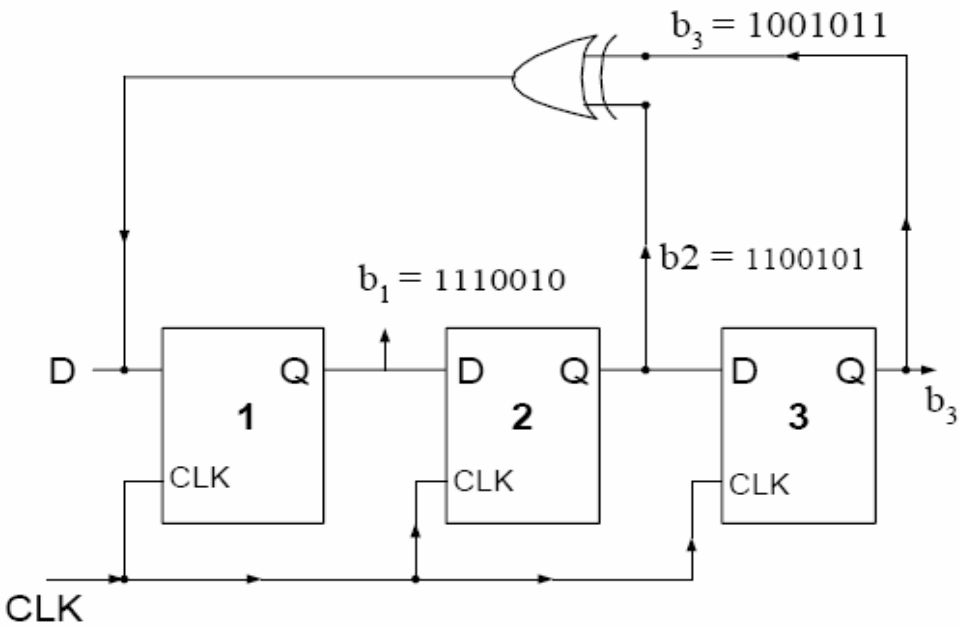
A simple PRBS generator

The following figure shows a simple 7-bit PRBS generator employing a 3-bit shift register, realized by three D-type re-triggerable Flip-flops (two TTL chips 7474) :-



Logic Diagram of 7 - bit PRBS Generator

The PRBS signal generated as above will have the following characteristics:-

1. The length of the sequence generated by it, m = 2^N-1 , where N = number of bits (i. e., Flip-flops) of the shift register,
2. After every m number of binary bits, the sequence will be repeating itself.
3. The maximum number of 1's coming together will be 'N' in the sequence, whereas the maximum number of zeroes coming together will be (N-1).
4. The duration of one bit is equal to the period of the clock deriving it.
5. The PRBS generated by above circuit may be represented by:-
   1 1 0 0 1 0 1 1 1 0 0 1 0 1 1 1 0 0 1 0 1 1 1 0 0 1 0 1 1 1 0 0 1 0 1 1 1 0 0 1 0 1 ,

Re-setting of the PRBS generator

To obtain the two outputs b1 and b2 from the PRBS generator, connect a 5-Volts fixed DC supply to the '+ve' & '-ve' inputs of the PRBS unit for its biasing, and connect the previously adjusted TTL clock (from any pulse generator) to the clock input of the PRBS unit. Connect the outputs b1 and b2 of the PRBS generator to the two Y-channels of CRO. If the b1 and b2 do not appear on the CRO screen, then **touch momentarily** the " + 5-Volt Supply terminal" of the biasing supply of the PRBS generator (Red wire) to its 'D'input (brown wire) to re-circulate the bits in the shift registers of PRBS generators. Now b1 and b2, will appear on the CRO screen. Note that b1 = 1110010 and b2 = 1100101, are the 7-bit PN sequences generated by the given PRBS generator.

Pin-wise Checking of All ICs of PRBS Generator

Pin #	IC-1 (7474)	IC-2 (7474)	IC-3 (7486)
1	Vcc (+5V)	Vcc (+5V)	b_3
2	D	b_2	b_2
3	Clock	Clock	D
4	Vcc (+5V)	Vcc (+5V)	NC
5	b_1	b_3	NC
6	NC	NC	NC
7	Ground (0-Volt)	Ground (0-Volt)	Ground (0-Volt)
8	NC	NC	NC
9	b_2	NC	NC
10	Vcc (+5V)	NC	NC
11	Clock	NC	NC
12	b_1	NC	NC
13	Vcc (+5V)	NC	NC
14	Vcc (+5V)	Vcc (+5V)	Vcc (+5V)

Note that a fixed 5-V DC supply should be used for biasing of the kit.

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