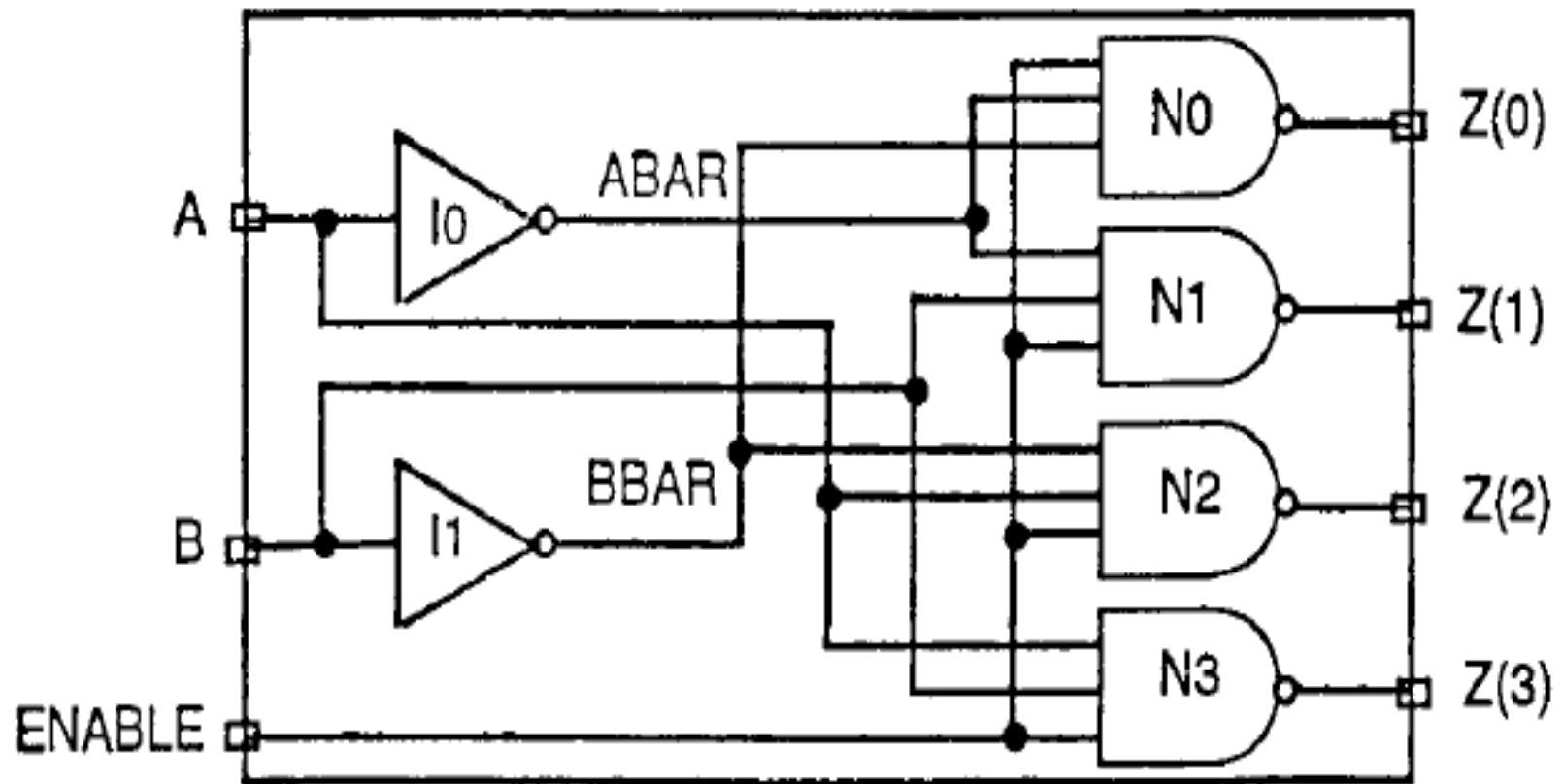# Decoder 2 X 4

- which does the reverse of an [encoder](#), undoing the encoding so that the original information can be retrieved

EN	S1	S0	Z0	Z1	Z2	Z3
0	X	X	0	0	0	0
1	0	0	1	0	0	0
1	0	1	0	1	0	0
1	1	0	0	0	1	0
1	1	1	0	0	0	1

Structural Style

```
entity DECODER2x4 is
port (A, B, ENABLE: in SIT: Z: out BIT_VECTOR(0 to 3));
end DECODER2x4;
architecture DEC_STR of DECODER2x4 is
component INV
    port (A: in BIT; Z: out BIT);
end component;
component NAND3
    port (A, B, C: in BIT; Z: out BIT);
end component;
signal ABAR, BBAR: BIT;
begin
I0: INV port map (A, ABAR);
I1: INV port map (B, BBAR);
N0: NAND3 port map (ABAR, BBAR, ENABLE, Z(0));
N1: NAND3 port map (ABAR, B, ENABLE, Z(1));
N2: NAND3 port map (A, BBAR, ENABLE, Z(2));
N3: NAND3 port map (A, B, ENABLE, Z(3));
end DEC_STR;
```