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"Ultra Fast Acting Electronic Circuit Breaker"

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Abstract: This paper is intended to gormandize protection of electric circuit from over cargo and a short circuit fault which is happens into the power system. So then for protection electric circuit from short circuit or over cargo current we introduce the ECB (Electronic Circuit Breaker) which has lower trip time of circuit whenever abnormal condition do as compared to mechanical or convectional circuit swell similar as MCB(Miniature Circuit Breaker) which takes longer time to trip the circuit because of veritably slow action thermal bimetal switch medium that used in MCB(Miniature Circuit swell). For protection of sensitive cargo from short circuit or over cargo current trip time of circuit should be veritably low and this can be achieved by ECB (Electronic Circuit Breaker). At the time of short circuit, current inflow through the series element which has a low resistance that's tasted by ECB(Electronic Circuit Breaker). also voltage drop across series element and preset voltage are compared in position comparator, attendant signal of comparator is given to microcontroller, MOSFET is operated through microcontroller and also operation of relay is decided by MOSFET and circuit is trip presently.

Keywords: Super-Fast,Circuit Breaker,.

I.INTRODUCTION

This paper is demonstrated to protection of electrical system from load condition. Home appliances and artificial instruments are substantially failure because of load current. Any type of motor is designed to operate at particular value of current, if load occurs due to which current flowing to home appliances or artificial instrument is further than the rated current and this leads to failure of instrument because of over cargo. So for protection of electric circuit from over cargo and short circuit condition circuit swell(CB) is used. A circuit swell is automatic switching device which cover the electrical system automatically. During normal condition it acts as typically Close(NC) switch when load condition do also it becomes typically Open(NO) Switch and cover the electric circuit by segregating the healthy and unhealthy part of circuit. Atomic Circuit Breaker(MCB), Air Circuit Breaker(ACB), oil painting Circuit Breaker(OCB), etc are some main types of circuit swell(1). Miniature Circuit Breaker(MCB) descry the fault current and after discovery of fault current it operate and trip the electric circuit and cover the electric circuit form load condition. It contain bimetallic strip due to which wearing of this strip is to be and this leads to slow response when electric circuit is overfilled. That mean it takes further time to trip the circuit when over cargo condition do. This Model Circuit Swell(MCB) is able of handling 10000 amps current but when current standing is exceeded by 1000 amps also MCB isn't provident to use. MCB operate on temperature when load occurs current Flowing through bimetallic strip increases also toast is also increases which beget the distortion of bimetallic strip and open circuit is to be be in this way it cover the circuit but change in temperature reduces current capacity of circuit swell(2). These disadvantages of Miniature Circuit Breaker(MCB) can be excluded by Ultrafast responding Electronic Circuit Breaker(ECB). The trip medium of ultra presto acting electronic circuit swell is veritably presto as compared to mechanical circuit swell i.e. Miniature Circuit Breaker MCB). Electronic Circuit Breaker(ECB) contain position comparator that smell the current flowing through series element and attendant voltage value is compared with preset voltage value. This attendant voltage or drop in voltage is commensurable to over cargo current. tasted voltage is converted to DC voltage and affair of position comparator is given to microcontroller, MOSFET is operated through microcontroller and operation of relay is done through MOSFET. This Electronic Circuit swell (ECB) is veritably useful for protection of sensitive cargo (3).

II.RESEARCH METHODOLOGY

Researching the methodology for an ultrafast acting electronic circuit breaker (UFA ECB) involves understanding the key concepts in circuit protection, semiconductor technologies, and high-speed control systems. Below is an outline of the methodology typically followed:

1. Literature Review
   - Identify Existing Technologies: Review existing solutions for circuit breakers such as mechanical, solid-state, and hybrid designs. Focus on ultrafast switching technologies, including semiconductor-based solutions like MOSFETs, IGBTs, and SiC or GaN transistors.
   - Performance Benchmarks: Investigate the response times, current and voltage ratings, and protection levels of existing circuit breakers.
   - Emerging Technologies: Explore advancements in ultrafast circuit breakers, such as those that use power electronics, superconducting materials, or novel semiconductor materials.
2. Design Requirements Specification
   - Operational Parameters: Define the target voltage and current range, switching speed (typically in microseconds or nanoseconds), breaking capacity, and energy dissipation.
   - Safety and Protection: Specify the protection features such as overcurrent, short-circuit, thermal, and electromagnetic interference (EMI) protections.
   - Response Time: Establish the maximum acceptable response time for the breaker to interrupt the fault.

III.Components Rating

Component	Value
Atmega 320p microcontroller	+5v,100mA
1 stepdown transformer	230v to 12v-15v, 1.5VA
2 Potential Transformer	230v,1KVA
1N4001	1A
7802(Voltage Regulator)	7-35v,1A
7812(Voltage Regulator)	+12V,1A

III. MODELING WORKING

- This circuit uses standard power supplies including a step-down transformer from 230v to
- 12v and 4 diodes as bridge rectifiers, and provides a pulsating DC that is filtered by an
- electrolytic capacitor of approximately 470µF to 100µF.
- The regulated 5 volt DC voltage is additionally filtered by a small 10 microfarad
- electrolytic capacitor to eliminate noise generated by the circuit.
- An LED is connected in series with a 330 ohm resistor to ground at this 5v point,
- which is a negative voltage, indicating that 5v power is available.

IV. BLOCK DIAGRAM

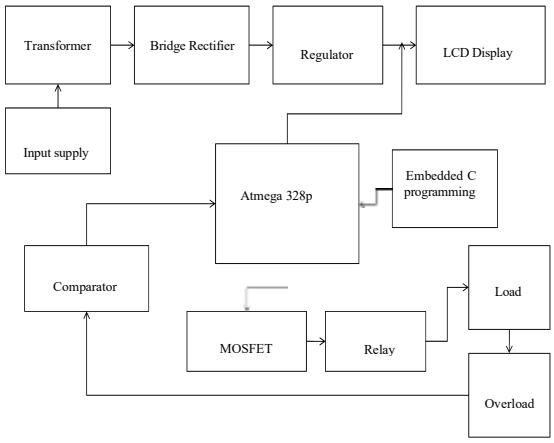

Fig.0.1: Block Diagram of Electronic Circuit Breaker

IV.CONCLUSION

This arrangement is designed for the immediate tripping of circuit swell in the situation of any kind of defective conditions or abnormal conditions like short circuits and burden condition. The proposed ultra fast amusement electronic circuit swell is cheap with ultrafast tripping system compared to slow acting convectional thermal bimetallic atomic circuit combers. UFAECB's can be better further by using advanced Thyristors family.

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