

SI100EEE – Introduction to Information Science and Technology

Homework #3 (Due: March 8th)

Design Problem 1:

The adder block in the tablet-bottling system in Figure 1-1 performs the addition of the 8-bit binary number from the counter and the 16-bit binary number from Register B. The result from the adder goes back into Register B. Please use 74HC283 ICs to implement this function and draw a complete logic diagram including pin numbers. The detailed information of 74HC283 is shown in Figure 1-2.

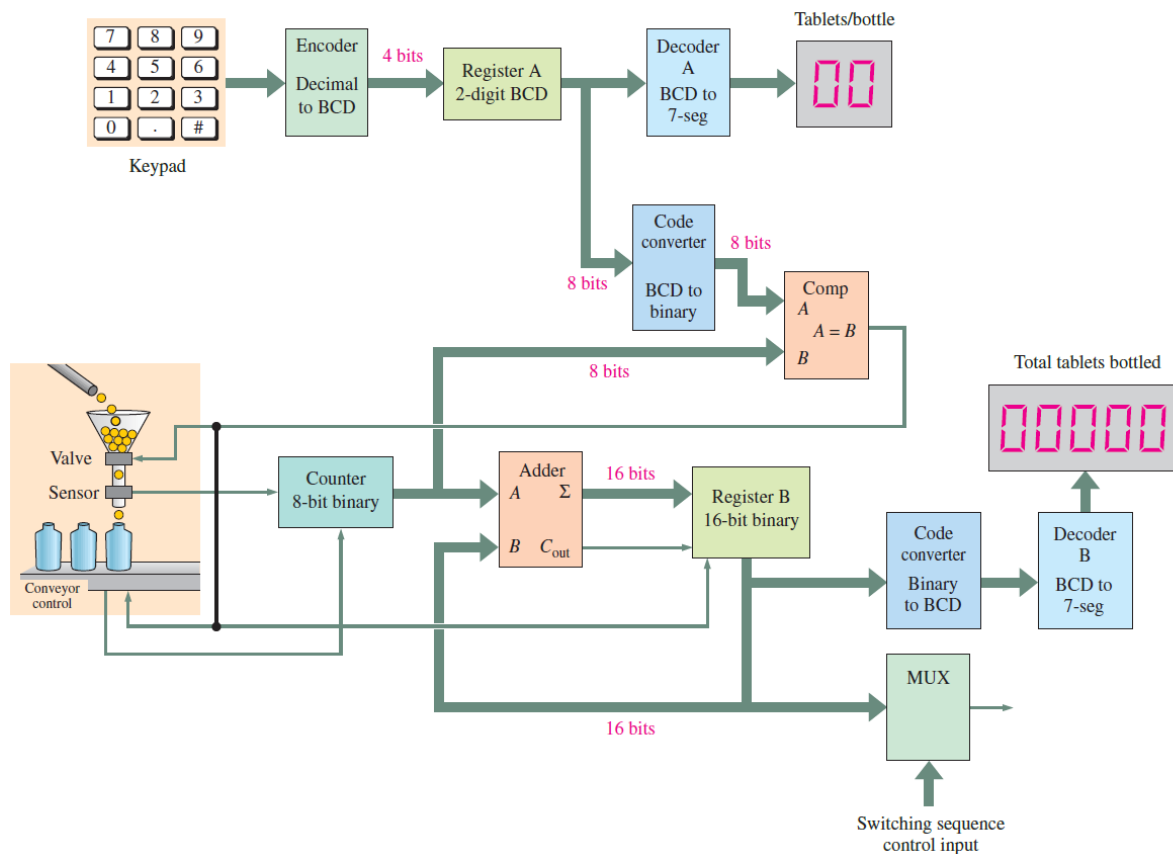


Figure 1-1 Tablet-bottling system

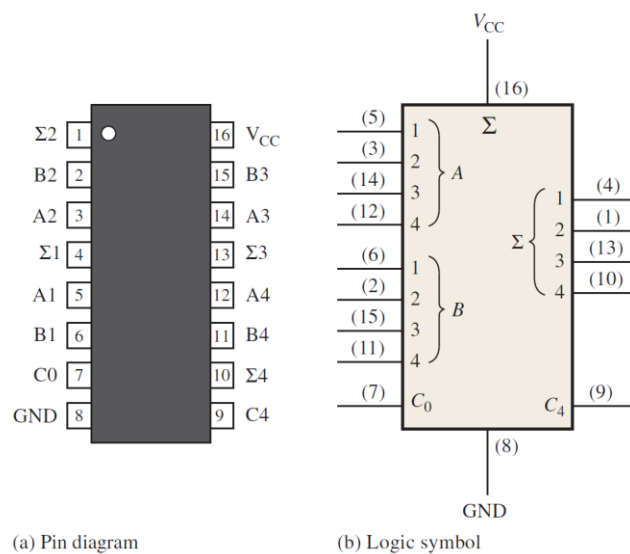


Figure 1-2 74HC283 – 4-Bit parallel adder

Design Problem 2:

In the shipping department of a softball factory, the balls roll down a conveyor and through a chute single file into boxes for shipment. Each ball passing through the chute activates a switch circuit that produces an electrical pulse. The capacity of each box is 32 balls. Design a logic circuit to indicate when a box is full so that an empty box can be moved into position.

Design Problem 3 (Bonus):

Based on the traffic light control FSM system described in the class, list the design changes that would be necessary in this system so that we can add a 15s left turn arrow for the main street. The turn arrow will occur after the red light and prior to the green light. Draw the logic circuit for this new system.