Cryptographic Vending Machine

Group ¡insert_group_number¿
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1 Technical Definitions of Terminology

For the purposes of this circuit the following tables define the values for specific parameters pertaining to this circuit.

Explicit Name	Canonical Names	Symbol	Value
Voltage High	High, H	V_H	(2V-5V)
Voltage Low	Low, L	V_L	(0V-.8V)
Power Supply Voltage		V_{cc}	5V
Temperature Range	Min & Max	T_A	(0C-70C)
Active State	Active High		V_H

2 Change Maker IO

The purpose of this section is to Provide extra detail on the specification of IO streams and how they interface with other devices.

2.1 Input Stream Details

- **Enable Bit:** This bit tells the change maker to start computing and when it is disabled, the circuit will halt no matter what part of the calculation it is in. In addition to this, the enable bit is not shown to the user, it only connects to the vend and bill count circuit.

- **Clock:** The cycling of the clock sequentially makes change. Generally takes 6 clock cycles considering average values for change in machine and number to make change of. This is hidden from user

- **Number to Make Change of:** This value is fed in parallel over the data bus from the vending circuit, and bills in machine circuit. This bus is hidden from user.

- **Counter Reset Switches:** These switches set the bill counters to BILL_MAX which is equal to 15. These are accessible by maintainer.

2.2 Output Stream Details

- **Running:** This bit shows whether or not change is being made. This should halt operation of most other operations. When this is low the

circuit is not doing anything

- **Bill to Dispense:** This is a binary number representing the bill to dispense. This is fed to the bill dispense hardware, but in the prototype this value is displayed on the 4 LEDs.

- **Dispenser Clock:** This sends a clock pulse with the bill to dispense to enqueue the bill current being displayed. This is an LED on the prototype.

- **Counter Low LEDs:** These LEDs indicate when change is low.

3 Operation of the Change Making Circuit

3.1 Initialization

1. Set enable at low

2. Cycle Clock from low to high to low

3. Fill machine with bills to make change

4. Reset change counters, by cycling switches 1,2, and 3 low to high to low

3.2 How to Make Change

1. Feed the value you want to make change of over the data bus

2. Make certain clock and enable are low

3. Set clock to high, then to Low

4. Set enable to high

5. Allow clock to cycle

6. Read output LEDs as bill to dispense and clock for dispenser This prototype emulates support for the bill dispensing machine described in this manual.

3.3 Maintenance

- There are three LED's which mark when their category of bills is empty for that category. The LED's are labeled for their value, and are shown on the specification diagram.

- When the restock change LED's are lit the maintainer must open up the machine and fill up the appropriate bill and then reset its counter by flipping its switch: low to high to low.

- The 10s have a reset switch at 3. The 5s have 2 as their reset switch. The 1s have 1 as their reset switch.

- For clarification to more technical analysis: reset refers to set on the chain of flip flops, but is stated as reset to improve understanding for technicians who lack an electrical or computer engineering background.

- If issues arise where initialization fails try toggling clock while enable is Low.