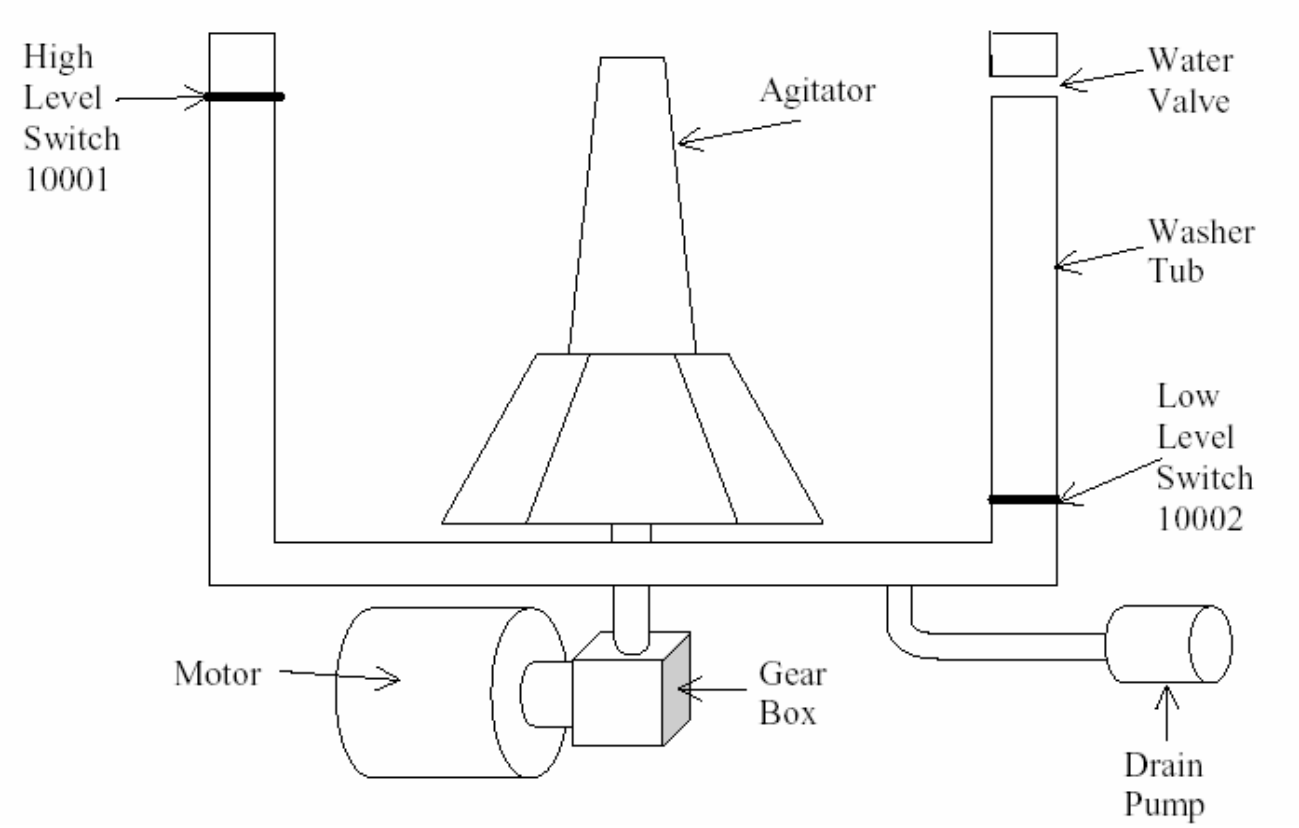
Project: # 7 SIMULATING A WASHER CYCLE



PROBLEM STATEMENT:

The washing time of the washer comprises three cycles: wash, rinse, and spin cycles. During the wash cycle, water is added until a high level switch is triggered on. Then, the water valve is shut off and the agitator is activated for 12 minutes. After the 12 minutes timer has expired, the dirty water is drained out through a pump that is activated as soon as the agitator stops. The drain pump is stopped when the low-level switch is triggered low. Then, the rinse cycle starts.

The rinse cycle starts when the low-level switch is triggered low (end of wash cycle). The cycle starts by adding water into the tub until the high level switch is triggered. As soon as the high level switch is triggered, the water valve is shut off and the agitator is activated for 6 minutes. When the 6-minute clock has expired, the agitator is stopped and the water is drained out. The pump continues to drain the water until the low-level switch is triggered low, then the spin cycle starts.

During the spin cycle, the motor connected to the agitator disengages from the gearbox permitting the agitator to spin freely for 4 minutes. To simplify the problem use two separate motors **to simulate** the spin and agitate cycles as indicated below.

SIMPLIFIED PROGRAM – (use seconds instead of minutes to speed up simulation).

Step 1: Press the start button
Step 2: Add water until the high level switch is triggered.
Step 3: Shut off the water valve.
Step 4: Turn the agitator on for 12 seconds.
Step 5: Stop the agitator and start the pump until the low level switch is triggered off.

RINSE CYCLE
Step 6: Repeat steps 2 through 5 (the rinse time for step 4 is 6 seconds).

SPIN CYCLE
Step 7: Turn the spin motor on for 4 seconds.

Create a ladder logic diagram for the washer described above using the following pointers.

Note: Use seconds instead of minutes for cycle times to speed up the process simulation.

INPUTS	DESCRIPTION	TYPE OF CONTACT	STATUS
X1	High level switch	Normally open	Closed when water is present
X2	Low level switch	Normally open	Closed when water is present
X3	Start/Stop switch	Normally open	Closed when toggled high

OUTPUTS	DESCRIPTION
Y1	Agitator motor
Y2	Spin motor
Y3	Drain pump
Y4	Add water valve

HINTS :

The start/stop switch is used to simulate power on/off in some sense. When power is turned on, all timers should be enabled, and the wash cycle started. When power is turned off, all timers should be reset, and **all outputs** shut off. When power is turned back on, the process should start over beginning, optionally, with the wash cycle, or at later stage.