Title:
History Of The Computerflip-Flops - A Basic Counter

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Summary:
Flip-Flops - A basic counter

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Article Body:
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We looked at the Binary system, and basic computer logic elements, in previous articles, "It’s

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There are several types of counter, nearly all of which use a basic element of electronics, th

OK back on topic. The flip-flop is as old as electronics, and is a classic example of the bina

It normally has two outputs, one being the complement of the other. That is,if one output(A) i

In logic terms the flip-flop is made up using AND and OR gates, in logic cicuitry it is just

We can make up a Truth Table, which we have used before. If you recall, a truth table tells yo

TRUTH TABLE for Flip Flop - Toggle (C)hange,- Outputs A and B.

INITIAL STATE
T B A
0 1 0 ’A’ output is 0

PULSE #1
T B A
C 0 1 ’A’ output is 1

PULSE #2
T B A
C 1 0 ’A’ output is 0

Now we string some flip-flops together to make a counter. Say we have a sensor on a beer bottl

We will take the A output of the 3 flip-flops to a decoder black box, which we can use to dete

Our 3 Flip-Flops now come up with a truth table like this:-

INITIAL STATE
FF2 FF1 FF0
TBA TBA TBA
010 010 010 ’A’ outputs 000 - 0

PULSE #1
FF2 FF1 FF0
TBA TBA TBA
C10 C10 C01 ’A’ outputs 001 - 1

[The (C)hange flips FF0 (always). FF1 & FF2 are blocked by the AND gate which needs a 0 input

PULSE #2
FF2 FF1 FF0
TBA TBA TBA
C10 C01 C10 ’A’ outputs 010 - 2

[The (C)hange flips FF0 (always). FF1 flips beacause the ’B’ output from FF0 is a 0 when the F

PULSE #3
FF2 FF1 FF0
TBA TBA TBA
C10 C01 C01 ’A’ outputs 011 - 3

[FF0 flips, FF1 is blocked again,as is FF2.]

PULSE #4
FF2 FF1 FF0
TBA TBA TBA
C01 C10 C10 ’A’ outputs 100 - 4

(FF0 flips, FF1 flips, FF2 flips.)

PULSE #5
FF2 FF1 FF0
TBA TBA TBA
C01 C10 C01 ’A’ outputs 101 - 5 count complete!

[FF0 flips, FF1 and FF2 are blocked.]

This counter can count up to 111, 7 decimal, it then resets to 0. A couple of interesting poir

1. FF0 flips every pulse. FF1 flips every 2 pulses. FF2 flips every 4 pulses etc. These facts

2. Look at the ’B’ outputs from the counter. In sequence the values are:- 111, 110, 101, 100,