State Truth Table

s_1	s_0	a	b	n_1	n_0	x
0	0	0	0	0	0	0
0	0	0	1	0	0	0
0	0	1	0	0	1	0
0	0	1	1	0	0	0
0	1	0	0	0	0	0
0	1	0	1	0	0	0
0	1	1	0	1	1	0
0	1	1	1	1	0	0
1	0	0	0	1	0	1
1	0	0	1	1	1	1
1	0	1	0	0	0	1
1	0	1	1	1	0	1
1	1	0	0	0	0	1
1	1	0	1	1	1	1
1	1	1	0	0	0	1
1	1	1	1	1	1	1

Boolean Equations

$$n_0 = \overline{s_1}.\overline{s_0}.a.\overline{b} + \overline{s_1}.s_0.a.\overline{b} + s_1.\overline{s_0}.\overline{a}.b + s_1.s_0.b.\underbrace{(a+\overline{a})}_{1}$$

$$= \overline{s_1}.\overline{b}(\overline{s_0}.a + s_0.a) + s_1.b(\overline{s_0}.\overline{a} + s_0)$$

$$n_0 = \overline{s_1}.b.a + s_1.b(\overline{s_0}.\overline{a} + s_0)$$

$$n_1 = \overline{s_1}.s_0.a.\overline{b} + \overline{s_1}.s_0.a.b + s_1.\overline{s_0}.\overline{a}.\overline{b} + s_1.\overline{s_0}.\overline{a}.b + s_1.\overline{s_0}.a.b + s_1.s_0.\overline{a}.b + s_1.s_0.a.b$$

$$= \overline{s_1}.s_0.a\underbrace{(\overline{b}+b)}_{1} + s_1.\overline{s_0}.\overline{a}(b+\overline{b}) + s_1.\overline{s_0}.a.b + s_1.s_0.b.\underbrace{(\overline{a}+a)}_{1}$$

$$n_1 = \overline{s_1}.s_0.a + s_1.\overline{s_0}.\overline{a} + s_1.\overline{s_0}.a.b + s_1.s_0.b$$

$$x = s_1.\overline{s_0} + s_1.s_0$$

$$= s_1(\overline{s_0} + s_0)$$

$$x = s_1$$

$$n_1 = \overline{s_1}.s_0.a + s_1.\overline{s_0}(\overline{a} + a.b) + s_1.s_0.b$$