Experiment No.: 3
Experiment Name: Control of Conveyor System Using PLCs and Sensors
Objectives

Upon the completion of this experiment, the student should be able to Objectives:
* To learn how PLCs are used in automation systems.
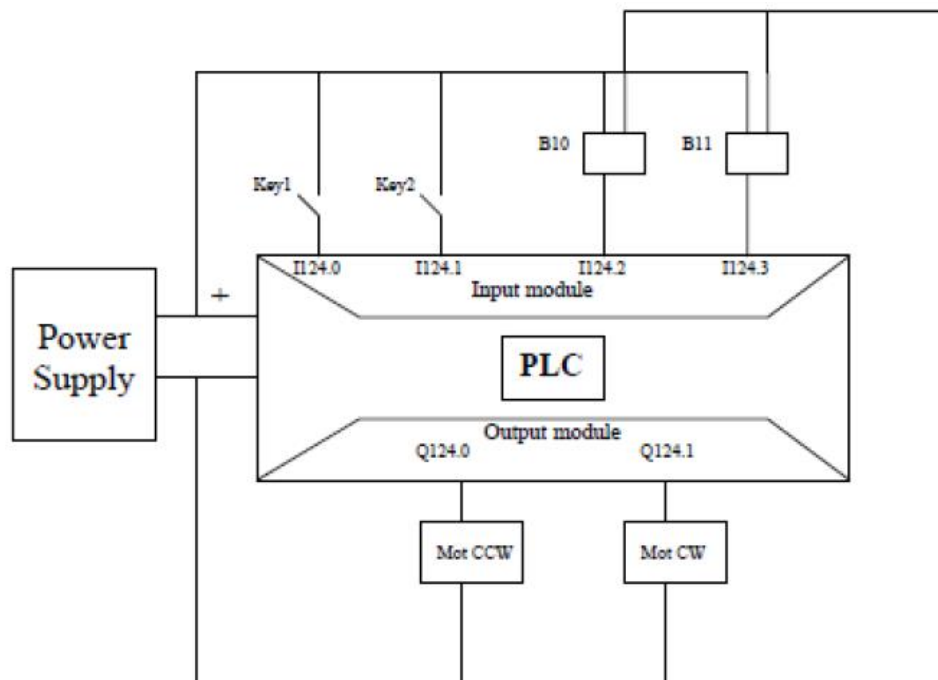* To learn how to use sensors in automation systems.

Equipments Required:
Siemens S7 PLC unit, conveyor belt, proximity sensor (B11), photo sensor (B10), Metallic cylinder, and plastic cylinder.

Theoretical background:
The single track conveyer belt is for connecting two operating stations or units in order to assemble flexible manufacturing facilities .using automatic handling equipment it can be combined with any functional unit or operating module. The conveyor belt consists of a single-track belt that is equipped with an electrical drive and includes an optical sensor for detecting when work pieces reach the end of the conveyor and an inductive sensor in the middle of the belt. The mechanical design of the belt employs metal profiles that allow for additional installation options (sensors, cylinders) to easily be retrofitted.

Electrical wiring diagram:

Procedure:
* Create new step 7 light software project.

Fill the symbol table bellow.

Status	Symbol	Address	Data Typ	Comment
	CYCL_EXC	OB 1	OB 1	Cycle Execution
	key1	I 124.0	BOOL	
	key2	I 124.1	BOOL	
	B11	I 124.2	BOOL	
	B10	I 124.3	BOOL	
	Motor CCW	Q 124.0	BOOL	
	Motor CW	Q 124.1	BOOL	

ave the symbol table and Exit from the symbol editor.

[A]: Simple operation of the conveyor belt.
The following figure shows a conveyor belt that can be activated electrically. Two start buttons (key1 and key2) is used to move the conveyor belt in both directions, and one button is used to stop it. The proximity sensor is used to detect metallic cylinder only and photo sensor is used to detect both of the cylinders, such that when the cylinder reaches the sensor, the conveyor belt stop.
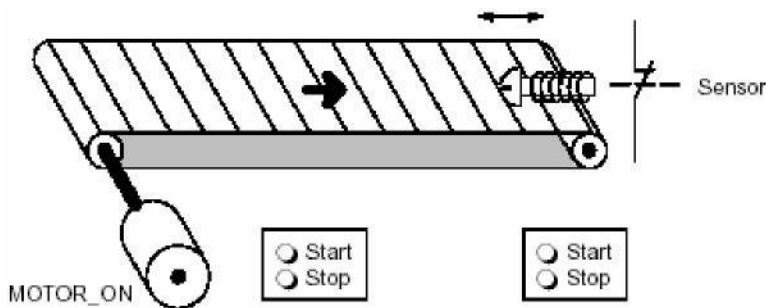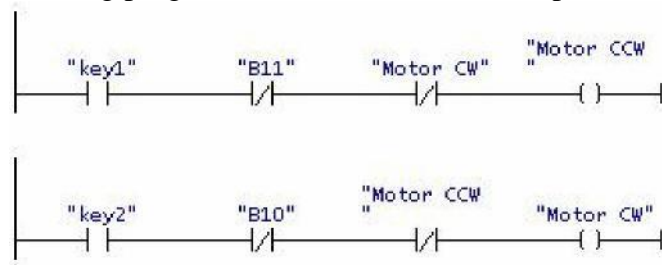

Fig.1 The conveyor belt.

Write the following program and connect the sensors and motor terminals to the needed PLC inputs according to the symbol table above. Put the metallic item between the two sensors and then write the following program in the PLC and test its operation as follows.
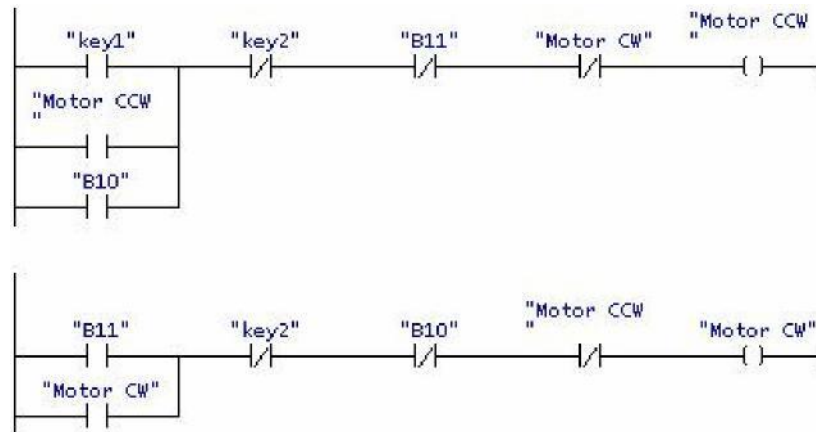

-Actuate Key1 and see what happens; comment.
-Actuate key 2 and see what happens; comment.
-Actuate the two keys at the same time and note the operation of the conveyer belt, comment.

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Q1) What happens if you actuate the two operating keys at same time? Why? Now remove the metallic object, put the Plastic object, and operate the system; comment.

B) Alternating movement of the conveyor.
• Create the following ladder diagram in your project, and download it to the PLC S7, then test its operation.

This program will operate the conveyer in the alternating movement.
- Put the metallic cylinder between the two sensors.
- Actuate key1 and note what happens, write that in your notes and try to explain the logic of operation.
- Now actuate key2 and note that the conveyer will stop.

Q2) What is the function of B11, B10, and key1?