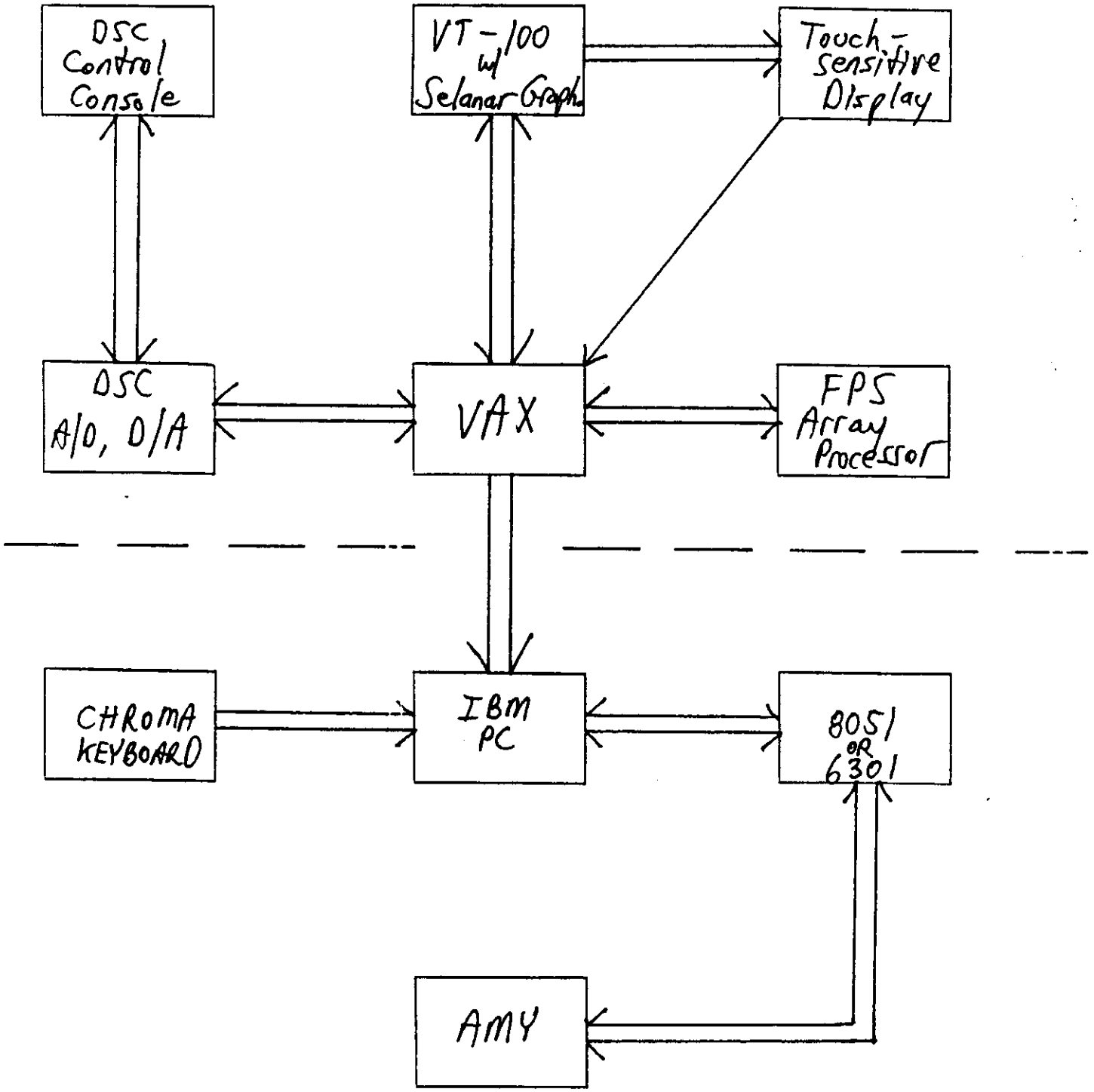
Audio Group
Hardware Configuration



Adding Noise with the Exponential ROM

$$\text{Any operation} = \overbrace{\exp[\ln A_i + B(t)]}^{①} - \overbrace{\exp(\ln A_i)}^{②}$$

$$= \exp(\ln A_i) \cdot \exp[B(t)] - \exp(\ln A_i)$$

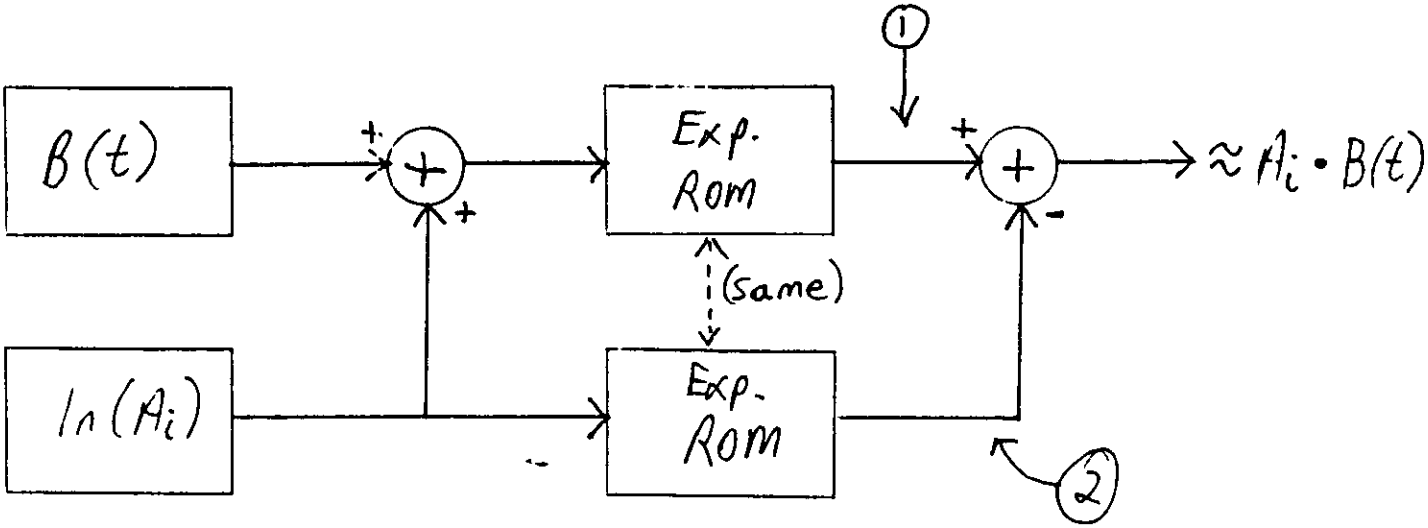
$$= A_i \cdot \exp[B(t)] - A_i$$

$$= A_i[\exp B(t) - 1]$$

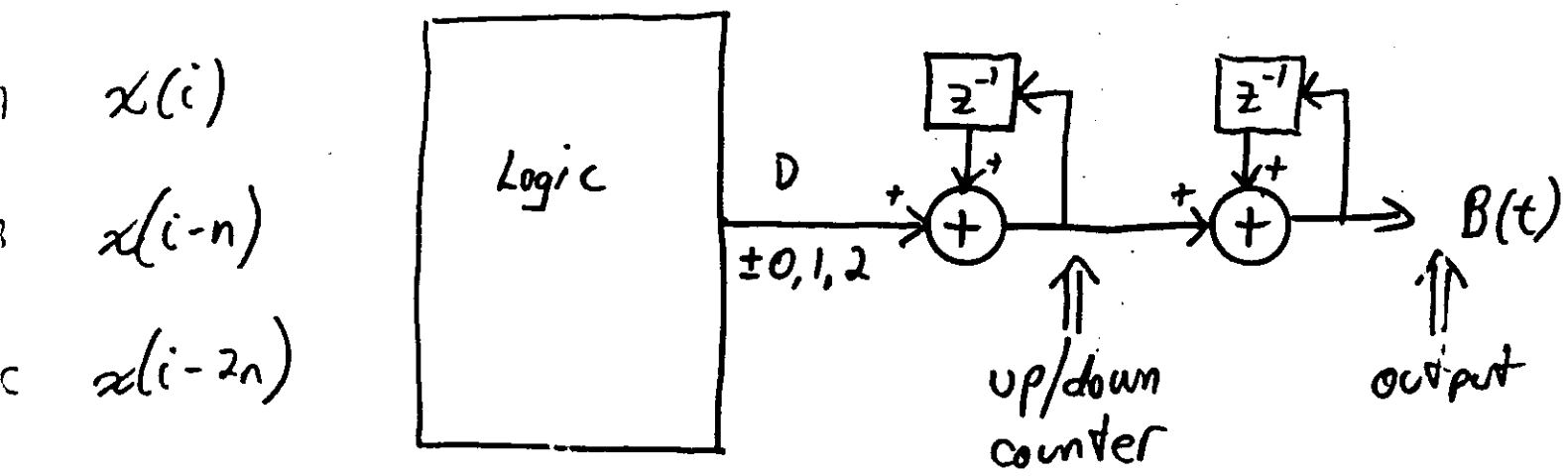
Desired result: $\text{Output} = A_i \cdot B(t)$

Any operation $\cong$ Desired result if

$$\exp(B(t)) - 1 \approx B(t)$$



Noise Generation (continued)

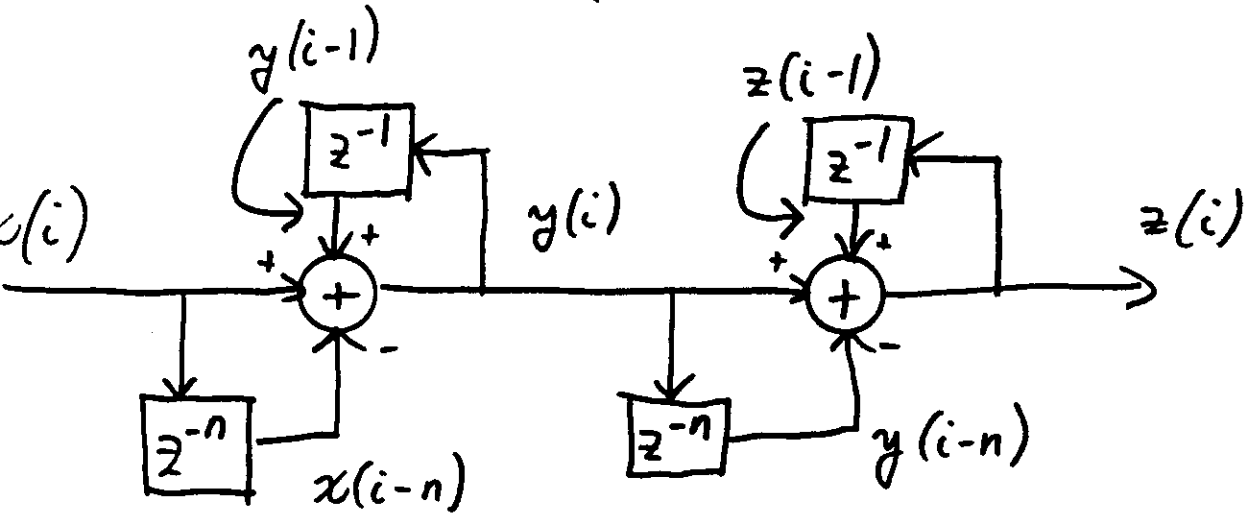


A	B	C	D
0	0	0	0
0	0	1	1
0	1	0	-2
0	1	1	-1
1	0	0	1
1	0	1	2
1	1	0	-1
1	1	1	0

3 dB bandwidth: $0.318 * \frac{f_s}{n}$

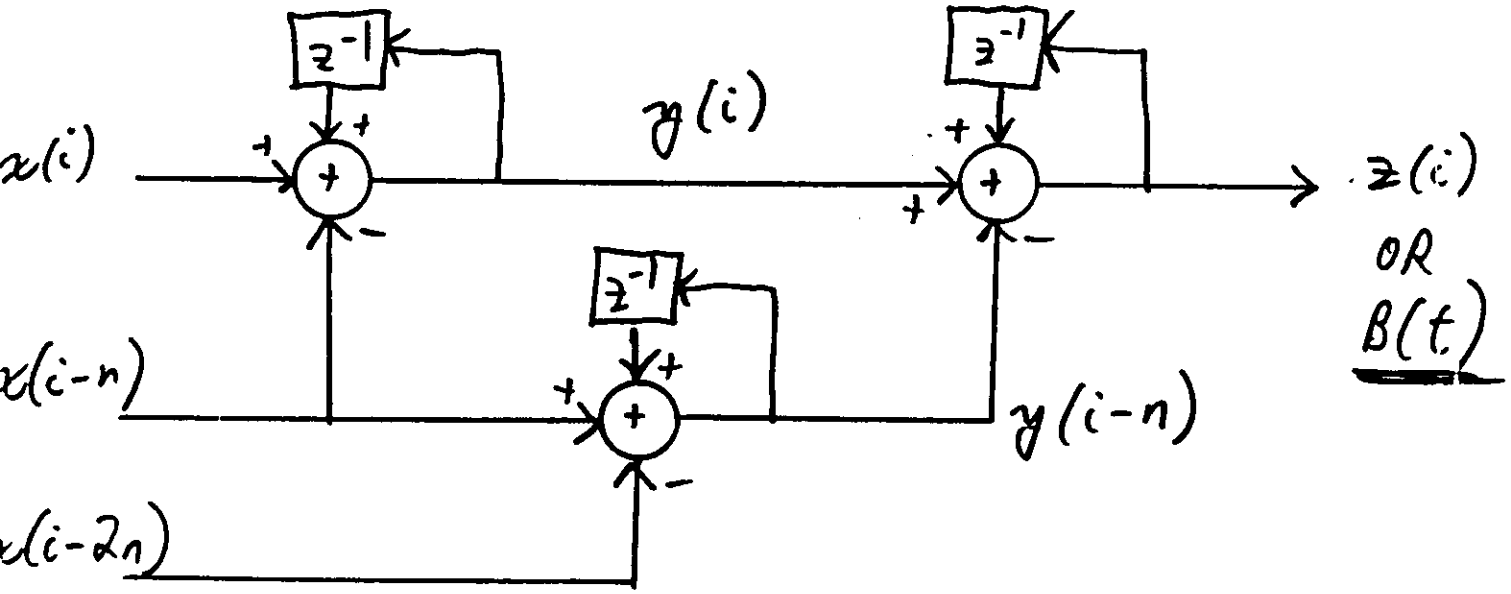
f_s = sampling rate
n = delay between shift registers

Noise Generation (continued)

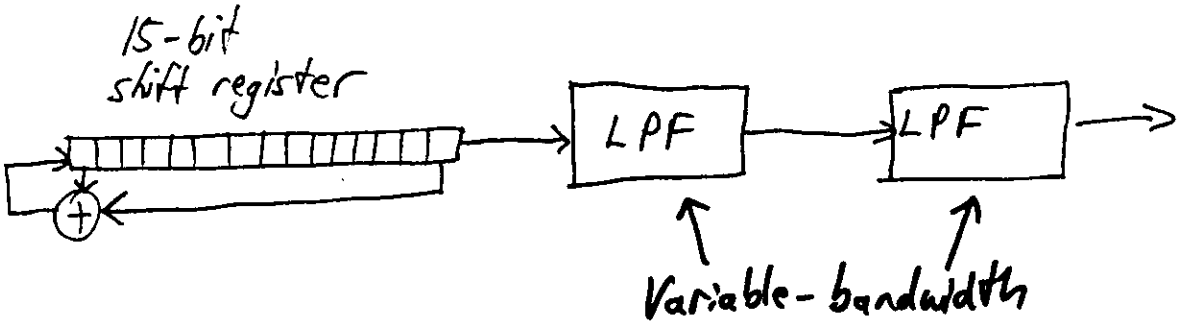


$$y(i) = x(i) + y(i-1) - x(i-n)$$
$$z(i) = y(i) + z(i-1) - y(i-n)$$

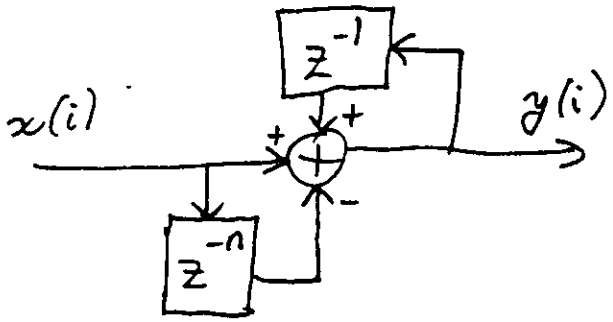
$$y(i-n) = x(i-n) + y(i-n-1) - x(i-2n)$$



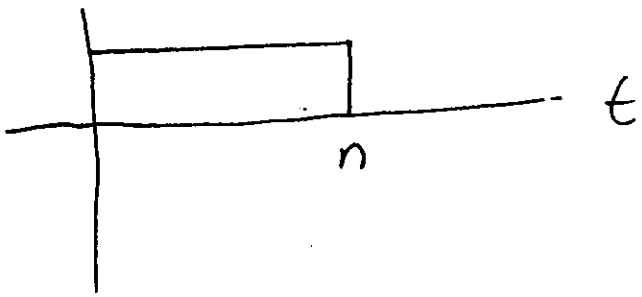
Noise Generation in AMY



LPF



Impulse Response:



$$y(i) = x(i) - x(i-n) + y(i-1)$$

$$H(z) = \frac{Y(z)}{X(z)} = \frac{1 - z^{-n}}{1 - z^{-1}}$$

Transfer Function