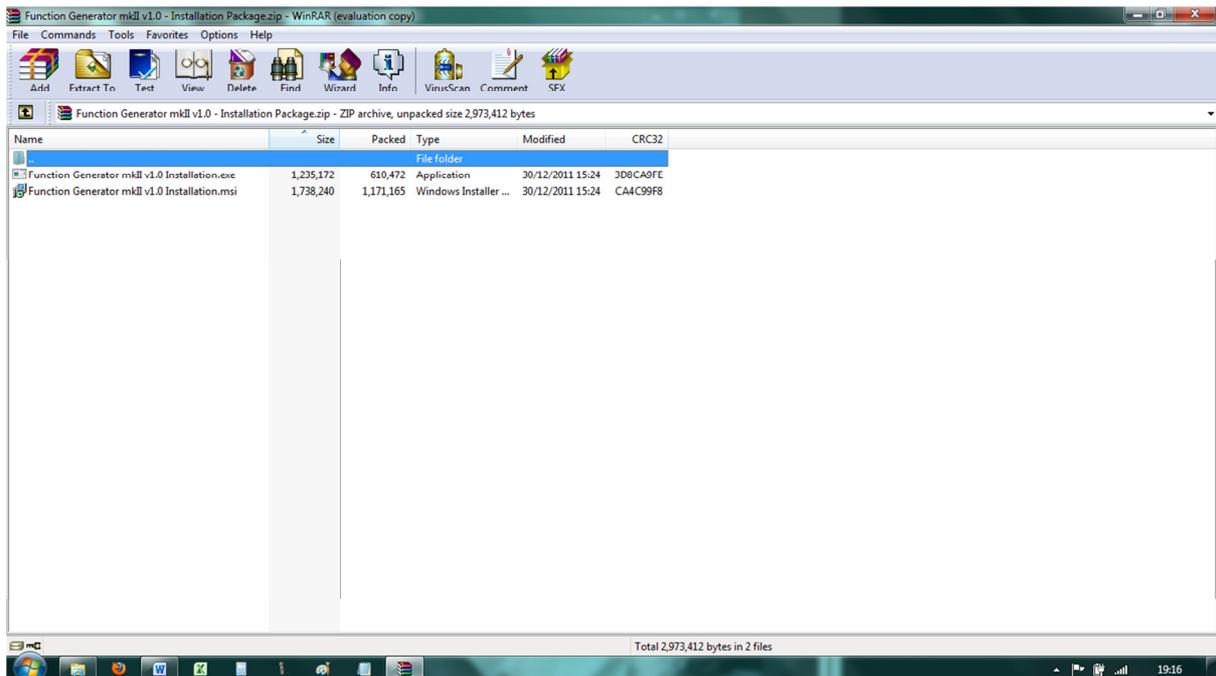


Figure 1.1 – Installation Package

On double clicking Function Generator mkII v1.0 Installation.exe you will be greeted with the installation wizard.

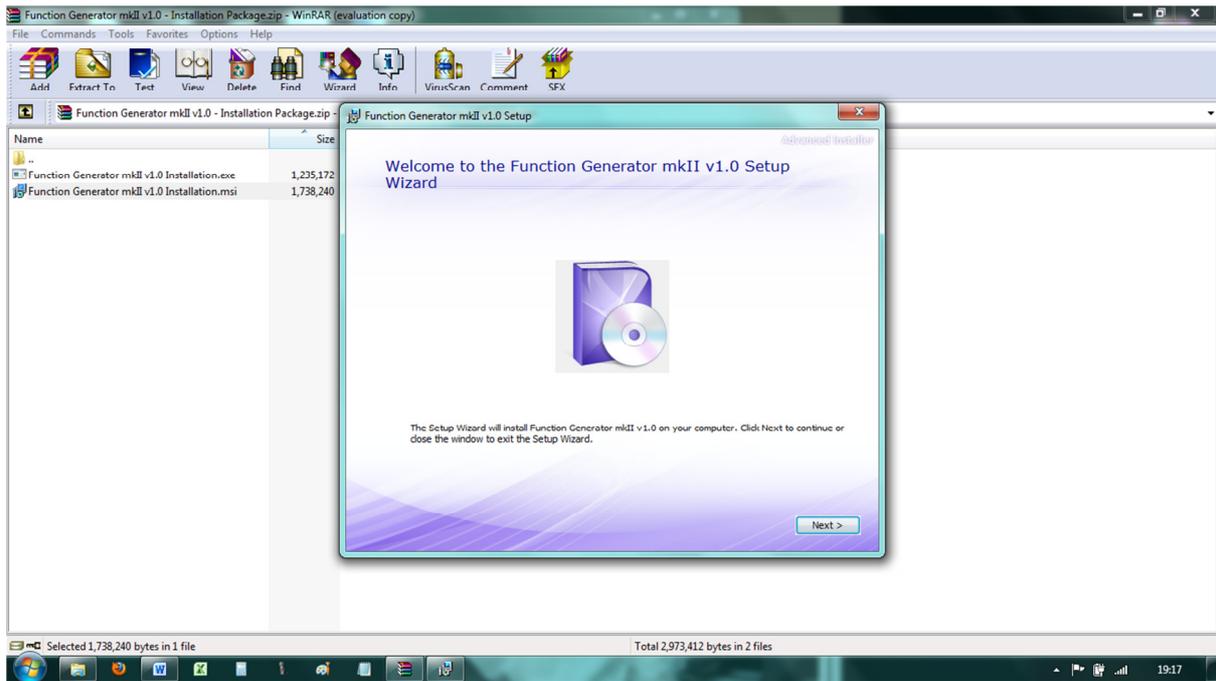


Figure 1.2 – Installation Package Greeting

Click next and follow the onscreen instructions

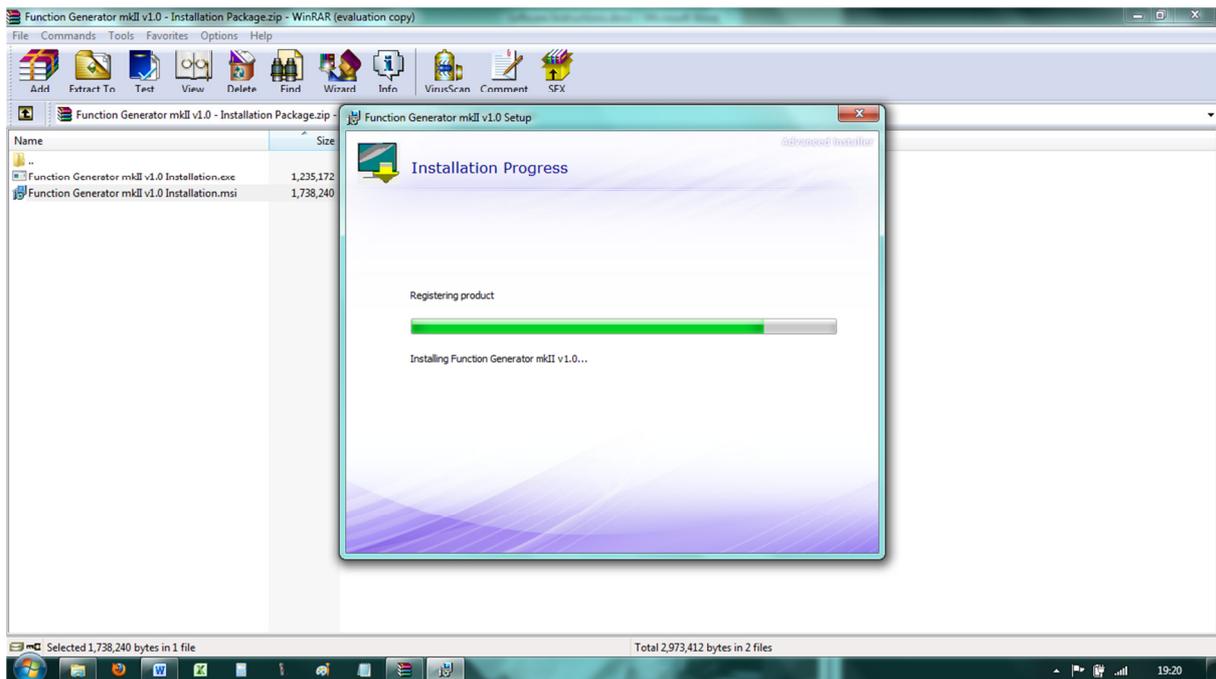


Figure 1.3 – Installation Process



Once the installation has been completed a desktop icon will be installed

Figure 1.4 – Software Widows Icon

2 – Running The Software

2.1 Overview

The software is designed to link the function generator to the PC via USB, the purpose being to allow you the user to transfer your own designed function generator waveforms. The transfer function is two way. Data can be written to the NVRAM chip and read from the NVRAM chip.

The software will display all 12 user presets each box designed to receive 64 numbers from 0 – 255.

Graphical interface is provided so that you can preview the waveform before uploading to the function generator.

The software is also required for preloading the factory presets to the NVRAM chip. The NVRAM chip when installed for the first time will be empty/blank. The software will provide the 18F4550 a command to install the factory preset data.

User projects can be saved as part of an on-going project, where all 12 presets are saved for future reference.

The software also includes a simple DAC calibration tool to adjust the values to take into consideration any non-linearity of the DAC.

2.2 Starting a New Project

To begin a new project and save/transfer new waveforms, a new project needs to be created. To do this open the software and click on the tool bar tab 'User Preset' and select 'Project' and 'new'.

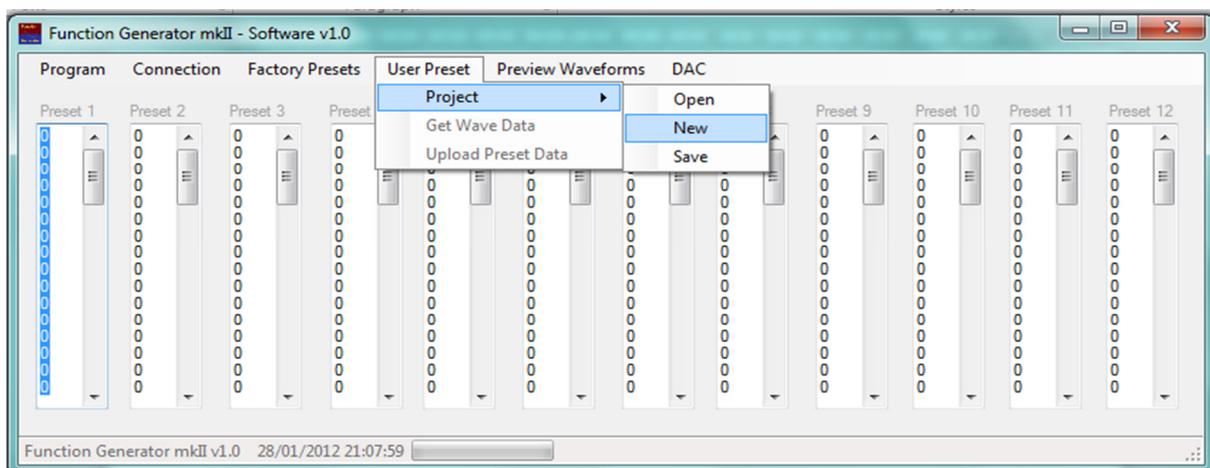


Figure 2.1 – Starting a new project

Here you will be asked to set a name for your project, type a name for your project and click save. From here your project will be created.

Here you can type in your waveform values. For example insert the following values below

Table 2.1 – Example Waveform Data

127
140
152
164
176
188
199
209
218
226
234
240
245
249
252
254
254
253
251
247
243
237
230
222
213
204
193
182
170
158
146
133
121
108
96
84
72

61
50
41
32
24
17
11
7
3
1
0
0
2
5
9
14
20
28
36
45
55
66
78
90
102
114
127

Copy and paste these values into the text box marked 'Preset 1'.

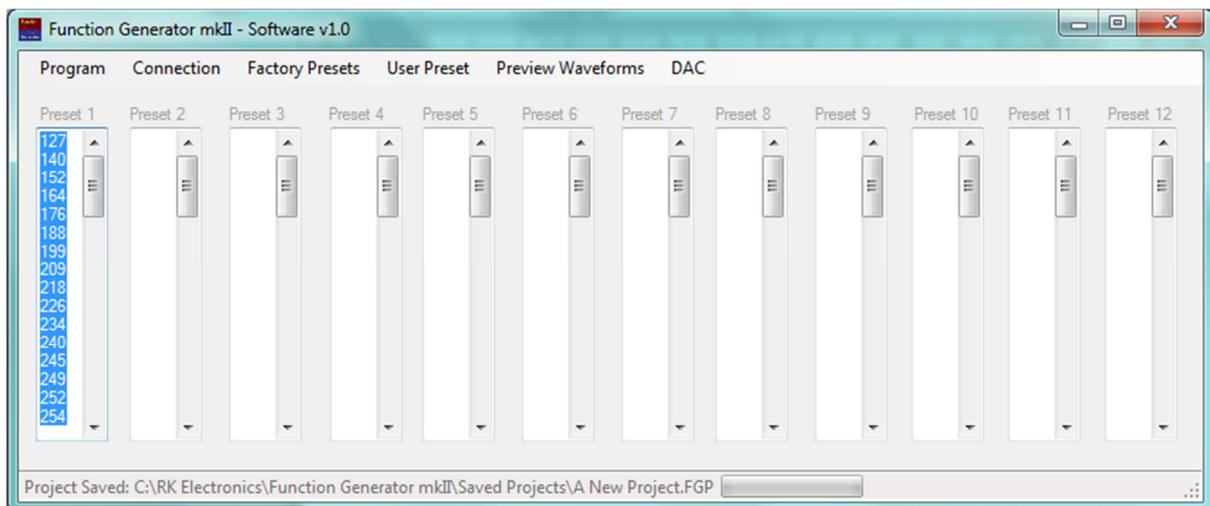


Figure 2.2 – Example Waveform Data Written to 'Preset 1'

Here you can perform a number of tasks;

1. Insert more waveform data into presets 2 – 12
2. Save your current work
3. View your waveform

For option 1 simply continue as before. For option 2 simply go to the toolbar and click: User Preset/Project/Save. Here you can overwrite the existing project or save as another project.

To view your waveform click the toolbar: Preview Waveforms/Graphical Analysis/Preset 1.

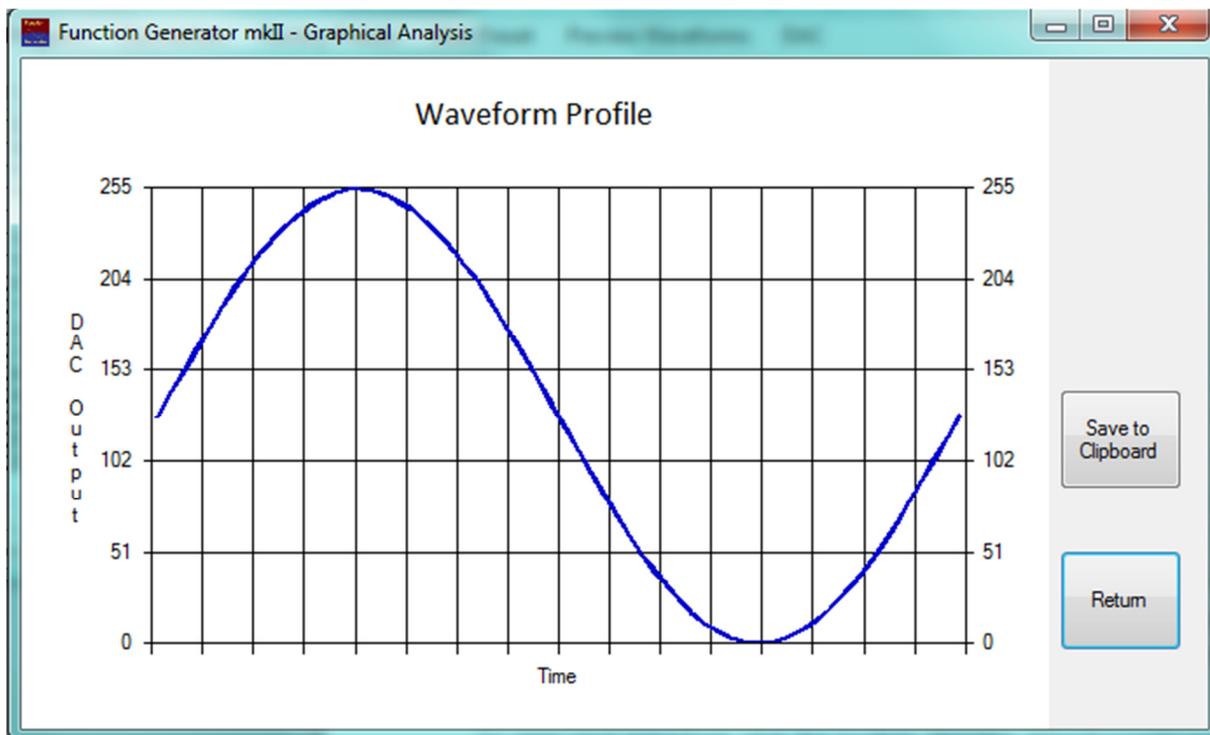


Figure 2.3 – Graphical Analysis of Preset 1

Here you can see that the example data produces a first order sine wave. Here you can also save the waveform to the computers clipboard and pasted as shown on the next page.

Waveform Profile

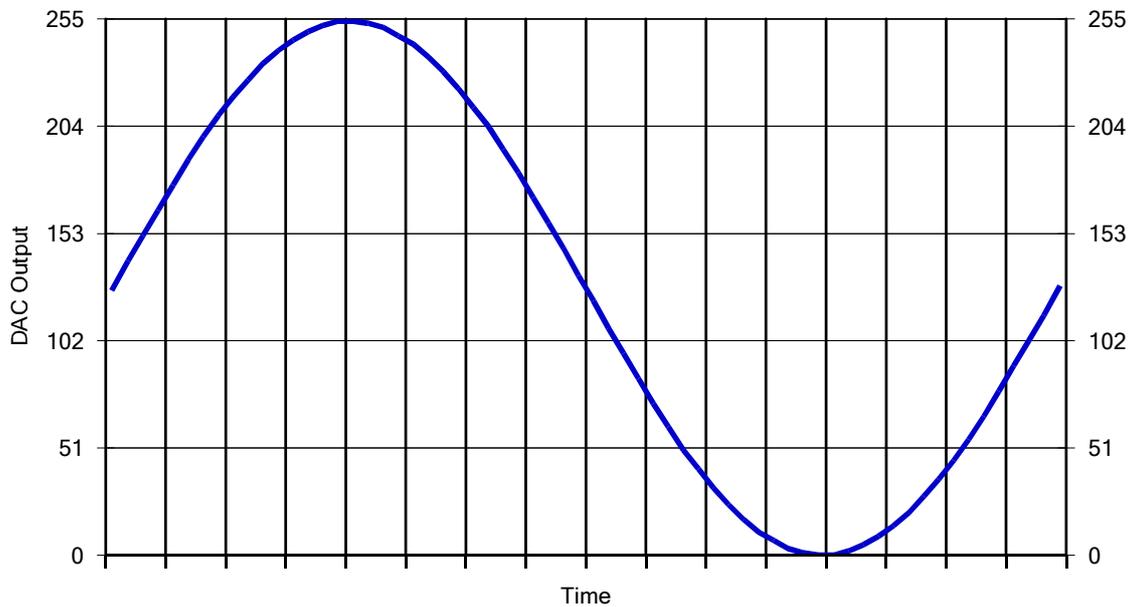


Figure 2.4 – Clipboard Image that is stored

2.3 Connecting USB

The next stage is to connect the function generator to the PC. When you boot the software for the first time you may have noticed that the software indicated that Vendor and Product IDs have not been set. These are the USB identity numbers you used for the Mikrobasic HID tool, before compiling the 18F4550 .hex file.

Once you tell the software the numbers you have used, these numbers will be saved to the file C:\RK Electronics\Function Generator mkII\USBIDs.cfg

From this point forward you can start to connect the computer to the function generator. To do this click; Connection\Connect

Once connected a message will be displayed on the screen informing you that the generator has acknowledged that connection is established or there is a USB connection error.

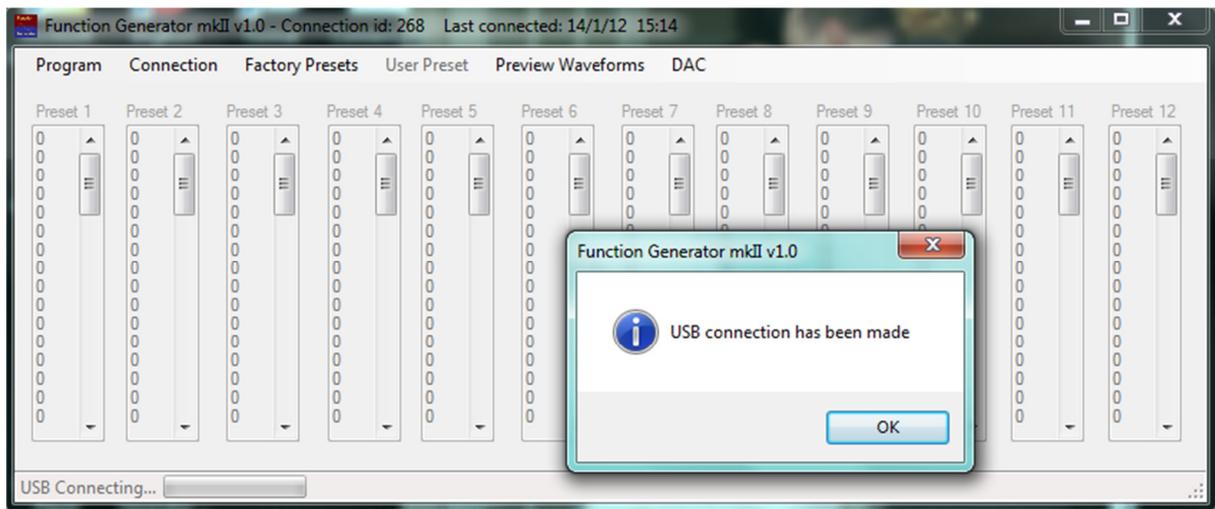


Figure 2.5 – Confirmation of Function Generator Connection

Now that there is a connection between the computer and function generator, two changes will be made;

1. USB Status indicator on the function generator should change
2. Factory presets and user presets options become available.

Here you can now perform two functions

1. Install factory presets to NVRAM
2. Transfer data to and from the function generator

2.4 Transferring Data

Once a USB connection has been made data transfer to and from the function generator can be made. To gather user preset data from NVRAM click;

User Preset\Get Wave Data

Here all 12 preset fields will be populated with the data from the NVRAM chip.

To transfer all 12 preset fields click;

User Preset\Upload Preset Data

Preset data can be loaded and saved using the User Preset\Project options

To install factory presets to NVRAM during NVRAM first time use click;

Factory Presets\Install Factory Presets to NVRAM

2.5 DAC Calibration

DAC Calibration is designed to correct for any non-linear output from the DAC chip. To use the calibration a series of digital to analogue conversions are required to determine voltage versus binary data linearity.

To perform the calibration the following presets need to be uploaded to the NVRAM chip

Preset 1: 64 bytes at binary value of 255

Preset 2: 64 bytes at binary value of 64

Preset 3: 64 bytes at binary value of 1

Preset 4: 64 bytes at binary value of 0

Run the function generator for all four user presets and note the voltage output from the DAC and write down.

Open the DAC Calibration tool by clicking;

DAC\DAC Calibration Tool\Polynomial

Here you enter the voltage values to measured and a calibration curve will attempt to be generated. Note; this bit of software does not always work.

Once you enter the voltages click; Calibration.

If you are happy with the calibration curve you can save the calibration. Here the save file is saved as a .dcf file (DAC Calibration File)

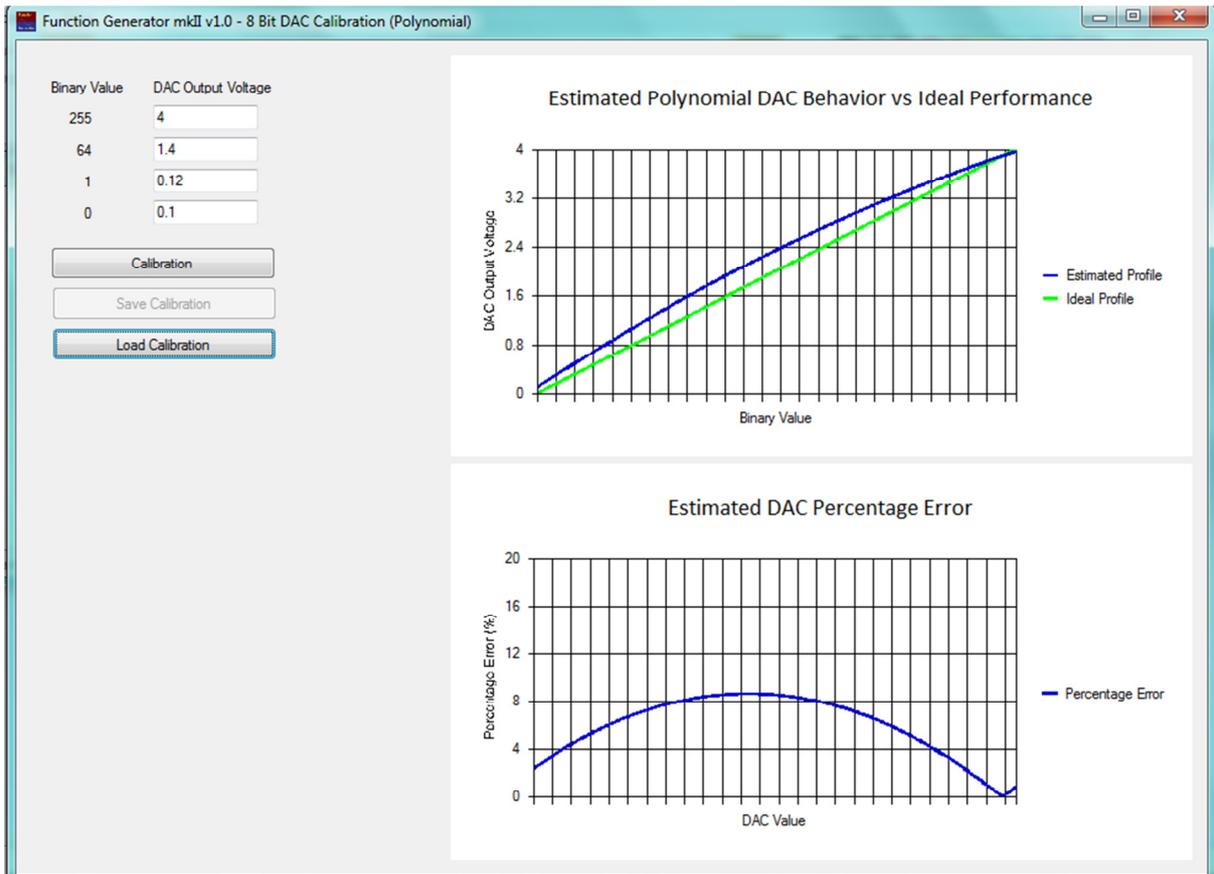


Figure 2.6 – DAC Calibration Tool

To apply the calibration, click;

DAC\Adjust Presets to DAC Calibration

Here you will be asked to load a calibration file, and the calibration compensation will be applied.

3 – Uninstalling the Software

To uninstall the software go to:

Start\Control Panel\Uninstall a Program

Select the software title 'Function Generator mk II' and click uninstall, then follow wizard instructions.