Nanjing University of Aeronautics and Astronautics

Course Title 《Programmable Logic Controller》

Experiment Name PLC Programming

Part I Simulation Software

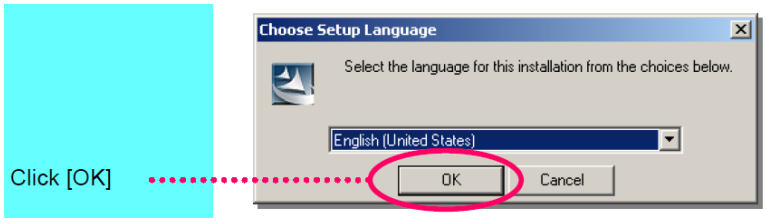
1. CX-One Installation

Before installing the CX-One, you must:

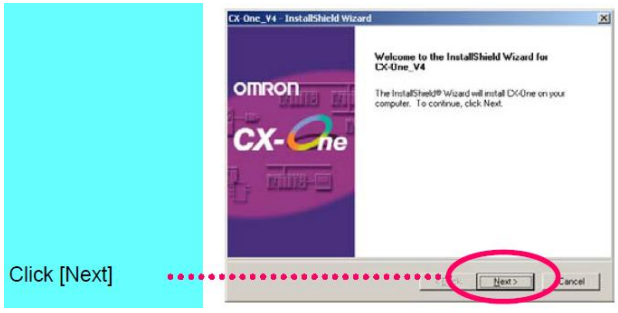
- Terminate all Windows programs
- Uninstall previous versions of Support Software (such as CX-Programmer) if already installed.
- Installation takes about 15 to 45 minutes depending on your personal computer.
- To change/modify/delete CX-One after installation, refer to the PDF manual “CX-One Setup Manual”, Chapter 2 ”Installation and Uninstallation”.

In case of the installing procedure by DVD-ROM:

Insert CX-One installation disk (DVD-ROM) into your personal computer’s DVD-ROM drive.
[Choose Setup Language] dialog box is displayed. By default the OS language installed on your personal computer is automatically selected.
Check if the language is appropriate, then click the [OK] button.



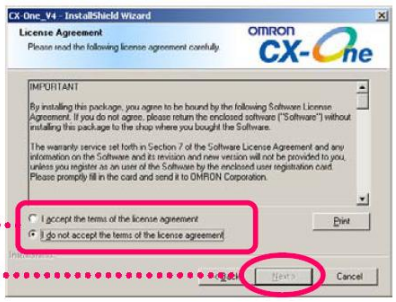
CX-One setup wizard starts.



The [License Agreement] dialog box is displayed.
Read the software license agreement carefully. If you agree with all items, select the [I accept the terms of the license agreement] radio button and click the [Next] button.

Select the radio button

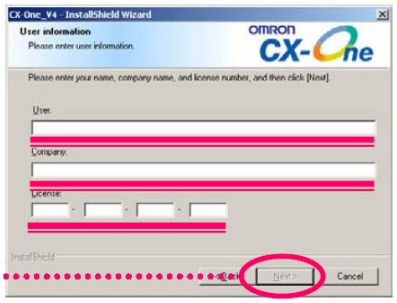
Click [Next]



The [User information] dialog box is displayed.

Enter [User], [Company], [License] (product serial number of CX-One)

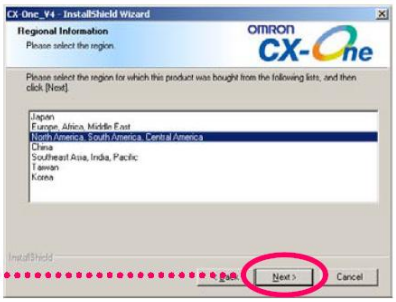
Click [Next]



The [Regional Information] dialog box is displayed.

Select the [region] in which the software was purchased

Click [Next]



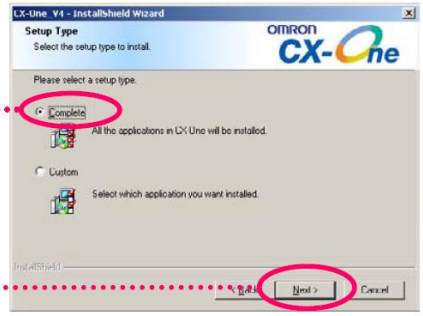
The [Installation Folder Selection] dialog box and [Setup Type] dialog box are displayed.

Select an installation folder, then click [Next]

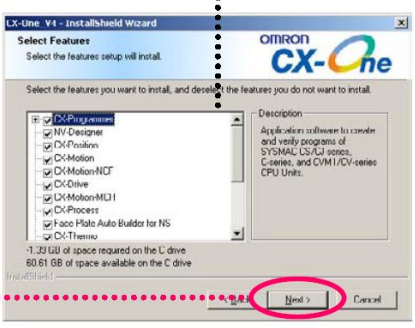
Select the radio button [Complete]

Click [Next]

Read the message and click [Next]

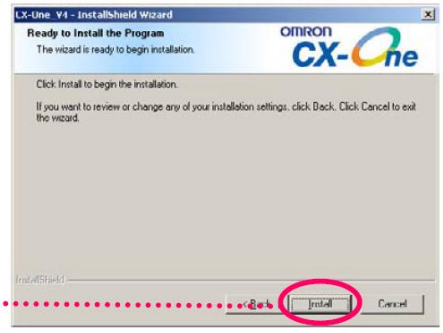


By selecting [Custom], you can individually select and install Support Software.



The [Choose Destination Location of OMRON FB Library], [Select Program Folder], and [Ready to Install the Program] dialog boxes are displayed.

Click [Install]



CX-One installation is starts.

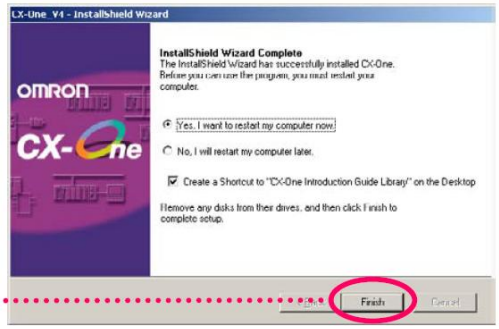
During the installation, the [OMRON USB driver Installation Wizard], [WinPcap Setup Wizard], and [Direct Ethernet Connection: Network Card Selection] dialog boxes are displayed.

Continue with the installation procedure according to the messages displayed by the Installation Wizard.

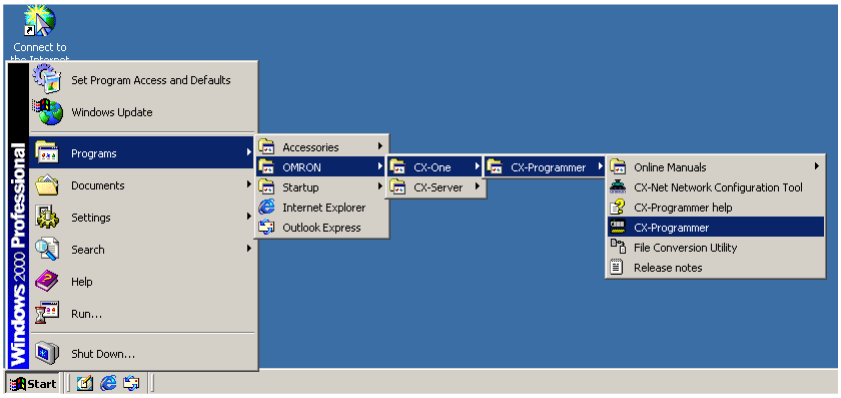
Click [Finish]

A dialog box (right) is displayed.
Click the [Finish] button to finish the installation wizard.

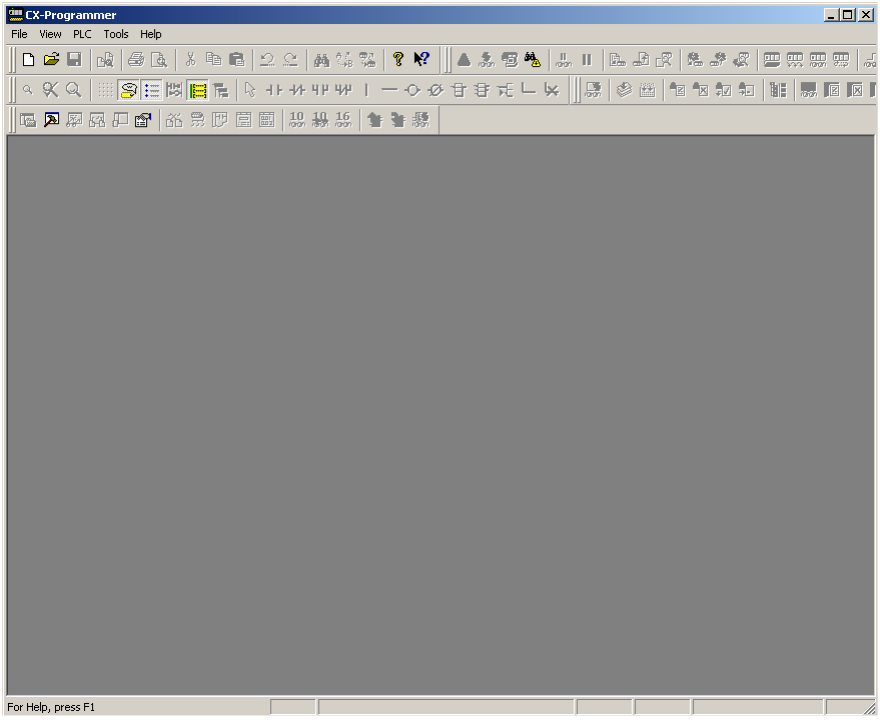
Installation is complete.
(When it is necessary to restart the personal computer, a restart confirmation dialog box appears.)



2. Startup of CX-Programmer

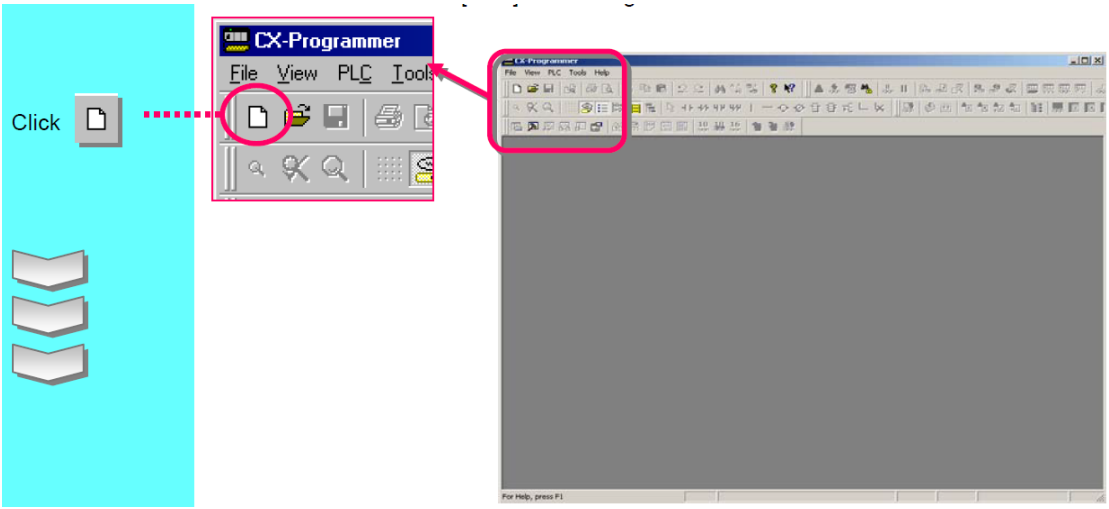


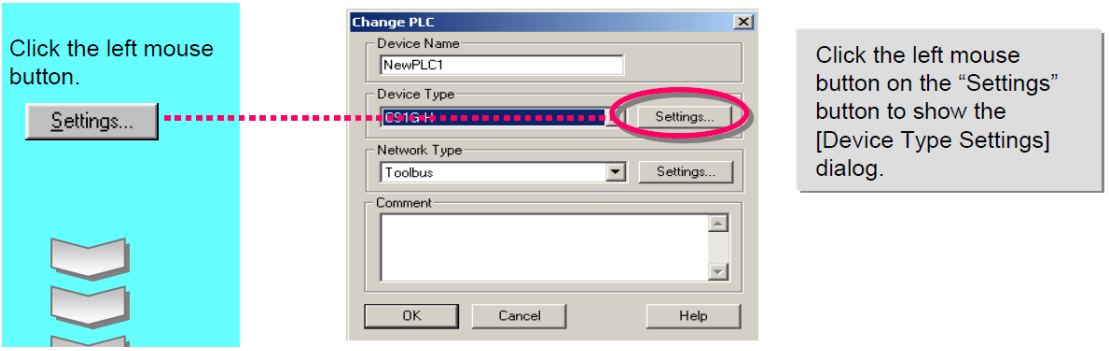
The initial screen when starting up CX-Programmer is displayed.

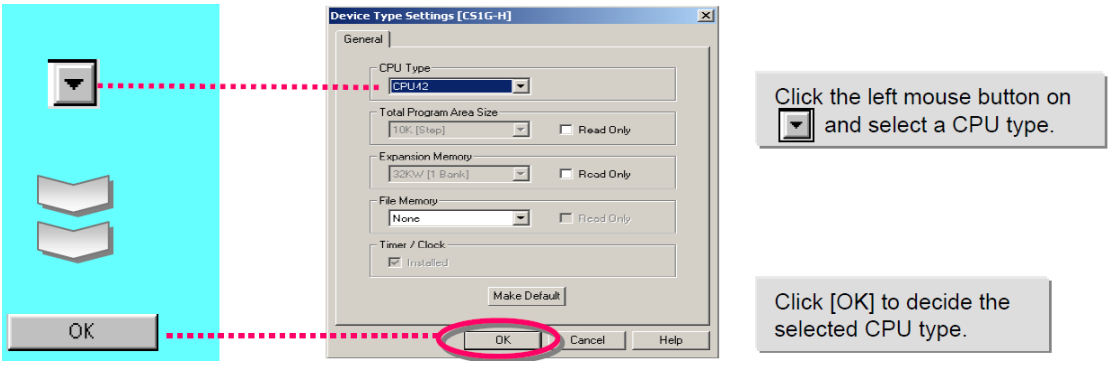


3. New Project Opening and Device Type Settings

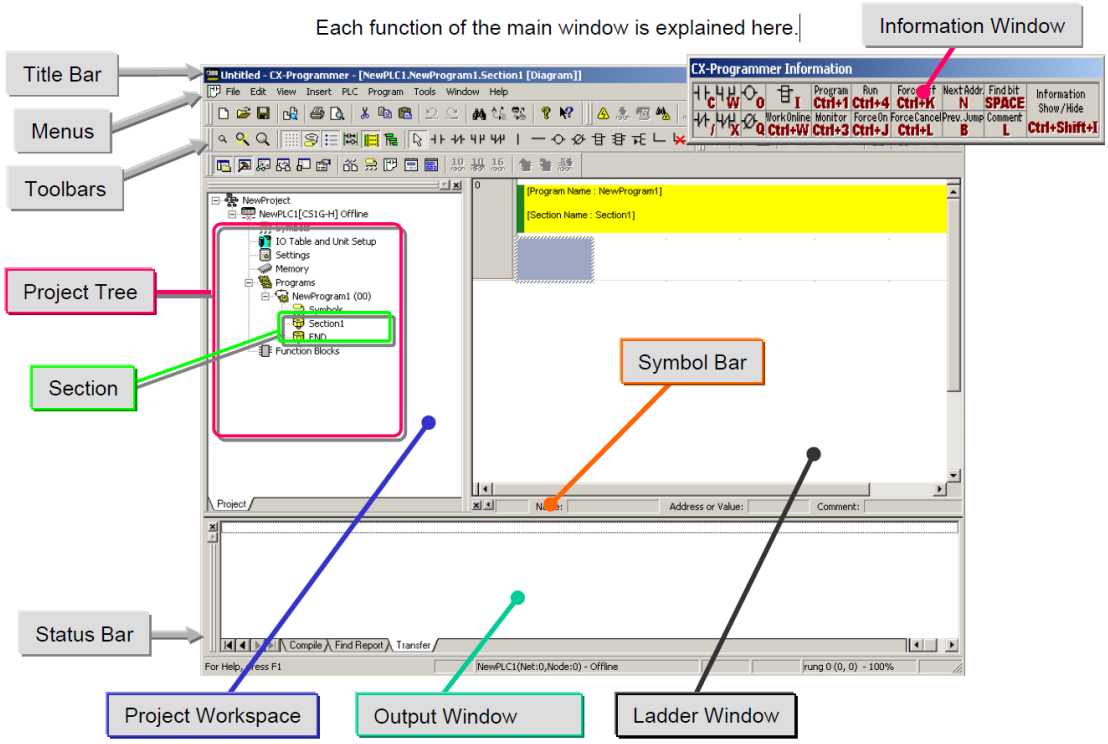
Click the toolbar button [New] in CX-Programmer.







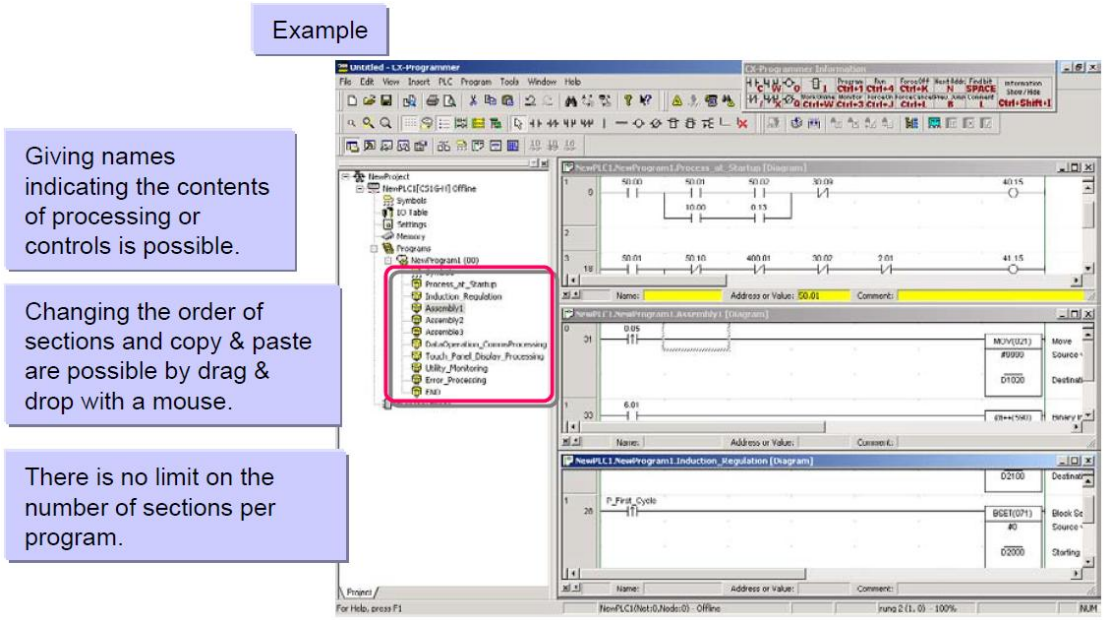
4. Main Window



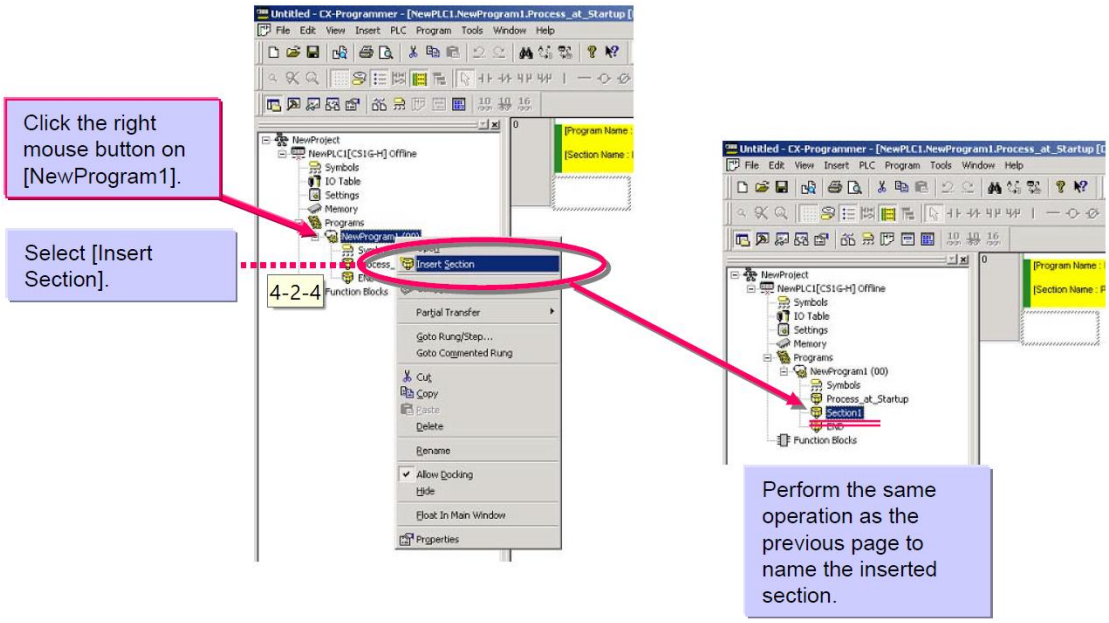
Name	Contents/Function
Title Bar	Shows the file name of saved data created in CX-Programmer.
Menus	Enable you to select menu items.
Toolbars	Enable you to select functions by clicking icons. Select [View] -> [Toolbars], and you can select toolbars to be displayed. Dragging toolbars enables you to change the display positions by the group.
Section	Enables you to divide one program into a given number of blocks. Each can be created and displayed.
Project Workspace Project Tree	Controls programs and data. Enables you to copy data by the element by executing Drag and Drop between different projects or within a project.
Ladder Window	A screen for creating and editing a ladder program.
Output Window	▪ Shows error information in compiling (error check). ▪ Shows the results of searching for contacts/coils in the list form. ▪ Shows error details when errors occurred while loading a project file.
Status Bar	Shows information such as a PLC name, online/offline, location of an active cell.
Information Window	Displays a small window to show the basic shortcut keys used in CX-Programmer. Select [View] -> [Information Window] to show or hide the Information window.
Symbol Bar	Displays the name, address or value, and comment of the symbol presently selected by the cursor.

Section

Section is a function to create/display a "block" of a program divided per function. It improves not only the visibility of a program but also the development productivity by reusing components if the program consists of similar controls, because copy and paste on the program tree are available. Moreover, program upload by section is possible and it enables you to do online operation smoothly.

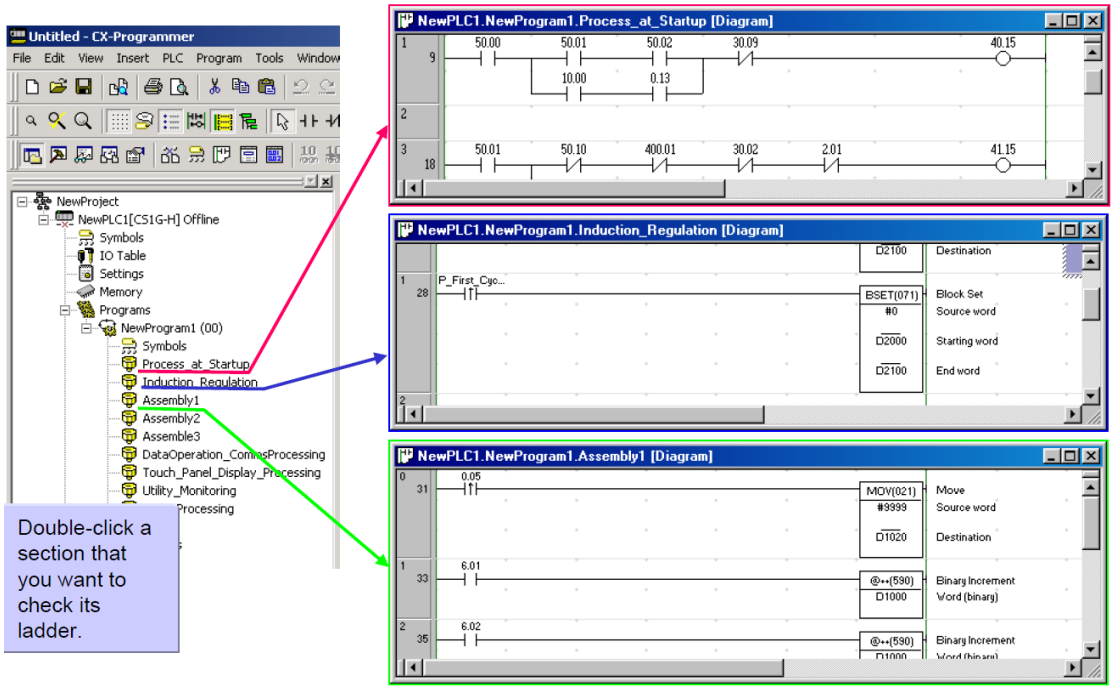


Addition of a section



It is possible to go to each section (a ladder block) from a section list.

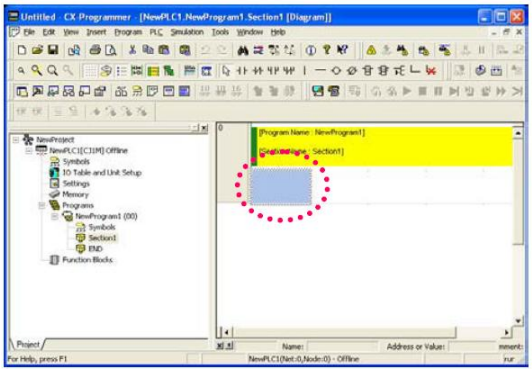
As checking the global image (control flow) of a program on the section list, you can go to a specified section.



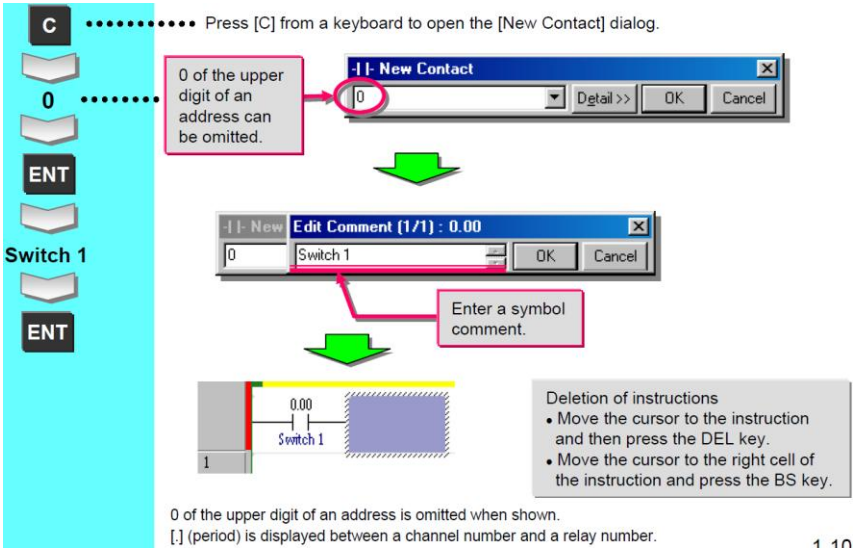
5. Program Creation

The following description uses the [CX-Programmer Keyboard mapping] – [Classic Mode].

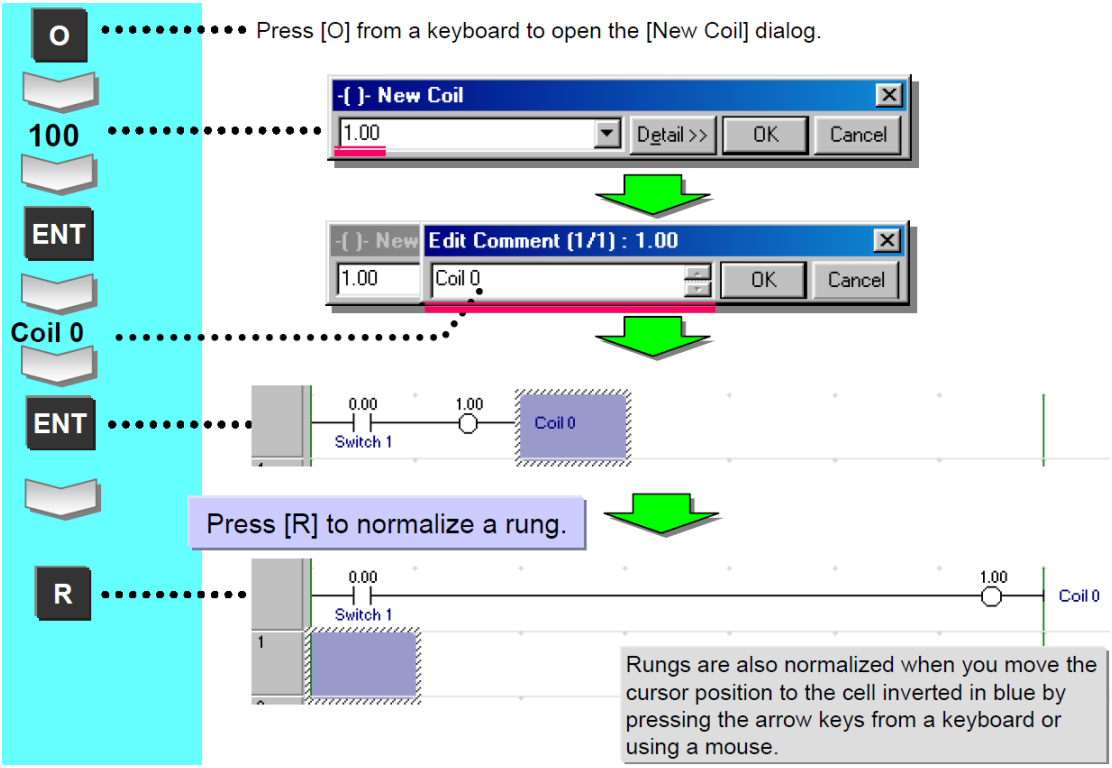
After checking the cursor position at the upper left of Ladder Window, start programming.



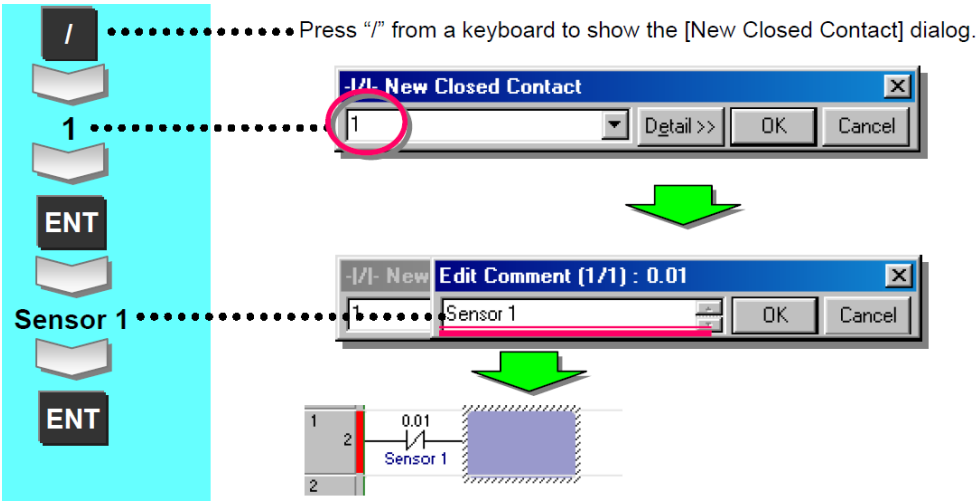
5-1. Entry of Normally Open Contact



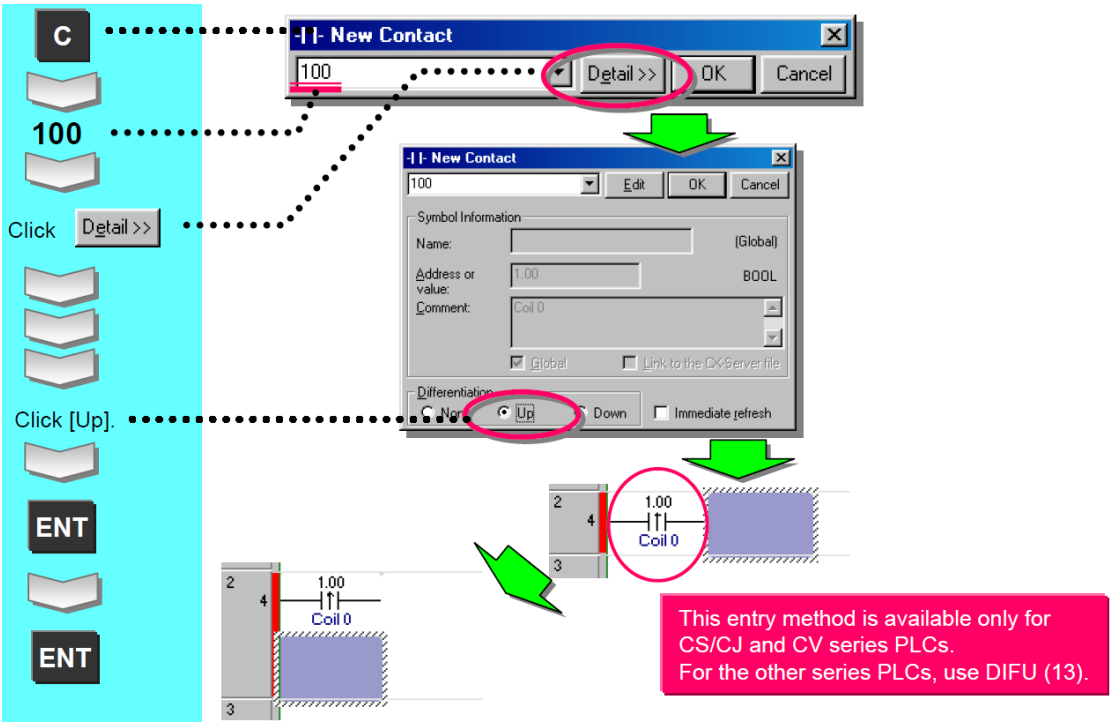
5-2. Entry of Coil



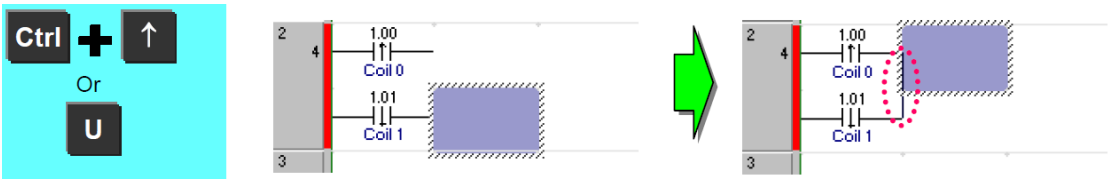
5-3. Entry of Normally Closed Contact



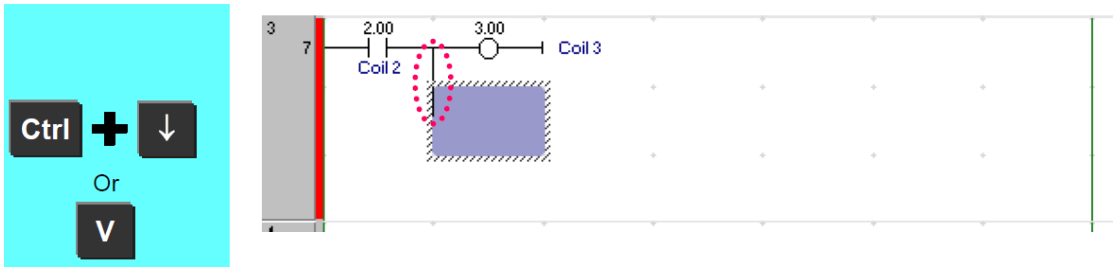
5-4. Entry of Differential Contact



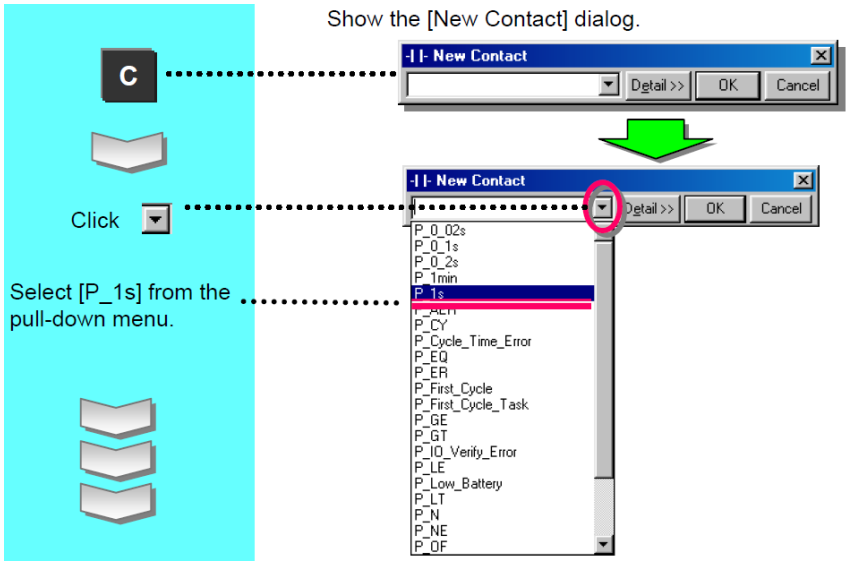
5-5. Entry of Vertical…Up



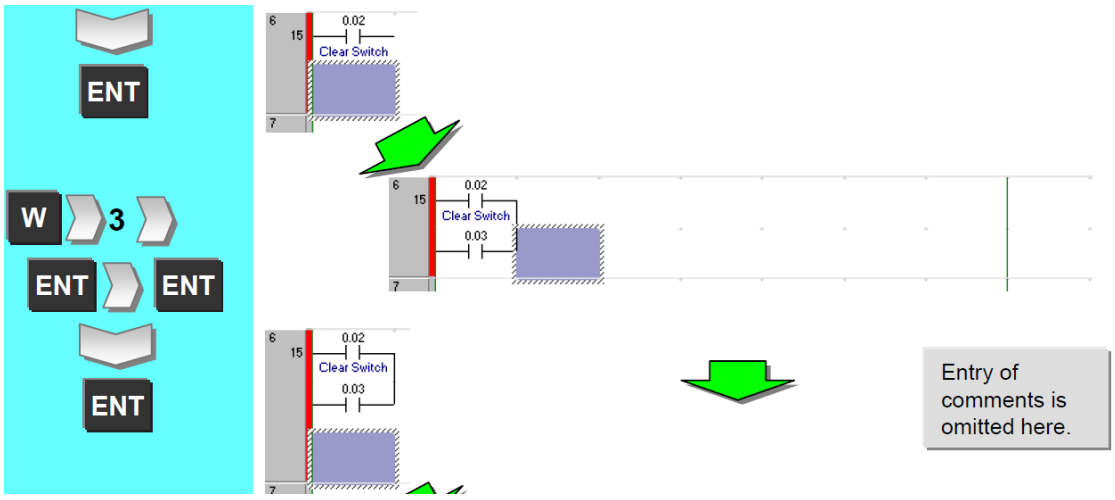
5-6. Entry of Vertical…Down



5-7. Entry of Auxiliary Relay - 1.0 Second Clock Pulse Bit

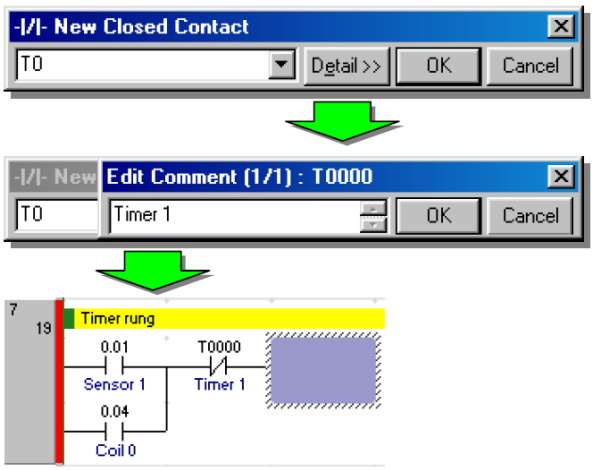


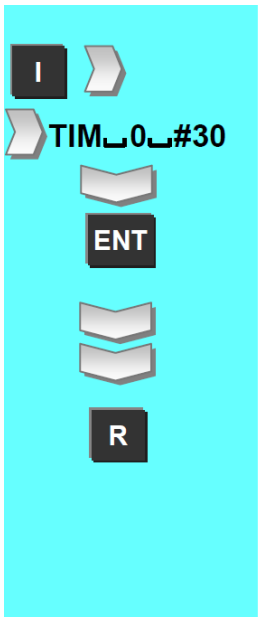
5-8. Entry of OR Rung



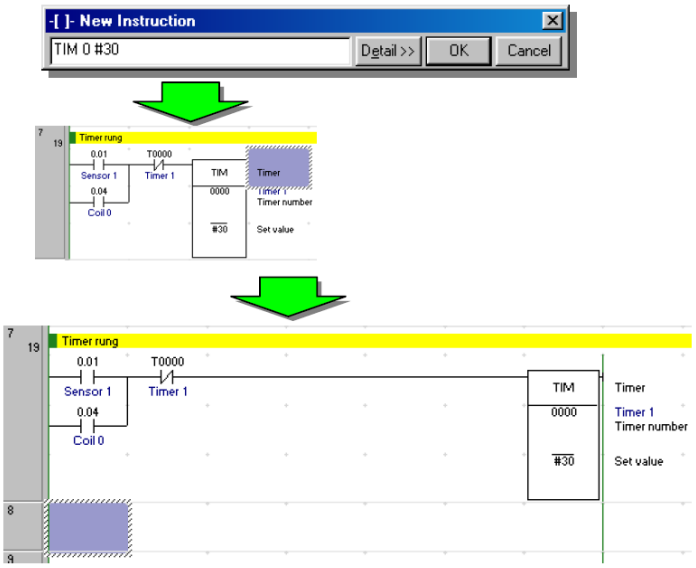
5-9. Entry of Timer Instructions

Entry of a Timer bit





Entry of a Timer instruction



5-10. Entry of Counter Instructions

I

CNT␣0␣#5

ENT

Move the cursor by using arrow keys or a mouse.
Enter a bit for reset.

R

C C0 ENT

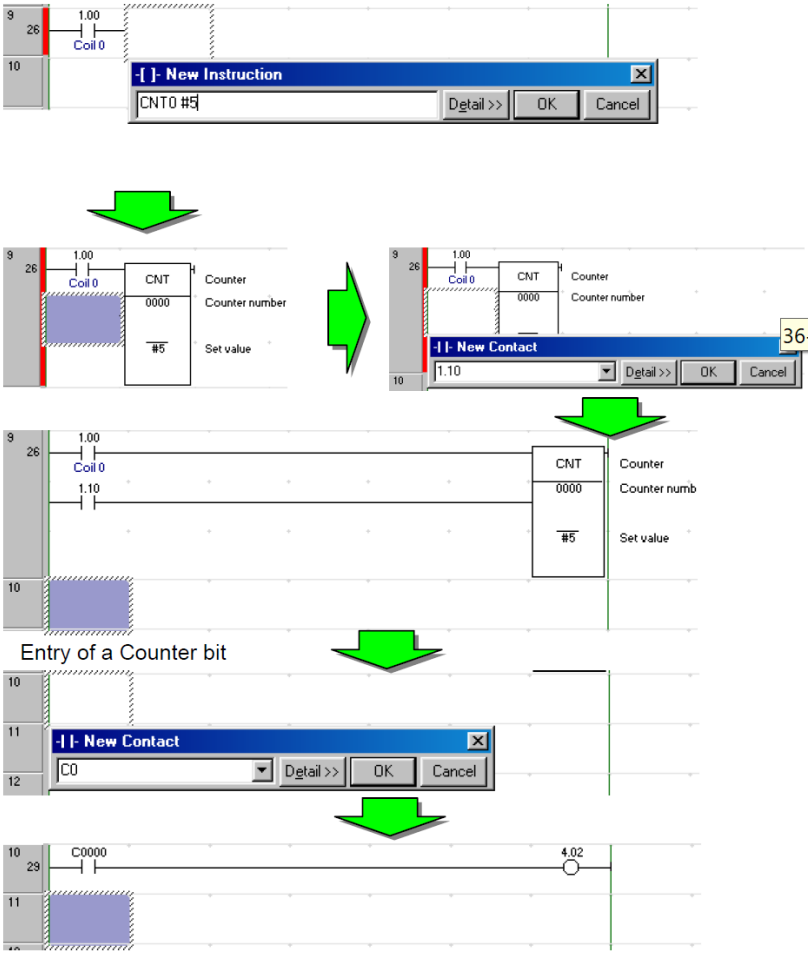
ENT

O 402 ENT

ENT

1-25 R

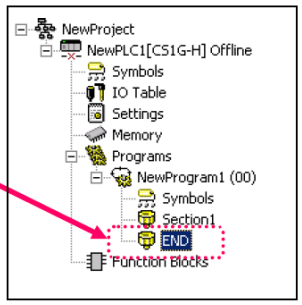
Entry of a Counter instruction



Entry of a Counter bit

5-11. Entry of END Instruction

At the creation of a new project, a section of the END instruction only is automatically generated.
You do not need to enter an END instruction.



Note:
The END section is not generated when you load a program created with CX-Programmer V2 or the former versions.

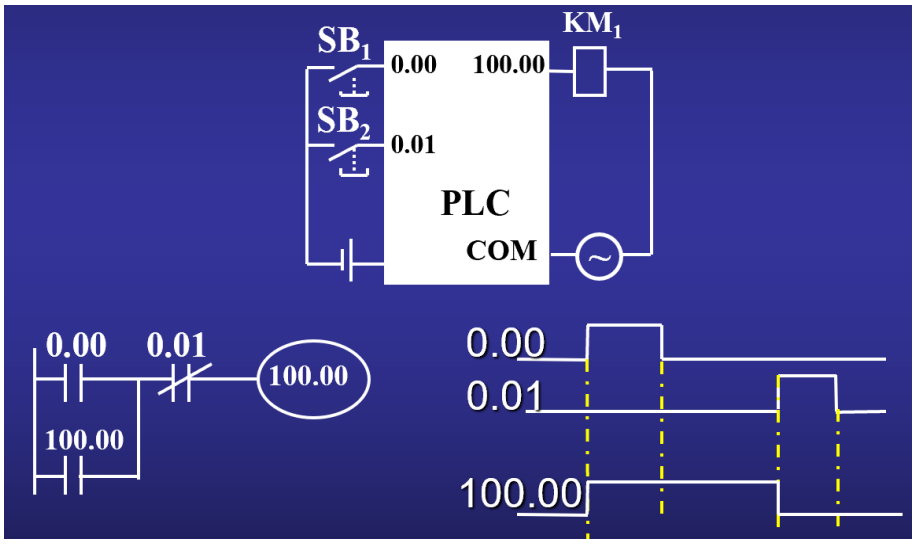
Part II Programming Practice

1. Practice the following basic instructions

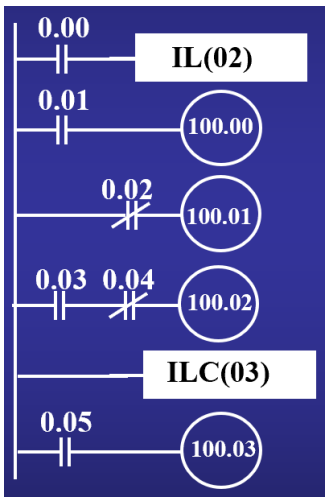
LD	LD NOT
AND	AND NOT
OR	OR NOT
OUT	OUT NOT
OR LD	AND LD
SET	RESET
KEEP	
DIFU	DIFD

2. Implement the following ladder diagrams and check the results

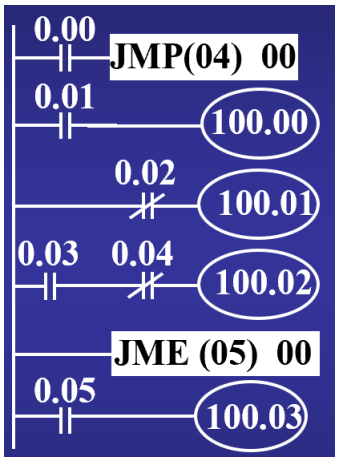
(1) Start-hold-stop circuit



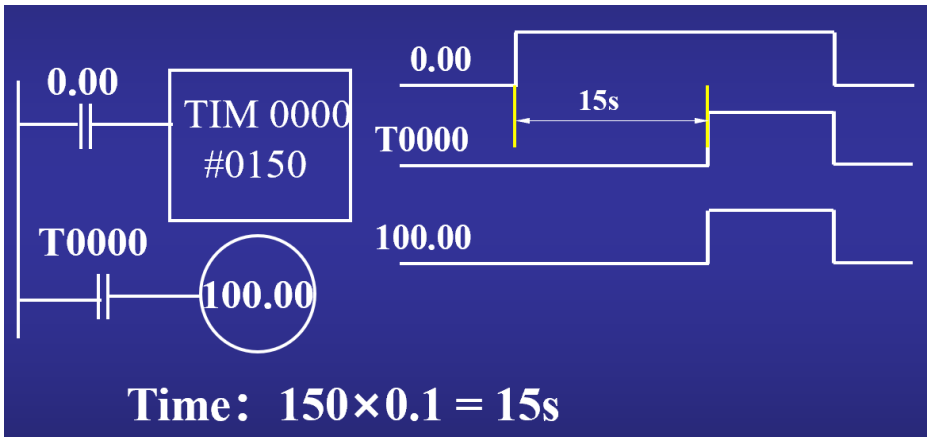
(2) IL/ILC



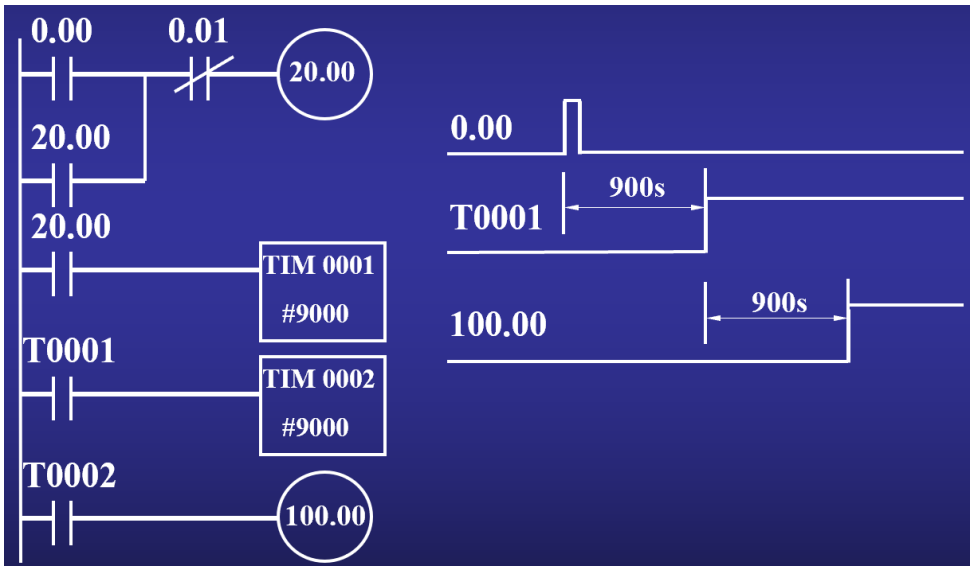
(3) JMP/JME



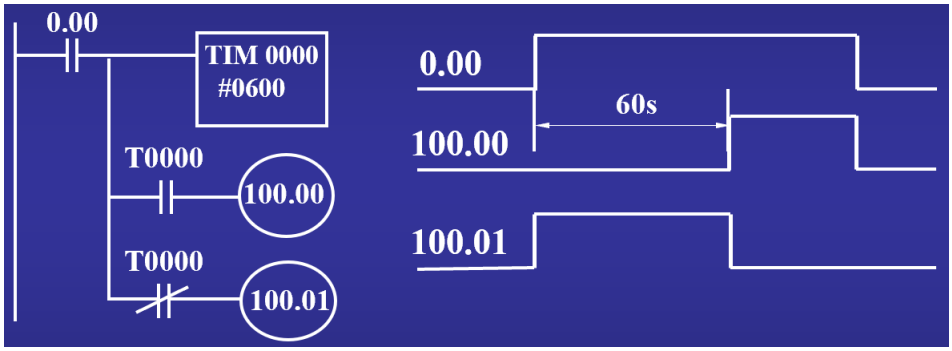
(4) Timer



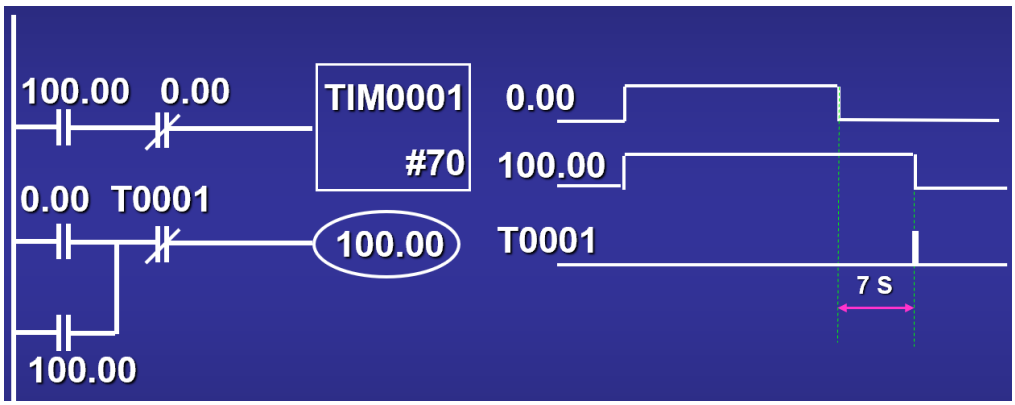
(5) Cascade timer



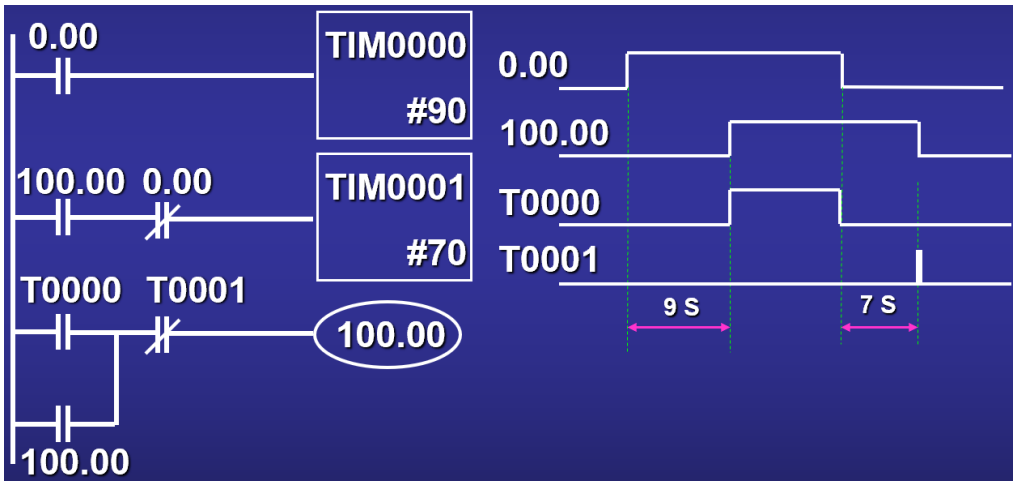
(6) On-delay



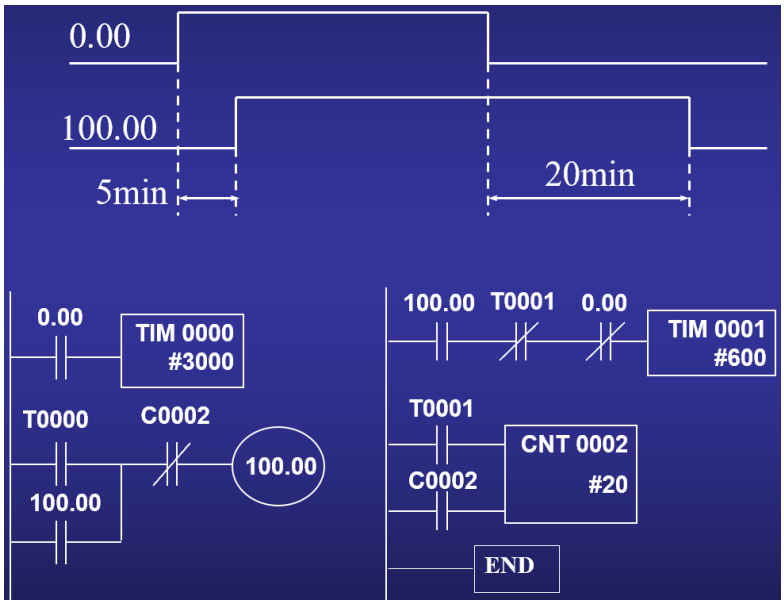
(7) Off-delay



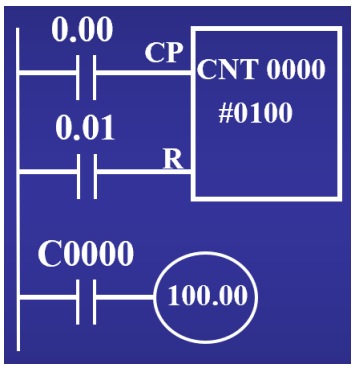
(8) On delay/off delay



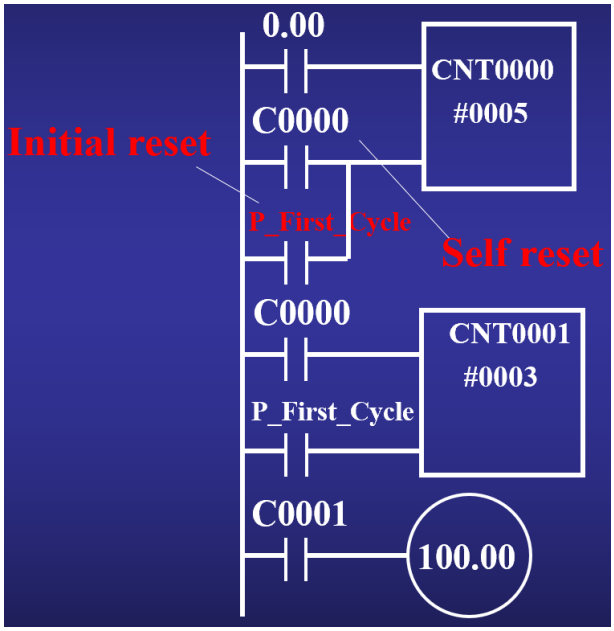
(9) On delay/off delay (long time)



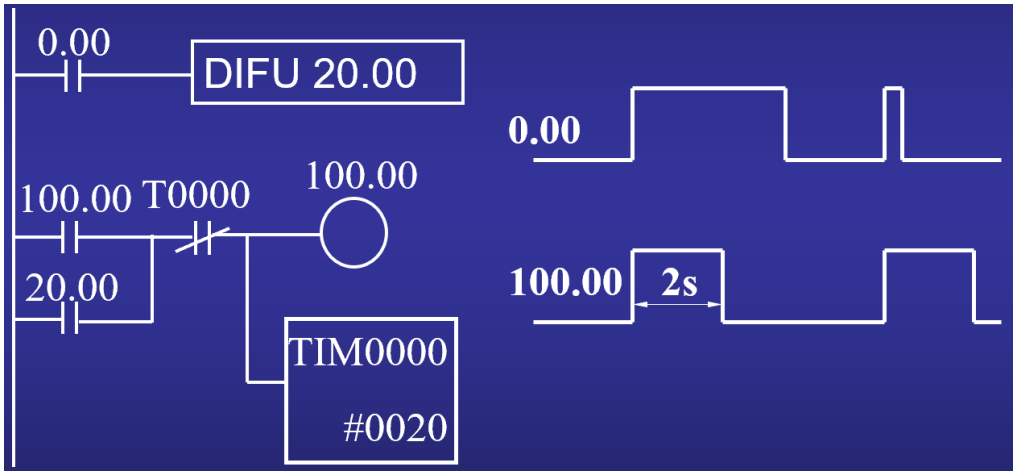
(10) Counter



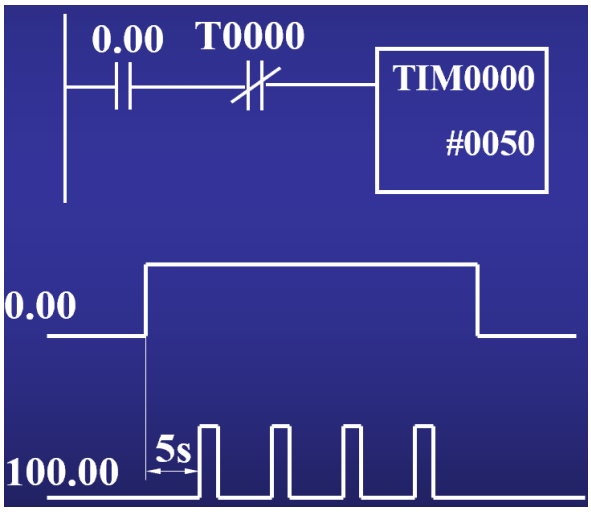
(11) Extended counter



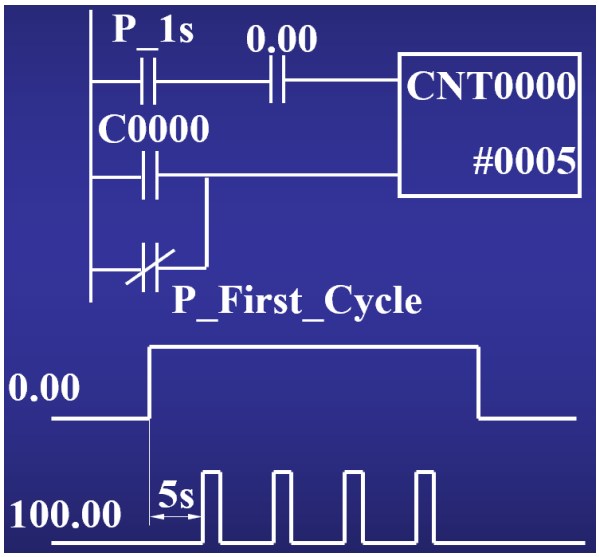
(12) Single-pulse generator



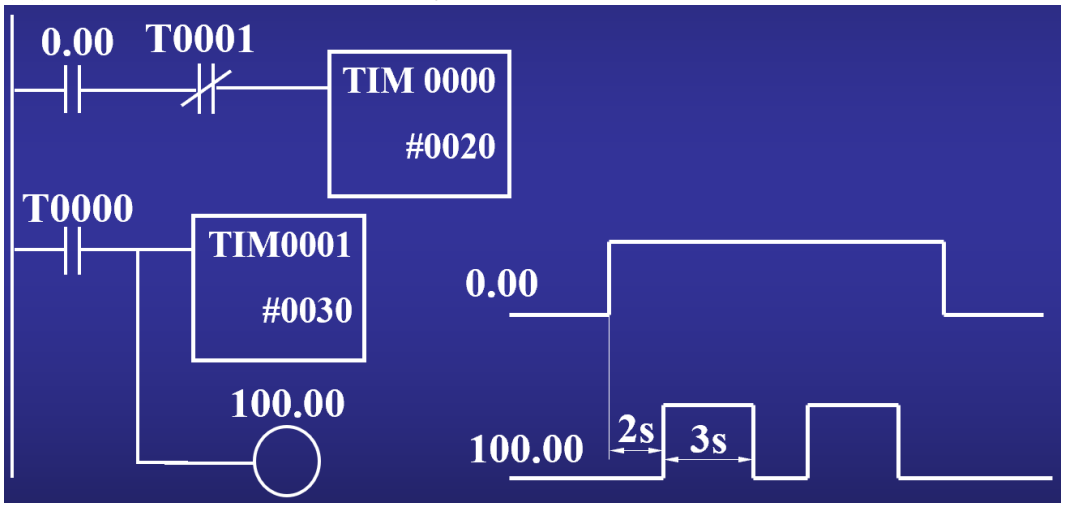
(13) Pulse generator (using timer)



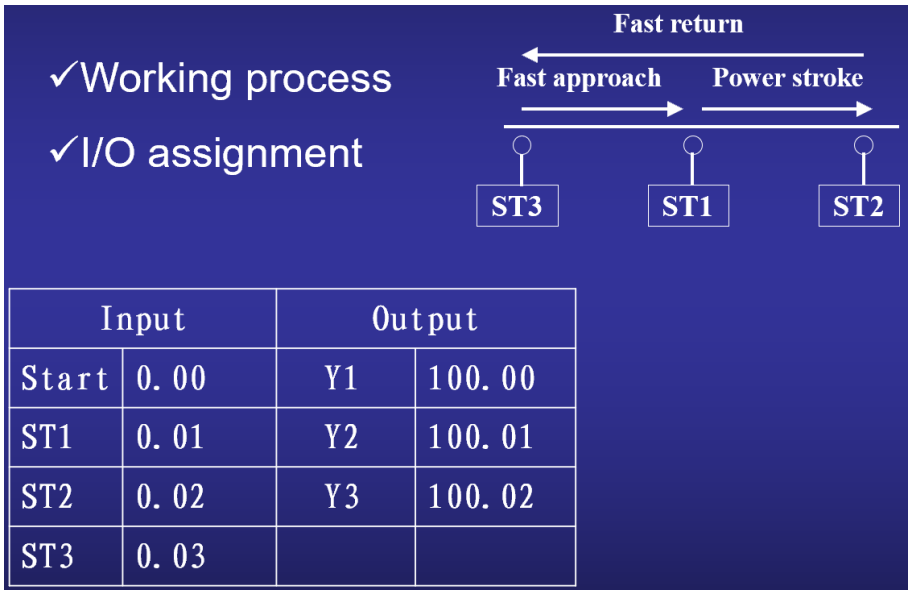
(14) Pulse generator (using counter)



(15) Pulse with variable width and duty ratio



(16) Power head



Input		Output	
Start	0.00	Y1	100.00
ST1	0.01	Y2	100.01
ST2	0.02	Y3	100.02
ST3	0.03		