

DELD Lab Assignment - I

■ Problem Statement - To realise 3 bit Binary to Gray & 3 Bit Gray to Binary converter using logic gates.

■ Objectives -

1. To study combinational circuits using gates.
2. Advantages & disadvantages of both codes.
3. Applications of Binary & Gray ~~Code~~ Code

■ Theory

Binary Code & Gray Code - In mathematics & Digital Electronics, a binary code represents data using the base-2 numeral system or simply a 2-symbol system (often "0" & "1")

Gray Code or Reflected Binary Code is an ordering of binary code such that two successive values differ in only one bit (digit).

for instance, $(1)_{10} = (001)_2$

& $(2)_{10} = (010)_2$

but $G(1) = (001)$ & $G(2) = (011)$

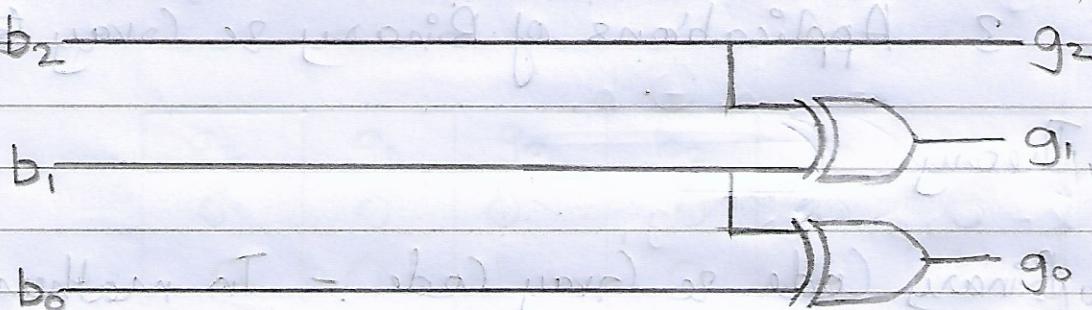
Thus, incrementing a value requires only one bit

to be modified.

Binary or Gray codes are used widely in digital electronics, further, gray codes are also used to facilitate error corrections in communication systems.

■ Design -> ~~Low-Delay~~ ~~Minimal Jitter~~ at ~~stop~~

1. Binary to Gray code.

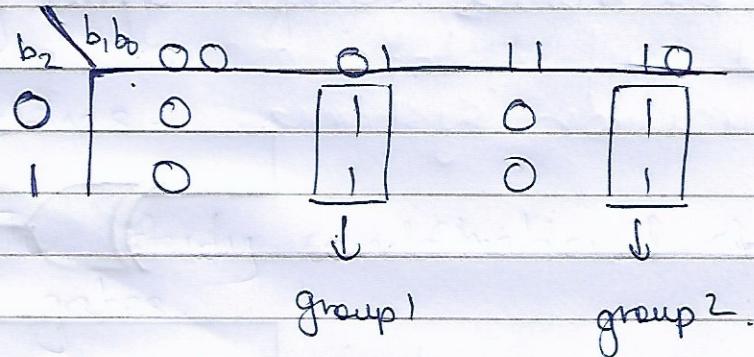


b_2	b_1	b_0	g_2	g_1	g_0
0	0	0	0	0	0
0	0	1	0	0	1
0	1	0	1	0	1
0	1	1	1	1	0
1	0	0	1	1	0
1	0	1	1	1	1
1	1	0	1	0	1
1	1	1	1	0	0

$$(010) = 0(101)$$

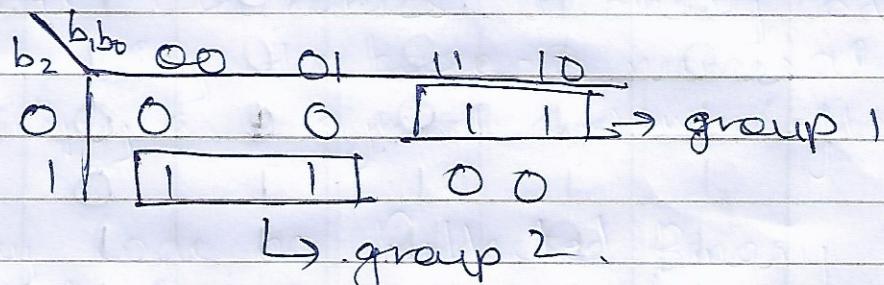
$$(110) = 1(101) \text{ or } (100) = 1(101)$$

→ K-Map for g_0 ,



$$\begin{aligned} g_0 &= G_1 + G_2 = \overline{B_0} b_1 + b_0 \overline{b}_1 \\ &= \underline{b_0 \oplus b_1} \end{aligned}$$

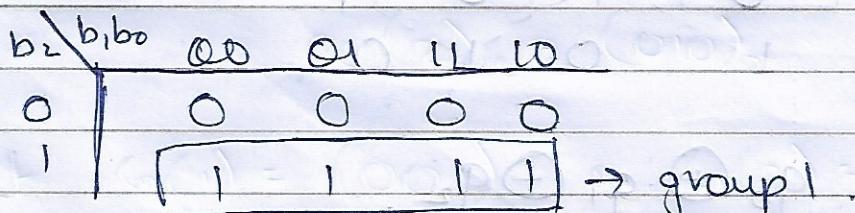
→ K-Map for g_1 ,



$$g_1 = G_1 + G_2.$$

$$= \overline{B_2} b_1 + b_2 \overline{b}_1 = \underline{b_1 \oplus b_2}$$

→ K-map for G_2 .



$$G_2 = G_1 = \underline{\underline{b_2}}$$

2. Gray code to Binary:

$$g_2 \rightarrow b_2$$

$$g_1 \rightarrow b_1$$

$$g_0 \rightarrow b_0$$

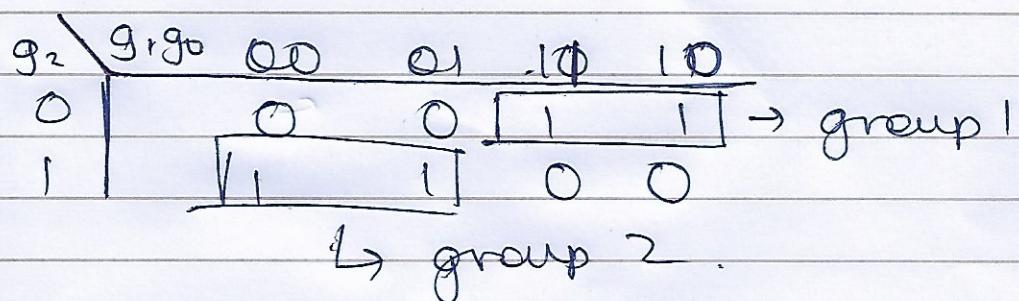
g_2	g_1	g_0	b_2	b_1	b_0
0	0	0	0	0	0
0	0	1	0	0	1
0	1	1	0	1	0
0	1	0	0	1	1
1	1	0	1	0	0
1	0	1	1	1	0
0	0	0	1	1	1

\rightarrow K-map for b_0 :

$g_2 \backslash g_1, g_0$	00	01	11	10
0	0	-1	0	1
1	1	0	1	0

$$\underline{b_0 = g_0 \oplus g_1 \oplus g_2}$$

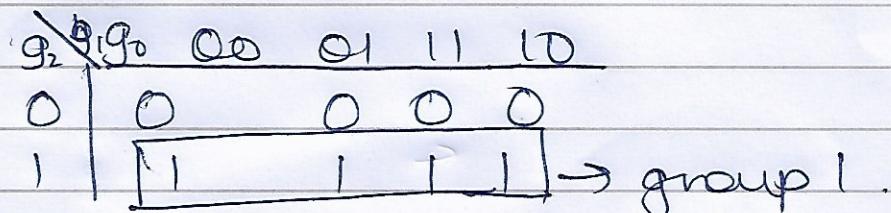
→ k-map for b_1



$$b_1 = G_1 + G_2$$

$$= g_1 \bar{g}_2 + \bar{g}_1 g_2 = \underline{g_1 \oplus g_2}$$

→ k-map for b_2



$$b_2 = G_1 = \underline{g_2}$$

■ Conclusion: Realised a simulated version of 3bit binary to gray code & 3bit gray code to binary converter.

■ FAQ :

Q. Why is code conversion necessary?

→ Every form of code has its set of advantages and disadvantages, thus, to suit our needs,

we rely on the ability to move data from one form to another.

Q1 P1 10 00 00 00
I group ← 1 1 0 0 0 0
0 0 1 1 1 1
S group ←

$$sd + 1d = sd$$

$$\underline{-E \oplus E} = \underline{E, \bar{E}} + \underline{\bar{E}, E} =$$

sd of gen-1 ←
Q1 P1 10 00 00 00
0 0 0 0 0 0
I group ← 1 1 1 1 1 1

$$\underline{sd} = 1d = sd$$

size of network bottleneck a bottleneck (mininal) at other group size is about size of largest resource needed

: off

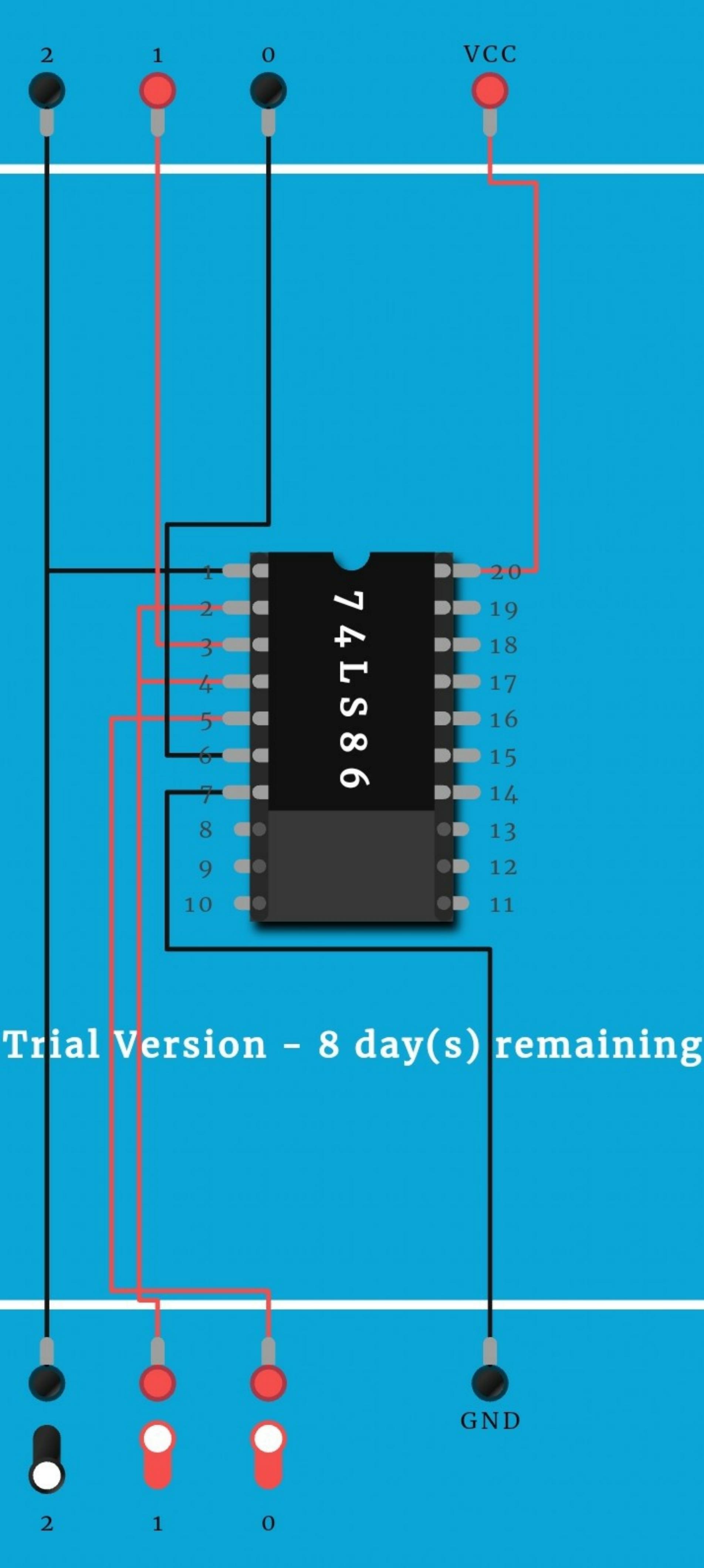
Execution continues what is until a

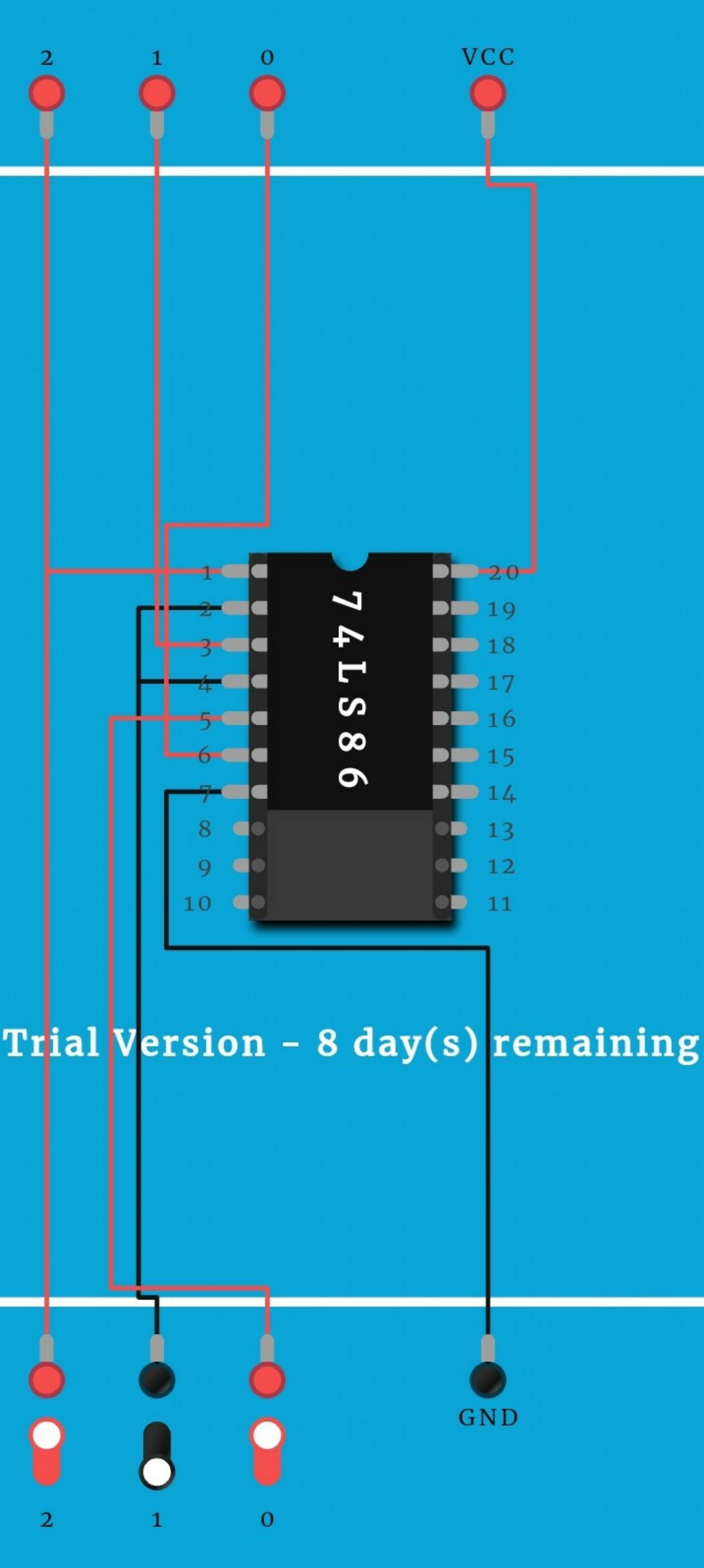
longer time for the end user to wait until a share and the actual application has

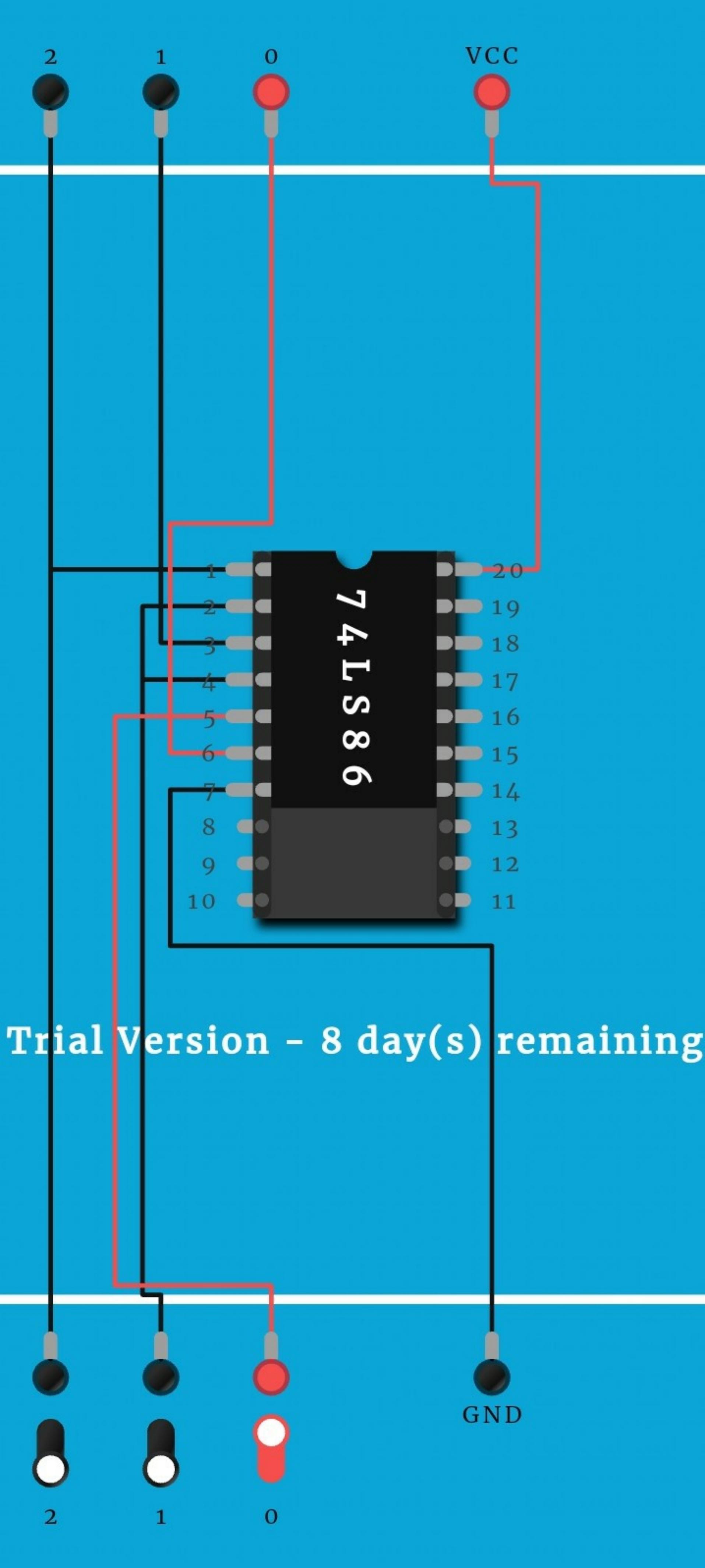
DELD LAB ASSIGNMENT 1

PG 34, Jaynam Modi (G3)

Binary to Gray Code Converter.







Gray Code to Binary Converter.

