



1. Design and draw a ladder diagram circuit suitable for a PLC which will fulfil the following control requirement:

A momentary push switch is to be recognised, remembered and used to switch on an output for a period of 30 seconds. After 30 seconds this output is to be switched off and must be off for 0.5 seconds before a second output switches on.

The second output remains on until a second push switch is operated to turn it off. If the second push is operated at any time then the current output must turn off and the system await the press of the first push. The rungs of the ladder diagram must contain interlock contacts which prevent both outputs being on at the same time.

2. Redesign and improve the pelican crossing ladder diagram given of FIGURE 1 of lesson PLC - 6 - 2 by adding timer rungs and counter rungs between rungs 12 and 14 (or any similar workable scheme) together with the necessary contacts inserted in the amber and green man lights of rungs 7 and 10, etc. The chart below shows the required sequence of events. Note that a section of the chart is repeated a total of 16 times. The time intervals are given below.

Time periods	1	2	3	4	5	6	7	.....	35	36	37
Green road light	ON	ON	OFF	OFF	OFF	OFF	.....	OFF	OFF	ON	
Red road light	OFF	OFF	OFF	ON	OFF	OFF	.....	OFF	OFF	OFF	
Amber road light	OFF	OFF	ON	OFF	ON	OFF	.....	ON	OFF	OFF	
Wait sign	OFF	ON	ON	OFF	OFF	OFF	.....	OFF	OFF	OFF	
Green man	OFF	OFF	OFF	ON	ON	OFF	.....	ON	OFF	OFF	
Red man	ON	ON	ON	OFF	OFF	OFF	.....	OFF	OFF	ON	
											
					first occurrence				sixteenth time		

Time period 1 is the 'normal' conditions.

Time period 2 is after the pedestrian presses the push button.

The change from period 2 to period 3 can only be made after at least one five second check of the road sensors.

The time interval between 3 and 4 is 4 seconds.

The time interval between 4 and 5 is 10 seconds.

The time interval between 5 and 6 is 0.5 seconds.

The time interval between 6 and 7 is 0.5 seconds.

It is not necessary to show the whole of the traffic light ladder diagram of lesson PLC - 6 - 2, only rungs which have been modified. There must, however, be a comprehensive explanation of the operation of the modified rungs accompanying the modified ladder diagram.

3. The chart below shows a required set of step sequences with the same time interval between steps.

Provide a ladder diagram and a comprehensive explanation as a solution for this chart by using two eight-bit shift registers (SFT0 controls relays 50 to 57, SFT1 controls relays 60 to 66). The sequence is to have an initial start signal and thereafter can be free running. A reset control and timer to clock the shift registers must be provided.

STEP No.	OUT0	OUT1	OUT2	OUT3	OUT4	OUT5	RESET
1	ON						1
2	ON	ON					2
3	ON	ON	ON				3
4		ON	ON	ON			4
5			ON	ON	ON		5
6				ON	ON	ON	6
7					ON	ON	7
8						ON	8
9					ON	ON	9
10				ON	ON	ON	10
11			ON	ON	ON		11
12		ON	ON	ON			12
13	ON	ON	ON				13
14	ON	ON					14
15	ON						STEP 1 and 15

Return to step 2