

# Labo 2: Ladder Diagrams & GRAFCET Corrigé

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The activation of the GRAFCET step can be represented in the Ladder diagram using one sequential memory block (SR) : 0 indicating that the state is not active and 1 when it is active. The synthesis of such specification consists in determining the control functions of the SR FF.

**Exercice 1.** Construct a linear GRAFCET with 5 different steps using Ladder Diagram. Choose inputs and actions freely.

**Réponse :**

The screenshot displays the I2Grafcet software interface, which is used for creating and visualizing PLC programs. The interface is divided into several panes:

- Top Pane (Ladder Diagram):** Shows a ladder logic diagram with six rungs. Each rung starts with a normally open contact labeled 'state1', 'state2', or 'state3'. These contacts are connected to coils for 'GVL.output1', 'GVL.output2', and 'GVL.output3'. The diagram is organized into three sections, each containing two rungs.
- Left Pane (PLC Program):** Displays the ladder logic code in a text editor. The code is as follows:

```
1 PROGRAM PLC_FRG
2 VAR
3   // States
4   state1 : BOOL := TRUE;
5   state2 : BOOL := FALSE;
6   state3 : BOOL := FALSE;
7 END_VAR
```
- Bottom Left Pane (Visualization):** Shows a 3D visualization of the PLC hardware. It includes three cylindrical components (sensors) and three circular components (actuators) arranged in a row.
- Bottom Right Pane (Messages):** Displays the status of the program. It shows 'Last build: 0 0 0' and 'Precompile: ✓'. Below this, it indicates 'Messages - Total 0 error(s), 0 warning(s), 0 message(s)'.

The interface also includes a menu bar at the top with options like 'File', 'Edit', 'View', 'Project', 'FBD/LD/L', 'Build', 'Online', 'Debug', 'Tools', 'Window', and 'Help'. A toolbar with various icons for file operations and execution is located below the menu bar.

**Exercice 2.** Using ladder diagrams construct the problem for a GRAFCET shown on Figure 1: Choose inputs and actions freely.

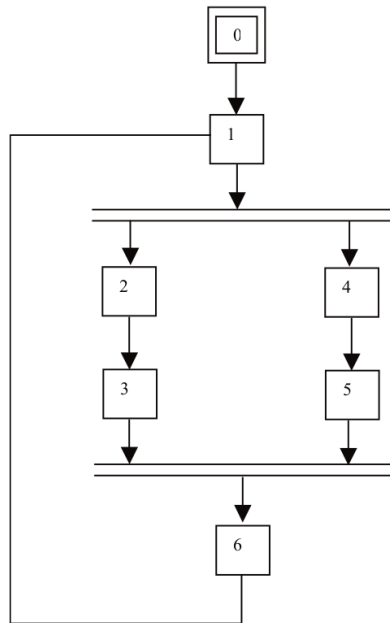


Figure 1: GRAFCET to be made using Ladder diagram.

**Réponse :**

**Exercice 3.** Implement a traffic light using GRAFCET (SFC). First build a single traffic light that will switch between green, orange and red automatically using timers. Then add a second one that controls a perpendicular road. They thus can't be green at the same time.

**Réponse :**

The screenshot displays the CODESYS environment with three active PLC programs. The main workspace shows a sequence of steps: Init, Green, Orange, and Red, connected by transition lines with time delays (t#2s). The left pane shows the variable declaration table for the PLC\_PRG program.

Scope	Name	Address	Data type	Initialization	Comment	Attributes
VAR	isGreenLightOn		BOOL	TRUE		
VAR	isOrangeLightOn		BOOL	FALSE		
VAR	isRedLightOn		BOOL	FALSE		
VAR	t		INT		Output	

The bottom status bar indicates: Messages - Total 50 error(s), 0 warning(s), 0 message(s). The current user is (nobody).

