

Design and Implementation of an Elevator Floor Indication System Using 7-Segment Display

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This study was conducted with the educational aim of understanding elevator control circuit design and enhancing implementation skills. Based on related IEEE papers [1]–[3], a simplified system was implemented that takes switch inputs and displays floor numbers using a digital counter and a 7-segment display.

The system converts the switch input into a 4-bit code through an encoder, outputs the selected layer number as a digital value, and stores this digital value in a latch to provide it to the comparator. The comparator compares the target value with the current value of the counter and outputs the $A=B$ signal when it matches. Meanwhile, the 200Hz clock generated by the multivibrator is divided down to 2Hz by the 1/100 divider and supplied to the BCD Up/Down Counter, which sequentially increases or decreases the number according to the divided signal. If the counter output matches the target value, the counter operation is stopped by the $A=B$ signal from the comparator, and the final output is displayed on the display through the 7-segment decoder.

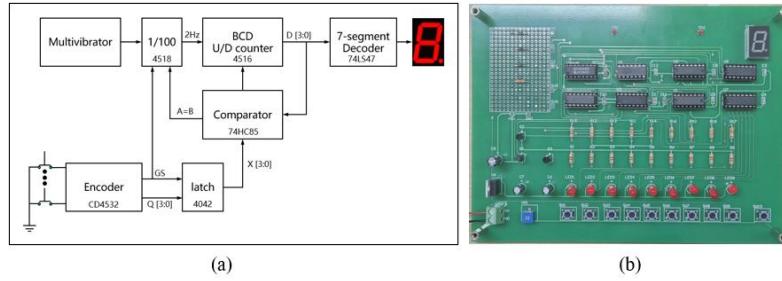


Fig. 1. (a) System block diagram and (b) fabricated board of the proposed system.

The following main parts were used in the implementation of this circuit. The encoder used CD4532, the latch used CD4042, and the comparator used 74HC85. The BCD Up/Down Counter implemented the layer increase and decrease operation using CD4516, and the 1/100 divider divided the 200Hz input clock into 2Hz using CD4518. The counter output was displayed on the 7-Segment Display (FND507) through the 7-Segment Decoder (74LS47). In addition, Tact Switch (SW1–SW9) for layer selection input, Red LEDs (LED1–LED9) for current layer display, and LM7805 regulator of the power supply unit were used.

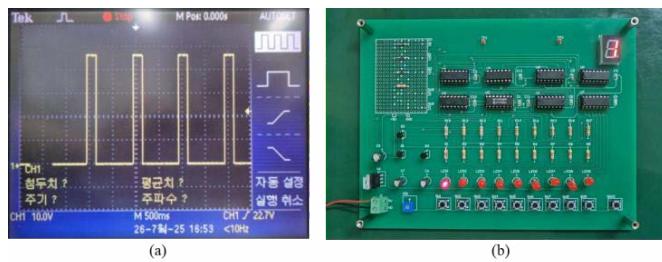


Fig. 2. Experimental results. (a) Elevator operation signal divided at 1/100: 2 Hz (b) photo of the system operation produced

The proposed system was experimentally verified through two tests. First, a 200 Hz clock generated by the multivibrator was divided by 1/100 using the 4518 dividers, producing a 2 Hz signal confirmed with an oscilloscope. Second, when a target floor between the 1st and 9th was selected on the completed board, the elevator simulation moved from the current floor to the target floor at 0.5-second intervals, with the process displayed on a 7-segment display.

REFERENCES

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