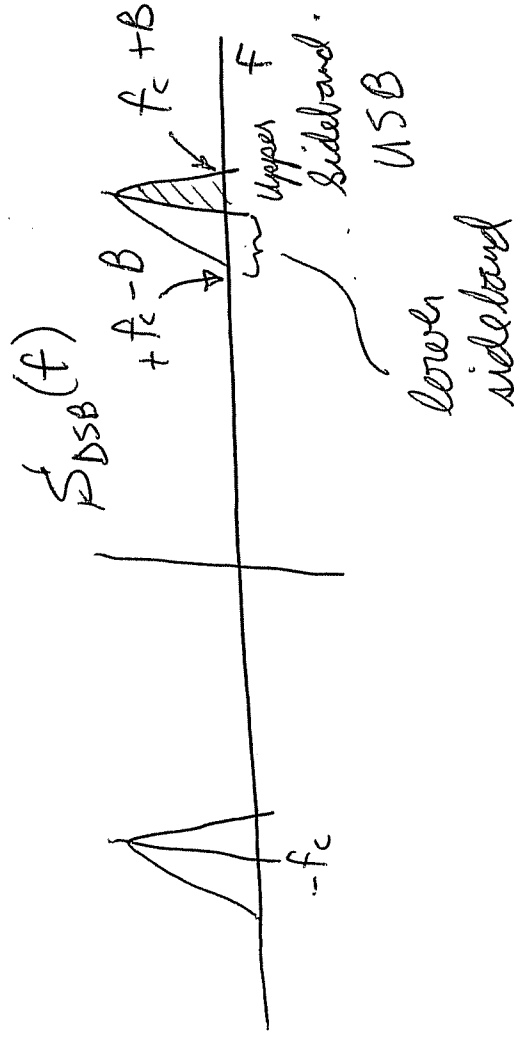


①

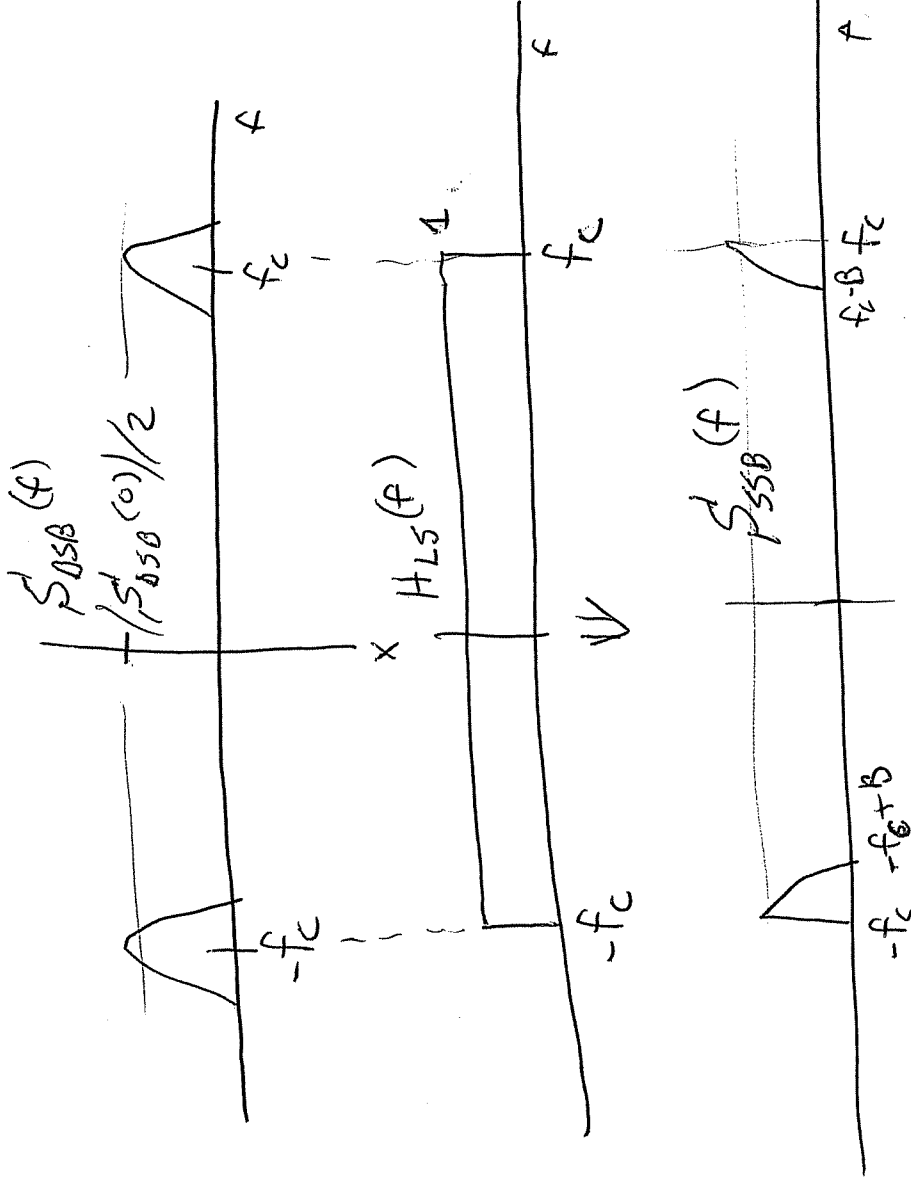
EE511: Lecture 18 Single Side Band Suppressed Carrier (SSB SC)

The double side band of DSB SC is redundant.



Consider the concept of SSB SC where we start with a DSB SC signal $S_{DSB}(t)$

3

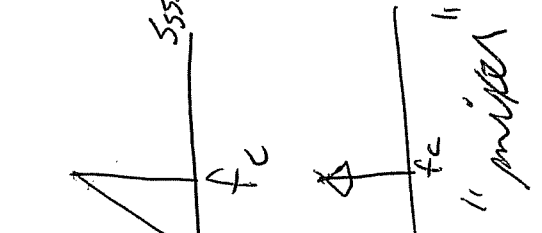
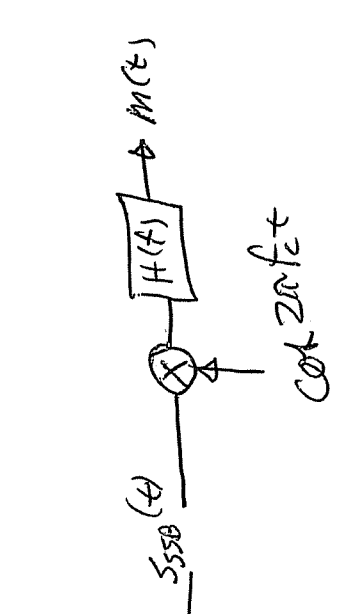


where $S_{SSB}(t) = S_{DSB}(t) * h_{LLS}(t)$ where "LS" = lower sideband

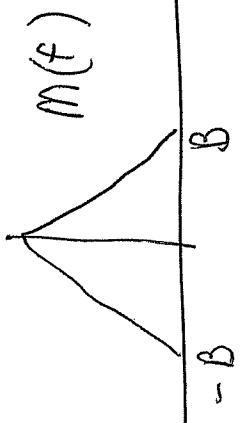
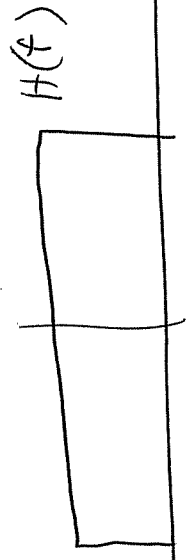
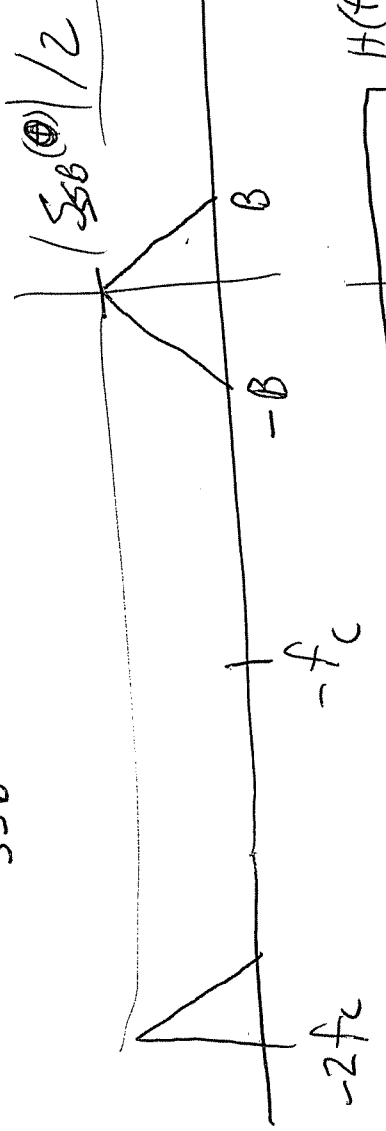
Recall the concept of the ~~superheterodyne~~

3

Let's demodulate same as DSB



$$= S_{SSB}(t) \cos(2\pi f_c t) * h(t)$$



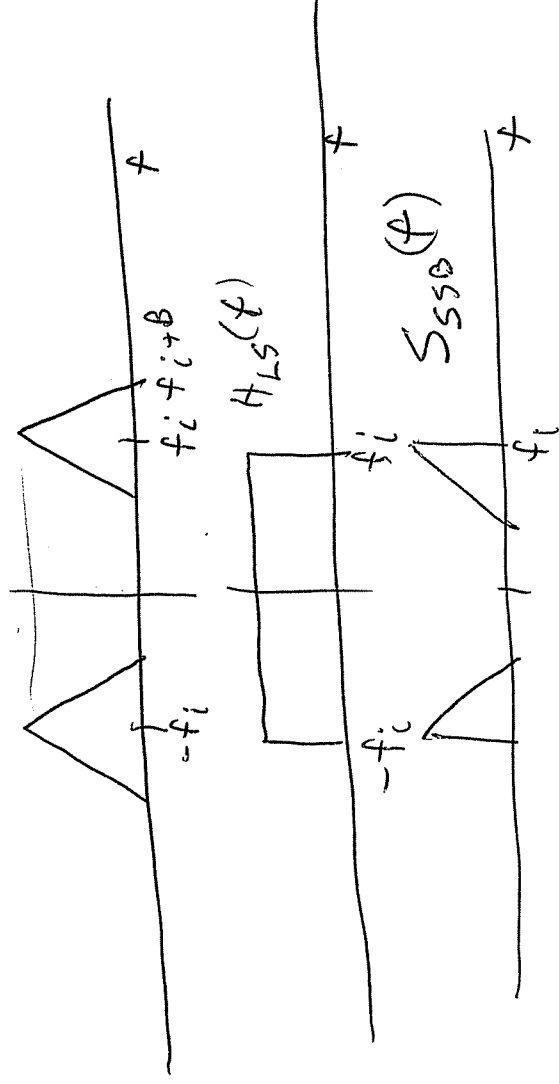
Generate a SSB modulated signal (4)
 using an intermediate frequency.

Given $m(t)$ A. t. $M(f) = \frac{A}{-B \quad B}$

An intermediate signal is generated with $s_i(t) = \cos(2\pi f_i t)$ where $f_i > B$

The first step is

$$s'_{SSB}(t) = (m(t) \cos 2\pi f_i t) * h_{LS}(t)$$



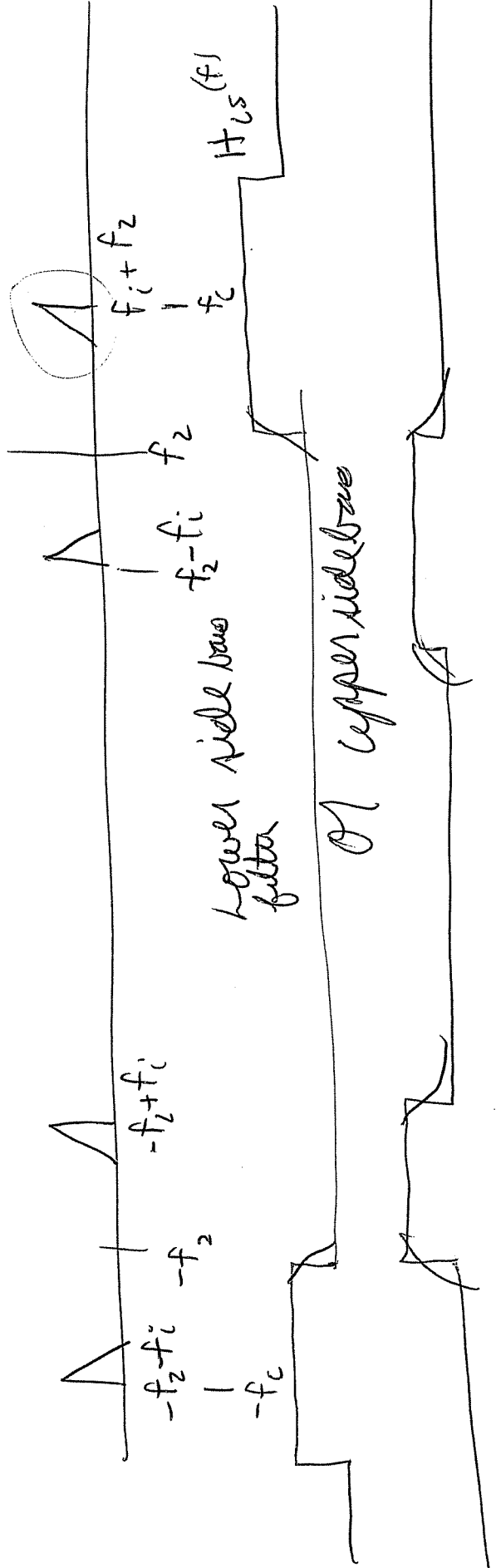
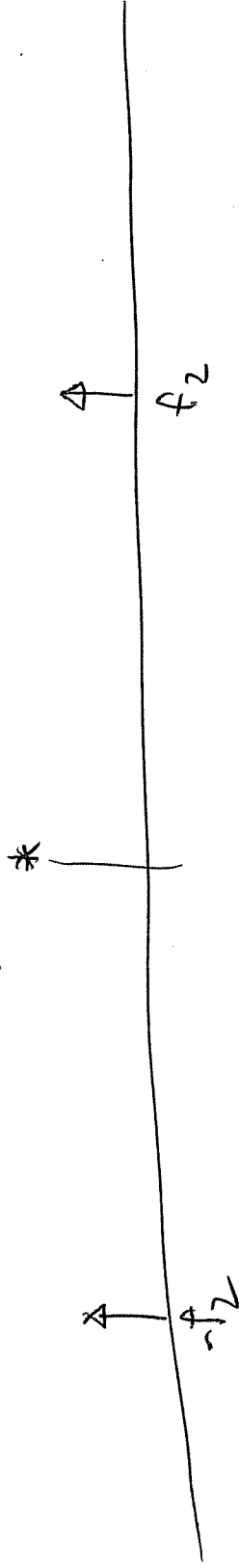
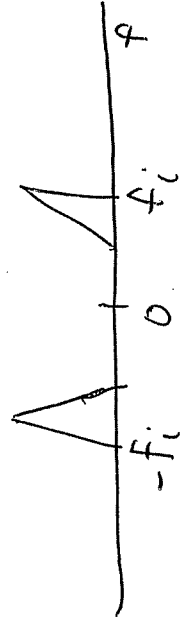
5

We would like our SSB to

be located at f_c

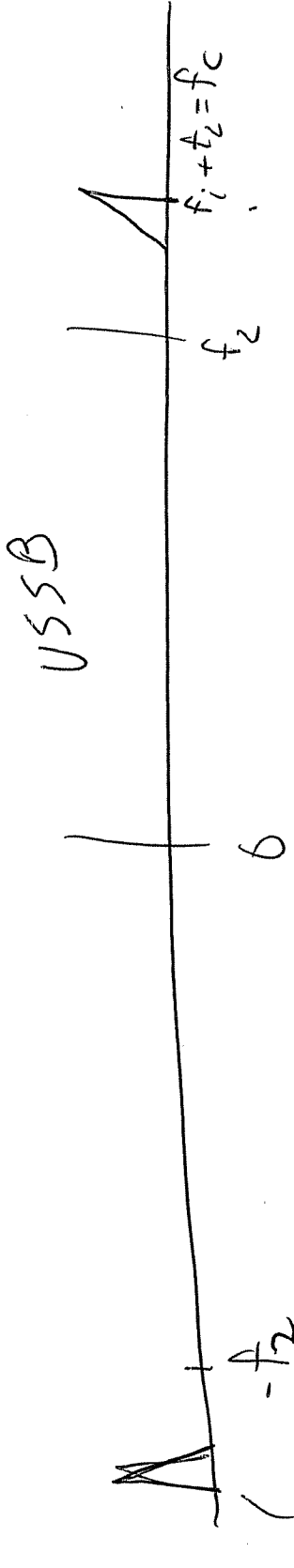
Let $f_2 + f_i = f_c$ so $f_2 = f_c - f_i$

$$\frac{\delta(f-f_2) + \delta(f+f_2)}{2}$$

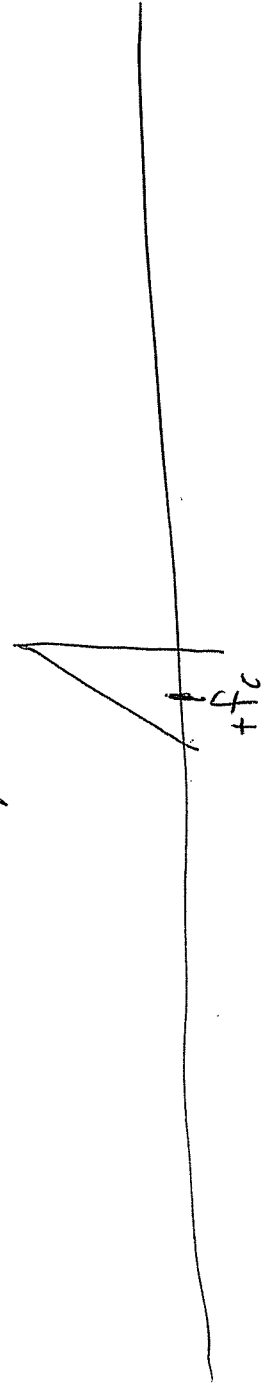


Let's use $H_{LS}(t)$

6

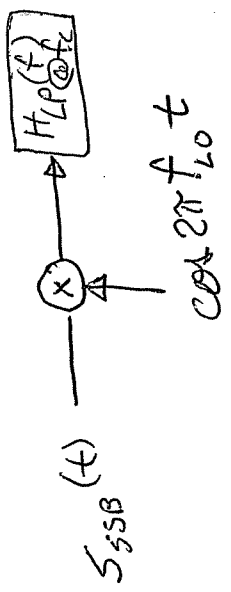
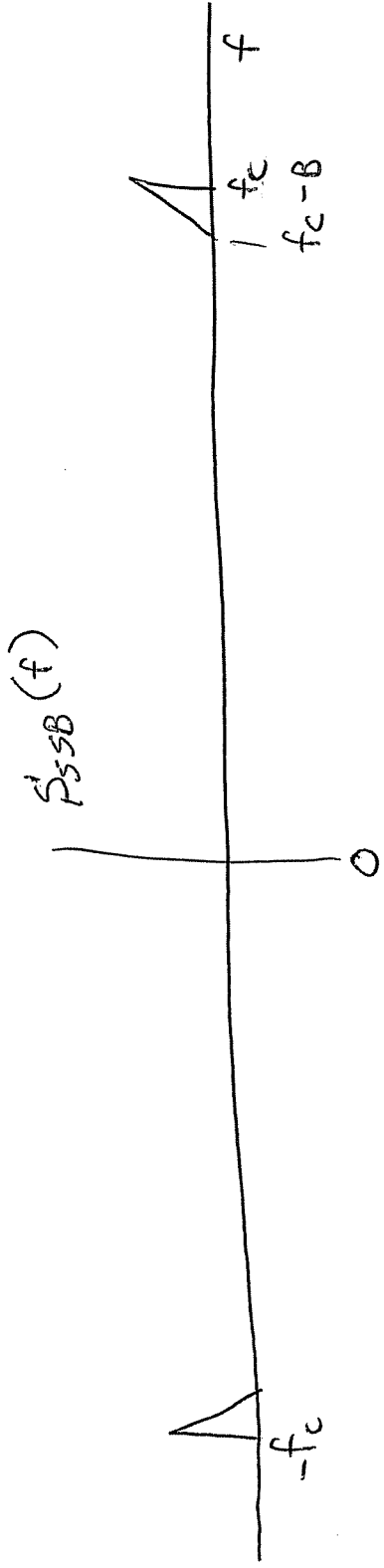


NOTE: in practice an additional offset is implemented so



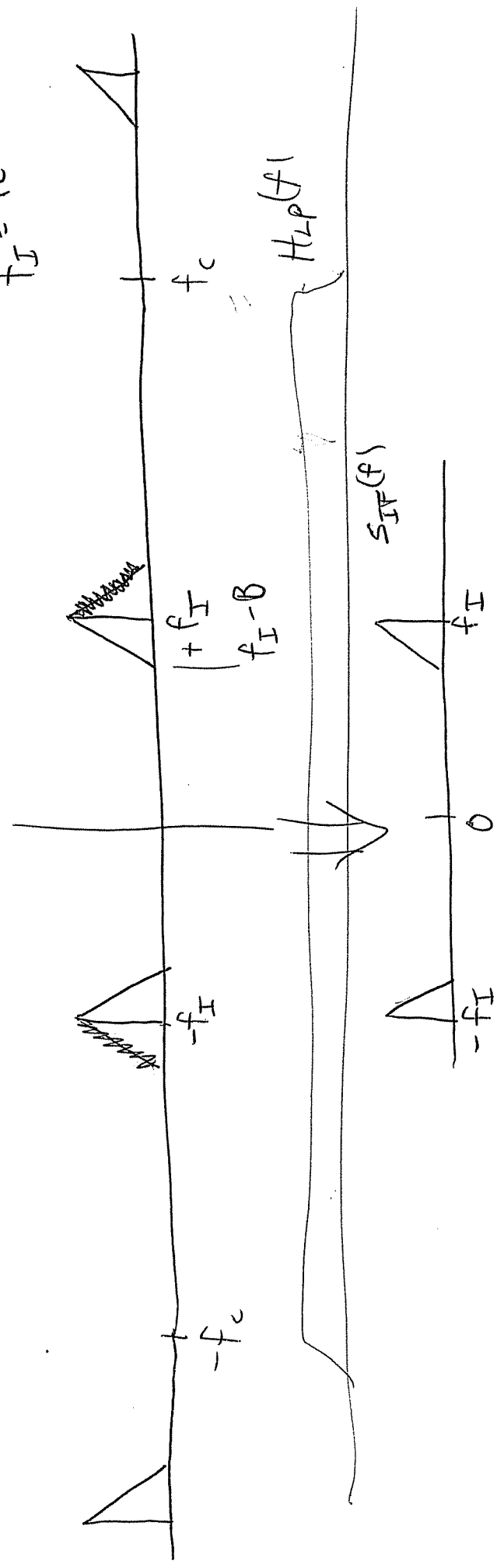
⑦

Demodulation SSB using IF



Let's use low side $f_{LO} < f_c$

$$f_I = f_c - f_{LO}$$



8

