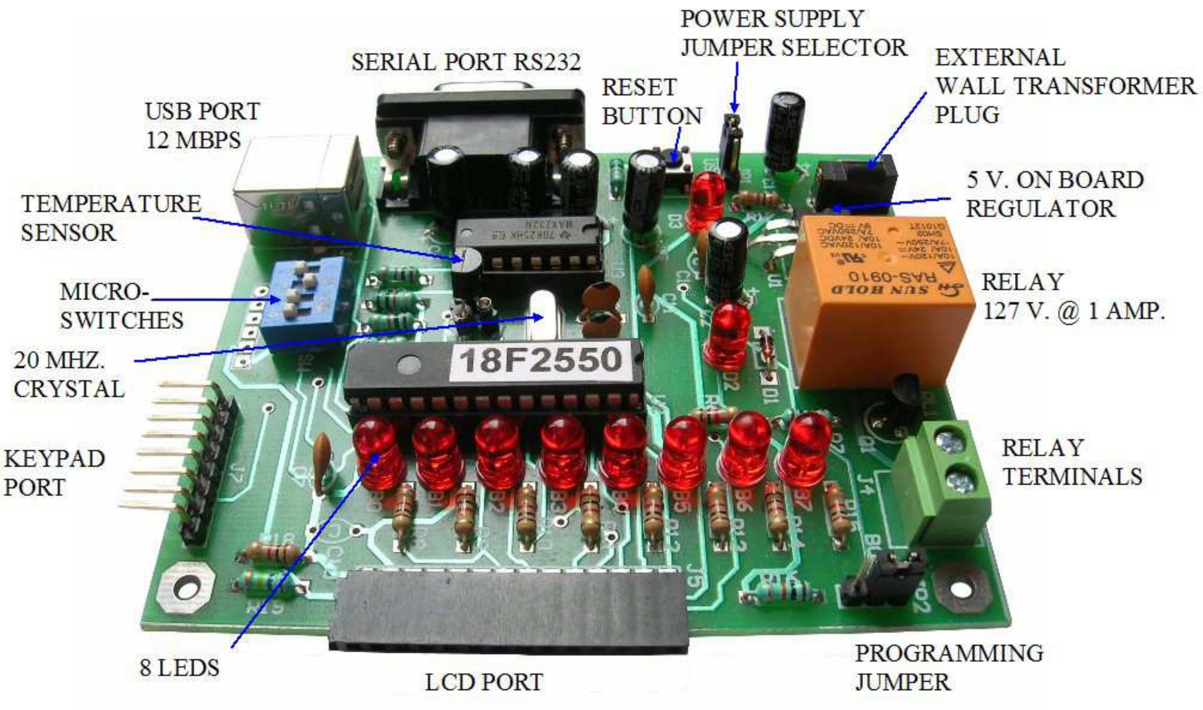
BOLT 18F2550 SYSTEM PROGRAMMING MANUAL

All manuals, files and programs mentioned in this manual, may be downloaded from the following link:

http://puntoflotante.net/BOLT-SYSTEM-DOWNLOAD.htm

Index:

BOLT 18F2550 MICROCONTROLLER SYSTEM

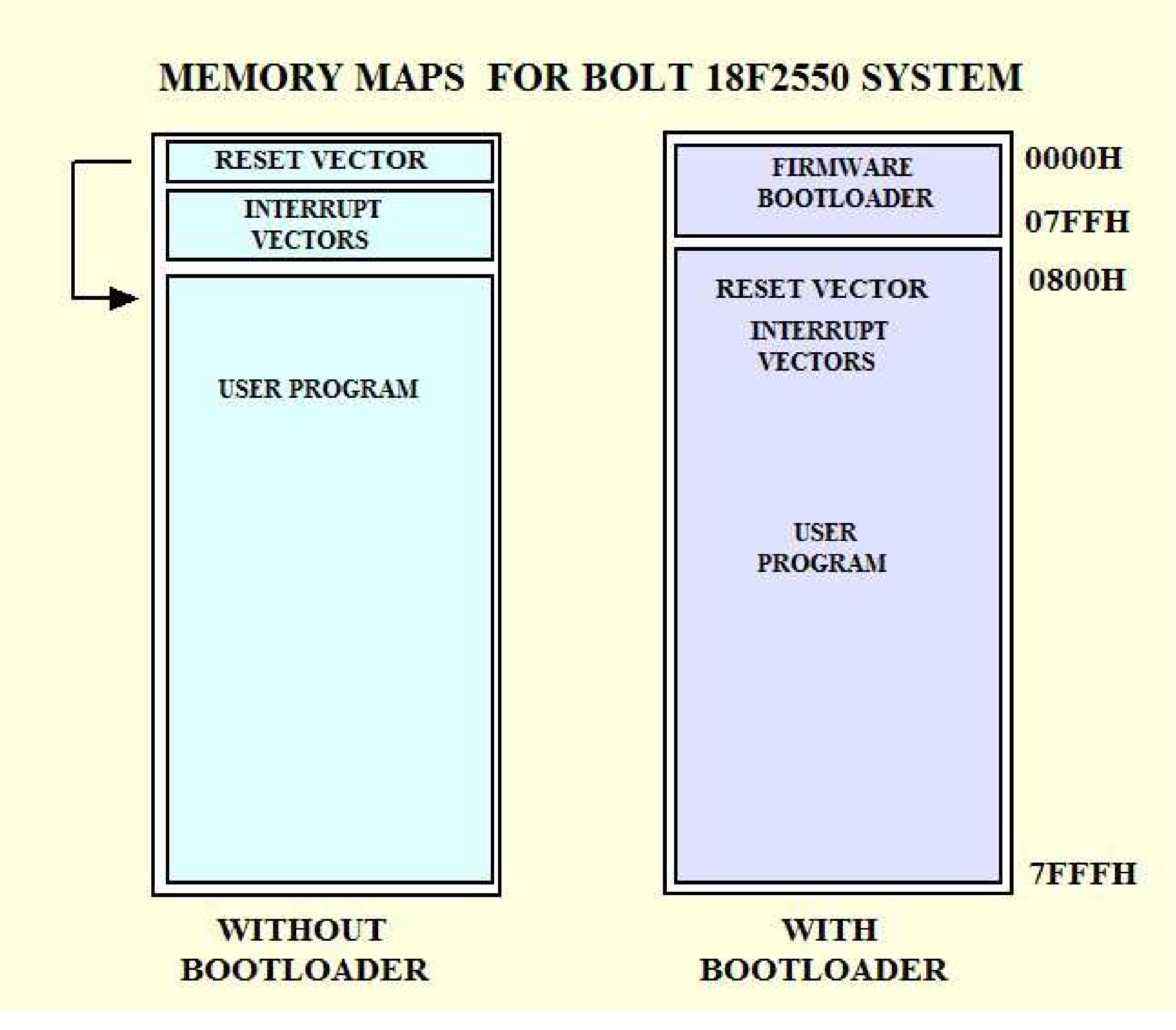


1. Overview: Programming Bolt 18F2550 system through the USB port.

18F2550 microcontroller has the ability to modify its own FLASH memory under the control of a firmware.

This firmware is called "Bootloader" and is factory preloaded on Bolt 18F2550 System. The figure below shows the map in purple with the 18F2550 code memory, preloaded with the firmware bootloader.

The Bootloader occupies approximately 2K locations in the bottom of the FLASH memory of the 18F2550, (locations 000H..7FFH). This area should not be used by the user application program. The 18F2550 contains a total of 16K words of 16 bit length code in its memory.



Using this firmware bootloader you can transfer executable programs (.hex) via USB cable from PC to flash memory using the software called Bolt v.1.0.1, whose installation is detailed in Chapter 2.

The projects and test programs of Bolt system were developed using the C18 compiler v.3.40 and MPLAB IDE v.8.63, from Microchip. The support CD (you may download all files from our internet site as well) includes also a folder with all auxiliary libraries that can be used with template for the development of new projects. Please see Chapter 5 of this guide for more information.

CONFIGURATION REGISTERS

The 18F2550 microcontroller has 14 configuration registers of 8 bits each. Such registers can enable and configure many features of the microcontroller. Bolt system operates with a 20 MHz external crystal.

PRELOADED VALUES OF CONFIGURATION REGISTERS:

REGISTER	ADDRESS	VALUE 8MHZ	VALUE 20MHZ
CONFIG1L	30000H	21H	24H
CONFIG1H	30001H	0EH	0EH
CONFIG2L	30002H	38H	38H
CONFIG2H	30003H	1EH	1EH
CONFIG3L	30004H	00H	00H
CONFIG3H	30005H	80H	80H
CONFIG4L	30006H	80H	80H
CONFIG4H	30007H	00H	00H
CONFIG5L	30008H	FFH	FFH
CONFIG5H	30009H	80H	80H
CONFIG6L	3000AH	FFH	FFH
CONFIG6H	3000BH	A0H	A0H
CONFIG7L	3000CH	FFH	FFH
CONFIG7H	3000DH	FFH	FFH

These configuration words are already factory preloaded into the bootloader firmware, with the information from the table shown above. To see the details of the function of each of the bits in each register, please refer to the manual PIC18F2550 Datasheet.pdf pages 286-295.

For the Bolt 18F2550 system to work properly, these words should not be modified. However, if your application requires modifications, it would be necessary to reprogram the firmware bootloader of 18F2550 using a conventional ICSP programmer. Chapter 6 provides instructions for this case. Please be aware that any change in these registers may cause a system malfunction.

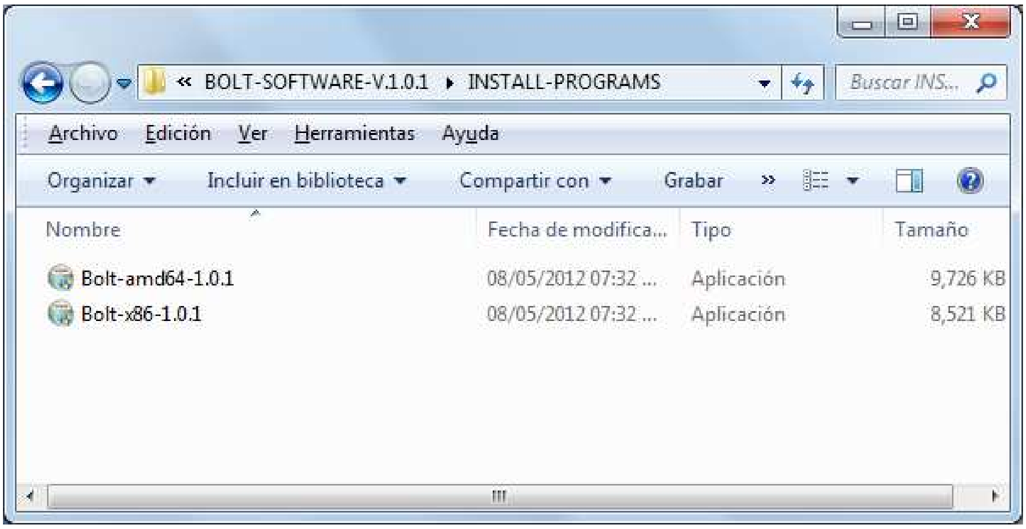
2. Installation of programming software Bolt v.1.0.1, Bolt v.1.0.2

To program module Bolt through the USB port of your PC, it is necessary to install the provided software in your support CD, compatible with Windows 8, Windows 7 (32 and 64 bits), Vista and XP. You may find the installations files in :

http://puntoflotante.net/BOLT-SYSTEM-DOWNLOAD.htm

Bolt-amd64-1.0.2 for Windows 8
Bolt-amd64-1.0.1 for Windows 7, 64 bits
Bolt-x86-1.0.1 for Windows 7, 32 bits, Vista and XP.

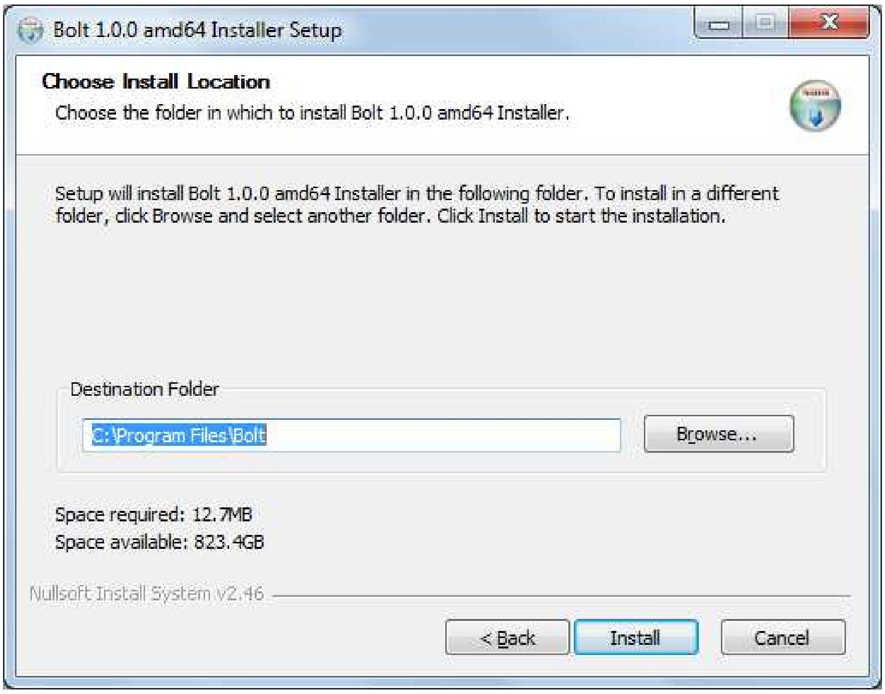
Folder with installation files is shown below:



Nombre	Fecha de modifica...	Tipo	Tamaño
Bolt-amd64-1.0.1	08/05/2012 07:32 ...	Aplicación	9,726 KB
Bolt-x86-1.0.1	08/05/2012 07:32 ...	Aplicación	8,521 KB

Open the installer depending on the operating system on your PC. The installation files will be stored in the specified folder in the window below (Destination Folder). Do not change the name of this destination.

Click “Install” to continue.


Bolt 1.0.0 amd64 Installer Setup

Choose Install Location

Choose the folder in which to install Bolt 1.0.0 amd64 Installer.

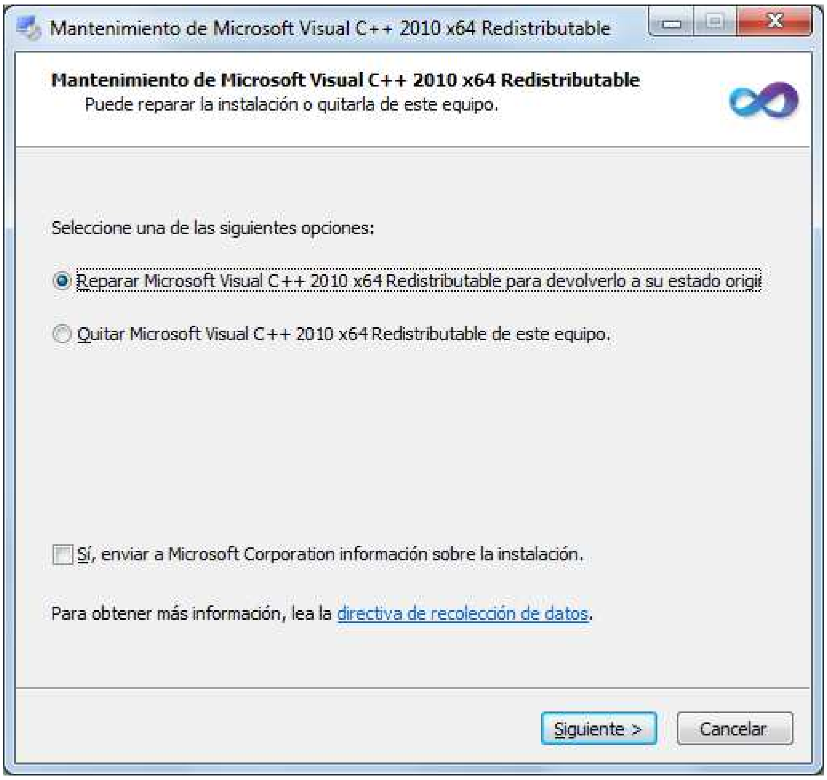
Setup will install Bolt 1.0.0 amd64 Installer in the following folder. To install in a different folder, click Browse and select another folder. Click Install to start the installation.

Destination Folder: C:\Program Files\Bolt

Space required: 12.7MB
Space available: 823.4GB

Nullsoft Install System v2.46

The installation program may require to install or update additional files for runtime operation of Visual C ++. If the program asks for it, as shown in the window below, choose "Repair".



Mantenimiento de Microsoft Visual C++ 2010 x64 Redistributable

Mantenimiento de Microsoft Visual C++ 2010 x64 Redistributable

Puede reparar la instalación o quitarla de este equipo.

Seleccione una de las siguientes opciones:

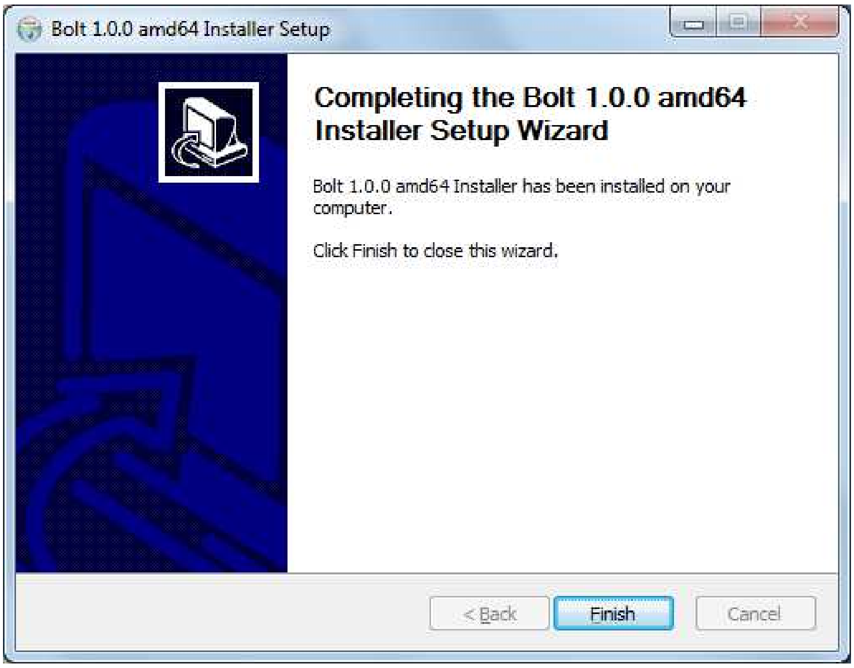
● Reparar Microsoft Visual C++ 2010 x64 Redistributable para devolverlo a su estado origi

○ Quitar Microsoft Visual C++ 2010 x64 Redistributable de este equipo.

□ Sí, enviar a Microsoft Corporation información sobre la instalación.

Para obtener más información, lea la directiva de recolección de datos.

Click “Finish”. End of installation!



Bolt 1.0.0 amd64 Installer Setup

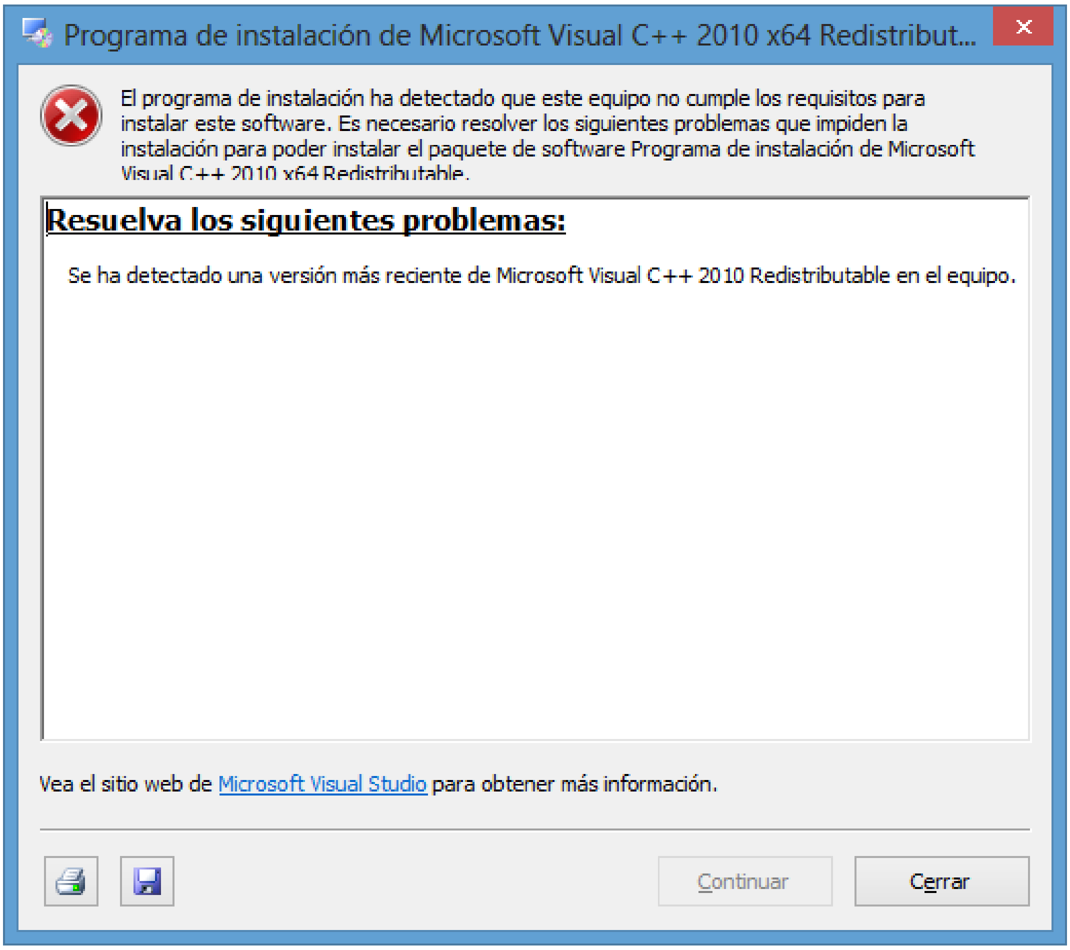
Completing the Bolt 1.0.0 amd64 Installer Setup Wizard

Bolt 1.0.0 amd64 Installer has been installed on your computer.

Click Finish to close this wizard.

*****IMPORTANT NOTE WHEN INSTALLING Bolt v.1.0.2, for Windows 8*****

If the installation program finds a previous versión of Visual C++ libraries installed on your PC, it will show the following message. This ***IS NOT*** an error message, and you do not have to take any actions. Just close this window and the installation will succesfully finish.



Programa de instalación de Microsoft Visual C++ 2010 x64 Redistribut...

El programa de instalación ha detectado que este equipo no cumple los requisitos para instalar este software. Es necesario resolver los siguientes problemas que impiden la instalación para poder instalar el paquete de software Programa de instalación de Microsoft Visual C++ 2010 x64 Redistributable.

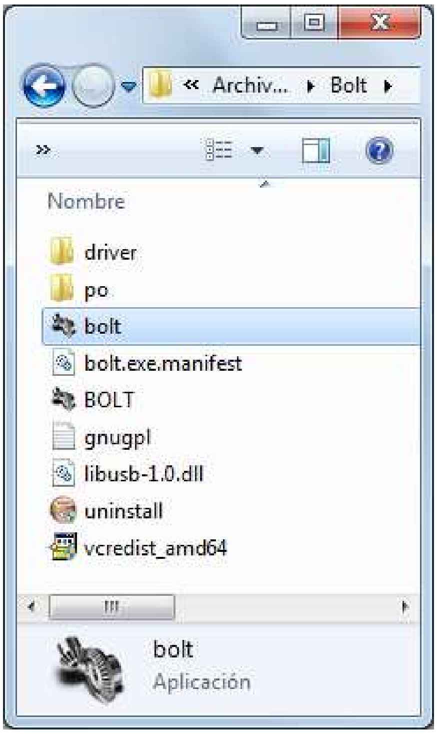
Resuelva los siguientes problemas:

Se ha detectado una versión más reciente de Microsoft Visual C++ 2010 Redistributable en el equipo.

Vea el sitio web de Microsoft Visual Studio para obtener más información.

Remember that the files were stored in the installation folder in the path: C:\Program Files\Bolt.

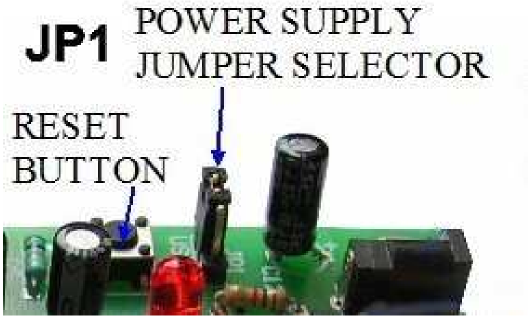
Go to that directory and giving a right mouse click to the application file "Bolt.exe" marked in the image below, create a shortcut in the desktop.

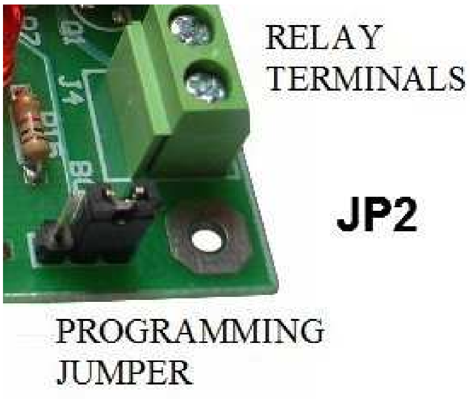


3. Positioning of jumpers JP1 y JP2.

Referring to the figure shown on page 1 of this guide, locate jumpers JP1 and JP2 in module Bolt. The table below shows the function of each jumper. Put the power supply jumper JP1 to the "USB" position as shown below. This will feed board directly from the USB cable.

To program the FLASH memory of the system using software Bolt v.1.0.1., set jumper JP2, as shown in the photo below, in the closest position to the green terminals of the relay.



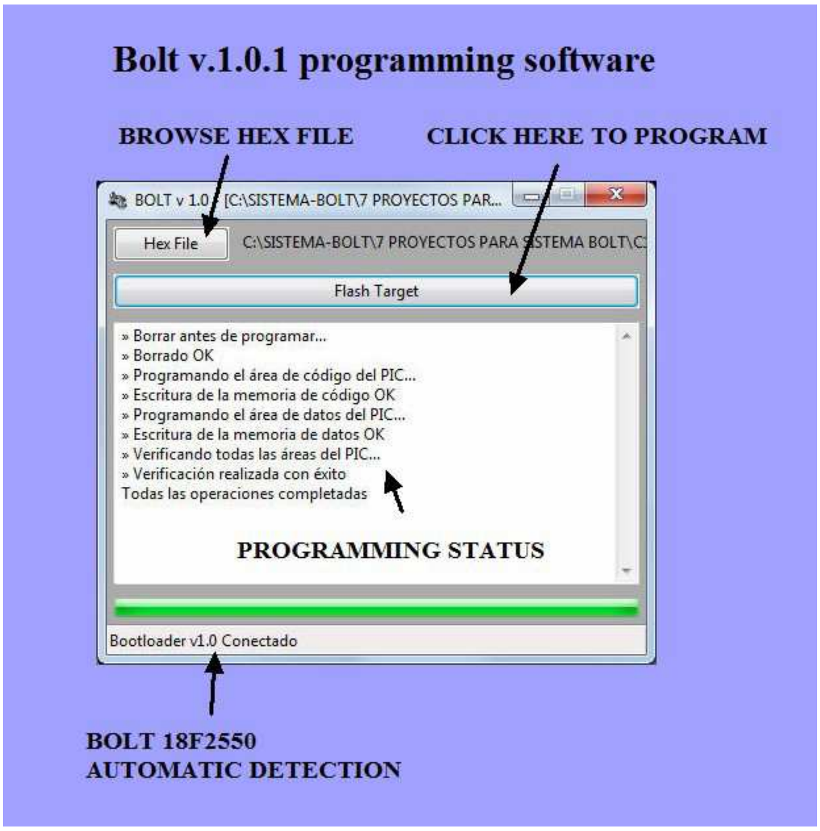


Jumper	Position in PCB	FUNCTION	Position	FUNCTION
JP1	**“USB"**	**Board is powered through USB cable**	**Opposite**	**Board is powered through external wall transformer**
JP2	**"JP2"**	**Autorun mode: execute user program**	**Opposite**	**Bootloader mode: Program 18F2550 Flash memory**

4. Loading programs with software Bolt v.1.0.1, Bolt v.1.0.2

Connect USB cable to your PC and to the module Bolt 18F2550 and open from the desktop of your PC the file “Bolt” (a shortcut was created in chapter 2).

On detecting the module Bolt 18F2550, the driver is automatically installed on the PC and, in the program window you will read the sign "Bootloader v1.0 Connected", as shown below. If necessary disconnect and reconnect the USB cable. Remember the JP2 jumper should be in the position closest to the green terminals of the relay.


Bolt v.1.0.1 programming software
BROWSE HEX FILE
CLICK HERE TO PROGRAM
BOLT v 1.0 [C:\SISTEMA-BOLT\7 PROYECTOS PAR...
Hex File
C:\SISTEMA-BOLT\7 PROYECTOS PARA SISTEMA BOLT\C:
Flash Target
PROGRAMMING STATUS
BOLT 18F2550
AUTOMATIC DETECTION

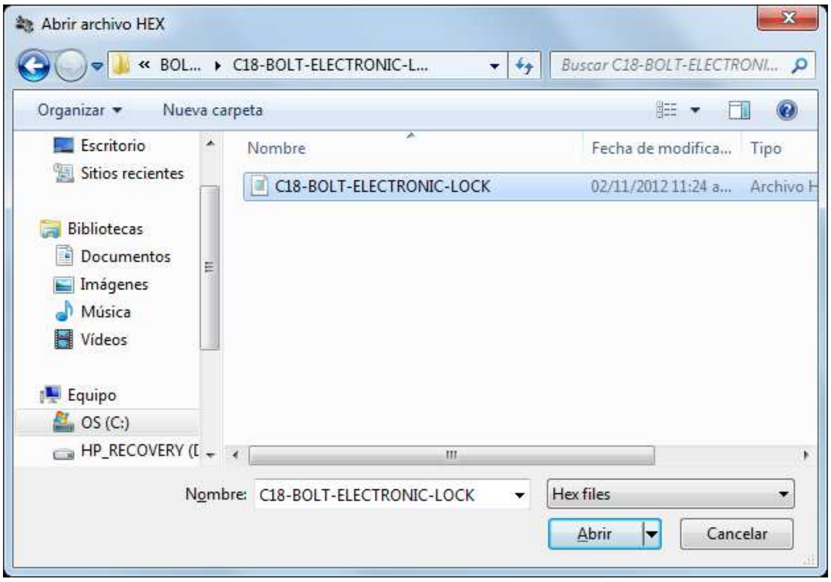
» Borrar antes de programar...
» Borrado OK
» Programando el área de código del PIC...
» Escritura de la memoria de código OK
» Programando el área de datos del PIC...
» Escritura de la memoria de datos OK
» Verificando todas las áreas del PIC...
» Verificación realizada con éxito
Todas las operaciones completadas

Bootloader v1.0 Conectado

With option ***“Hex File"*** find the desired file to load, for example:

C:\BOLT-SYSTEM\BOLT-18F2550-7-PROJECTS\C18-BOLT-ELECTRONIC-LOCK

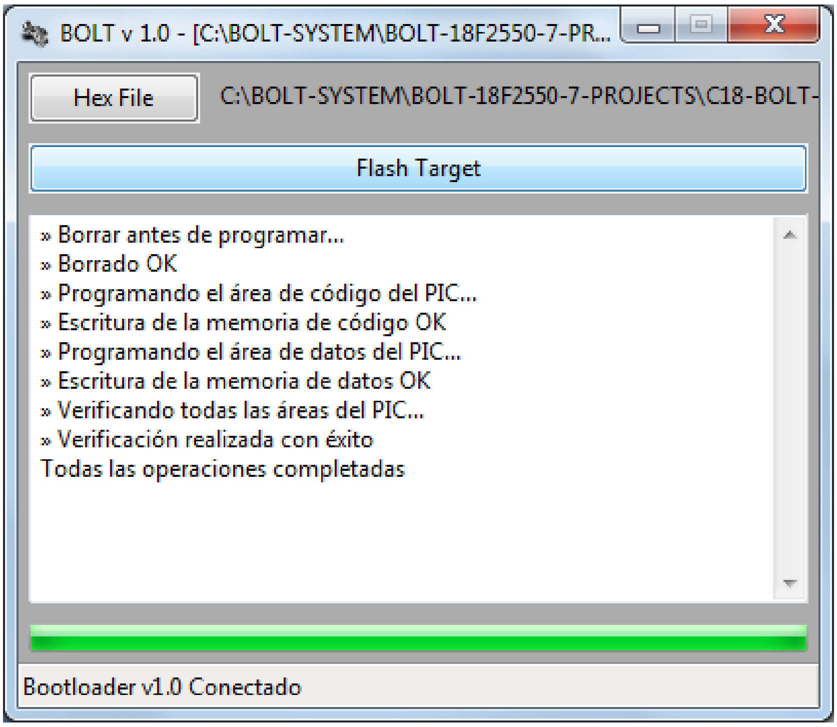
Choose the executable file: "C18-BOLT-ELECTRONIC-LOCK.hex" and click "Flash Target" to program.



Nombre: C18-BOLT-ELECTRONIC-LOCK

Hex files

In just a few seconds, the programming software will perform the file transfer, indicating in the window every step of the programming protocol as shown:



C:\BOLT-SYSTEM\BOLT-18F2550-7-PROJECTS\C18-BOLT-

```
» Borrar antes de programar...
» Borrado OK
» Programando el área de código del PIC...
» Escritura de la memoria de código OK
» Programando el área de datos del PIC...
» Escritura de la memoria de datos OK
» Verificando todas las áreas del PIC...
» Verificación realizada con éxito
Todas las operaciones completadas
```

Bootloader v1.0 Conectado

Executing the program: once successfully programmed, change the programming jumper JP2 to the nearest position to sign "JP2" in Bolt 18F2550 system, to run the user program in **autorun mode**. Finally, press the reset button to execute the program. Everytime you power up the board, the executable program will automatically run.

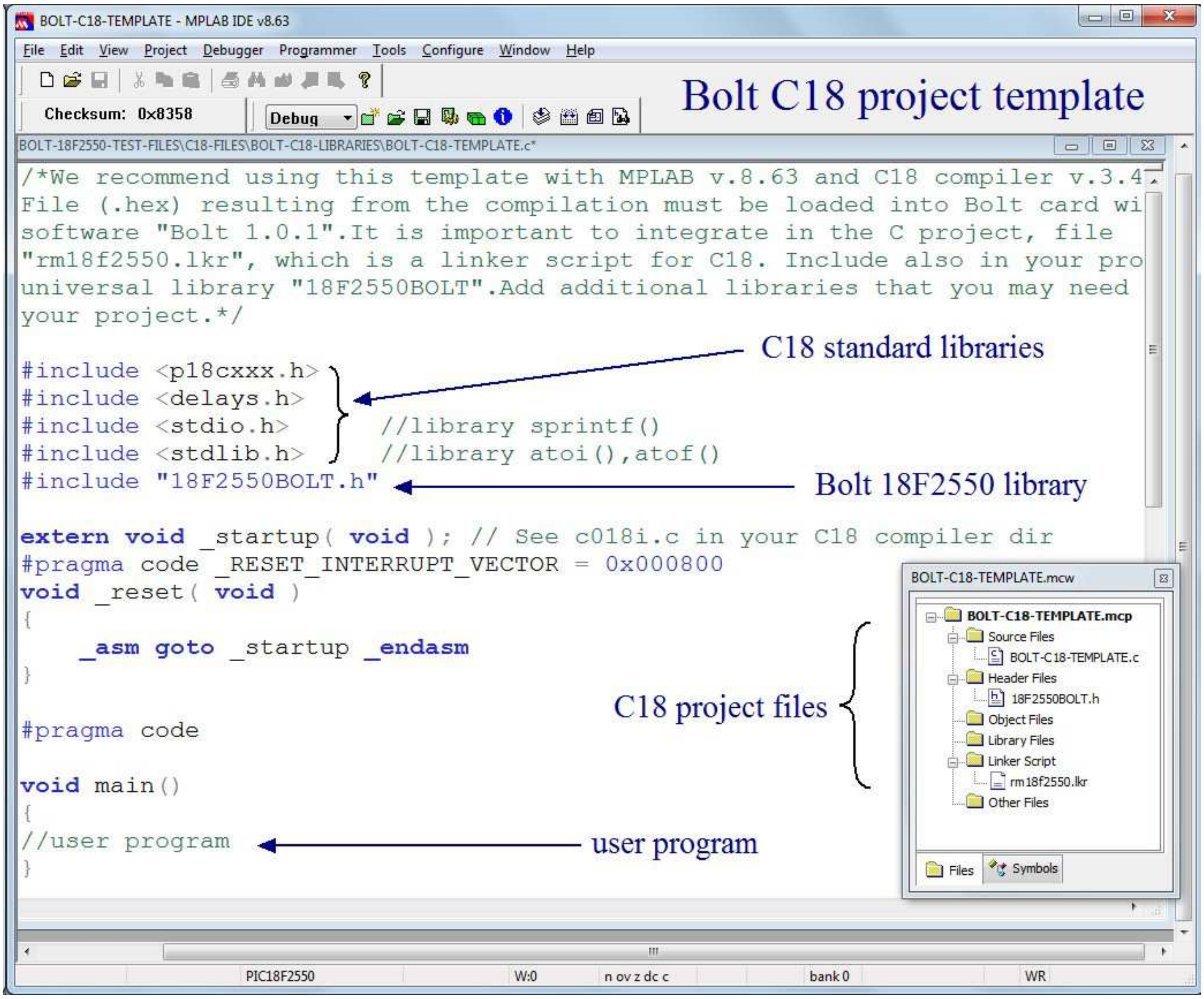
Repeat the procedure for any other executable file you wish load into the Bolt module.

5. Template and libraries to develop new programs for BOLT system using C18 compiler.

BOLT C18 TEMPLATE: In the CD, you will find a folder with a programming template for C18 compiler, so that your new application programs work properly with the firmware loaded on the BOLT system. Always use the contents of this folder, together with the libraries required to create a new project in MPLAB IDE with the C18 compiler. The path is as follows:

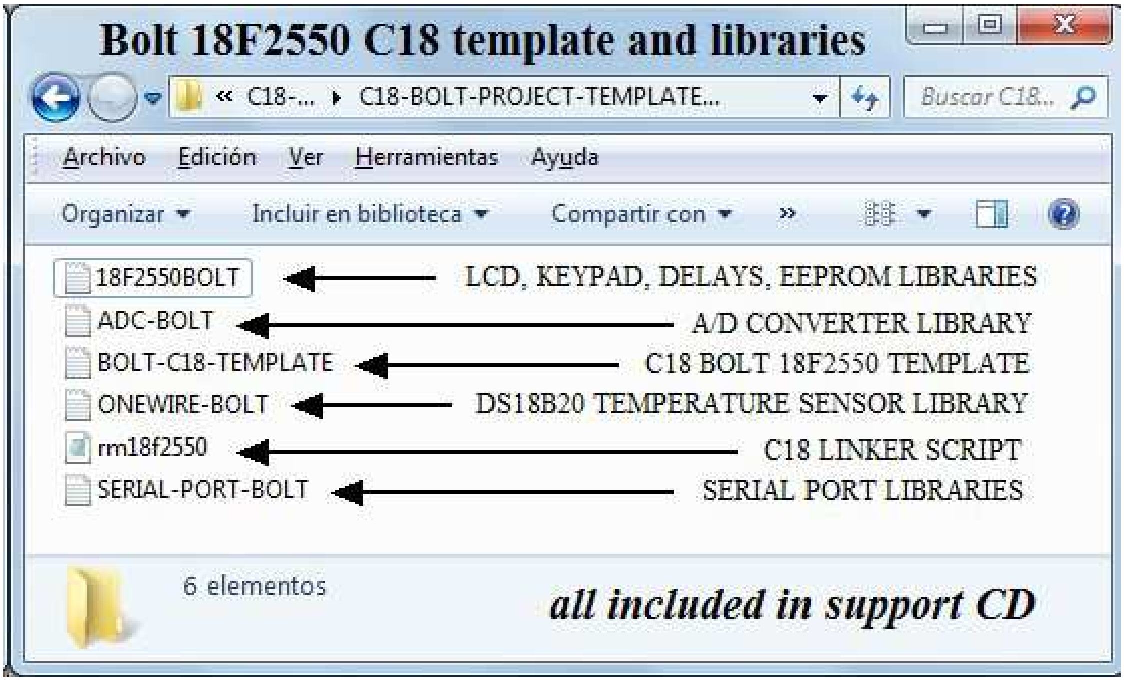
C:\BOLT-SYSTEM\BOLT-18F2550-TEST-FILES\C18-FILES\BOLT-C18-TEMPLATE-LIBRARIES

In the image below, a template for Bolt 18F2550 is ready to write a new program, in a project created for C18 in MPLAB IDE.



```
/*We recommend using this template with MPLAB v.8.63 and C18 compiler v.3.4
File (.hex) resulting from the compilation must be loaded into Bolt card wi
software "Bolt 1.0.1".It is important to integrate in the C project, file
"rm18f2550.lkr", which is a linker script for C18. Include also in your pro
universal library "18F2550BOLT".Add additional libraries that you may need
your project.*/

#include <p18cxxx.h>
#include <delays.h>
#include <stdio.h>       //library sprintf()
#include <stdlib.h>      //library atoi(),atof()
#include "18F2550BOLT.h"

extern void _startup( void ); // See c018i.c in your C18 compiler dir
#pragma code _RESET_INTERRUPT_VECTOR = 0x000800
void _reset( void )
{
    _asm goto _startup _endasm
}

#pragma code

void main()
{
//user program
}
```

BOLT 18F2550 C18 LIBRARIES: in the same path you will find a folder with all libraries with C18 functions for every interface in the Bolt system. The linker script file “rm18f2550” must be also included in every project.



18F2550BOLT	LCD, KEYPAD, DELAYS, EEPROM LIBRARIES
ADC-BOLT	A/D CONVERTER LIBRARY
BOLT-C18-TEMPLATE	C18 BOLT 18F2550 TEMPLATE
ONEWIRE-BOLT	DS18B20 TEMPERATURE SENSOR LIBRARY
rm18f2550	C18 LINKER SCRIPT
SERIAL-PORT-BOLT	SERIAL PORT LIBRARIES

all included in support CD

6. How to reload firmware into FLASH memory of the 18F2550.

If for any reason, the chip 18F2550 needs to be replaced with a new one, or lose its original firmware, follow the steps below to reprogram your firmware. This procedure will require an ICSP type programmer.

Remove first the 18F2550 circuit and insert it into the socket of ICSP programmer. Use the following link to find and download the bootloader file.

http://puntoflotante.net/BOLT-SYSTEM-DOWNLOAD.htm

Boot20Mhz.hex

-Program the FLASH memory with this file 18F2550 using ICSP programmer.

-Once programmed, reinsert the 18F2550 chip in the BOLT system.

7. Note about software Bolt v.1.0.1, Bolt v.1.0.2

The software named ***Bolt v.1.0.1*** and ***Bolt v.1.0.2*** mentioned in this guide, as well as the adaptation of the system firmware bootloader for 18F2550, were developed by *Frans Schreuder* specially for the Bolt 18F2550 system.

This software is included under the guidelines of GNU GENERAL PUBLIC LICENSE. You can download it directly from the link**:**

http://puntoflotante.net/BOLT-SYSTEM-DOWNLOAD.htm

Any questions, please contact:

TEL. (52)(55) 5653-5801
atencionaclientes@puntoflotante.net