

8-Hour Digital Clock Project Report

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Abstract—This report details the development of an 8-hour digital clock that displays seconds, minutes, and hours. The clock is implemented using JK Flip Flops, logic gates, and a microcontroller (Arduino UNO).

I. INTRODUCTION

The aim of this project is to build an 8-hour clock that shows the seconds, minutes, and hour readings.

II. COMPONENTS REQUIRED

- IC - 7476 (JK Flip Flop)
- IC-7408 (AND Gate)
- IC-7432 (OR Gate)
- IC -7447 (BCD Decoder)
- Seven Segment Display
- Breadboard
- Wires
- Arduino UNO

III. THEORY

Synchronous counters were constructed using JK Flip Flops. The state diagram of the counter was written, and the logic of the circuit was determined using Karnaugh maps. A common clock rail was created for the synchronous counter, serving as the clock input for all JK Flip Flops. The output of the last flip flop in a set serves as the common clock input for the next flip flop. The initial clock pulse given to the first set of flip-flops (ones place of the seconds clock) is provided by the Arduino UNO.

IV. ARDUINO CODE

```
void setup() {  
    pinMode(7, OUTPUT);  
}  
  
void loop() {  
    digitalWrite(7, HIGH);  
    delay(1000);  
    digitalWrite(7, LOW);  
    delay(1000);  
}
```

In the above code, pin number 7 is used as the clock pin.

V. PROCEDURE

We constructed mod 10 and mod 6 synchronous counters and cascaded them as required. For the hour hand, a mod 8 synchronous counter was built. A mod 10 and mod 6 counter together form the ones place and tens place of the minutes and seconds.

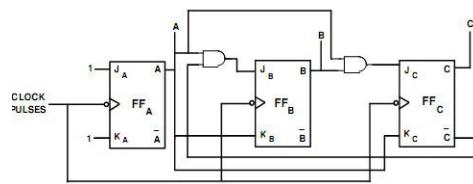


Fig. 1. Mod 6 counter

Decade 4-bit Synchronous Counter

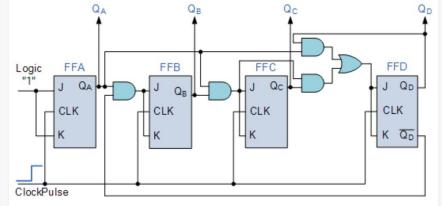


Fig. 2. Mod 10 counter

The outputs of the flip-flops are displayed using seven segment displays connected to an IC 7447, which is a BCD encoder.

VI. RESULTS

An 8-hour clock was constructed whose frequency can be changed by altering the delay time in the Arduino code. The clock resets once 8 hours are over (resets to 0:00:00 from 7:59:59).

VII. PICTURES

