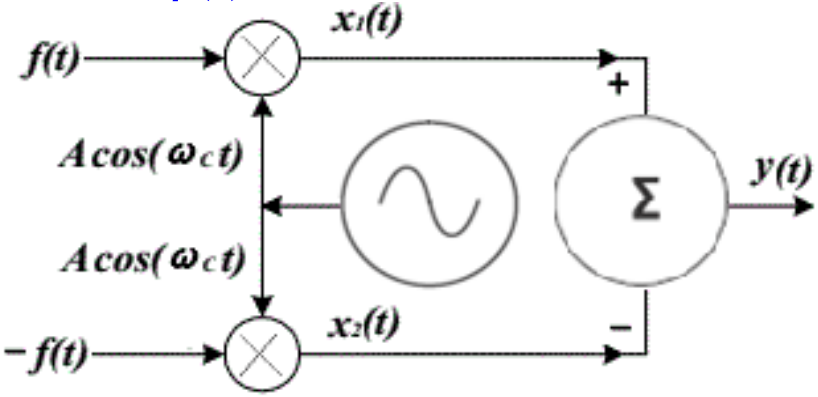
Study Questions (5~7)

5. An aircraft reaches cruise altitude of 10 km, and its VHF communication with a ground base station (the altitude of the station's tower mast is 890m) is finally lost. What is the furthest apart the aircraft and the base station can be? (Assume a spherical earth with radius of 6371km.)

6. The figure below illustrates a *balanced modulator*. The message signal applied to the top product modulator is $f(t)$, whereas that applied to the lower product modulator is $-f(t)$; these two modulators have the same local oscillator input: $A\cos(\omega_c t)$. Show the output $y(t)$ of the modulator.



Study Questions (5~7)

7. The output modulated signal derived from Question 6 is demodulated by applying it to a coherent detector (demodulator). Evaluate the effect of a frequency error $\Delta\omega$ in the locally generated carrier frequency, measured with respect to the carrier frequency of the modulated signal.