

Lab4Schools
Lab Activity “Bomb”



BOMB GUIDE



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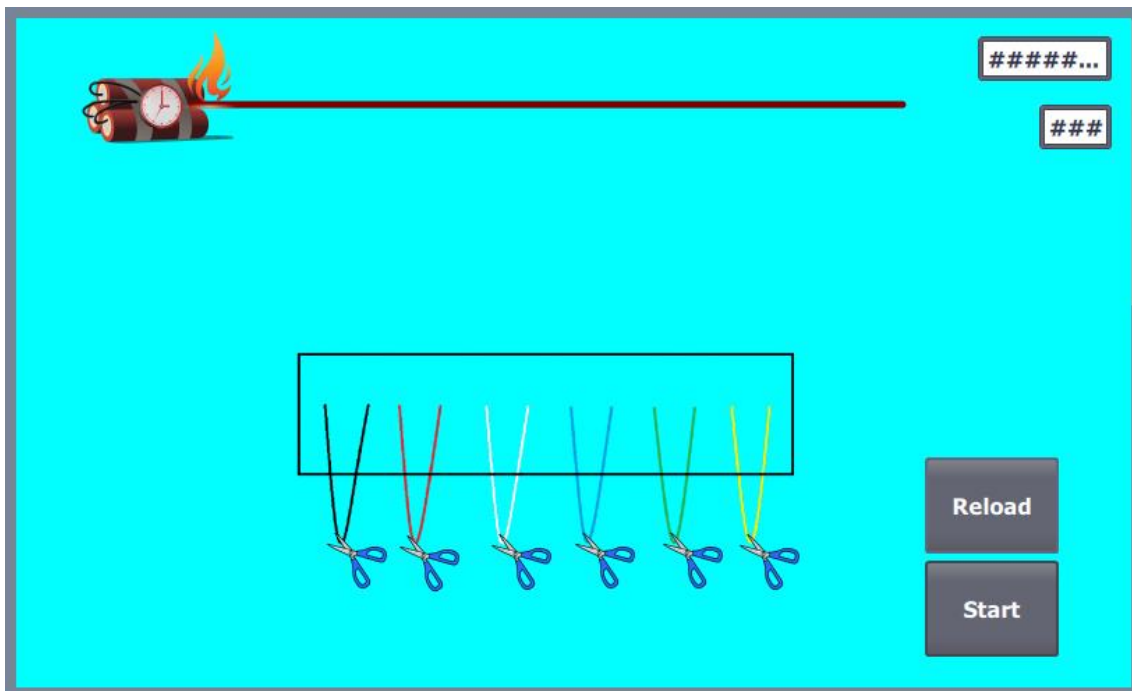
Bomb project

Hello everyone, I hope you are ready for what we are going to do. I recommend you not to talk about this with anyone because we could go to jail... **WE ARE MAKING A BOMB!**

Well, actually we are not making a bomb, we are just programming the sequence to defuse a bomb. How? Well, our bomb has 6 wires (black, red, white, blue, green and yellow) and to defuse it, we have to cut the wires in a proper order. If we cut the wrong wire, the bomb blows up! Besides, there's a timer so, if the time runs out, the bomb blows up too.

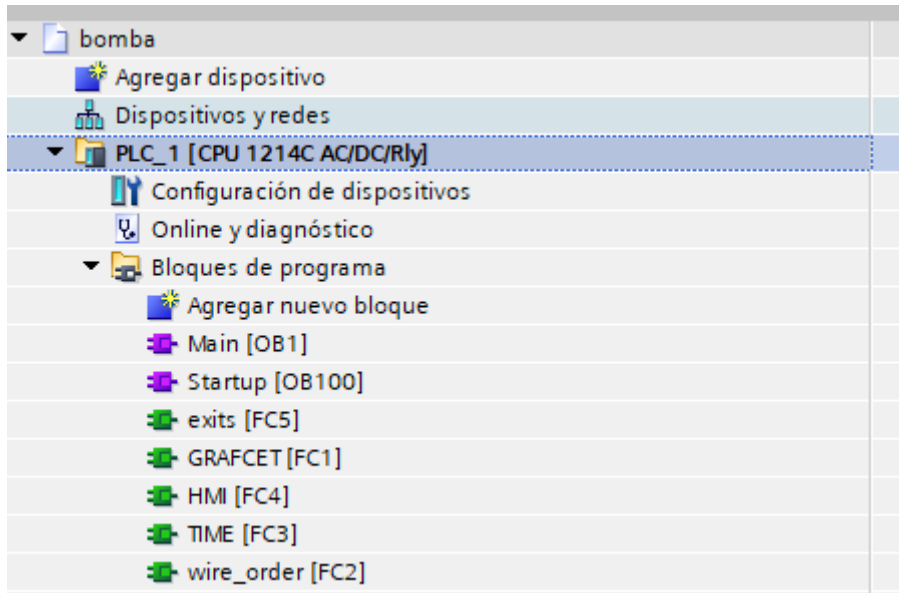
Don't worry if the bomb blows up, you won't die. The system will reset and you will just lose a point.

We are going to split you in two teams; Team A will prepare a program that will set up a defusing sequence and team B will do the same. After that both teams will exchange their bombs and we will see which team defuses the bomb first.



Program Explanation

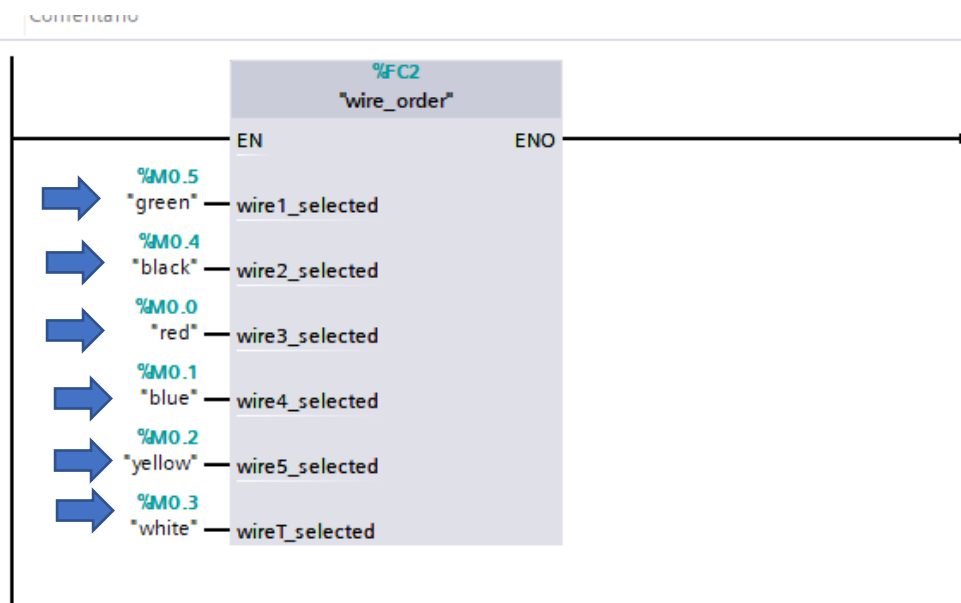
The program to make the bomb is almost done but you will have to program the last details. Once you open the program, you will have to unfold the "Project Tree" until you reach the program itself.



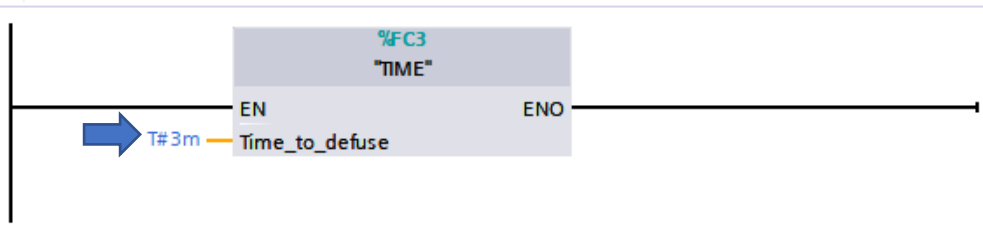
You will only need to modify 2 sections: The Main Section [OB1] and the GRAFCET [FC1]. **DON'T CHANGE ANYTHING ELSE OR THE PROGRAM WON'T WORK.**

Just for your information:

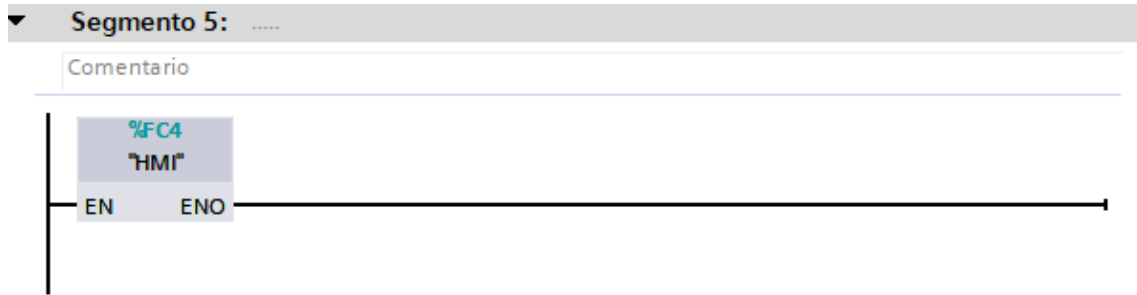
Wire_order [FC2]: By writing the colour labels you will choose the wire sequence. (This program is already done).



TIME [FC3]: In this FC you will choose the duration of the bomb's timer, remember to write it like this: T#3m (3 is the number and m=minutes, or you can put it in s=seconds(T#180s))



HMI [FC4]: This FC is just to control the communication with the HMI. You don't have to do anything in this section.



DON'T EDIT THE INNER PART OF THE FC, JUST THE INPUTS

Tags that you will use

The tags are already created, here you have their names and directions, you will need them to make the program

red(M0.0) → red wire

white(M0.3) → white wire

black(M0.4) → black wire

blue(M0.1) → blue wire

green(M0.5) → green wire

yellow(M0.2) → yellow wire

Stage(MB20) → This stores the stage you are inside the grafcet (the game starts when you leave Stage 0)

Wire1(M10.0) → First wire to cut

Wire2(M10.1) → Second wire to cut

Wire3(M10.2) → Third wire to cut

Wire4(M10.3) → Fourth wire to cut

Wire5(M10.4) → Fifth wire to cut

wireT(M10.5) → If this wire is cut the time splits in half (You won't need to program with this tag, because the program is already made in the FC)

remaining_time(MD16) → remaining time (when it reaches zero the bomb Will blow up)

explosion(Q0.0) → This commands the bomb to blow up

Defused(Q0.1) → This defuses the bomb

Fails(MW22) → Counter of times the bomb has been blown up

Start(M0.6) → Start button, push it to start the game

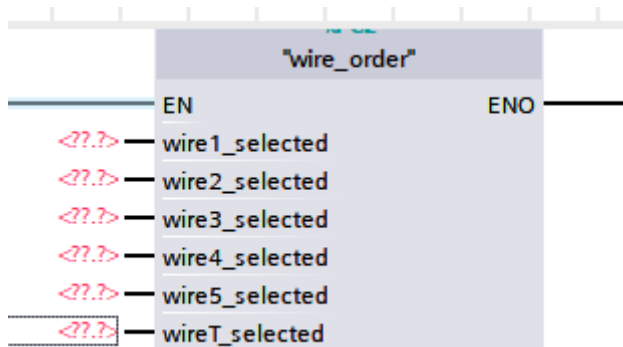
Reload(M0.7) → When the game end, push it to return to the start

YOUR TASKS:

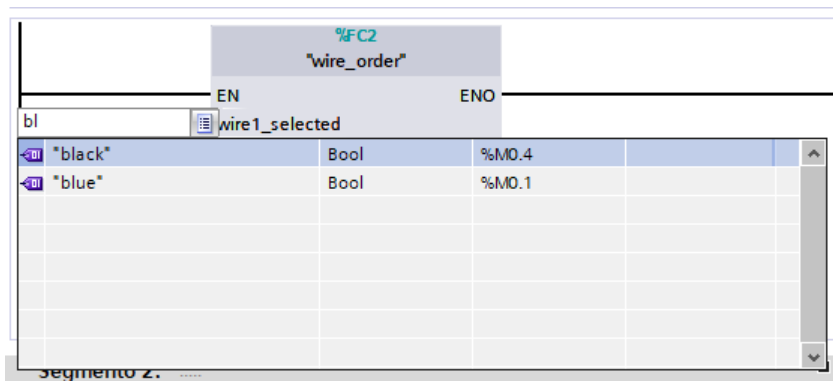
As we said before, you only have to modify 2 blocks, the Main OB1 block and the GRAFCET FC1 block. To open them, you just have to double click on them.

In the main OB1:

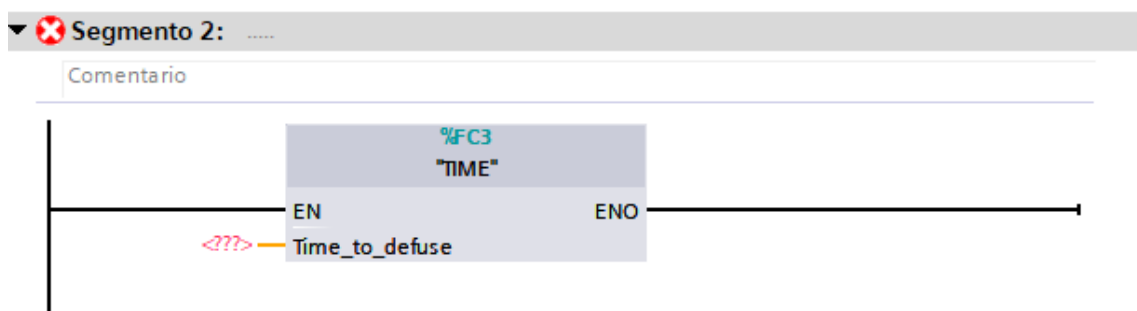
You will insert the sequence in which the wires must be cut, and the maximum time to defuse the bomb.



To enter a colour just double click on the input and type the colour of the wire that you want.



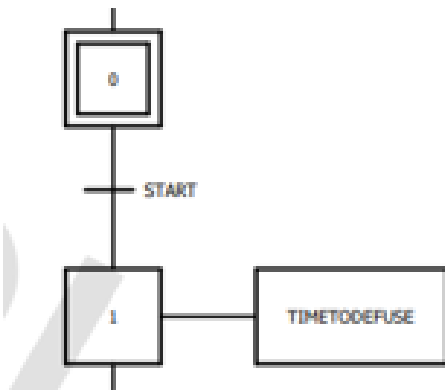
And do the same in the TIME FC.



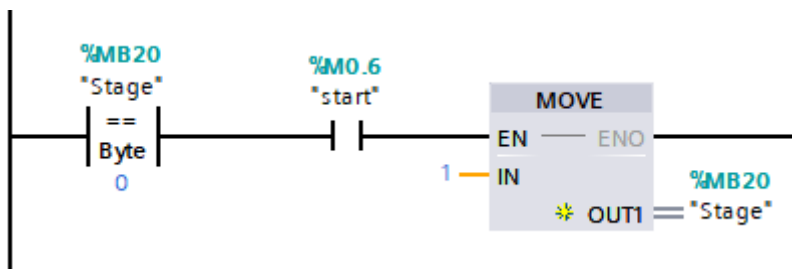
In the GRAFCET [FC1]:

This is where the real challenge start. In this block you will have to program the GRAFCET. Don't worry, we will give it to you. All you have to do is convert it to a contact diagram.

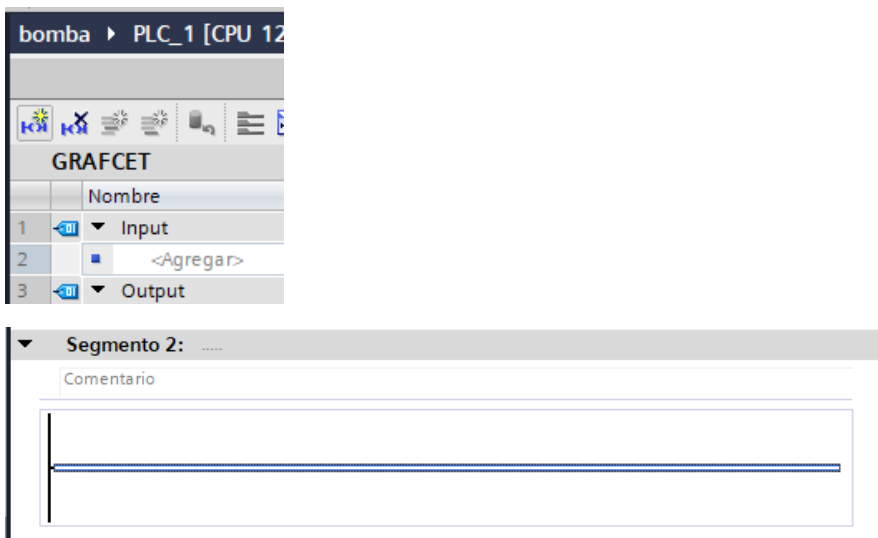
We will give you an example: To program this part:



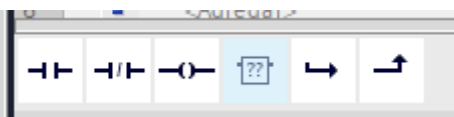
All you have to do is check if the grafcet is in the Stage 0 and if Start is pressed, move to the Stage 1. It looks like this.

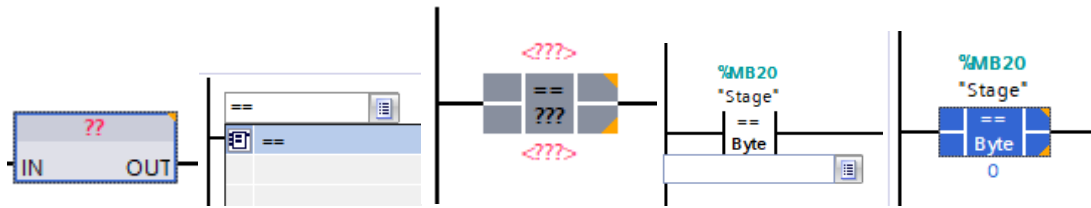


How do we do this? First, insert a new segment:



Then Enter a Box, choose a comparison, type "Stage" and, finally, the number you want to compare it with.

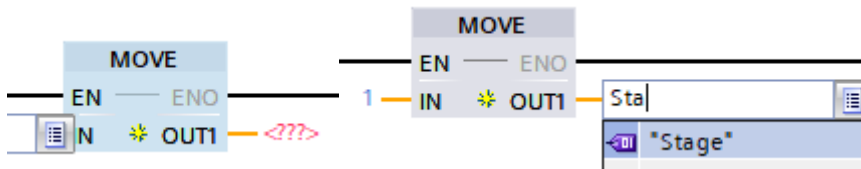




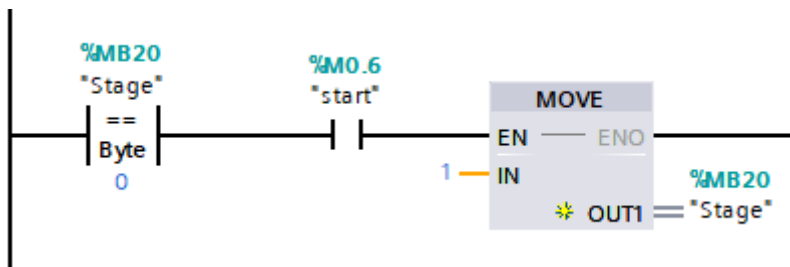
Then add an NO contact and type "Start"



And finally the MOVE box which will move our grafctet to the stage 1.



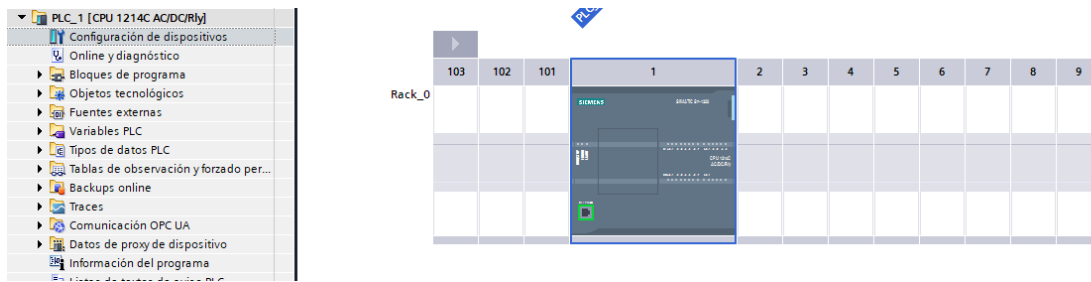
And that would be it!



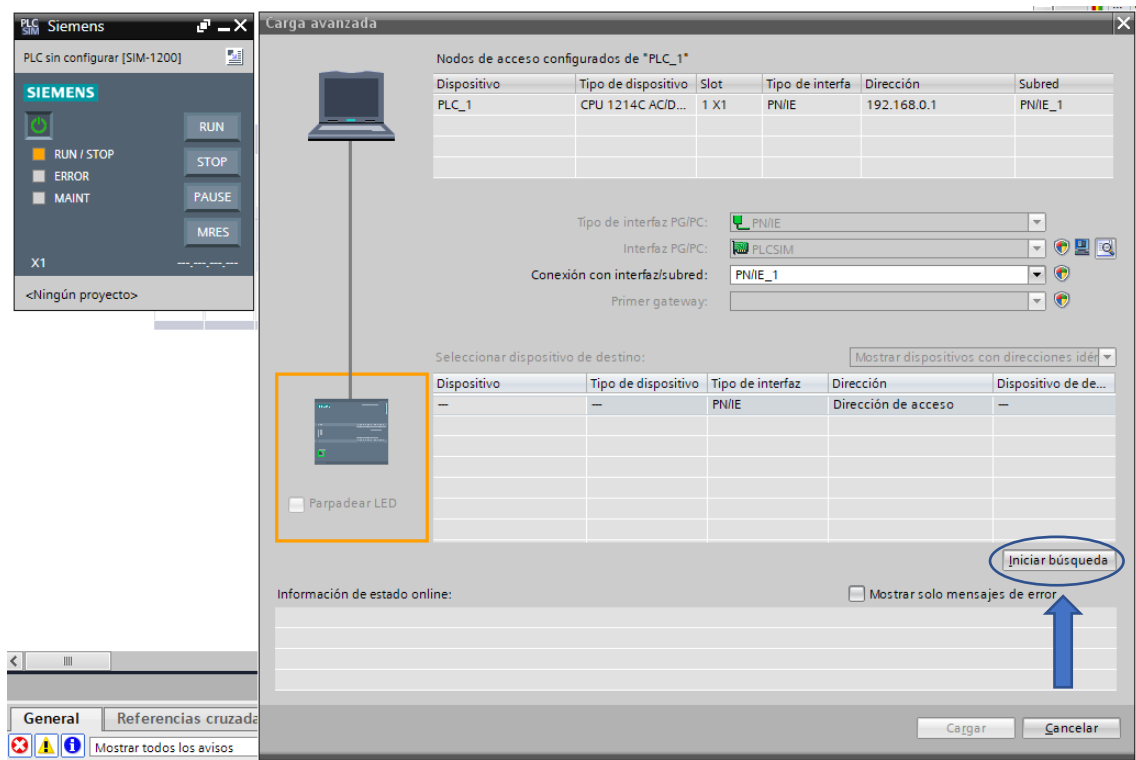
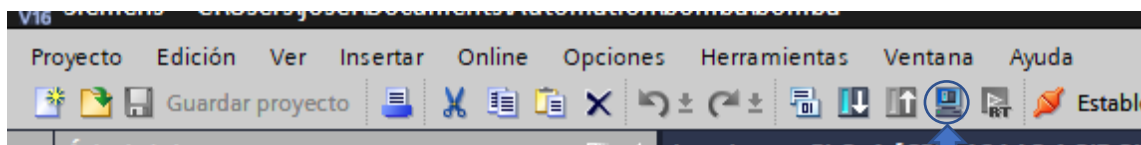
Now you have to program the rest of the GRAFCET!! Can you do it??

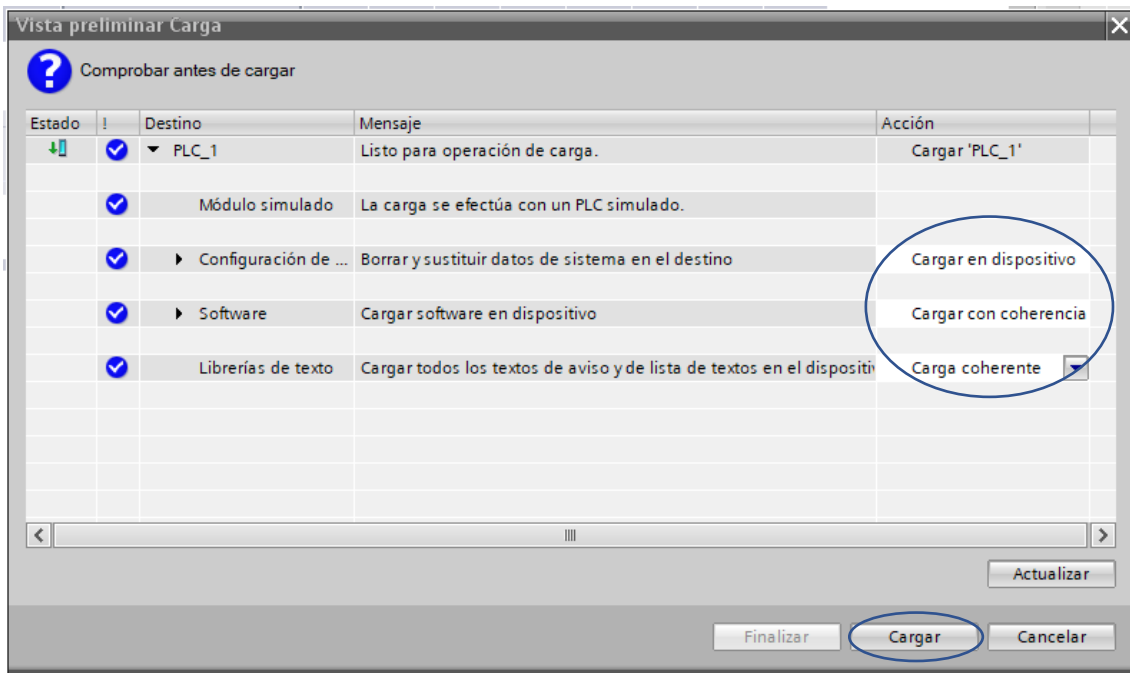
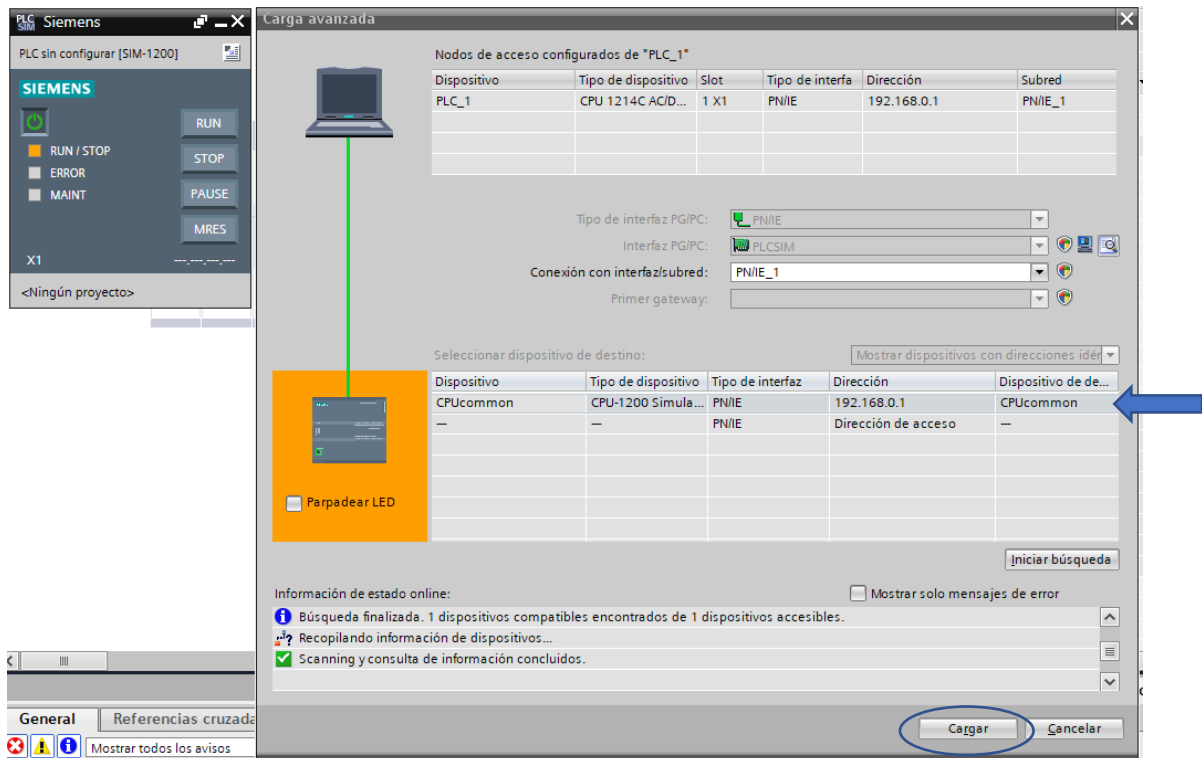
HOW TO SIMULATE THE PROGRAM

To Simulate the Program to test it, click on Configuración de Dispositivos:

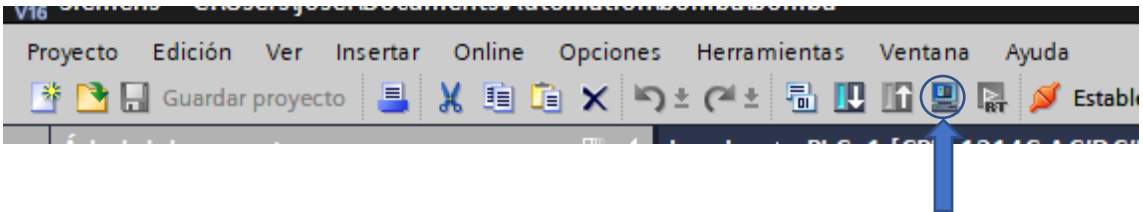
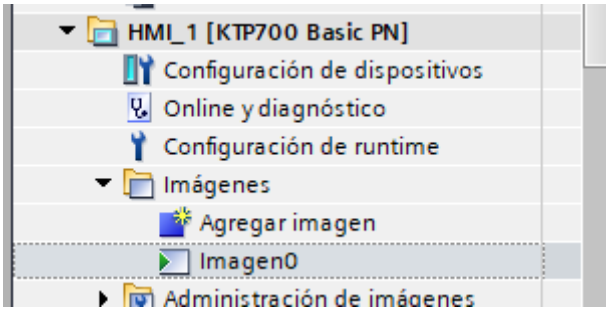


Then click here and follow the steps:





To simulate the HMI, click the same button but first select the HMI



Grafcet

