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Four Digital Electronic Combination Key Using A 74HCT688 Comparator IC Accompanied with An Alarm as A Security

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Abstract- The development of science and technology is increasingly useful and has a positive impact on providing convenience in all areas of human life, so that various tools, books, information, facilities and others are increasingly new and developing more rapidly. In addition, the development of science and technology also has a negative or detrimental effect on human life, namely the occurrence of various rampant crimes, acts of theft, robbery, bank break-ins that often occur everywhere, for this the key role as a security device becomes very important. Various forms of locks are widely used, both mechanical and electronic, compared to electronic locks, mechanical locks are felt to be less secure for use as door security, a four-digit digital electronic combination lock is designed using a comparator IC 74HCT688 accompanied by an alarm as a door guard..

Keywords: IC 74HCT688, keypad, safety device, electronic combination lock, buzzer.

I. INTRODUCTION (*HEADING 1*)

Along with the development of science and technology that is increasingly advanced, the degree of human life is also getting higher, this is because all kinds of needs for human life are increasing in number so that from time to time there are more and more. Along with the development of technology, safety devices are also growing according to needs. Security devices in the form of locks can be divided into two types, namely mechanical locks and electronic locks.

In subsequent developments, mechanical keys began to be abandoned by their users. This is because in terms of its shape which is less attractive besides that in terms of security it is less reliable. Because mechanical keys have various weaknesses, including, namely, mechanical keys are easy to duplicate or duplicate, besides that mechanical keys are easily damaged due to the large frequency of use to open and close doors. Moreover, the number of people who use a lot of the key will be damaged or worn out quickly. An alternative to a series of electronic locks is one that is very suitable for use in the conditions described above, making this electronic lock does not require high costs because the author only made it with four combination numbers. The principle of use or how this electronic key circuit works is as follows; every person who has the right to enter the laboratory room can only press the electronic key number that is owned on the keypad button. If the lock code number is pressed on the wrong keypad, the door will not open and the alarm will sound as a sign that the door is being attempted to be forced open, conversely if the number pressed is correct, the door will be opened accompanied by the display (green LED).

II. METHODS

The method used in this study is the development research method (engineering), which is research consisting of three stages, namely planning, implementation or assembly and testing.

Planning and Manufacturing of a Combination Lock Circuit that has a Block diagram and circuit parts, a block diagram for a Four-Digit Digital Electronic Combination Lock Circuit Utilizing the 74HCT688 Comparator IC Accompanied by an Alarm as a Door Security is shown in Figure 1

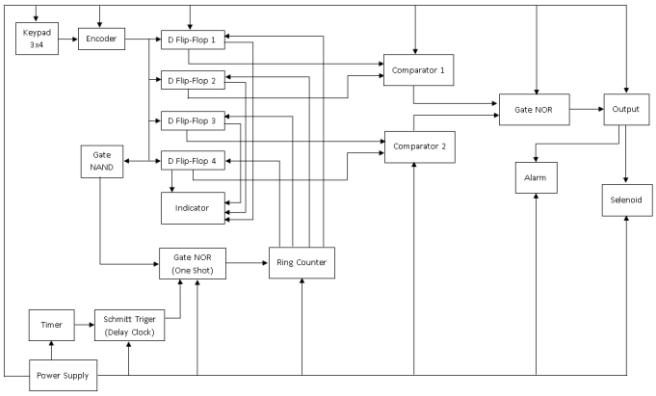

Fig.1 System Block

The explanation of each system diagram is as follows:

a. The 3x4 keypad is used as a button or switch to enter a Four Digit Digital Electronic Combination Lock Code number.
b. The encoder used in this four-digit digital electronic combination lock circuit is the TTL 74HCT147 IC, which is an encoder with nine data channels to the BCD code.
c. The comparator used in this circuit is IC TTL 74HCT688, which is an 8-bit data comparator.
d. Ring counter is a special type of register designed to count or count the number of clock pulses arriving at its inputs.
e. A register is a collection of memory elements that work together as a unit.
f. F. The power supply uses two power supplies, namely +5V and +12V power supplies

In figure 2. A simple miniature door design that can be controlled by a four-digit digital electronic combination lock device

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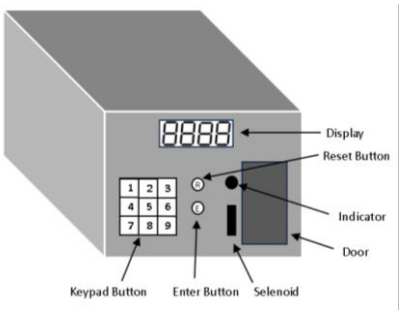

Fig.2 Miniature Door

This miniature door meets the requirements when used in real applications, namely:

- This miniature door can be opened from the outside if the keypad button is pressed according to the set-up code.

- Miniature doors can be opened from the inside without pressing the keypad button again like when entering.

- An alarm will sound if the keypad button pressed is not the same as the set-up code.

The placement of indicators, switches and keypads is adjusted to the miniature door image as shown in Figure 2 above..

III. Results and Discussion

The design of a four-digit digital electronic combination lock utilizing the 74HCT688 comparator IC accompanied by an alarm as a door security starts with entering the code in the Set-up/fix as a guideline for the number combination used as an electronic door opener. The following is the Set-up/fix table in this study.

Table 7. Research data

No.	Code Set-up/Fix	Pressed Button On Keypad				State After Enter Key Pressed			
		I	II	III	IV	Alarm	LED Display	Closedx	Open
1.	9644	**9**	**6**	**4**	**4**	-	**Green**	-	**#**
		9	4	4	6	#	Red	#	-
		4	6	9	4	#	Red	#	-
		1	5	8	9	#	Red	#	-
		3	8	7	9	#	Red	#	-
		1	8	9	5	#	Red	#	-
2.	2782	**2**	**7**	**8**	**2**	-	Green	-	**#**
		1	4	3	4	#	Red	#	-
		7	8	2	4	#	Red	#	-
		2	5	7	8	#	Red	#	-
		7	6	3	2	#	Red	#	-
		5	2	2	1	#	Red	#	-
3.	5214	**5**	**2**	**1**	**4**	-	Green	-	#
		1	5	2	4	#	Red	#	-
		1	4	5	2	#	Red	#	-
		1	4	2	5	#	Red	#	-
		2	4	5	1	#	Red	#	-
		5	4	2	1	#	Red	#	-
4.	4638	**4**	**6**	**3**	**8**	-	Green	-	#
		4	3	8	6	#	Red	#	-
		6	8	3	4	#	Red	#	-
		2	4	3	8	#	Red	#	-
		4	3	8	6	#	Red	#	-
		3	8	4	6	#	Red	#	-

Table 7 shows that the Four-Digit Digital Combination Lock series Utilizing the 74HC688 Comparator IC Accompanied by an Alarm as a Door Security has worked properly, that is, the door can be opened if the combination number button pressed matches the set-up / fix code, while if it does not match then the alarm will work.

In the first attempt according to the set-up code, namely: 9644, to open the door can be done by pressing the keypad button according to the set-up code, the buttons are pressed sequentially: the first button to be pressed is the number 9 button, the second button to be pressed is the number 6, the third button is is number 4 and the button that needs to be pressed next or fourth is number 4 after that pressing the enter key.

After pressing the sequence of buttons, the LED display turns green and the door can be opened. If the button presses are not sequential, for example the 1st button = number 9, the 2nd = number 4, the 3rd = number 4 and the 4th = number 6 after that enter, then the door will close or won't open but the alarm will go on.

When you press the button with the number 9446, this number does not match the set-up code, so the door will not open and the alarm will turn ON. The new door opens after pressing the button according to the set-up or fix code, namely the number 9644. So that the door opens, the code number 9-6-4-4 is a data set-up. If this set-up code is changed, then the keypad button press must according to the set-up code, what needs to be considered is that when pressing the keypad buttons, the buttons or numbers that are pressed must be in the order according to the set-up code. If the button presses are not in sequence, an error detection code will occur which causes the door to not open but the alarm to go off.

IV. Conclusion

After carrying out all research activities on a four-digit digital electronic combination lock that utilizes the 74HCT688 comparator IC through planning, assembly, testing and data analysis, the conclusions can be drawn:

a. 74HCT688 comparator IC is proven to be used as a controller for opening and closing doors.

b. It is proven that the 74HCT688 comparator IC is able to work together with other components so that it can be used as a reliable door guard.

c. This four-digit digital electronic combination lock circuit utilizing the 74HCT 688 comparator IC can be constructed from telephone keypads, TTL ICs, and CMOS ICs.

d. This four-digit digital electronic combination lock can only be opened by pressing the keypad button according to the number or set-up code.

e. If pressing the keypad button does not match the set-up code or presses the wrong button, the door will not open.

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The test results on the four-digit digital electronic combination lock show that the comparator IC 74HCT688 is as expected, that is, if the code input matches the set-up/fix then the door will open.

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