

Design and Analysis of Automatic Fuse Circuit Model Based on Simulation-II

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Abstract—In this paper the author deals with the “Fuse construction” for the newly proposed Automatic Fuse Circuit (AFC). Also this paper examines clearly the process of construction of Automatic fuse, for high reliability, high accuracy and for effective working, since protection depends on the type of fuse construction.

Index Terms— Construction of automatic fuse, Automatic Fuse Circuit(AFC),Relay, voltage regulator IC, copper metal strip,LM 135 IC,OP-AMP 741 IC.

1 INTRODUCTION

THE fuse construction proposed in this paper is the fuse box arrangement suggested for the AFC with required components. The working of AFC depends on the internal copper conductor temperature of the electrical transmission wire which is connected from the digital meter to the load. The temperature changes in the internal copper conductor of transmission supply wire with respect of its different sizes and current ratings are discussed in paper-I, shown in fig (1). [1].

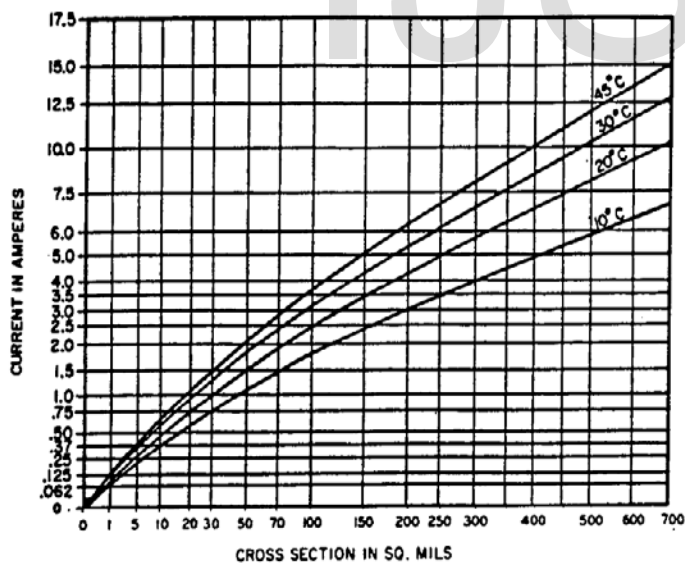


Fig.1 Internal Copper Conductor Characteristics.

The protection from short-circuits and overload currents depends on fuse criteria [2]. Also the available protection depends on the type of fuse construction in various circuits [3].

2 FUSE CONSTRUCTION

The suggested fuse construction for Automatic Fuse Circuit (AFC) is very clearly discussed with its required element connections in a compactable size box with dotted line, shown in fig(2). The total construction of the fuse box is taken under consideration of Indian supply rating such as single phase AC supply, 240V/ (5-20AMP).The fuse box mainly having elements namely AC to DC converter, voltage regulator IC's, solenoid relay type of contact rating 6AMP/250V and coil rating 12V DC, 250 Ohm, copper metal strip, closed insulated box, operational amplifier-741 IC and LM 135 IC.

The digital meter consists of four pin connections, two for input of supply wires from transmission electrical pole to it and another two connections to the load. In general every electrical fuse is connected in between digital meter and the load to protect the electrical loaded equipments when the fault occurs and over currents passed through the connection. From the fig (2), it can be observed that the two pin connections of digital meter are provided for the main service transmission wires and the other two pins are connected to the relay output pin and to the load. The other connection of load is connected to another output of relay and thereby a closed circuit is formed. The over current supply passed into this closed path will be controlled by the AFC box operation.

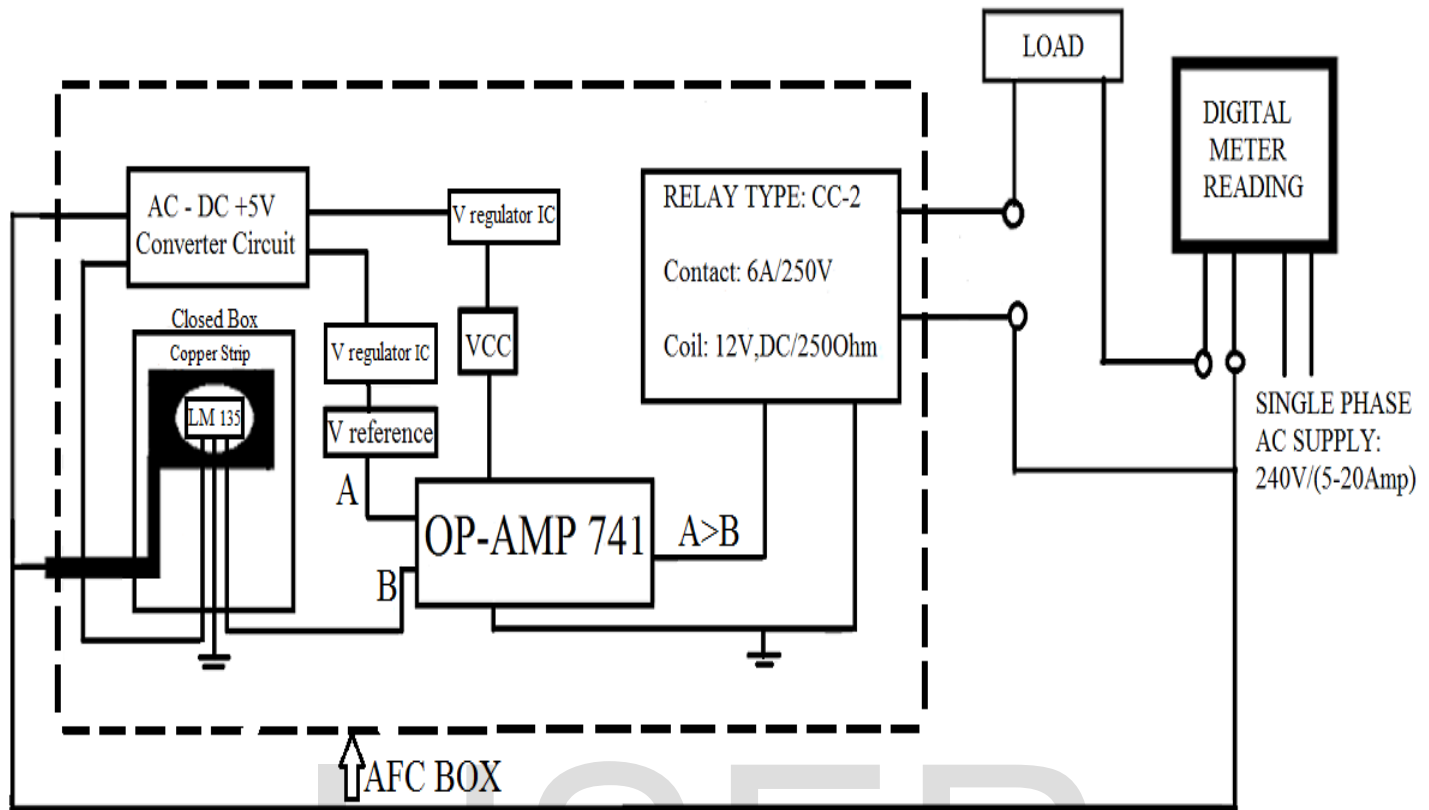


Fig.2 The construction of Automatic Fuse Circuit Box.

The AFC box consists of a closed insulated box in it, in which a temperature sensor LM 135 is fixed and surrounded by a copper metal conductor strip to which the supply wire is connected. With this connection the same rating of current is experienced by copper metal strip and then LM 135 IC senses some temperature which is to be calculated with the help of copper conductor characteristics shown in fig (1). This temperature in terms of voltage given as an input to OP-AMP 741, let it be "B". The another output to the OP-AMP is fixed one as V-reference, let it be "A". When the comparison between A and B voltages takes place then the output of OP-AMP is given to the input of relay, if $A > B$ is the output of OP-AMP then the closed path circuit holds the supply otherwise the path is in open condition. The total IC's are run with DC supply. Hence a AC to DC circuit of +5V rating is fixed in the box for conversion from the AC supply. Hence the voltage regulators are used for the regulating +5V DC supply as per requirement of elements.

3 CONCLUSION

It can be concluded that the suggested AFC box may be more protective and economical, most accurate and can be arranged in a compactable size. High speed of operation is possible with electronic IC's.

REFERENCES

- [1] C.Maruthi Ratna Kishore, INDIA, "Design and Analysis of Automatic Fuse Circuit Model Based on Simulation", IJSER - International Journal of Scientific & Engineering Research, Volume 4, Issue 12, December-2013.
- [2] Huang, R.K.; Nilsson, S. "Fuse selection criteria for safety applications" Product Compliance Engineering (ISPCE), 2012 IEEE Symposium, pp.1-8.
- [3] Wright, A.; Nottingham Univ., UK, "Construction, behavior and application of electric fuses", IEEE Power Engineering Journal (Volume: 4, Issue: 3, 1990) pp.141 – 148.