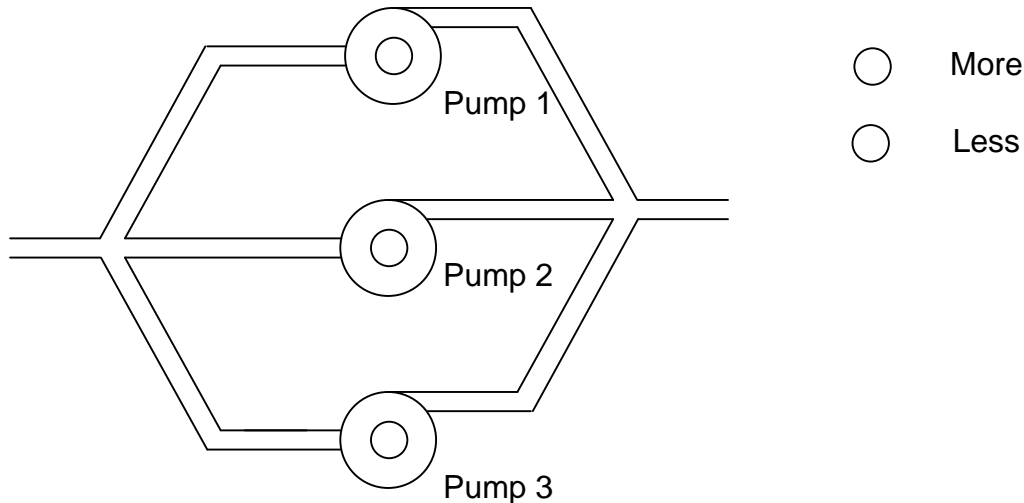


Chapter 11 Pumps with Floating Master

Three Pumps/Four Fans

Three pumps are arranged as follows to provide cooling water for a manufacturing plant. For cooling to occur, at least one of the pumps must be on at all times but if no cooling is required, all pumps are to be turned off. For more cooling, a second pump is requested to turn on, followed by a third pump if sufficient cooling is still not received. To protect each from wearing out prematurely, a plan has been devised to allow each pump to turn on and off by using logic to turn on the next pump in sequence and turn off the pump that has been on the longest. Timers should not be used to determine the pump on longest but rather logic should be used to determine which pump should have been on the longest. For example, if pump 2 and 3 are on but 1 is off, pump 2 is the one that should be turned off since it probably came on before 3 did. If a call for less cooling is received and all three pumps are on, the pump that was logically on for the longest time should be turned off. The system starts out with no pumps on and when a call for more occurs, pump 1 will turn on. Then the system is cyclical rotating through pumps 2, 3, 1, 2, etc.



Options:

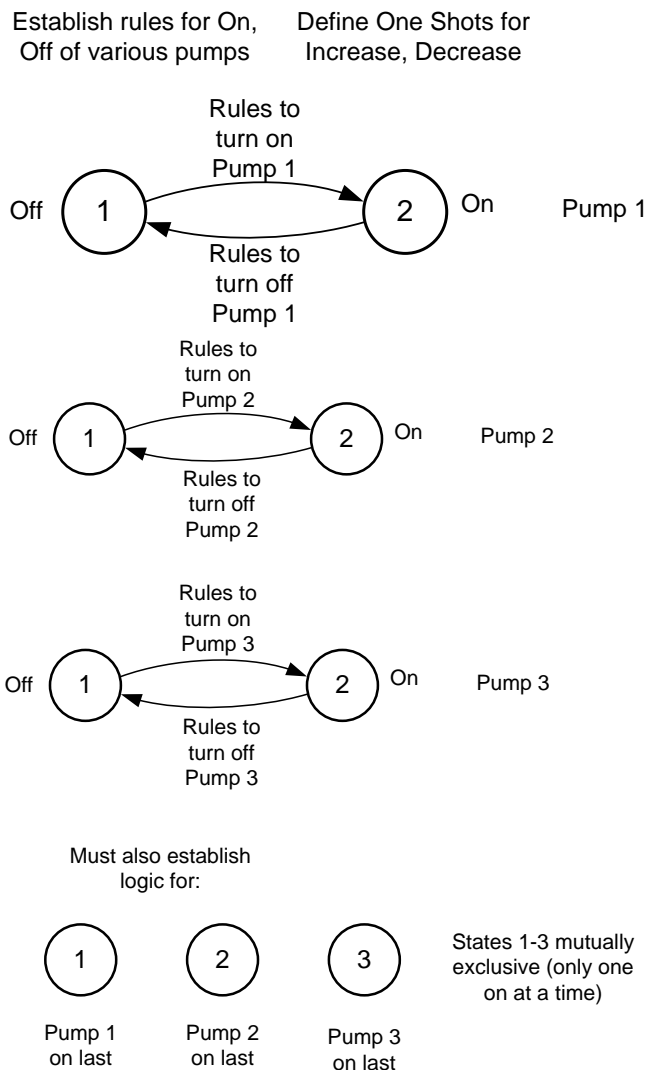
Base Add auto/manual switches for 1, 2, or 3 pumps. Auto will allow cycling of a pump normally while manual will allow a pump to be started and stopped with a push-button.

- Options**
- .1- P1(A/M), P2(A/M), P3(A/M)
 - .2- P1(A/M), P2(A/M), P3(A)
 - .3- P1(A/M), P2(A), P3(A/M)
 - .4- P1(A), P2(A/M), P3(A/M)
 - .5- P1(A/M), P2(A), P3(A)
 - .6- P1(A), P2(A/M), P3(A)
 - .7- P1(A), P2(A), P3(A/M)
 - .8 - add a fourth pump and have all P1-P4 either (A/M)

Note: The base program of this lab is called a floating master. The master is initialized as pump 1 until pump 2 turns on at which time it becomes the master. Pumps turn off based on the principle of leaving the master pump on until a signal for less initiated. Therefore, pump 1 would turn off before pump 2 if both pump 1 and pump 2 are on.

The Pump Demand Program Hints

Notice the position of the logic is extremely important in that the scan is used to do operations in a sequential order within the scan. This programming technique can aid in solving very difficult sequential logic such as this one with minimal difficulty. Use of the scan is a great aid in programming and sequential programming.



Four Fans – Repeat the pump problem except for four fans instead of three pumps



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