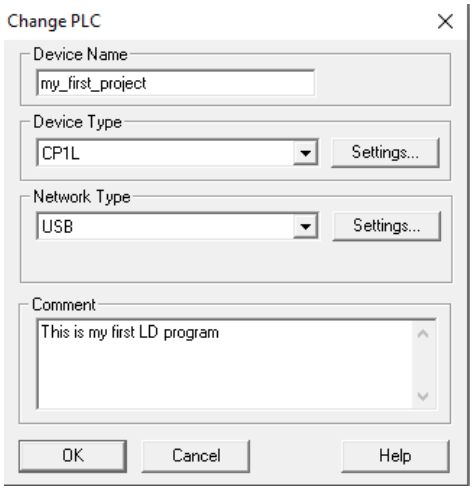
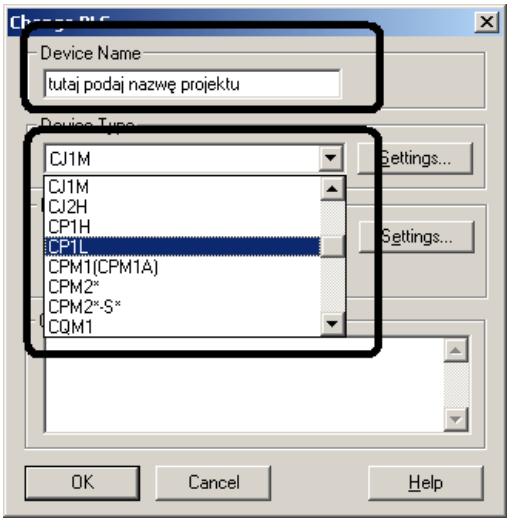
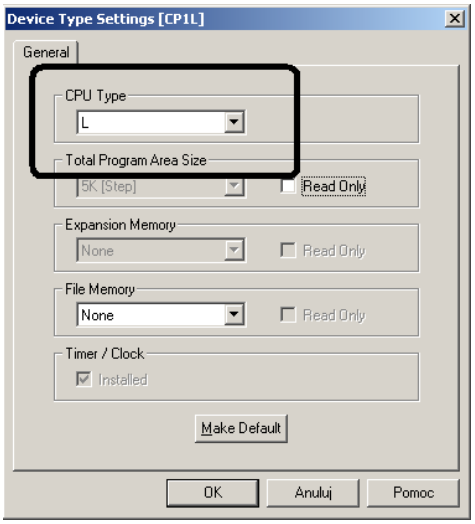
Introduction. Omron *CX-Programmer* is included in *CX-One* which is an integrated package for all of Omron's PLC series. The application includes a wide variety of features to speed up the development of a PLC program. New parameter-setting dialogues reduce setup time, and with standard function blocks in IEC 61131-3 structured text or conventional ladder language

Task.1. Run *CX-Programmer*. From the *File* menu choose *New…* (*File➔New…*).

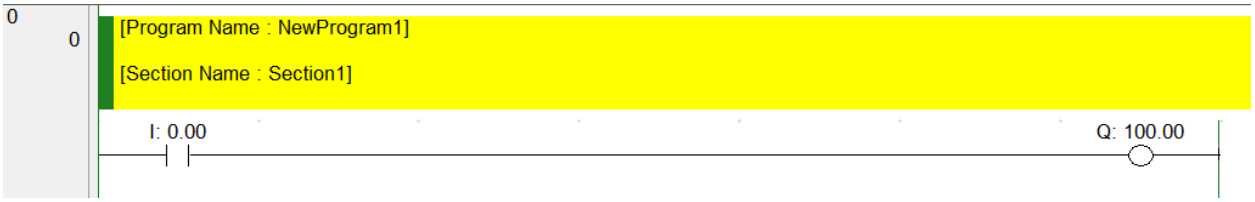


- *Device Name* - the name of the project.
- *Device Type* - PLC type that is used in the project.
- *Network Type* - the interface between PC and PLC.
- *Comment* - designer notes.



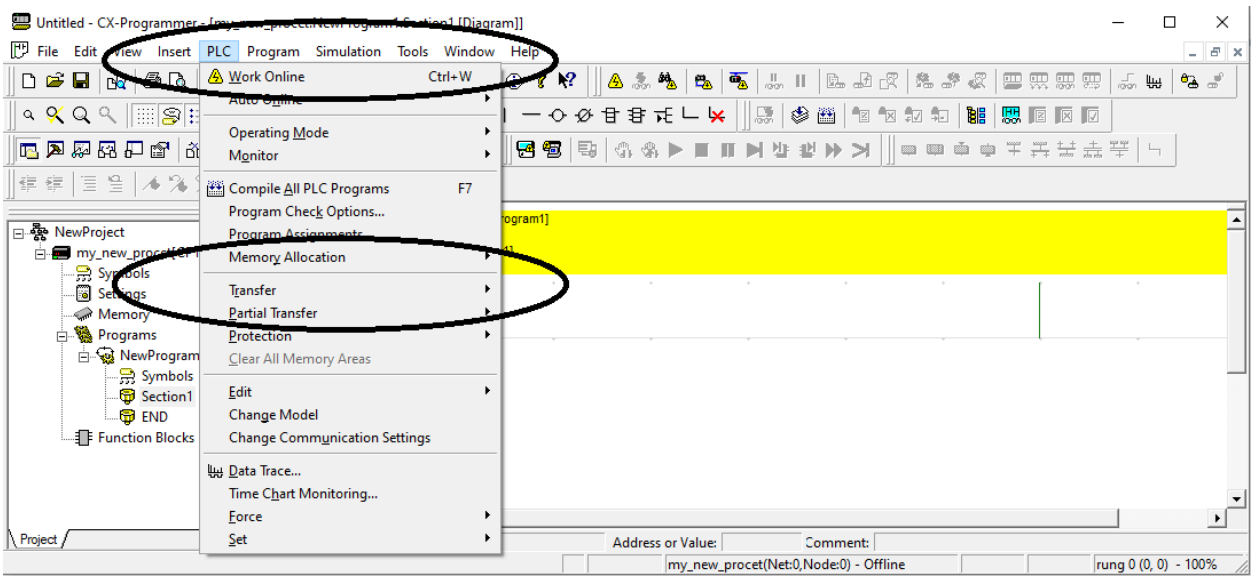


Create the following application:

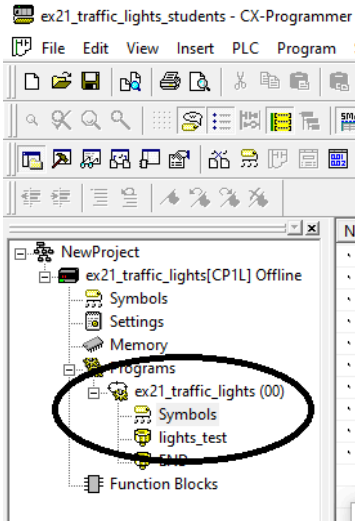


From the *Simulation* menu choose *Work Online Simulator* (*Simulation➔Work Online Simulator*). Wait for the gray background. Use the simulator to see how the program works.

Close the simulator (*Simulation➔Work Online Simulator*). Send this program to the PLC using the combination: *PLC → Work Online*; *PLC → Transfer → To PLC…*

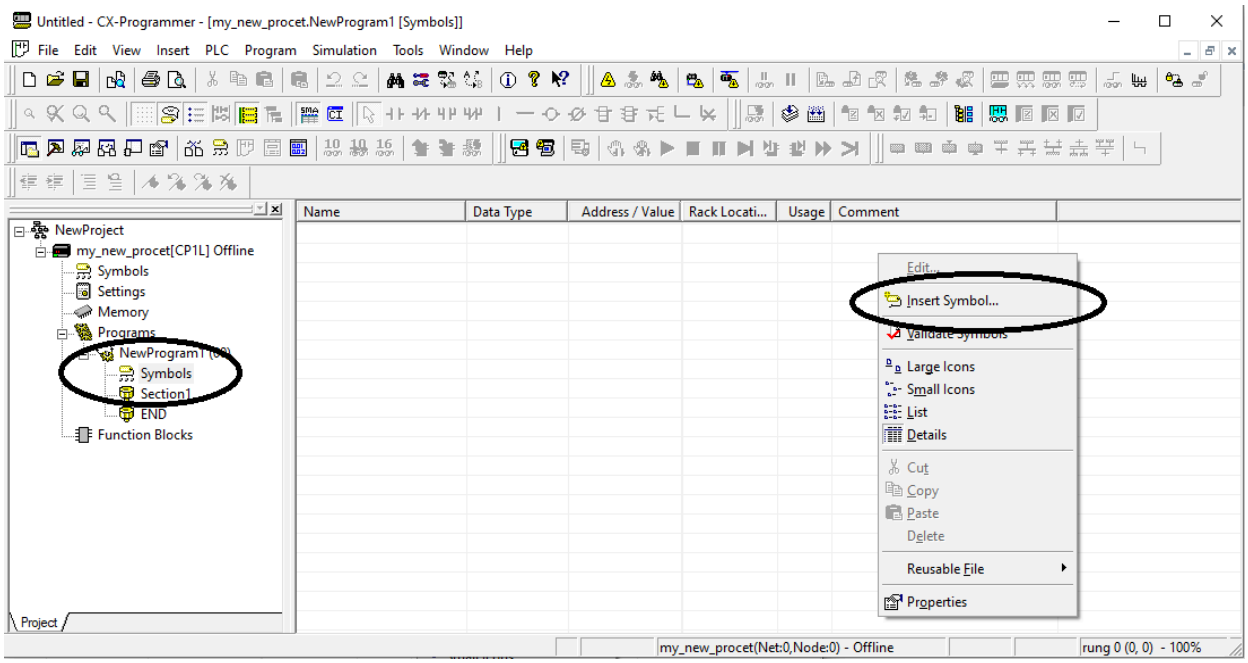


Task.2. Run *CX-Programmer*. From the *File* menu choose *New…* (*File➔New…*).

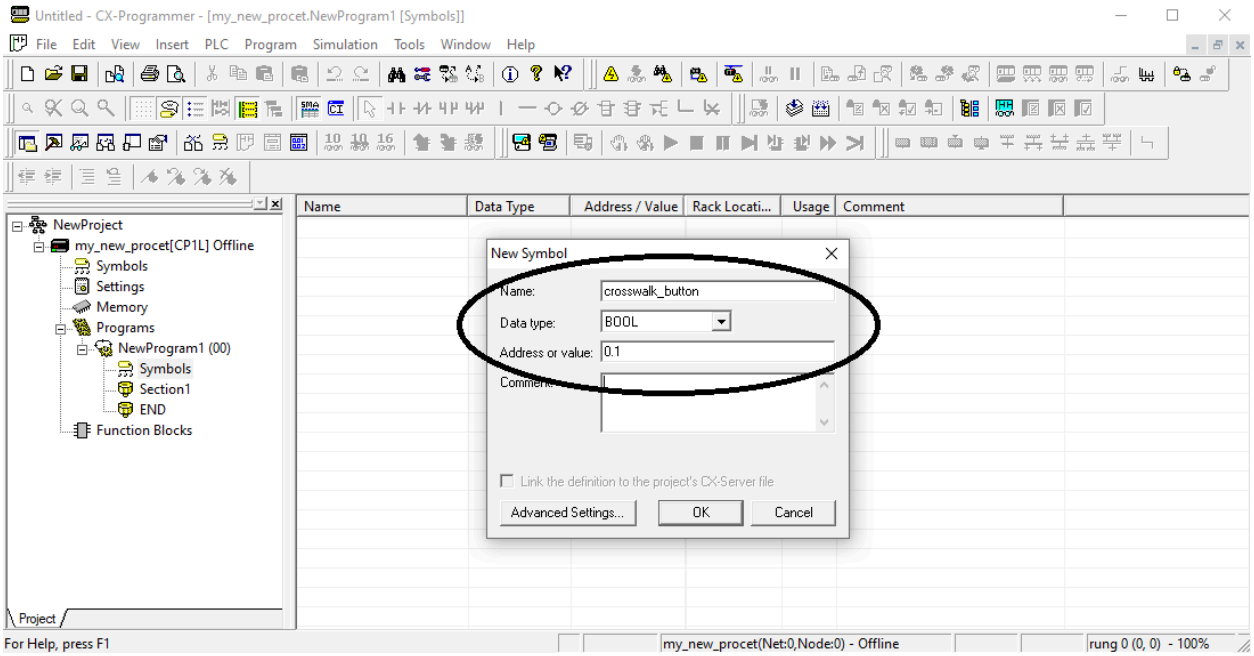


In the project tree, open the *Programs* tab. Select *Symbols*.

Press the right mouse button while keeping the mouse pointer inside the *Symbols* window. Select *Insert Symbol*.



Enter the *Name* and address in the PLC memory (*Address or value*).

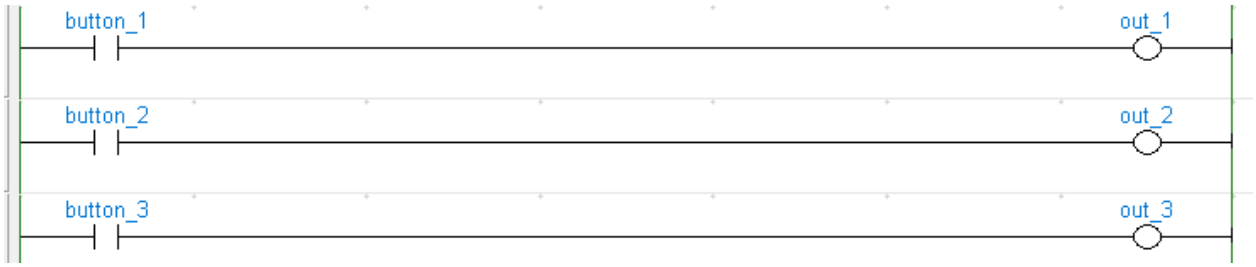


Create symbols according to the following table:

Hardware	Input symbol	Input	Output symbol	Output
Omron #1	button_1	0.0	out_1	100.0
	button_2	0.1	out_2	100.1
	button_3	0.2	out_3	100.2
Omron #2	button_1	0.0	out_1	100.0
	button_2	0.2	out_2	100.1
	button_3	0.3	out_3	100.2
Omron #3	button_1	0.0	out_1	100.0
	button_2	0.2	out_2	100.1
	button_3	0.4	out_3	100.2

Omron #4	button_1	0.0	out_1	100.0
	button_2	0.1	out_2	100.2
	button_3	0.3	out_3	100.3

Task.3. Using symbols from Task 2 build the following LD diagram in the *CX-Programmer*.



Send this program to the PLC. Check if it works.

Task.4. Using symbols from Task 2 build the following LD diagram in the *CX-Programmer*. Send this program to the PLC. Check if it works.

Task.5. Using symbols from Task 2 build the following LD diagram in the *CX-Programmer*. Send this program to the PLC. Check if it works.

Task.6. Using symbols from Task 2 build the following LD diagram in the *CX-Programmer*. Send this program to the PLC. Check if it works.

Task.7. Using symbols from Task 2 build the following LD diagram in the *CX-Programmer*. Send this program to the PLC. Check if it works.

Task.8. Using symbols from Task 2 build the following LD diagram in the *CX-Programmer*. Send this program to the PLC. Check if it works.

Task.9. Using symbols from Task 2 build the following LD diagram in the *CX-Programmer*. Send this program to the PLC. Check if it works.

Task.10. Using symbols from Task 2 prepare a solution that meets the following parameters:

1. *out_1 = button_1 | button_2*;
2. *out_2 = out_1 & button_3*;
3. *out_2 should be energized, even when the input ceases.*

The prepared program should be sent to the PLC and its operation presented to the teacher. After completing the task, the cxp file should be sent to the e-mail address shown in the footer, along with the authors of the solution.

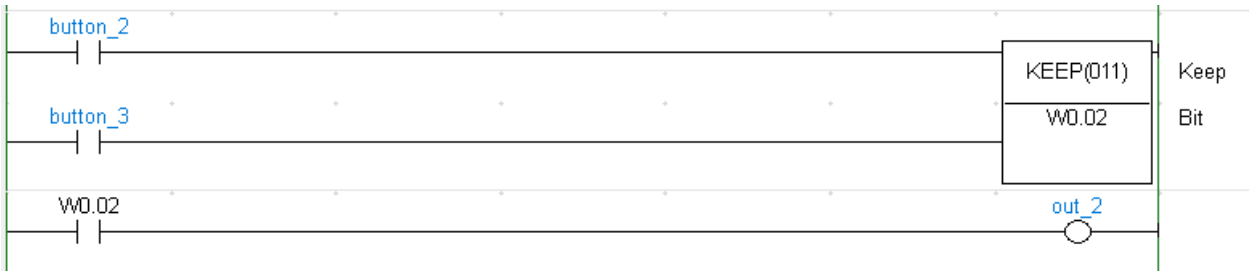
Task.11. Using defined symbols prepare a solution that meets the following parameters:

1. turn on and hold (latch) *out_3* if *button_3* and *button_1* were pressed;
2. turn on *out_3* if *button_2* and *button_3* were pressed.

Task.12. KEEP function. Add a new symbol.

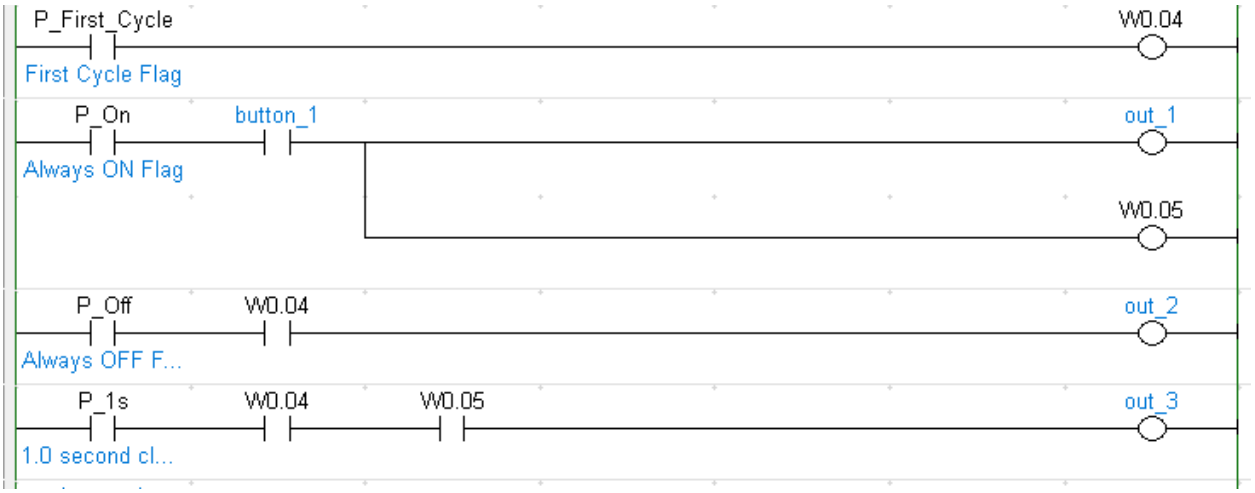
Hardware	Input symbol	Input
Omron #1	button_4	0.3
Omron #2		0.1
Omron #3		0.1
Omron #4		0.2

Build the following LD diagrams. Check the results.



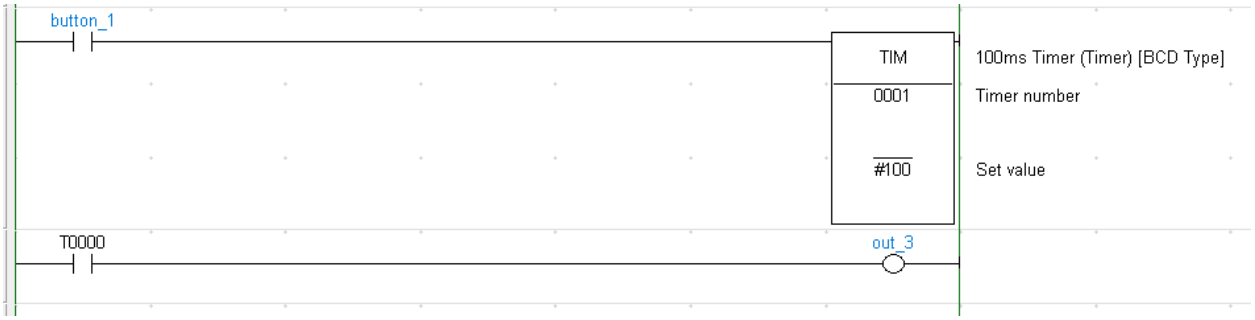
Task.13. SET/RSET function. Build the following LD diagrams. Check the results.

Task.14. P flags. Build the following LD diagrams. Check the results.

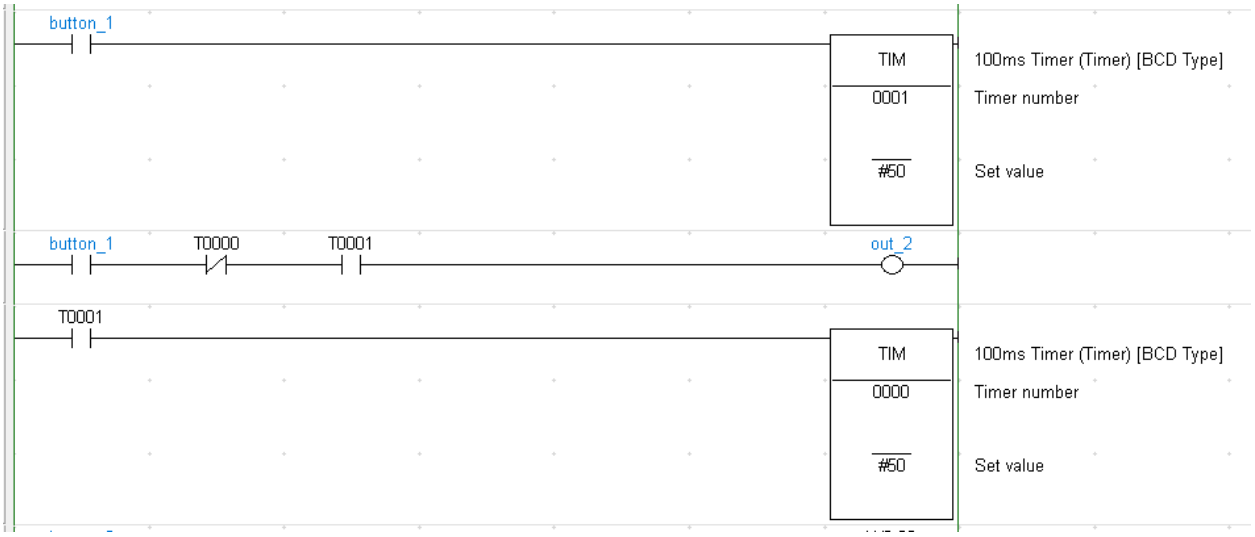


Task.15. Timer. Build the following LD diagrams. Check the results.

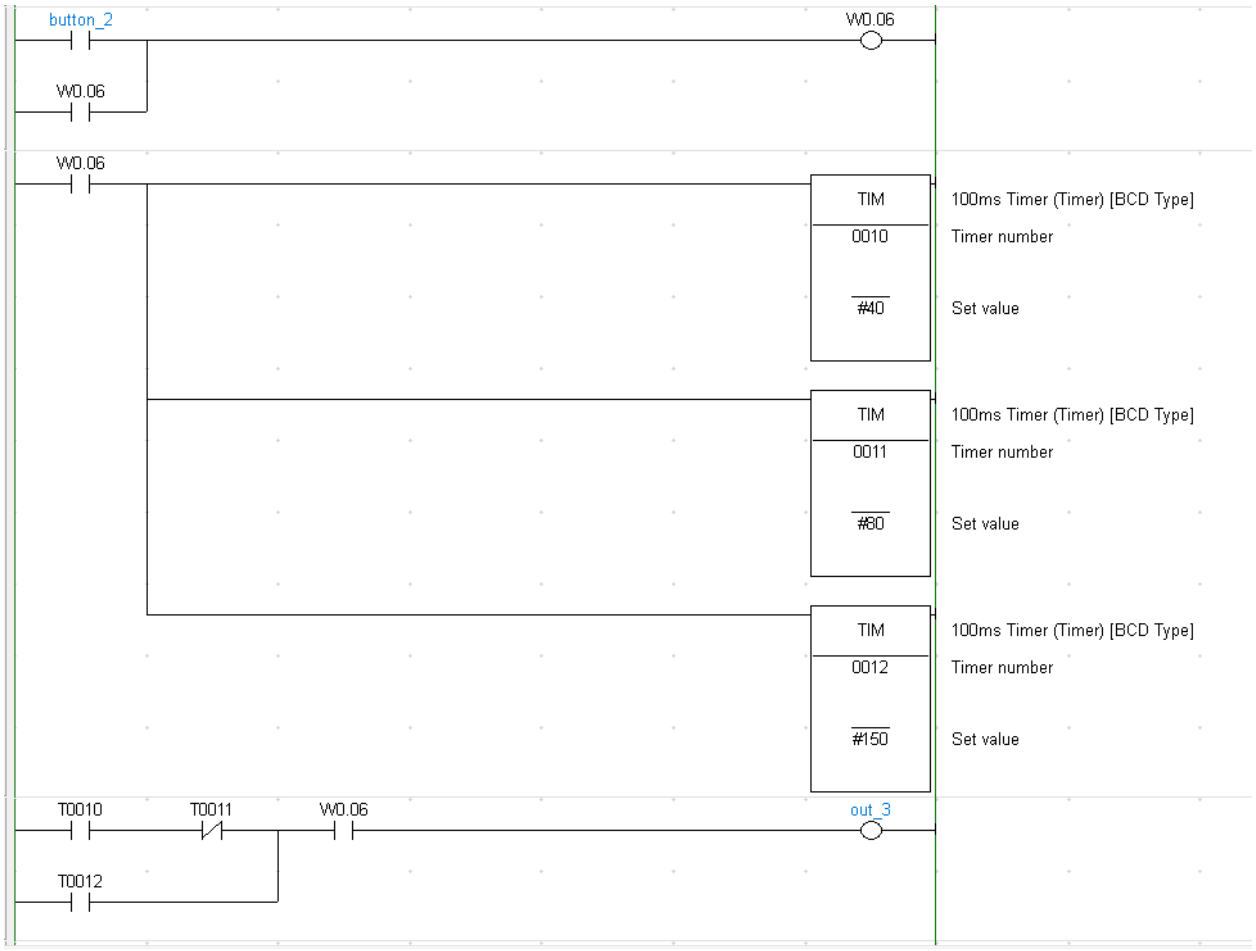
Timer function syntax: ***TIM 1 #100***



Task.16. Build the following LD diagram. Check the results.



Task.17. Build the following LD diagram. Check the results.



Task.18. Generate a 4s pulse on *out_2,* triggered by pressing the *button_3*.

Task.19. Generate 2 5s pulses on *out_1* triggered by pressing the *button_1*. The second pulse should be generated 10s after the first pulse is completed.

Task.20. Prepare a solution that meets the following parameters:

1. *out_1* is energized (on) 5s after either *button_1* or *button_2* is pressed.
2. *out_2* is energized (on) 3s after *button_1* and *button_2* were pressed.

3. *button_3* resets the system.

Task.21. Create an LD program that produces a 2Hz 50% PWM signal on *out_2*.

For those interested:

1. CX-Programmer Introduction Guide: www.fa.omron.com.cn/data_pdf/mnu/r132-e1-05_cx-programmer.pdf?id=1605

2. CP1L Programming Manual: assets.omron.eu/downloads/manual/en/v1/w451_cp1_cpu_unit_programming_manual_en.pdf