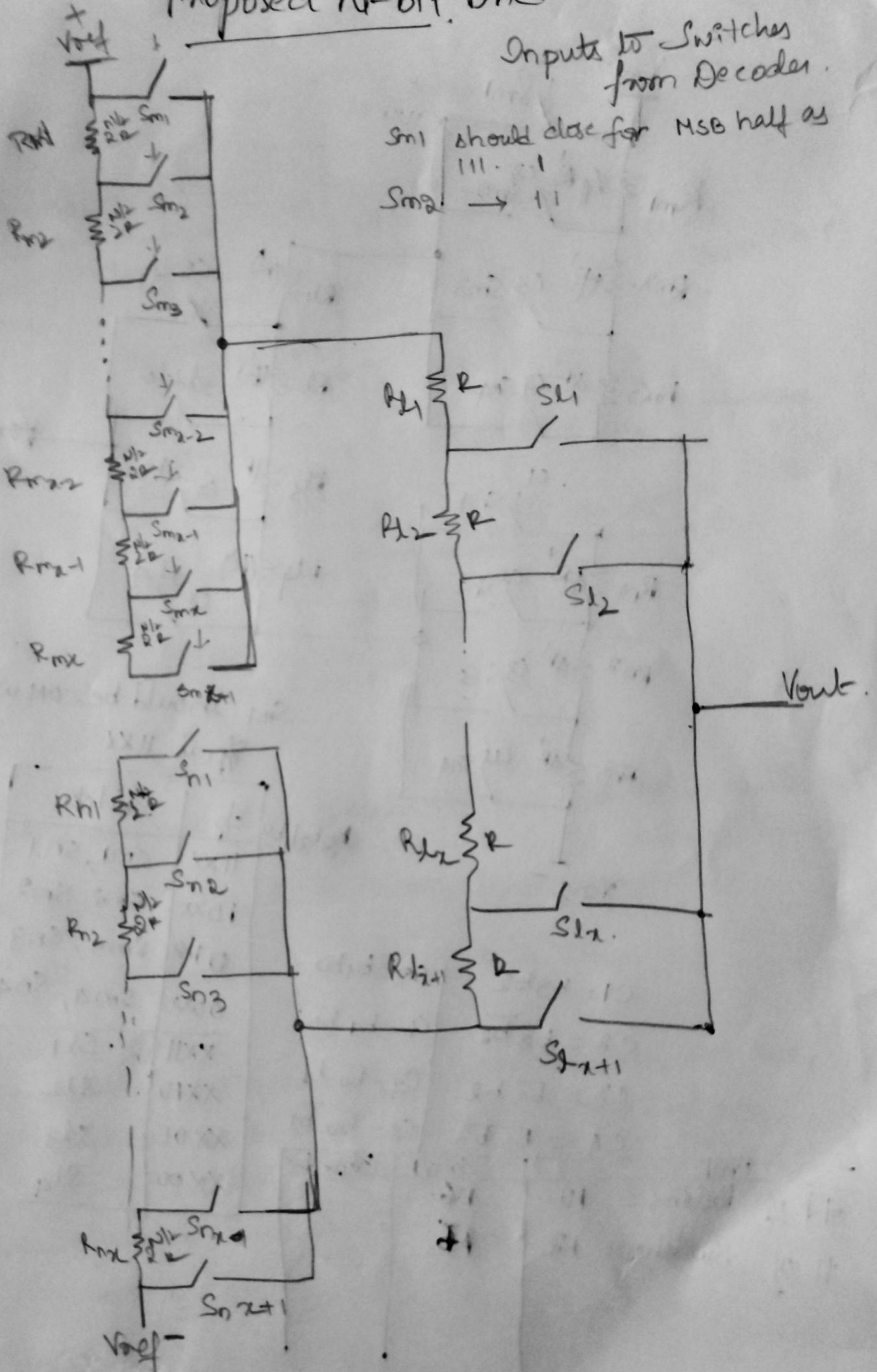


Proposed N-bit DAC.

①

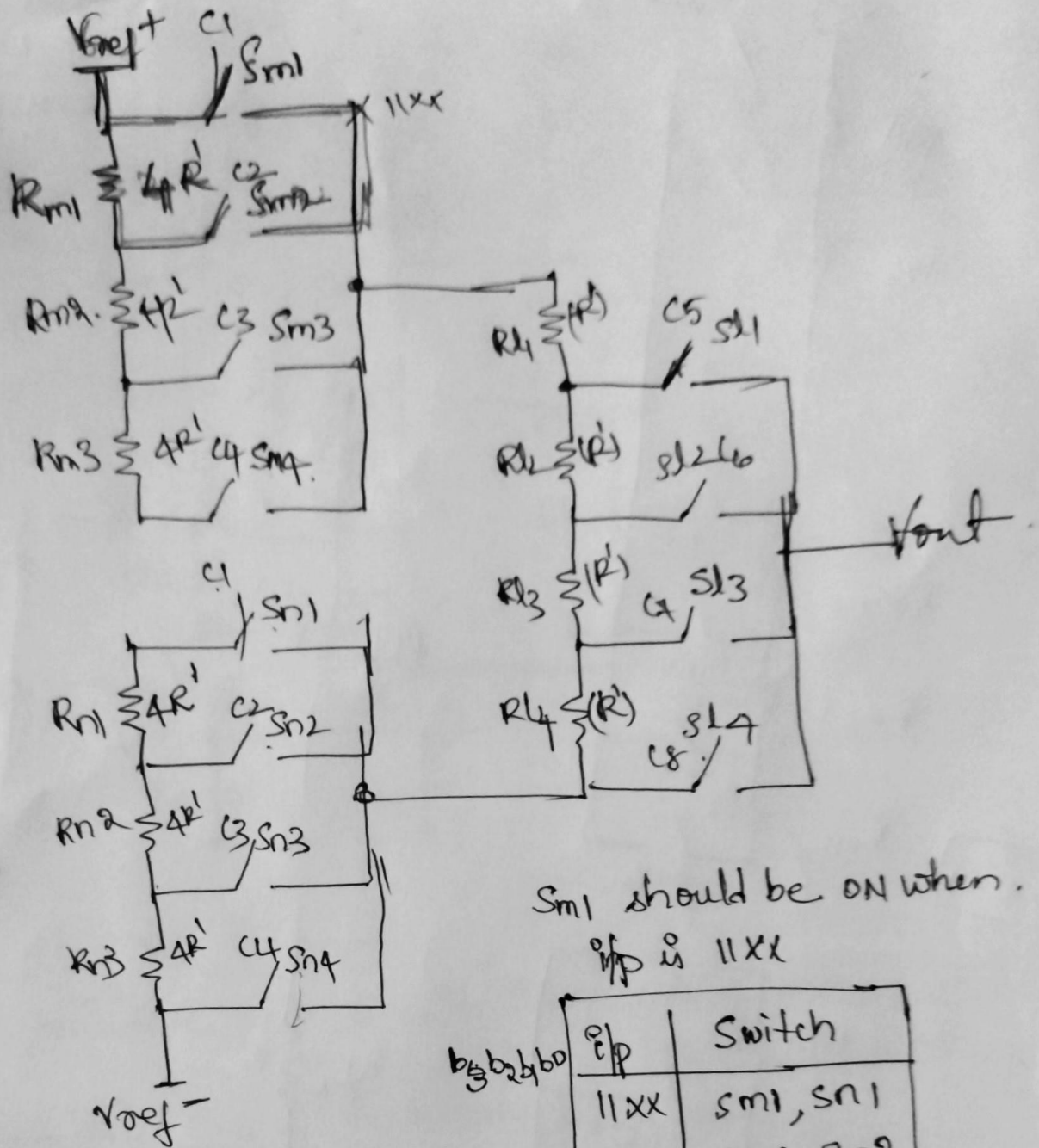
Inputs to Switches from Decoder.

S_{m1} should close for MSB half as
 $111 \dots 1$
 $S_{m2} \rightarrow 11$



$$\frac{4}{2} = 2$$

N=4 So, M-String has $2^{4/2} - 1 = 3$ resistor 118 N-string



S_{m1} should be ON when.
i/p is 11xx

i/p	Switch
11xx	S_{m1}, S_{n1}
10xx	S_{m2}, S_{n2}
01xx	S_{m3}, S_{n3}
00xx	S_{m4}, S_{n4}
xx11	S_{L1}
xx10	S_{L2}
xx01	S_{L3}
xx00	S_{L4}

$$\begin{aligned} C1 &= b_3 b_2 & C5 &= b_1 b_0 \\ C2 &= b_3 \bar{b}_2 & C6 &= b_1 \bar{b}_0 \\ C3 &= \bar{b}_3 b_2 & C7 &= \bar{b}_0 b_1 \\ C4 &= \bar{b}_3 \bar{b}_2 & C8 &= \bar{b}_0 \bar{b}_1 \end{aligned}$$

Prop.

of Resistors = 10

Conv.

16.

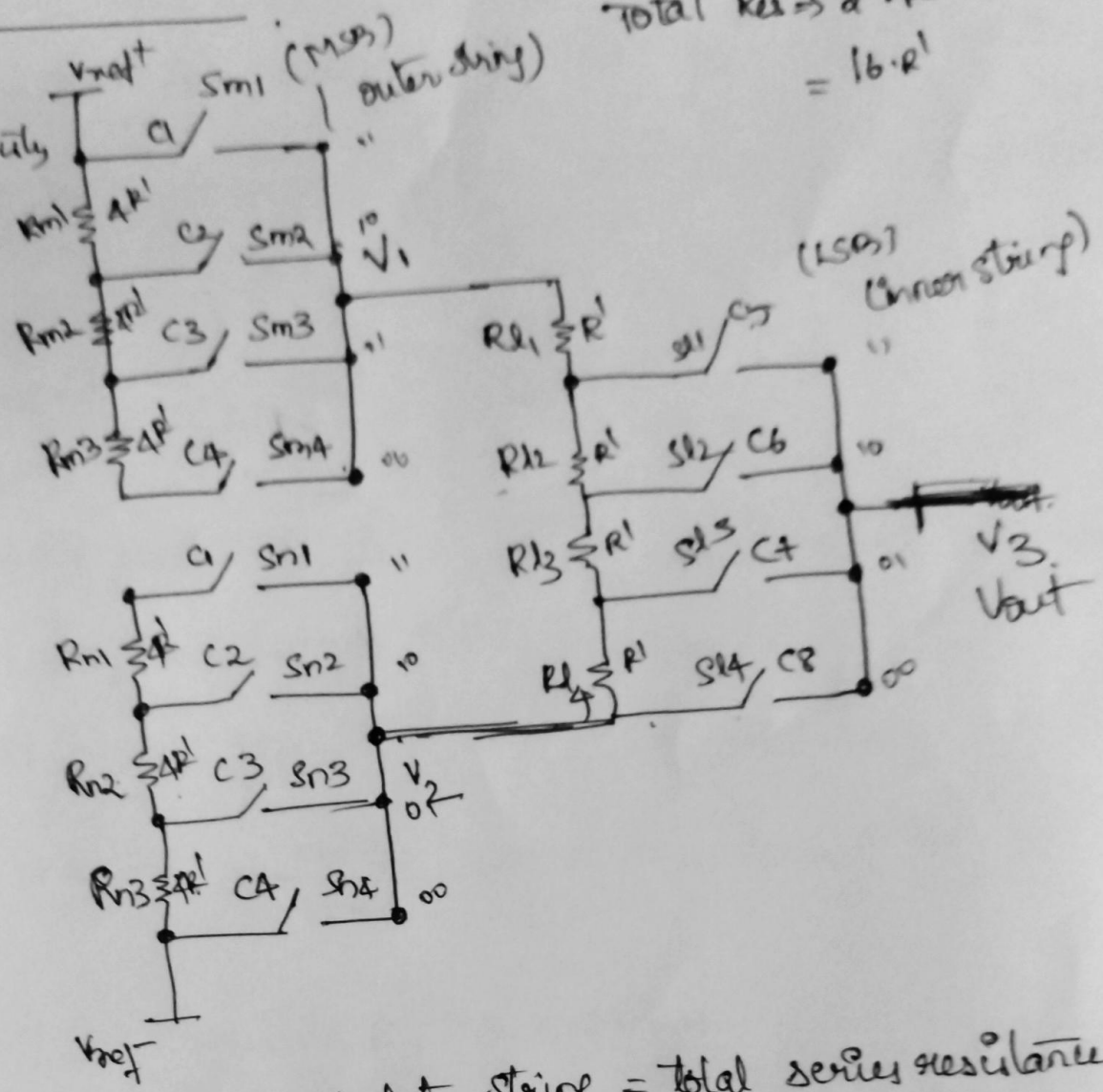
of Switches = 12

16.

eq tracing for $N=4$

Total Res $\rightarrow 2^N \cdot R'$
 $= 16 \cdot R'$

* Given an IP,
 * outer string resistivity
 +
 1 inner string seen
 are connected in
 series b/w
 V_{ref}^+ & V_{ref}^-
~~total~~



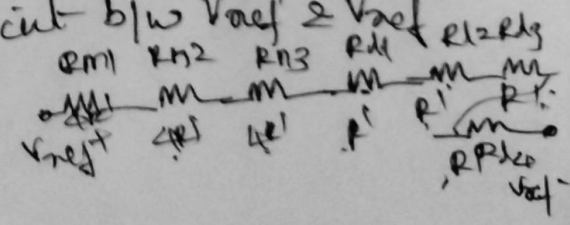
* one resistance value of outer string = total series resistance of 4 inner strings.

* So, $\frac{1}{4} (V_{ref}^+ - V_{ref}^-)$ is across inner string.

$\frac{3}{4} (V_{ref}^+ - V_{ref}^-)$ " " outer string.

* op volt $\Rightarrow V_2 + V_3$.

eq:- $11010 \Rightarrow * S_{l2}, S_{m2}, S_{m3}$ are closed. So, $R_{m1}, R_{n2}, R_{n3}, R_{l4}$ are in the series circuit b/w V_{ref}^+ & V_{ref}^- .
 * @ $V_2, \frac{2}{4}$ of the FSV & this is increased further with $\frac{2}{16}$ FSV



So, $V_{out} \approx \frac{10}{16} \checkmark$

$\frac{1010}{8421} = \frac{10}{2^N} = \frac{10}{16} \checkmark$

eg for 10 bit DAC

Conv. has 1024 resistors, Switches

Proposed has 94 resistors, 96 Switches

$N=10$

	#R	#S
Conventional	1024	1024
Proposed	94	96

$$10/2 = 5$$

resistor 31

resistor 31

resistor 32

94

32
32
32
96

The overall resistance is $R = 2^N \cdot R \Rightarrow$ Same as conventional which is required to get FSV.

for eg, if digital $8/p = 1011010011$, then o/p volt

$$V_{out} = \frac{723}{1024} \cdot (FSV) \Rightarrow 0.7 FSV.$$

M-stair \Rightarrow 31 resistors, 32 switches

N-stair \Rightarrow " , "

L-stair \Rightarrow " , "