

FINAL YEAR REPORT PROJECT
DIPLOMA IN ELECTRONIC ENGINEERING
SCHOOL OF ENGINEERING
MARA INSTITUTE OF TECHNOLOGY

THE MAINS CONTROLLER

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MAY 1986

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ACKNOWLEDGEMENT

This project was carried out by the final year students of Diploma level to fulfill the partial requirements in obtaining a Diploma.

The very success of this project was due to the contribution and advise by various personnels at every stages. Due to this we would like to take this opportunity to express our sincere and almost gratitude to our project advisor, Puan Kartini Salam, who has given us guide, encouragement and advise towards the successful of this project.

We would like to convey our greatest thanks to the lecturer involved, technicians, friends and finally to our beloved parents whom their blessing and pray always with us.

Thank you.

Hasnah bte. Hassan

Zainah bte. Mansoh

PREFACE

This project is primarily designed for use with a home computer to enable it to control pieces of mains powered electrical or electronic equipment. It operates by sending a signal through the mains supply so that no connecting wires from the controller unit to the receivers are necessary. The system should work well between any two rooms of a house and an outbuilding, providing that they are on the same mains circuit. Systems of this type are not suitable for long distance though. The controller can be used with up to four receivers and each receiver has a relay that controls mains loads of up to 10 Amps. for some 2400 Watts with the 240 Volts UK mains voltage.

The use of a phase locked loop tone decoder device in each receiver largely accounts for this combination of simplicity and reliability. The controller can be driven directly from any computer, such as the VIC 20 and Spectrum computers.

This project was built with two parts, a transmitter and a receiver. The transmitter and the receiver are operated through AC mains lines and are controlled by the computer. All the data needed are already programmed from the computer.

1.1 THE SYSTEM

The block diagram of the system is shown in Fig 1.1(a) but only a single receiver all use the same circuit.

1.2 GENERAL OPERATION OF THE SYSTEM

The transmitter is a little more than an oscillator operating at a frequency in the region of 200KHz. The oscillator is normally switched off, but it can be brought into action by operating one of four electronic switches. These are actually operated via an opto-isolator which ensures that the computer providing the control signals is totally isolated from the mains supply. Apart from bringing the oscillator into operation, the electronic switches also provide control for the output frequency of the oscillator. Each switch gives a different output frequency so that by tuning one receiver to each frequency then four receivers can be independently controlled.

The receiver circuit are designed to respond to short bursts of the signal from the transmitter, and each time a burst of signal is received the relay changes state. The alternative of having a relay switched on when the relevant frequency from the transmitter is present would be more difficult as the transmitter would have to be capable of providing up to four frequencies simultaneously.