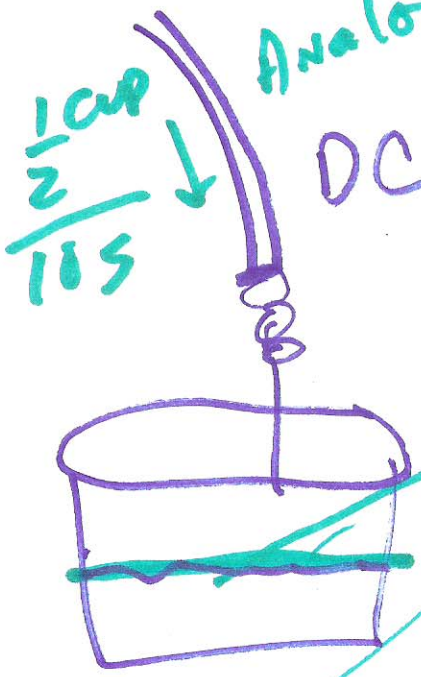
Ch. 6
Data Converter Design Basics



Analog

DC = water input constant.

Quantizer

10 sec

1 0 1 0 1 0 1 0

Clip board

$\frac{1-z^{-k}}{1-z^{-1}}$

Bucket

integrator

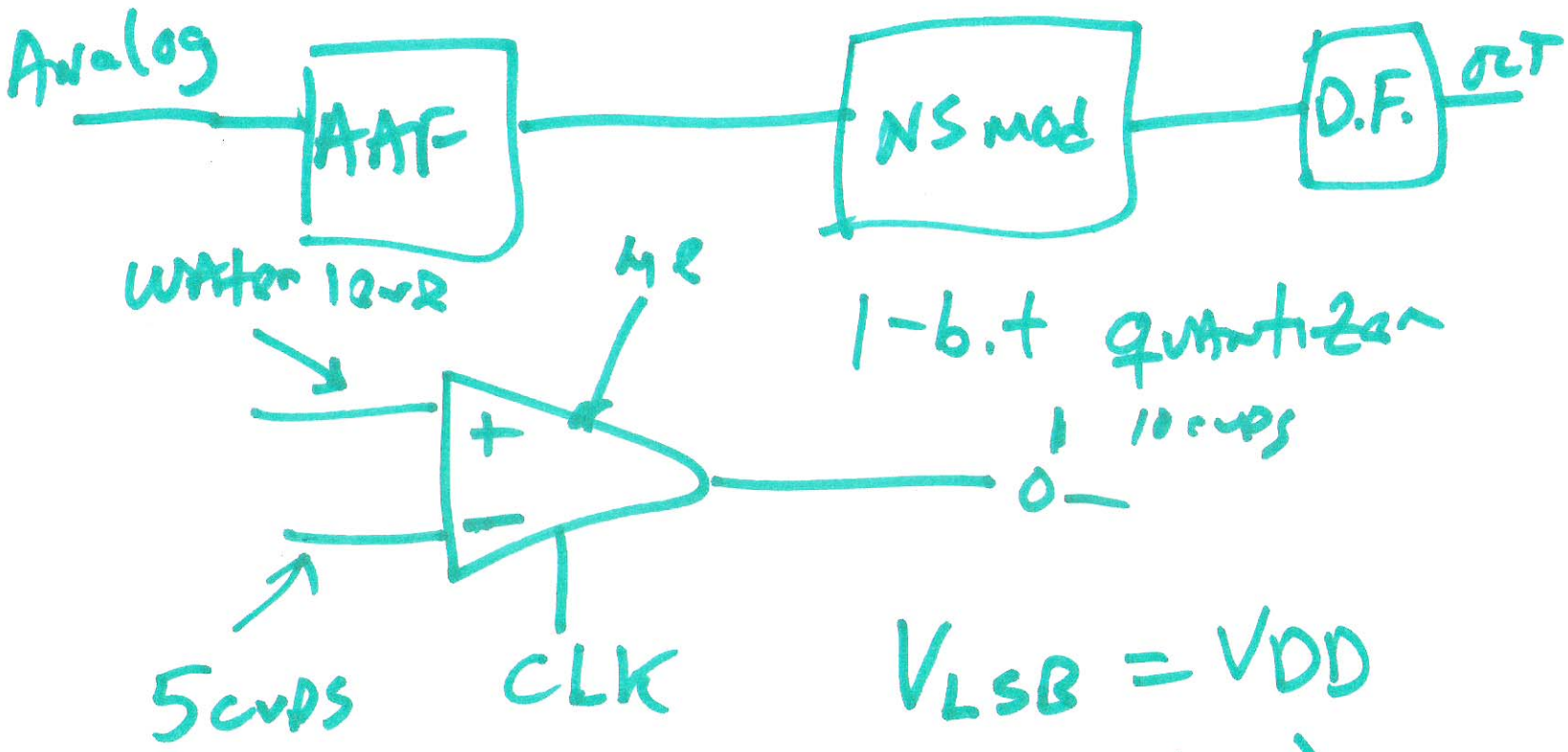
CVD is feedback to subtract from water going into the bucket

Level	time	Pump Y/N	Level
5cups	0	1	4cups
4cups	10	0, 4.61	4.61
4.61	20	1, 5.22	4.22
4.22	30	0, 4.83	4.83
4.83	40	1, 5.44	4.44
4.44	50	0, 5.05	4.05
4.05	60	0, 4.66	4.66
4.66	70	1, 5.27	4.27
4.27	80	0, 4.88	4.88
4.88	90	1, 5.49	4.49
4.49	100	1, 5.10	4.1

.61

7/11 1cup

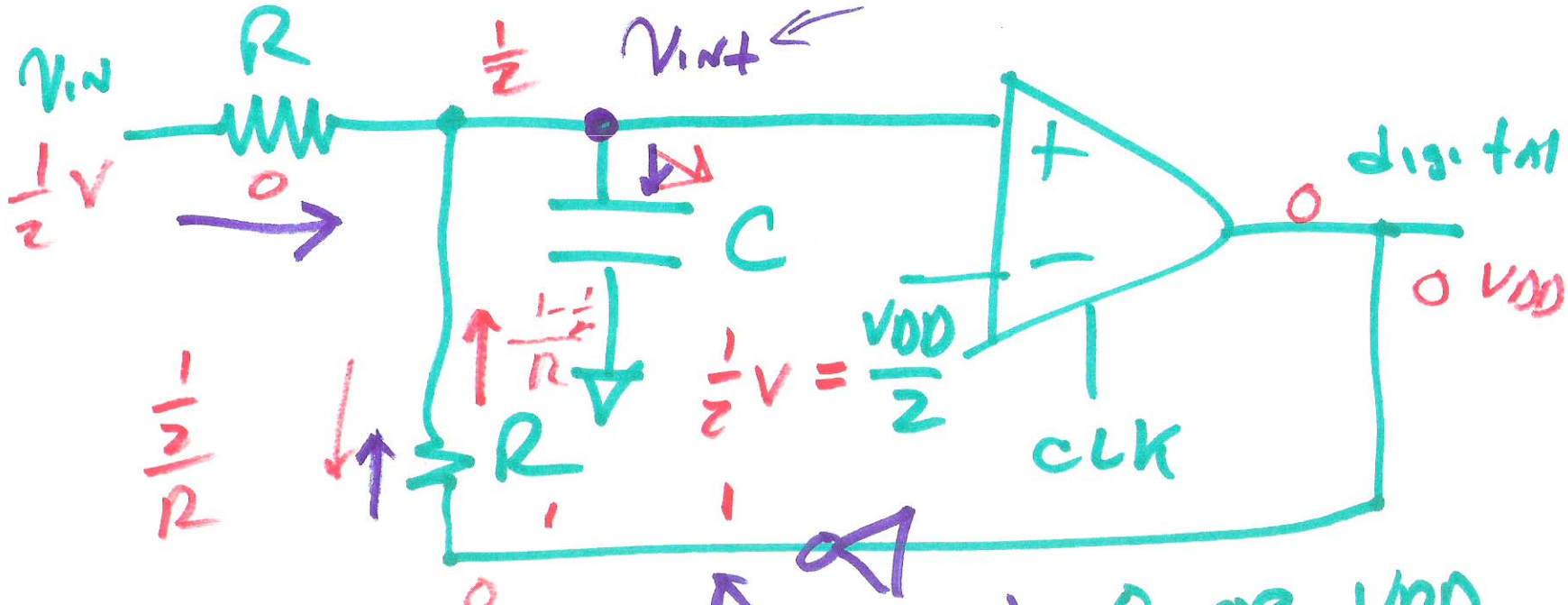
2)



$V_{LSB} = V_{DD}$

0 → 11 (-1)

1 → 01 (+1)



$$\frac{1}{j\omega C}\left(\frac{V_{in}-V_{int}}{R}+\frac{-V_{out}-V_{int}}{R}\right)$$

0 OR VDD

101010

+1 -1 +1 -1

0 = V_{cm}

$$= V_{int}$$

$$V_{int}\left(1+\frac{2}{j\omega RC}\right) = \frac{V_{in}}{j\omega RC} + \frac{-V_{out}}{j\omega RC}$$

$$v_{OUT} = -v_{in}(j\omega RC + 2) + v_{in}$$

$$A(f) = \frac{1}{2 + j\omega RC}$$

$$v_{OUT} = \frac{1}{3 + j\omega RC} \cdot v_{in}(f)$$