

# Microcontroller Based Programmable Sensitive Circuit Breaker

Sairatun Nesa Soheli

Lecturer of Electrical and Electronics Eng  
IUBAT–International University of Business Agriculture and  
Technology, Uttara, Dhaka, Bangladesh.

Md. Junaedul Haque

Asst. Manager of Transformer & Electric Manufacturing  
Co. (TEMCO)  
Sector – 11, Uttara, Dhaka, Bangladesh

**Abstract - This paper presents about the microcontroller based programmable sensitive circuit breaker using microcontroller chip PIC16F887 based on Micro C which logically compare to EPROM (Erasable Programmable Read Only Memory) with the help of ADC (Analog to Digital Converter). Basically this circuit breaker is used for the various amperes. This programmable sensitive circuit breaker is so fast more than an ordinary circuit breaker. So, this is safer than others.**

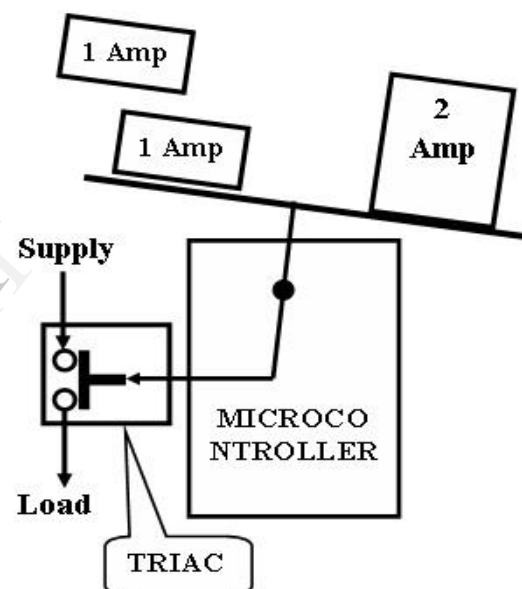
*Index Item Introduction, Block Diagram, Circuit Diagram, Circuit Description*

## 1. INTRODUCTION

Normally a circuit breaker is generally used in a factory or house, such as MCB (Miniature Circuit Breaker), MCCB (Moulded Case Circuit Breaker), VCB (Vacuum Circuit Breaker), ACB (Air Circuit Breaker) etc. In case of more protection we can use fuse, because fuse is more fast and safe than a normal circuit breaker. That means the working time of circuit breaker is more than a fuse. Nowadays microcontroller is used most of appliance all over the world. For using microcontroller, it is possible that our programmable sensitive circuit breaker to reduce its working time. In the other hand it is also possible to use this programmable sensitive circuit breaker for the various amperes, but it is quite impossible for an ordinary circuit breaker. It has five characteristics which can make different this programmable sensitive circuit breaker from others. Such as, its working time is very short, like a fuse or less than a fuse. It is possible to use various amperes. It is very sensitive. Basically it is based on microcontroller. Here we don't use any mechanical switch.

## 2. METHODOLOGY

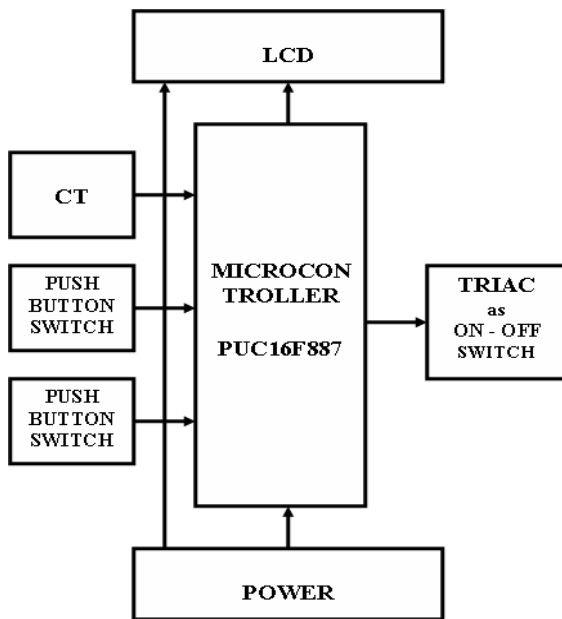
For making programmable sensitive circuit breaker more sensitive, we use current transformer, which measures current and help to run circuit breaker.



- It takes desire ampere from user with the help of push button switch.
- It saves the taken data.
- It measures the ampere of circuit.
- It compares circuit ampere and desire ampere which is given from user.
- If the circuit ampere is less than the desire ampere, then it keeps on the circuit breaker.
- If the circuit ampere is equal to the desire ampere, then the circuit breaker is turn off. So that the ampere will never rise.
- Unfortunately if the circuit ampere is higher or more than the desire ampere then the circuit will trip down.
- If the circuit breaker will trip, it keeps off until reset.

### 3. BLOCK DIAGRAM

The block diagram of Microcontroller Based Programmable Sensitive Circuit Breaker shown in below:

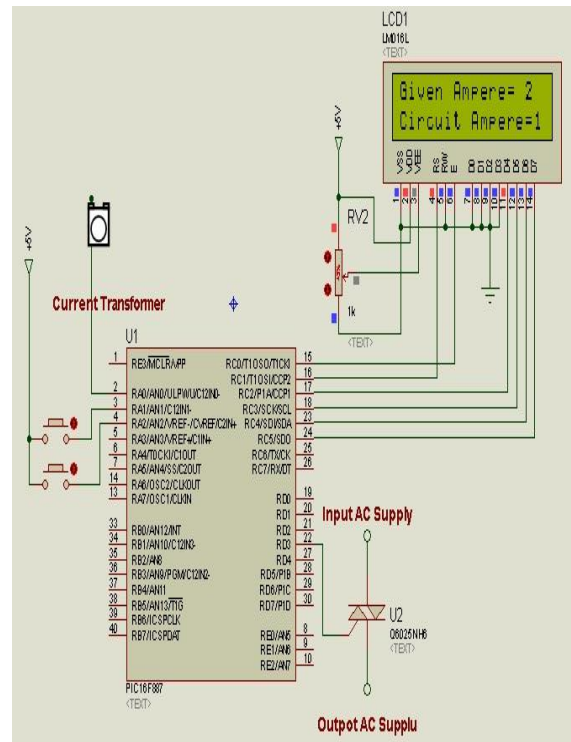


### 4. WORKING PRINCIPLE

The programmable sensitive circuit breaker collects the primary data from switch by user. From current transformer, microcontroller measures ampere from current transformer for ADC (Analog to Digital Converter) as a secondary data. After comparing primary and secondary data, the circuit is opened or shut down. For reducing the switching time of circuit breaker, we use TRIAC to on-off the circuit. When the current had gone, for keeping constant the setting of circuit breaker we use RTC (Real Time Clock).

### 5. COMPONENT USED

- Microcontroller PIC16F887, for controlling the whole system of programmable sensitive circuit breaker.
- Current Transformer, for calculating load.
- Switch, for inputting the data of ampere to microcontroller.
- LCD, for knowing the position of load.
- Variable Resistor, for measuring the load of ampere.
- IC7805, for supplying +5V as a power supply to microcontroller and other devices.
- IC1307, for working as a RTC (Real Time Clock).
- Crystal Oscillator 8MHz, for giving pulse to the microcontroller.
- TRIAC BT139, for using as a switch.
- Other accessories, for helping.



### 6. CIRCUIT OPERATION

Power supply provides +5V supply by using regulator IC7805. Then the system is on.

Current transformer sends a signal to the microcontroller through the variable resistance.

Microcontroller takes signal through a variable resistor. So, we can adjust the signal of current transformer and also it takes signal from push button switch.

LCD shows our given desire ampere and also shows the amperes of the circuit.

Due to the problem of electricity the microcontroller may go to the default mode. To solve this problem RTC (Real Time Clock) IC1307 keep the all data from microcontroller.

An ordinary circuit breaker takes 8ms time to open. To reduce this operating time we used TRIAC as a switch. TRIAC can operate 25mA and 1.3V at direct current or alternative current.

In a microcontroller, if we use 4MHz crystal oscillator to make very precise and sensitive to our programmable sensitive circuit breaker.

## 7. ALGORITHM

- Step-1 Initialize the controller.
- Step-2 Initialize the LCD.
- Step-3 Port 2 as Input port of current transformer.
- Step-4 Port 3 & 4 as input port of push button switch.
- Step-5 Conform port 19, 20, 21, 22 & 23 as output port.
- Step-6 Take the input from current transformer.
- Step-7 Take the input from push button switch.
- Step-8 Compare current transformer & push button switch data.
- Step-9 Disconnect the trigger voltage from TRIAC, if necessary.
- Step-10 Repeat from step.

## 8. CONCLUSION

This programmable sensitive circuit breaker is operated by microcontroller, that's why it is so fast. Here, we don't use any mechanical switch for on-off the circuit, in other hand for more sensitivity, we use TRIAC to on-off this system. So, now this programmable sensitive circuit breaker is faster than others. After making this circuit breaker properly, we can use this circuit breaker as a replace of fuse and to protect more expensive and sensitive machinery.

## 9. FUTURE SCOPE

- It is possible to more faster this programmable sensitive circuit breaker to use high oscillating pulse.
- In case of using high ampere through this circuit breaker can be used a lot of TRIAC in parallel.
- To make this programmable sensitive circuit breaker more workable, it is possible to use various types of sensor. Such as, Temperature sensor.
- It is also possible to add Earth Fault Relay with this programmable sensitive circuit breaker.
- Here also we can use auto-recloser.

## 10. REFERENCES

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