DEPARTMERNT OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
CAWANGAN PULAU PINANG

FINAL REPORT OF DIPLOMA PROJECT

99.99 SECOND STOP-CLOCK

DATE: (9 FEBUARRY 2004)

MOHAMMAD NORPAIZAL BIN CHE PA 2001229312
NOR AZILA BINTI MAT HASSAN 2001431256

SUPERVISOR:
EN. MOHD. NIZAM BIN IBRAHIM

ACKNOWLEDGEMENT

In the name of Allah (s.w.t) the most gracious and merciful, thank to Allah (s.w.t) for giving us opportunity to complete this project, KEU 380 although we have some problem in the process to complete it successfully.

We would like to express our deep sense of gratitude and appreciation to our project supervisor, En Mohd. Nizam bin Ibrahim for his consistent advice and guidance as well as provision of their valuable time, encouragement and patience during the period of completing this project. He shows us how to write a report, to explain the circuit operation and to arrange data. He is also gave us guideline in order to propose good project. In addition, he gives us some tips to present the final project fluently.

Thank all our friends, for their cooperation to find information and data about components in the Internet. Without their kindness, we had in trouble. We are also to thank the owner of a shop in Kampung Benggali because of his cooperation we can survey about components at his shop.

A special appreciations to our project coordinator, Tuan Haji Mohd Nor bin Tajuddin for his opinion about choosing a suitable title of project. He suggests a place to survey component that has a lot of choice. Moreover, he gave us idea to overcome our problem in order to complete our final project.

Finally, we would like to express our deepest gratitude to our family for their unlimited encouragement. They have all been a constant source of strength and inspiration to us besides supporting our financial sources.

ABSTRACT

The circuit uses easily available components. The IC 4033used in the circuit has a built-in decade counter and 7-segment decoder and driver, making the circuit compact and easy to assemble, due to low component count. The clock signal of 100 Hz, to drive the counters, is obtained from IC 4060 (IC5).

Start/stop executed by a simple flip-flop constructed around IC 4001 (IC6), having quad NOR gates. When start switch (S2) is momentarily pressed, two things happen. One, the counters are reset to zero and second, the counters are enabled to accept the clock signals.

The output of gate G2 goes low; enabling clock signals from IC5 to be accepted by counters IC1 to IC4. Simultaneously, output of gate G1 goes high and capacitor C2 starts charging through resistor R32. During this period this period, pin 8 of gateG3 is low and pin 9 is also low due to high input of gate G4. Hence, the output of G3 is high, resetting IC1 to IC4. After a while, when capacitor C2 has fully charged and pin 8 of gate G3 goes high, the output of G3 swings low, enabling the counter to start counting from 0.00 onwards.

When the stop switch is pressed momentarily the output of gate G2 goes high, disabling the counters to accept the clock pulses. Simultaneously, output of G1 goes low, and capacitor C2 discharges. But as output of G3 continues to remain low, the display is frozen until the start switch is pressed again.

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INTRODUCTION

1.1 Background

In laboratories and industries there is always a requirement to time accurately the flow-rate of liquid, or the motion of mechanical part. Sports enthusiasts to time race can also use this stop-clock. The circuit is very simple and uses CMOS integrated circuits, which keep consumption low. This permits use of battery, and hence portability, if desired.

The PCB design of the circuit is modular, offering flexibility in modification to suit individual requirement. Also, special attention has been given to housing the circuit in DIN standard cabinet available in the market. This will make the unit look professional.

This circuit divided into 4 stages. The first stage is the process of converting the AC to DC. This stage consists of transformer, capacitor and diode. The diodes react as a rectifier and the capacitor react as a filter. This rectifier is center-tapped rectifier that converted the input of alternative current to direct current.

The second stage is control stage. It controls the circuit operation. It is consist of two switches that are start and stop switch. The third stage is clock pulses generator that consists of IC 4060. It provides 100 Hz to the circuit. The fourth stage is seven segments that appear the output from binary to numerical number using common cathode display.