Electro Cam Corp.

PLμS Controls Div.

Using Electro Cam Corp. PLμS™ Controller in Conjunction with External Shift Register

Electro Cam Corp. PLμS™ Programmable Limit Switches (PLS) have the ability to turn on outputs based on a product present input signal, such as a photo eye or proximity switch. When the input is received, the corresponding output is enabled to turn ON within the same "revolution" or product cycle. If the output is not required until several cycles after the input, an external shift register can be used in conjunction with the Electro Cam Corp. PLS to accomplish the task.

The product present detect signal can often be too fast for a PLC input to register. The high speed scan time of the Electro Cam Corp. PLS gives you the capability to read the input and provide the PLC input with a longer duration pulse that it can read. This gives you the high-speed capabilities of the PLS controller along with the shift functions that a PLC can provide.

Shift Registers Defined
A shift register is a logic process that allows the controller to keep track of what happens at one point, and remember it until another specified point occurs. An example would be a machine that has several pockets or stations, and every one of the pockets or stations has its own product cycle. The shift register takes a data bit (ON or OFF condition) from one station to another. This information is used in the logic process at that predetermined station to decide if it does something based on what happened at the first station.

Most shift register logic is performed in a process that is commonly referred to as FIFO (First In, First Out). This means that the register has a specific number of positions. At the first position the data bit for that position is either turned ON, if the proper conditions are met, or is left OFF if the proper conditions are not met. The controller receives a signal that tells it to move the information (ON or OFF state) of the bit, one position down the register. When that particular data bit gets to the last position in the register, the controller looks to see if it is ON or OFF, then the controller knows whether to do something because of the condition of the bit. After the next shift of the register bits, the last bit is dropped and the bit before it now takes its place. This is a continual process in that as bit information is put into the first position, the bit information in the last position is removed.

Now let's use the example of a label application process for a bottle filler. At the first position there is no bottle, so the shift register has an OFF data bit for that nest. As that nest moves through the filling process, the data bit (OFF switch) moves as each new bottle enters the filler. When the nest that doesn't have a bottle gets to certain stations, the controller looks at the data bit to determine whether it should do something (if the bottle is there, it does something, if there is no bottle, it does nothing). When the nest gets to the label applicator the data bit is OFF, so the label applicator doesn't try to apply a label to a bottle that is not present!

Setting Up Electro Cam Corp. PLS with an External Shift Register
The diagrams below all refer to the Electro Cam Corp. controller's inputs and outputs, and how they interface with the external shift register. The PLS will need to be set up into 3 groups as follows:

Group 1: The first group is set to mode 4 and receives the product present input. (Note: Modes are explained in detail in the controller Programming & Installation manual.) If the input falls within the product present window, the groups output is enabled to turn ON at its programmed ON/OFF setpoints. The resulting PLS output is fed into the shift register, and sets the shift register bit.
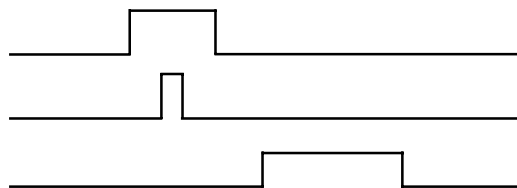
Mode 4
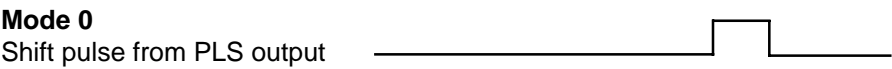Product window
(PLS group channel window)

Product present eye to PLS input
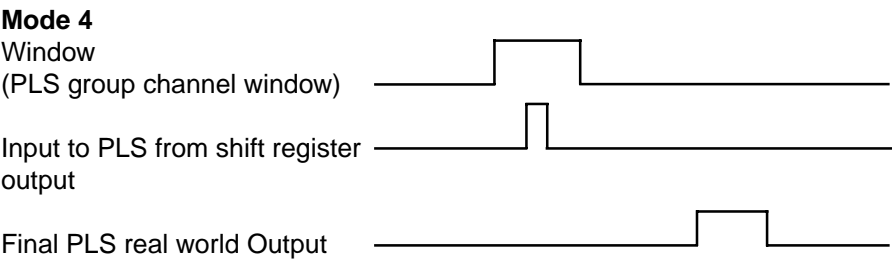
PLS output to shift register

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Group 2: This group is set to mode 0.
The output will turn ON every cycle, and will serve as the shift pulse input for the shift register.

Mode 0
Shift pulse from PLS output

Group 3: This group is set to mode 4 and receives its input from the shift register output. When the shift register gives an output within the PLS group window, the controller's real world output is enabled to turn ON and perform the desired operation on the product. A typical example would be a reject operation on a defective product that was detected in an earlier cycle.

Mode 4
Window
(PLS group channel window)

Input to PLS from shift register
output

Final PLS real world Output