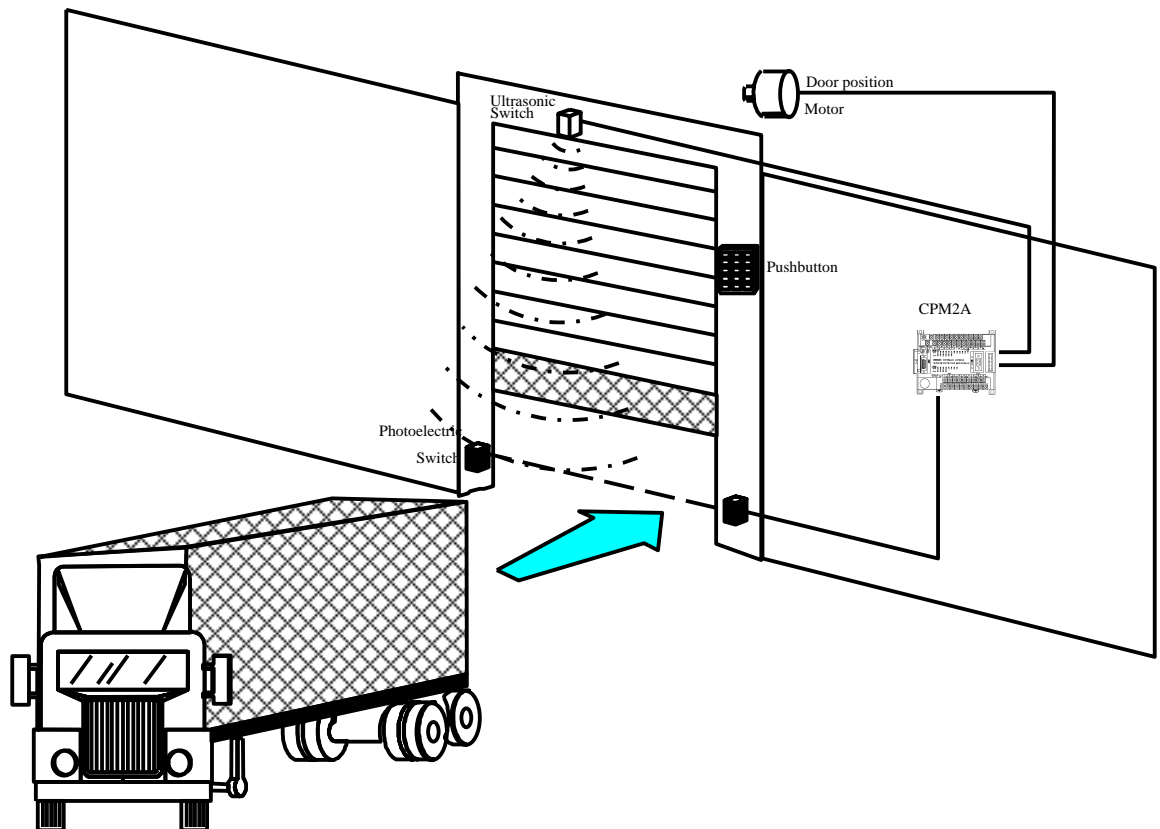


6. APPLICATION EXAMPLES OF BASIC COMMANDS

□ Application #10: Automatic Control Of Warehouse Door

The input ultrasonic switch is employed to detect the presence of an approaching vehicle. A separate photosensor detects the passing of a vehicle via the interruption of the light beam. In response to these signals, the control circuit controls the outputs that drive the motor of the door for opening and closing.

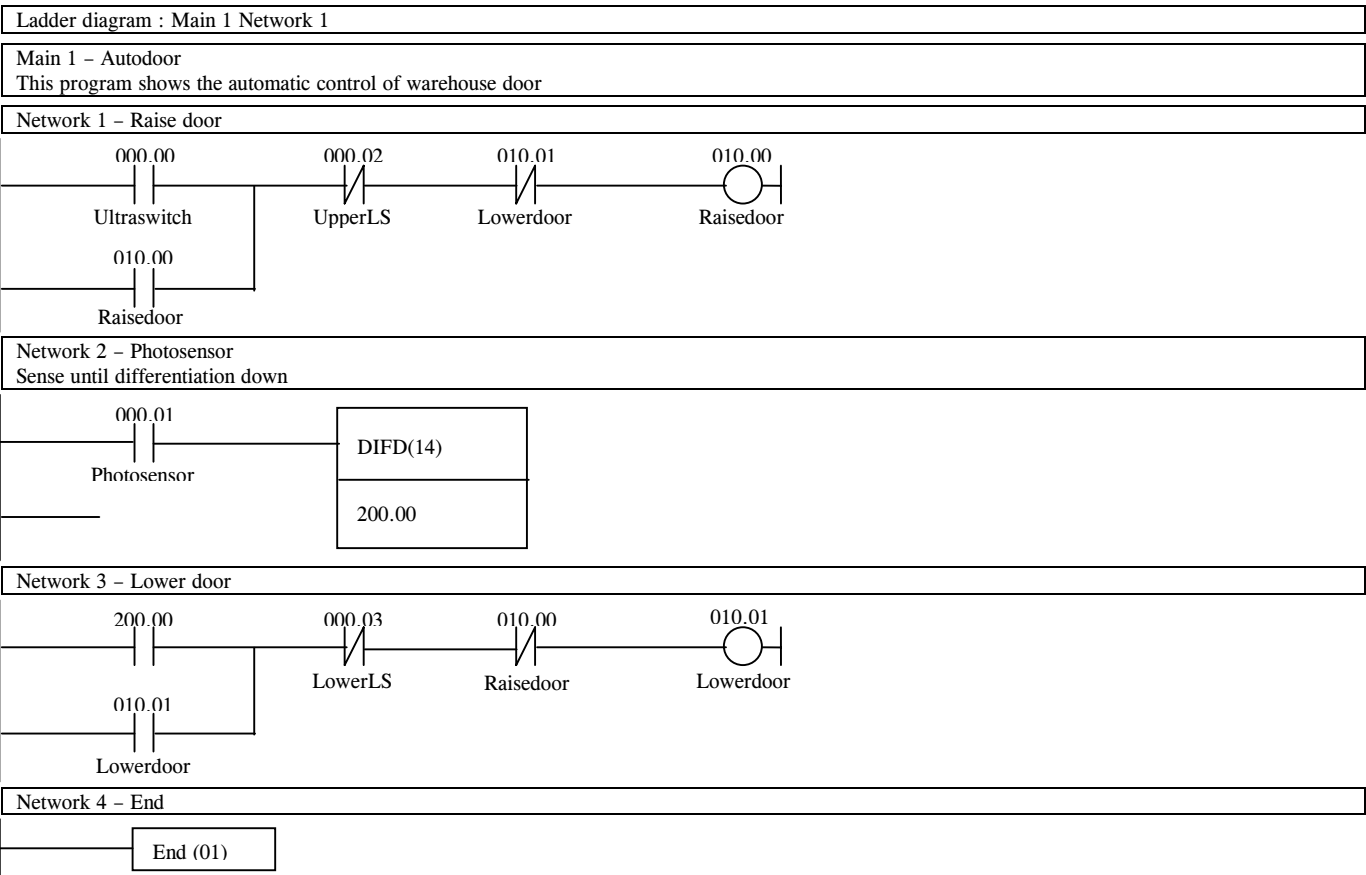


• I/O Assignment

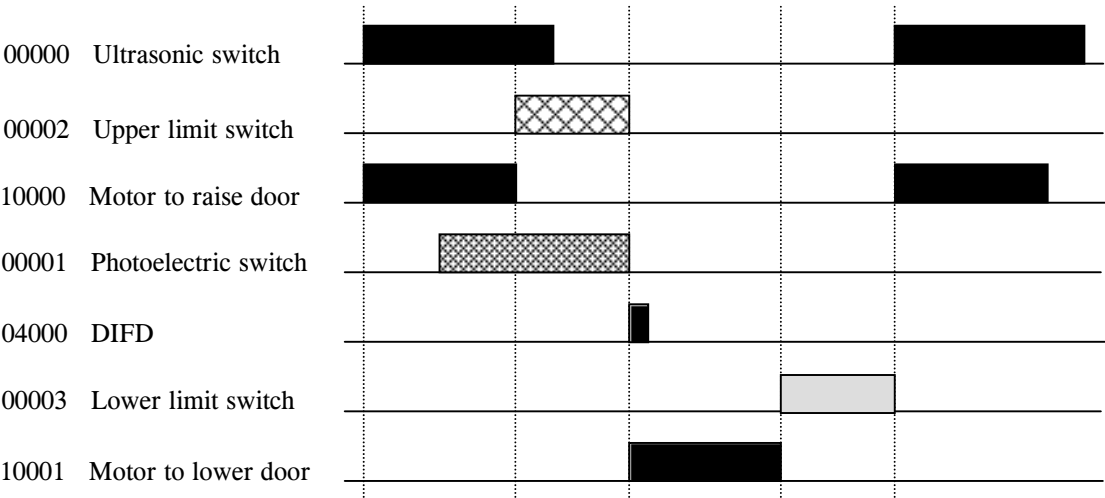
Input	Devices
00000	Ultrasonic switch
00001	Photoelectric switch
00002	Door upper limit switch
00003	Door lower limit switch

Output	Devices
01000	Motor to raise door
01001	Motor to lower door

6. APPLICATION EXAMPLES OF BASIC COMMANDS



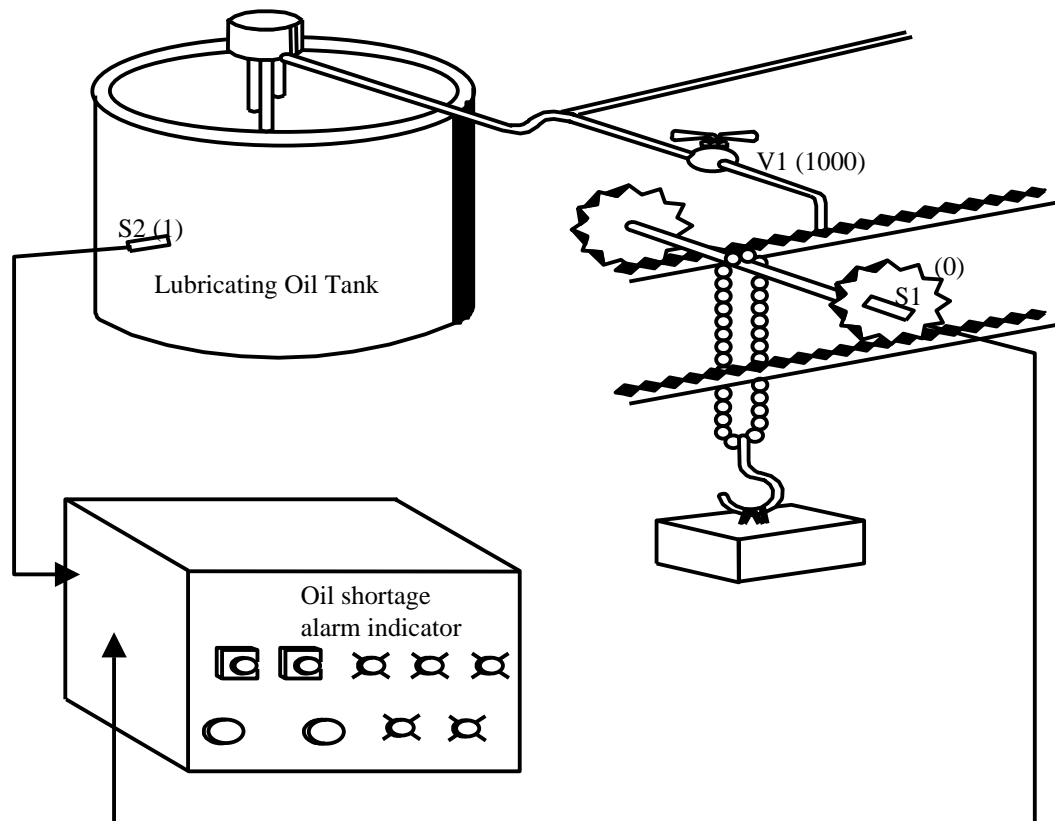
Timing diagram



6. APPLICATION EXAMPLES OF BASIC COMMANDS

□ Application #11: Automatic Lubrication of Gear

When the gear is moved towards S1, the sensor S1 will detect the gear and signal the electromagnetic valve for oil supply on the gear. The valve (V1) will open for a short period of time, supplying a predetermined quantity of oil. When sensor S2 sense that the lubricating tank oil level is low, the oil shortage alarm indicator will be ON.

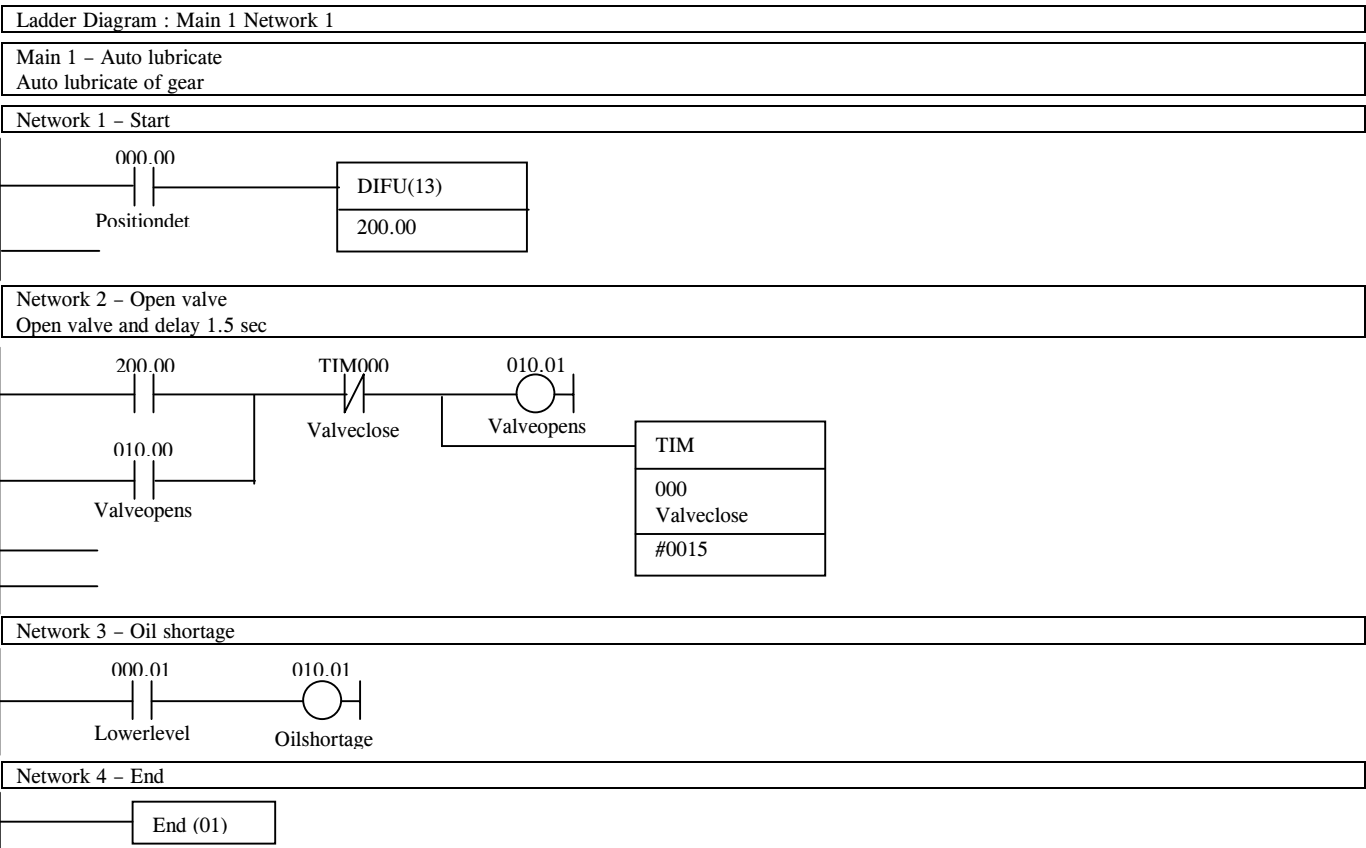


• I/O Assignment

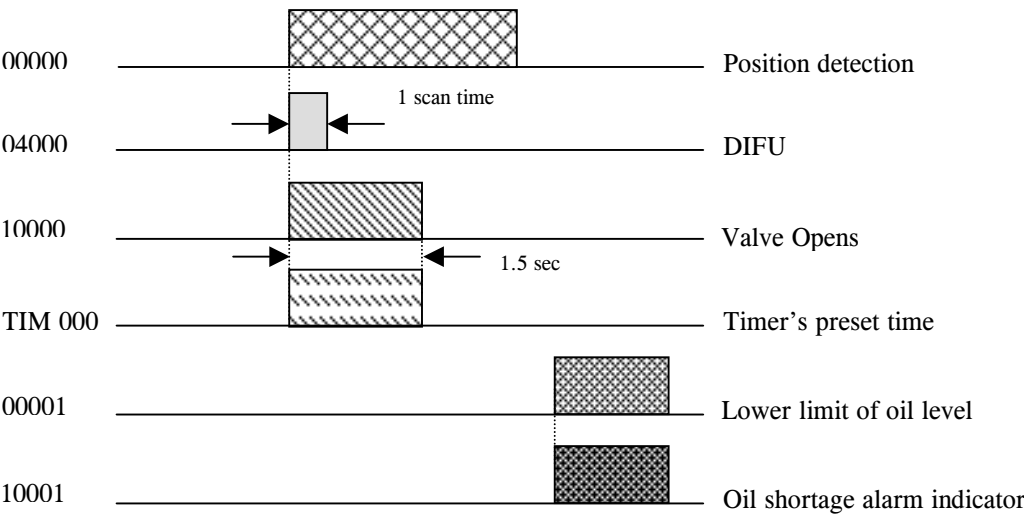
Input	Devices
00000	Position detection (S1)
00001	Lower limit of oil (S2)

Output	Devices
01000	Electromagnetic valve for oil supply (V1)
01001	Oil shortage alarm indicator

6. APPLICATION EXAMPLES OF BASIC COMMANDS



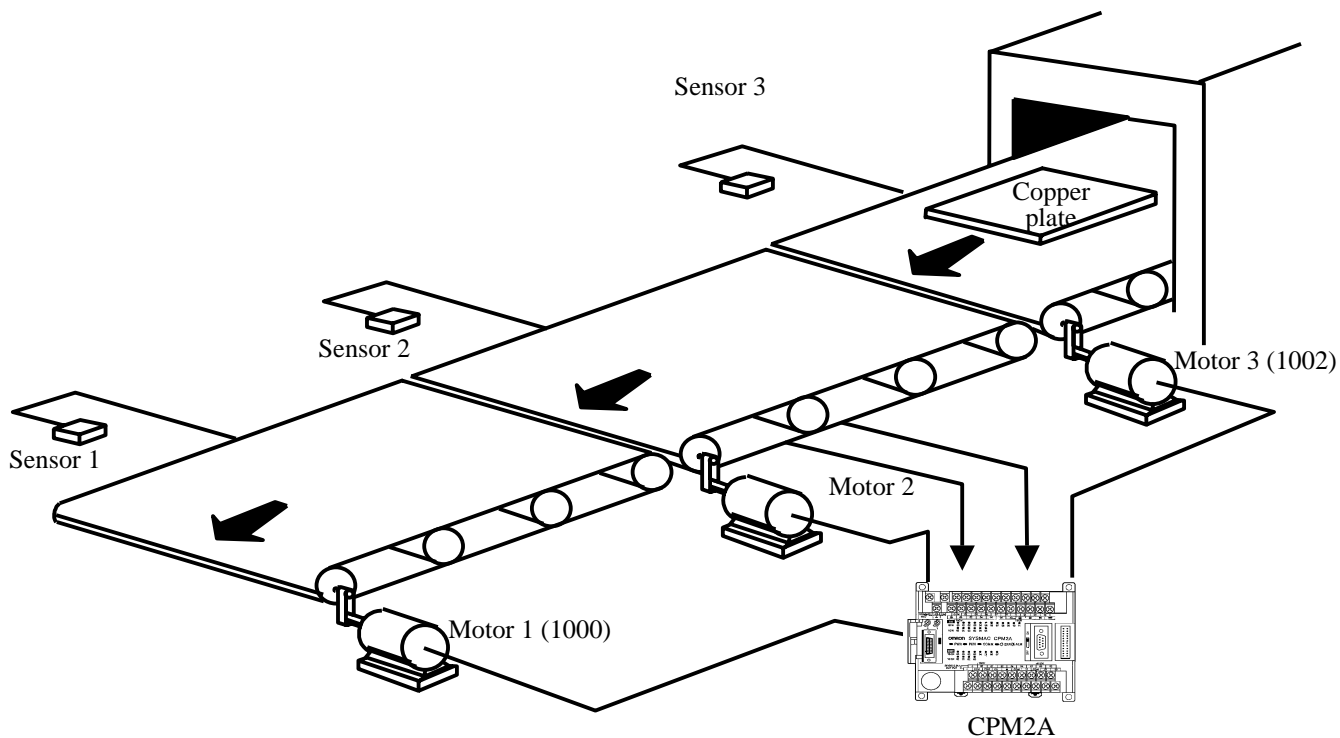
Timing diagram



6. APPLICATION EXAMPLES OF BASIC COMMANDS

□ Application #12: Conveyor Belt Motor Control

In this application, the PLC is used to start and stop the motors of a segmented conveyor belt. This allows only belt sections carrying an object (i.e. metal plate) to move. The position of a metal plate is detected by a proximity switch located next to each belt segment. As long as the plate is within the detecting range of the switch, the motor will work. If the plate moves beyond the range, a timer is activated and when this set time has lapsed, the motor of that belt stops.



• I/O Assignment

Input	Devices
00000	Sensor 1
00001	Sensor 2
00002	Sensor 3

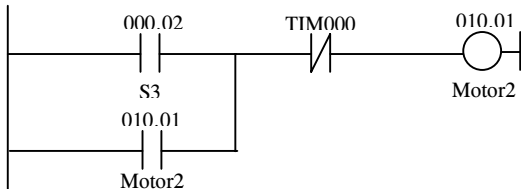
Output	Devices
01000	Motor 1
01001	Motor 2
01002	Motor 3

6. APPLICATION EXAMPLES OF BASIC COMMANDS

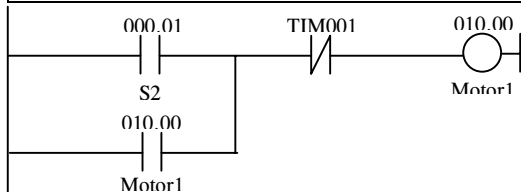
Ladder diagram : Main 1 Network 1

Main 1 – Conveyorcontrol
Conveyor belt control application

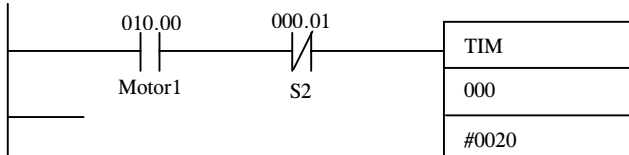
Network 1 – Motor2



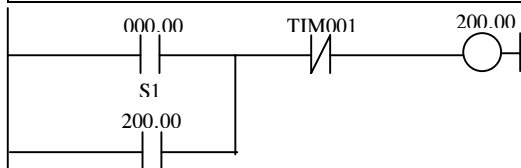
Network 2 – Motor1



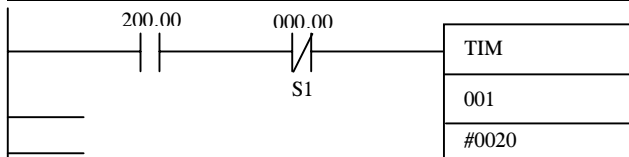
Network 3 – Delay for 2sec



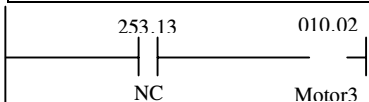
Network 4 – Sensor1



Network 5 – Delay for 2sec



Network 6 – Motor3



Network 7 – End



• Operation :

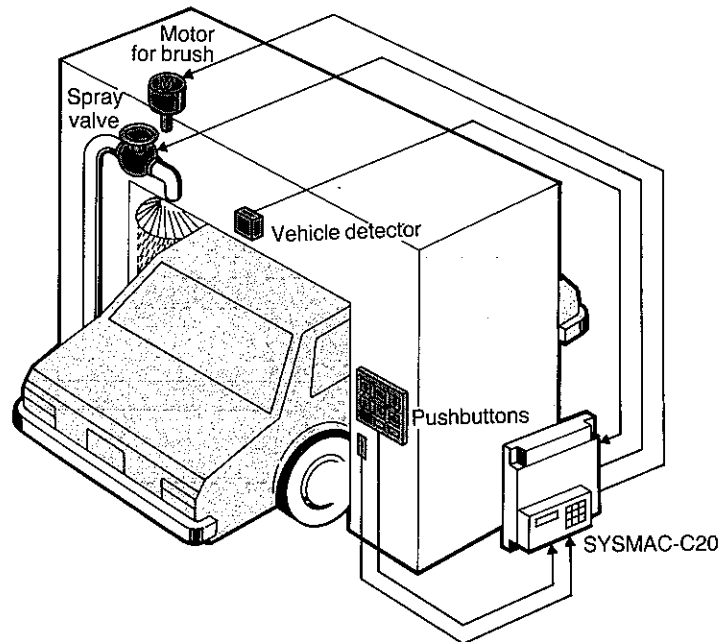
- Motor 2 turns ON when Sensor 3 detects the product
- Motor 2 is ON until Motor 1 is turned ON and product is out of detection range of Sensor 2
- Motor 1 turns ON when Sensor 2 detects the product
- Motor 1 is ON until product is out of detection range of Sensor 1



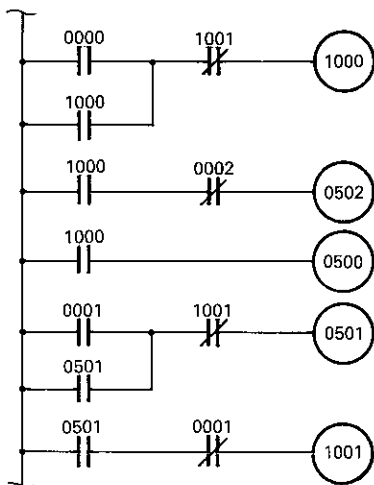
Application examples

Automatic car washing machine

The C20 is used to control a car washing machine in this example.



Ladder diagram



Explanation

As input devices, a vehicle-detecting device and pushbutton switches are used. In response to the signals from these devices, the C20 opens a valve for the spray and starts the motor for the revolving brush.

I/O assignment

Input	Relay
Start button	0000
Vehicle detector	0001
Condition at which washing machine stops	0002
Output	
Spray valve	0500
Brush motor	0501
Movement of washing machine	0502

Application examples



Coding Chart

Address	Instruction	Data
0000	LD	0000
0001	OR	1000
0002	AND-NOT	1001
0003	OUT	1000
0004	LD	1000
0005	AND-NOT	0002
0006	OUT	0502
0007	LD	1000
0008	OUT	0500
0009	LD	0001
0010	OR	0501
0011	AND-NOT	1001
0012	OUT	0501
0013	LD	0501
0014	AND-NOT	0001
0015	OUT	1001

Operation

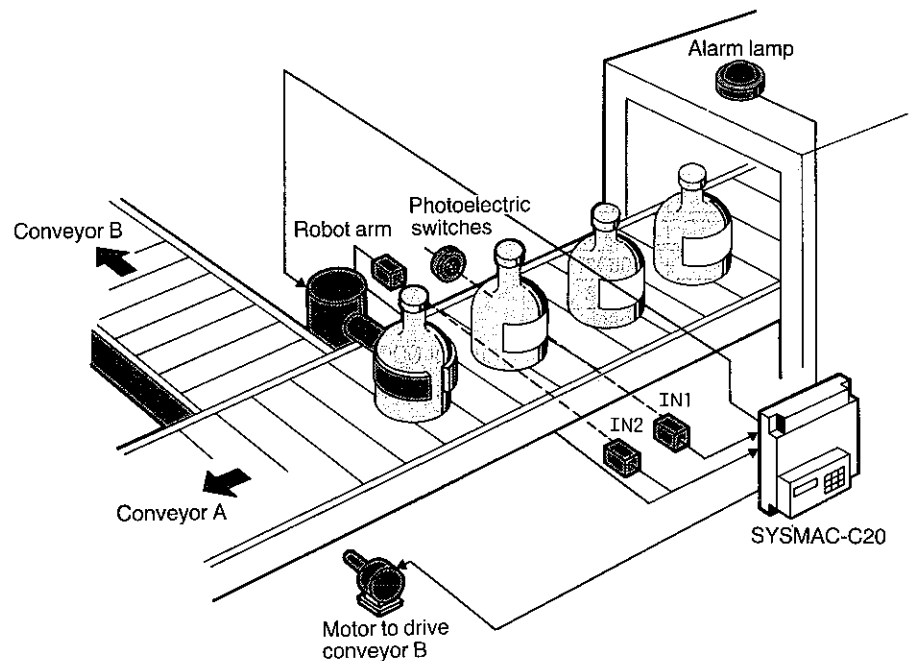
When the start button (input 0000) is depressed, the washing machine begins operating (i.e., the machine starts moving and at the same time, the spray valve is opened).

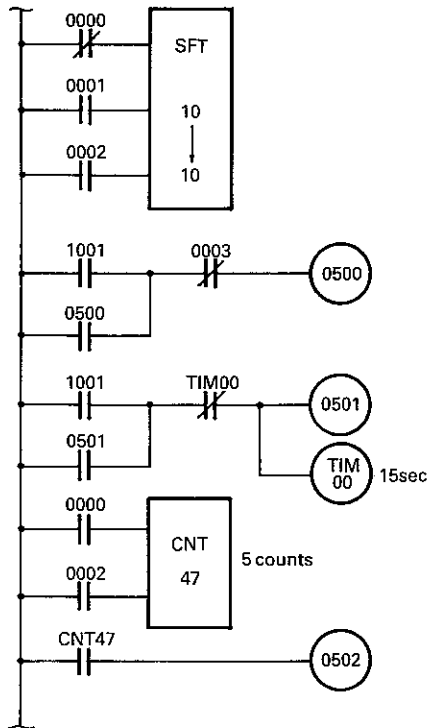
The washing process continues until Internal Auxiliary Relay 1001, which can also serve as a reset input, is opened. Input 0000 and Internal Auxiliary Relay 1001 are ANDed and the result is internally output to Internal Auxiliary Relay 1000. This result is then ANDed with input 0002 (the condition under which the washing machine is stopped). As long as the condition of this AND circuit is satisfied, output 502 is turned on, causing the washing apparatus to travel the entire length of the vehicle.

Internal Auxiliary Relay 1000 output is also directly connected to output 0500 that causes the spray valve to open. Output 501 is issued to start operating the brush when the vehicle detector sends a signal to the C20 (input 0001) (unless Internal Auxiliary Relay 1001 is open).

Bottle Label Detection

This application features a system in which bottles being moved on a conveyor belt are checked by photoelectric switches for labels.





If a defective product (a bottle without a label) is detected, the C20 directs a robot arm to remove the bottle and place it on another conveyor line. The C20 also counts the number of defective products. If their number reaches a preset value, the C20 causes an alarm lamp to go on.

Input	Relay
Label missing detection	0000
Bottle detection	0001
Stop	0002
Robot arm's original position detection	0003
Output	
Robot arm	0500
Conveyor B motor	0501
Alarm lamp	0502

This application makes use of the shift register (SFT) instruction. This instruction must be programmed in the order of data input (0000), clock input (0001), and reset input (0002). Moreover, the instruction data must be specified in channel units.

Address	Instruction	Data
0200	LD-NOT	0000
0201	LD	0001
0202	LD	0002
0203	FUN10	10
		10
0204	LD	1001
0205	OR	0500
0206	AND-NOT	0003
0207	OUT	0500
0208	LD	1001
0209	OR	0501
0210	AND-NOT	TIM00
0211	OUT	0501
0212	TIM	00
		#0150
0213	LD	0000
0214	LD	0002
0215	CNT	47
		#0005
0216	LD	CNT47
0217	OUT	0502

In this example, channel 10 is specified as the data. When a defective product (a bottle bearing no label) is detected, input 0000 is turned on and the state is stored in point 1000 of channel 10. At the next input signal of 0001, the state of point 1000 of channel 10 is shifted to 1001, indicating detection of a defective product. In response, output 0500 is issued unless input 0003 is applied. When output 0500 is issued, the robot arm removes the defective product on conveyor A and places it on conveyor B.

Input 0003 is turned on when the arm of the robot, after removing the defective bottle, returns to its original position. When relay 1001 is turned on, output 0501 is also issued, starting conveyor B.

Inputs 0000 and 0002 also serve as the count input and reset input, respectively, of the counter. When the counter counts five count inputs (five defective bottles), the counter turns on output 0502, which in turn illuminates the alarm lamp.