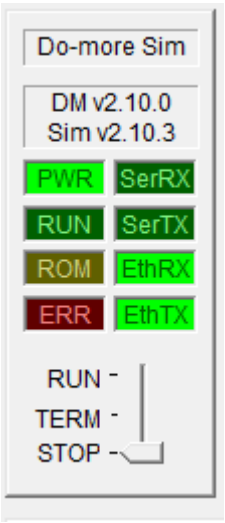
Garage Door Opener Simulation

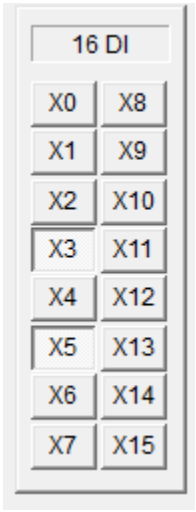
Simulate The Door Moving Down

(1)



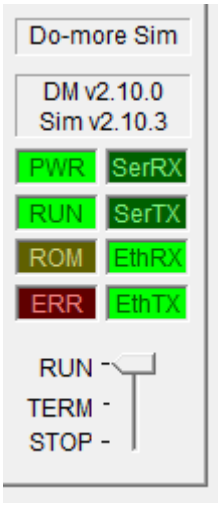
Put the PLC in STOP mode.

(2)



Energize X3(lower limit switch) and X5(safety photo eye). In this scenario, the door is fully open. This means that the upper limit switch(X4) is off.

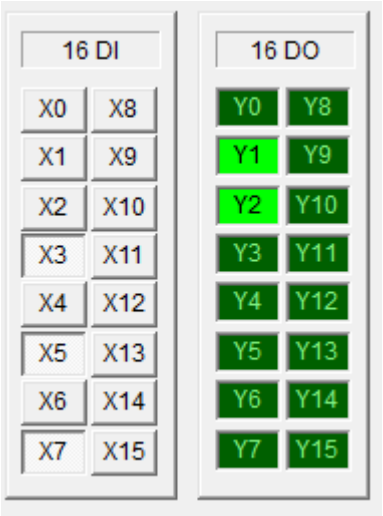
(3)



Put the PLC in RUN mode

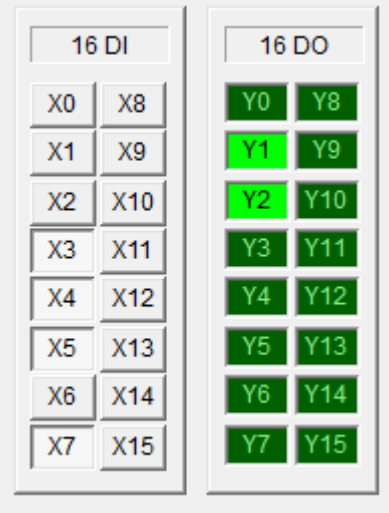
Garage Door Opener Simulation

(4)



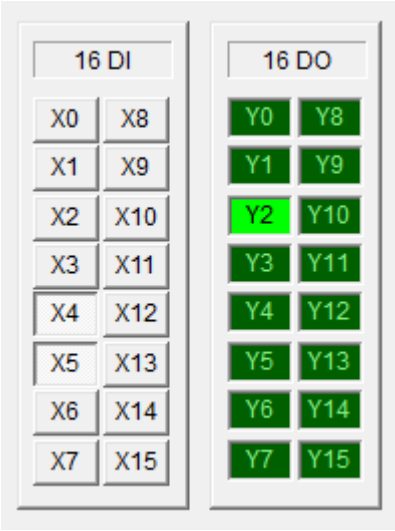
Toggle the wall push button(X0), and output Y2 will energize. This is the convenience light. It will stay lit for 5 minutes anytime a button is pushed. More importantly, outputY1 will energize. This powers the reverse starter, which allows the motor to begin closing the door. Here you have 15 seconds to energize the reverse auxiliary input(X7). This generous time is only for simulation purposes, ordinarily this time will be less than one second. Anyway, energize X7 to let the PLC know the reverse starter is engaged.

(5)



As the door moves down, the upper limit switch(X4) will disengage. Simulate this by energizing X4.

(6)



At a certain point, the door will engage the lower limit switch(X3). When you have decided that enough time has passed and that the door should be closed, de-energize X3. Output Y1 shuts off, the reverse starter drops out, and the the motor is stopped. The reverse auxiliary input(X7) also drops out. Simulate this by turning X7 off. The door is now closed.

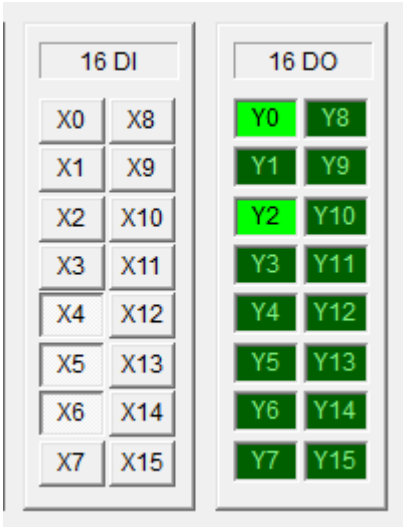
Garage Door Opener Simulation

Simulate The Door Moving Up

(1)

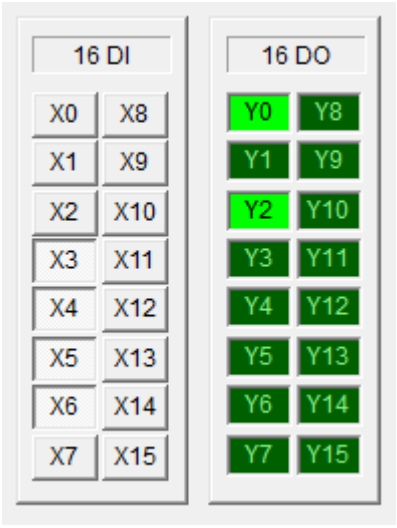
Make sure your inputs and outputs look like the above graphic. Y2 might not be energized if you have not pressed any buttons within five minutes. Shown above is the lower limit switch(X4) being engaged, the safety photo eye(X5) is not flagged, and the convenience light(Y2) is still on. With remote push button 1, toggle X1. The door will begin to move up.

(2)



Same as with the reverse auxiliary input, you have 15 seconds to engage the forward auxiliary input(X6). Turn X6 on.

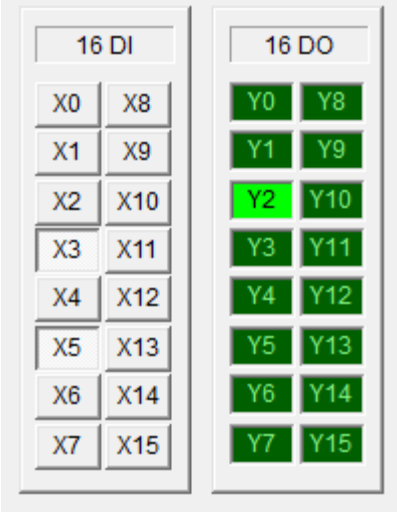
(3)



Since the door is moving up, the lower limit switch(X3) will disengage. Turn on X3. No limit switches are engaged at this point.

Garage Door Opener Simulation

(4)

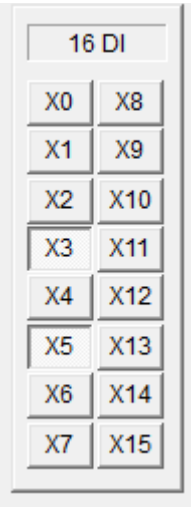


When you feel that enough time has passed that the door should be fully open, engage the upper limit switch(X4) by turning it off. The Y0 output de-energizes and the forward auxiliary input(X6) drops out. Simulate the forward auxiliary input(X6) dropping out by turning X6 off. The inputs and outputs should look the illustration here. The door is now fully up.

Testing The Safety Features

Kitty Cat Example 1

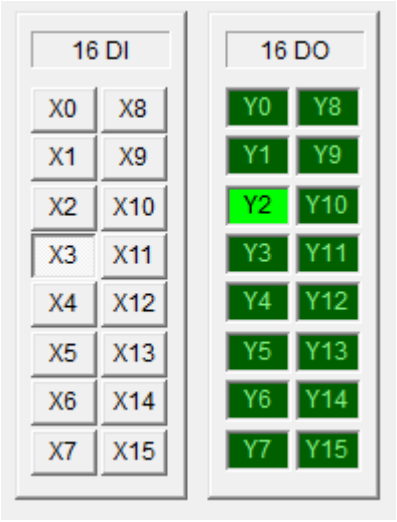
(1)



Fully open the door. Your inputs should look like this and the only energized output might be Y2.

Garage Door Opener Simulation

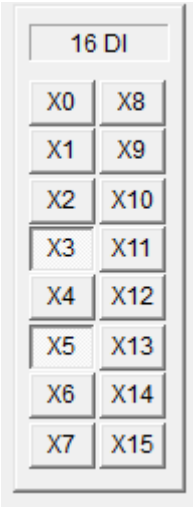
(2)



The pretend kitty cat has decided to lay down in the door's path. The safety photo eye(X5) turns off. At this point, the only input that should be on is the upper limit switch(X3). Try to close the door, toggle the remote push button (X2). The door will not move but the convenience light still comes on. Most importantly, the kitty cat is safe.

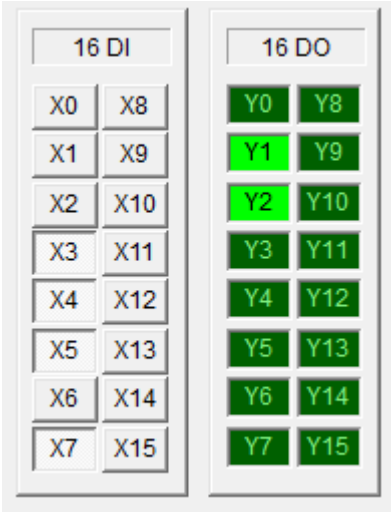
Kitty Cat Example 2

(1)



What if kitty cat goes under the door while it is already closing? Set the PLC inputs so that the door is open. Only the upper limit switch(X3) and the safety photo eye(X5) should be energized.

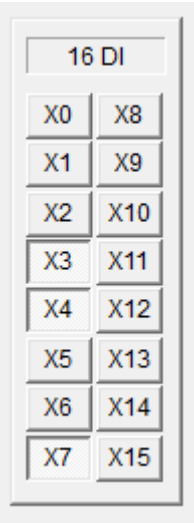
(2)



Toggle the wall push button(X0), the Y1 output sends current to the reverse contactor and the door begins to move down. You have 15 seconds to engage the reverse auxiliary input(X7). Likewise, since the door is now moving down, the upper limit switch(X4) will disengage. Simulate this by turning X4 on.

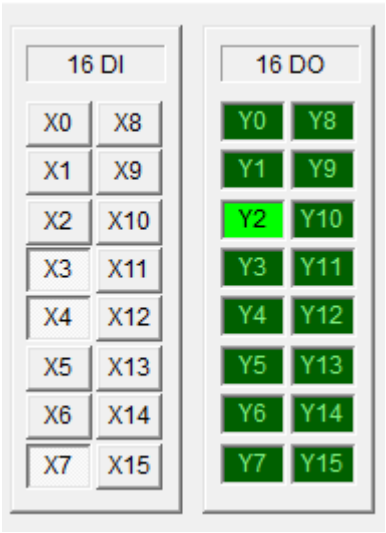
Garage Door Opener Simulation

(3)



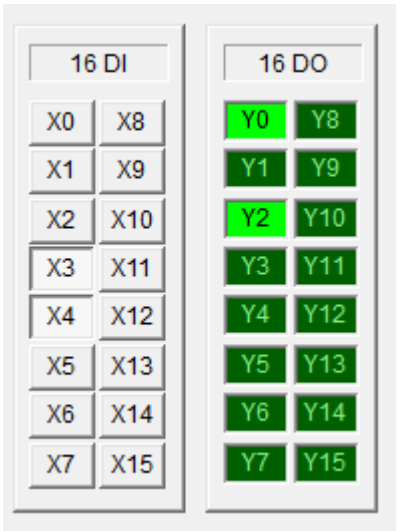
The pretend kitty cat walks directly underneath the door while closing and plops down for a nap. The safety photo eye's(X5) through beam is interrupted. Simulate this by turning X5 off. If the cat had ran full speed under the door, the door would not stop. The safety photo eye(X5) must be blocked for 1 second to interrupt normal operation.

(4)



After 1 second, the Y1 output de-energizes and the door stops closing.

(5)



Since the reverse contactor is now de-energized, the reverse auxiliary input(X7) will drop out. Simulate this and turn X7 off. As soon as the PLC sees that the motor is no longer moving down, it energizes Y0. This in turn energizes the forward contactor. The door begins to raise. As per usual, you have 15 seconds to energize the forward auxiliary input(X6). Turn X6 on.

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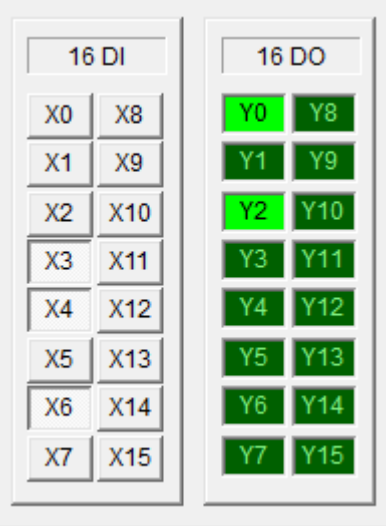
(6)

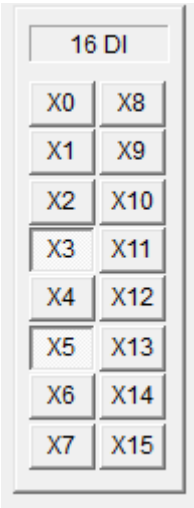


The door is moving up. The kitty cat is safe. Eventually the door will hit the upper limit switch(X4), Y0 will turn off, and the forward auxiliary input(X6) will drop out. Sooner or later the cat will move and the safety photo eye(X5) will input back to the PLC.

Other Features

Partially Opening or Closing the Door

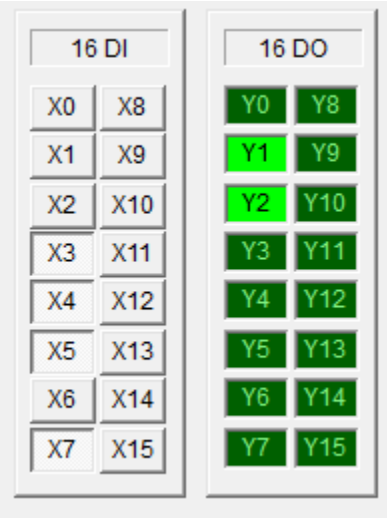
(1)



Set your PLC inputs so that the door is fully open.

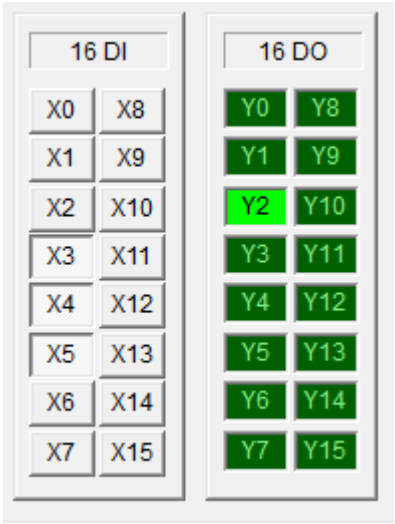
Garage Door Opener Simulation

(2)



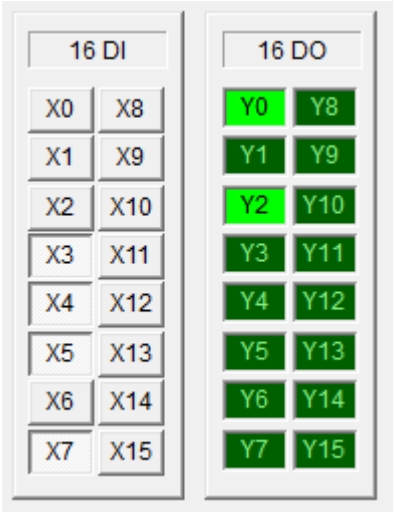
Toggle the wall push button(X0) to begin sending the door down. Don't forget to engage the reverse auxiliary input(X7) and disengage the upper limit switch(X4). Do this by turning X4 and X7 on.

(3)



When the door gets to the height you want it to stop, toggle the wall push button(X0). The Y1 output will shut off, killing power to the reverse contactor. Simulate this by turning the reverse auxiliary input(X7) off. Shown here there are no limit switches engaged, the door is halfway opened or halfway closed depending on your outlook

(4)



Toggle the wall push button(X0) again. This time the Y0 output will energize, and the door will begin to move back up. Don't forget to energize the forward auxiliary input(X7).

Garage Door Opener Simulation

(5)

The same principle works when the door starts down. Anytime you click either of the push buttons while the door is in motion, it will stop. When you click the push button again, the door will begin moving in the reverse direction.

Other Notes

In the event a power outage occurs while the door is moving, when power is resumed, no limit switches will be engaged. The PLC will automatically raise the door when it is back online. This is also a likely scenario when the garage door is first installed. The door will probably not be installed fully open or closed, but rather somewhere in the middle.