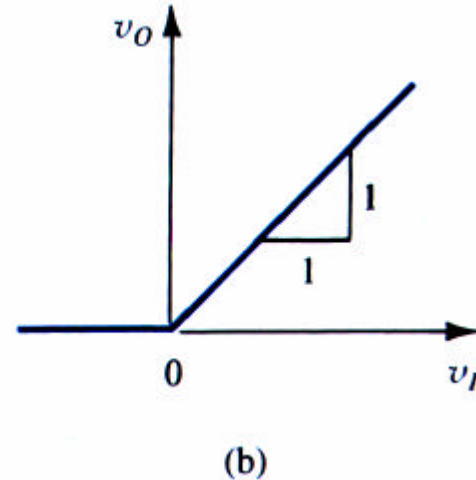
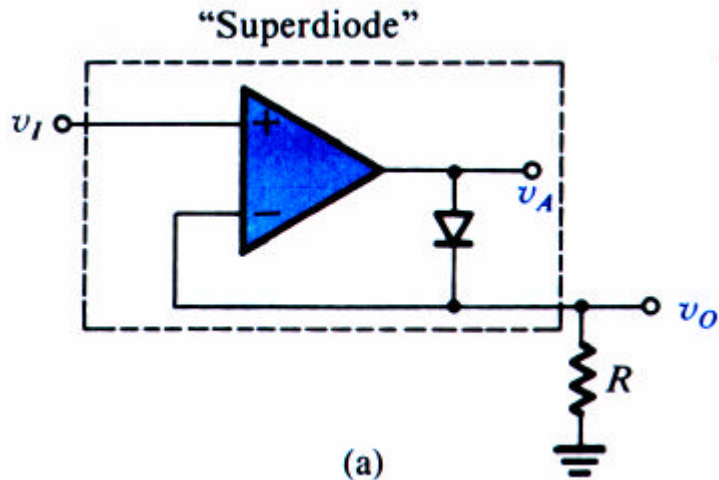


有二極體的運算放大器電路

精密半波整流電路

superdiode



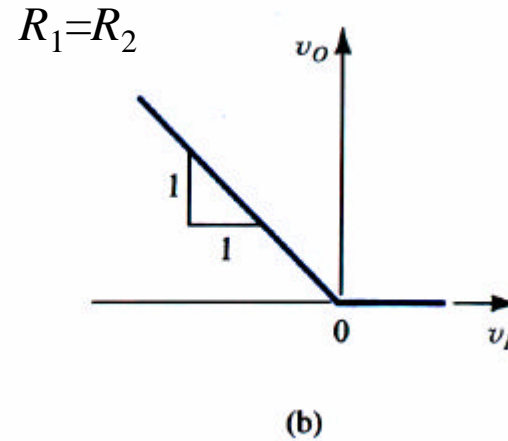
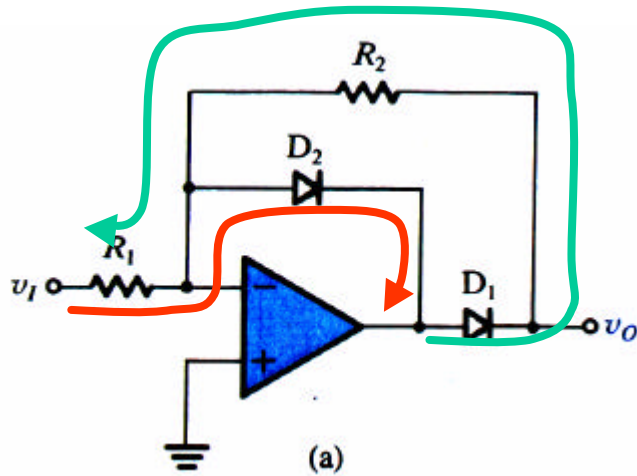
$u_I > 0, u_O = u_I$ (D ON)
 $u_I < 0, u_O = 0$ (D OFF)

$u_A = 0.7V$ Feedback loop is closed.
 $u_A = L^-$ Feedback loop is open.

電路的缺點：

1. 當輸入為負時，沒有負回授，兩輸入端電壓差為 u_I ，可能燒毀OP。
2. 當輸入為負時，沒有負回授，OP在飽和狀態。當輸入變正時，OP離開飽和狀態需要一段時間。

改良精密半波整流電路



輸入為正時的電流路徑

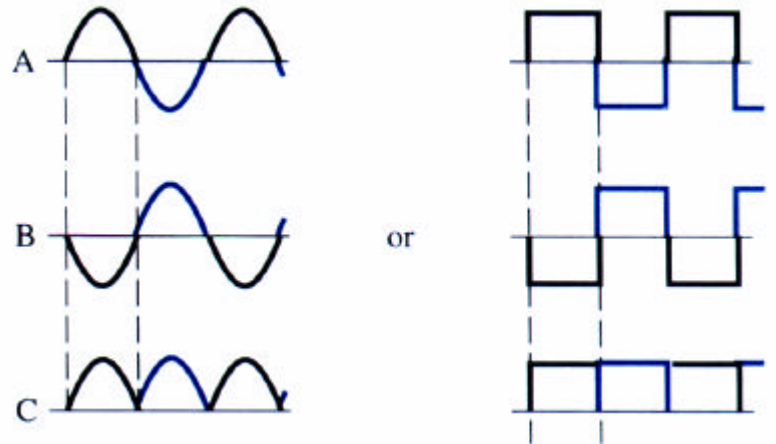
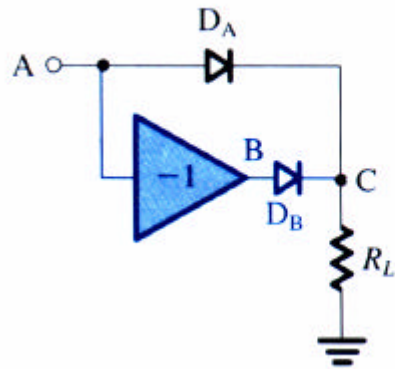


輸入為負時的電流路徑

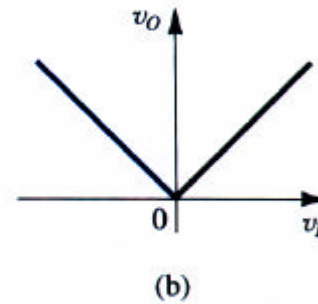
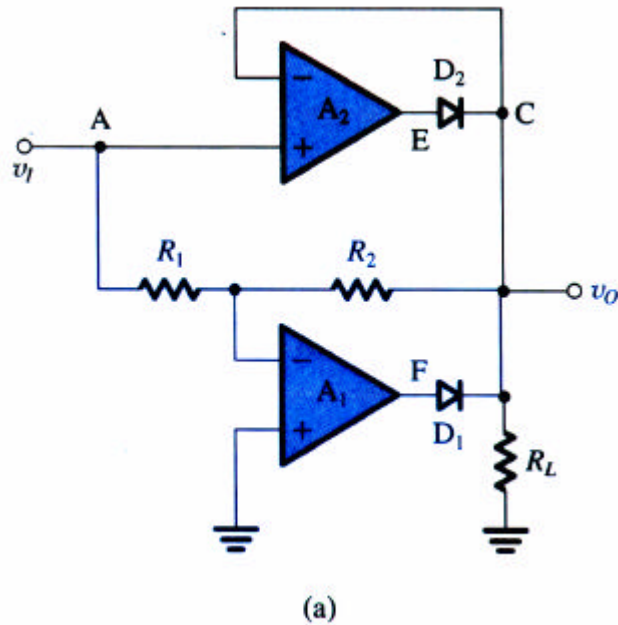
精密全波整流器

Absolute-value circuits

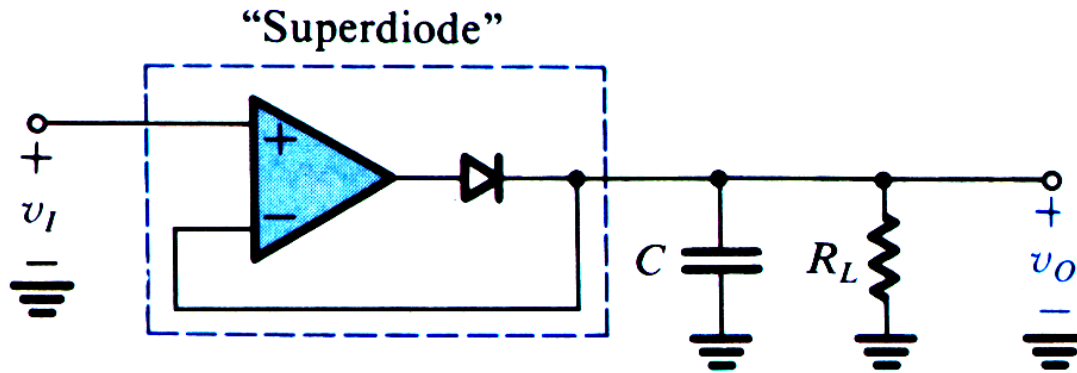
原理示意圖



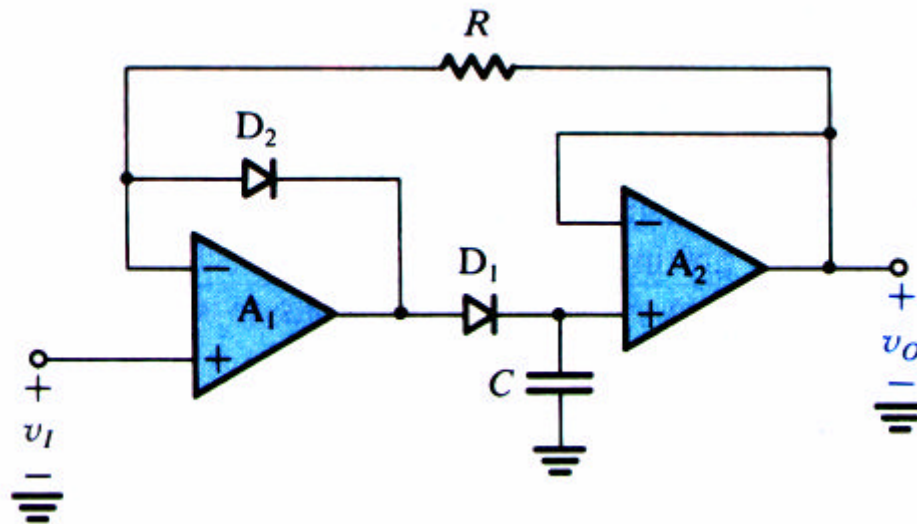
實際電路



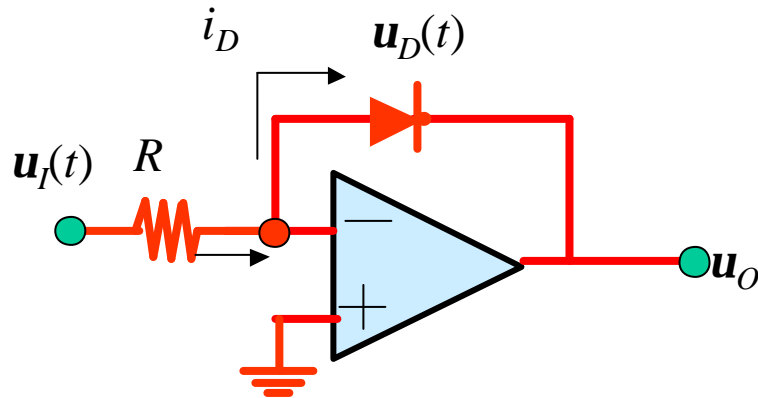
精密峰值整流器



加上Buffer的改良電路



Log Amplifier



$$i_D = I_S \left(e^{qu_D/kT} - 1 \right) = I_S \left(e^{u_D/V_T} - 1 \right) = \frac{u_I}{R}$$

$$u_O = -u_D \cong -V_T \ln \left(\frac{u_I}{I_S R} \right)$$

可用來做取dB值的電路

請你練習一下設計一個anti-log放大器電路，即取指數值的電路。