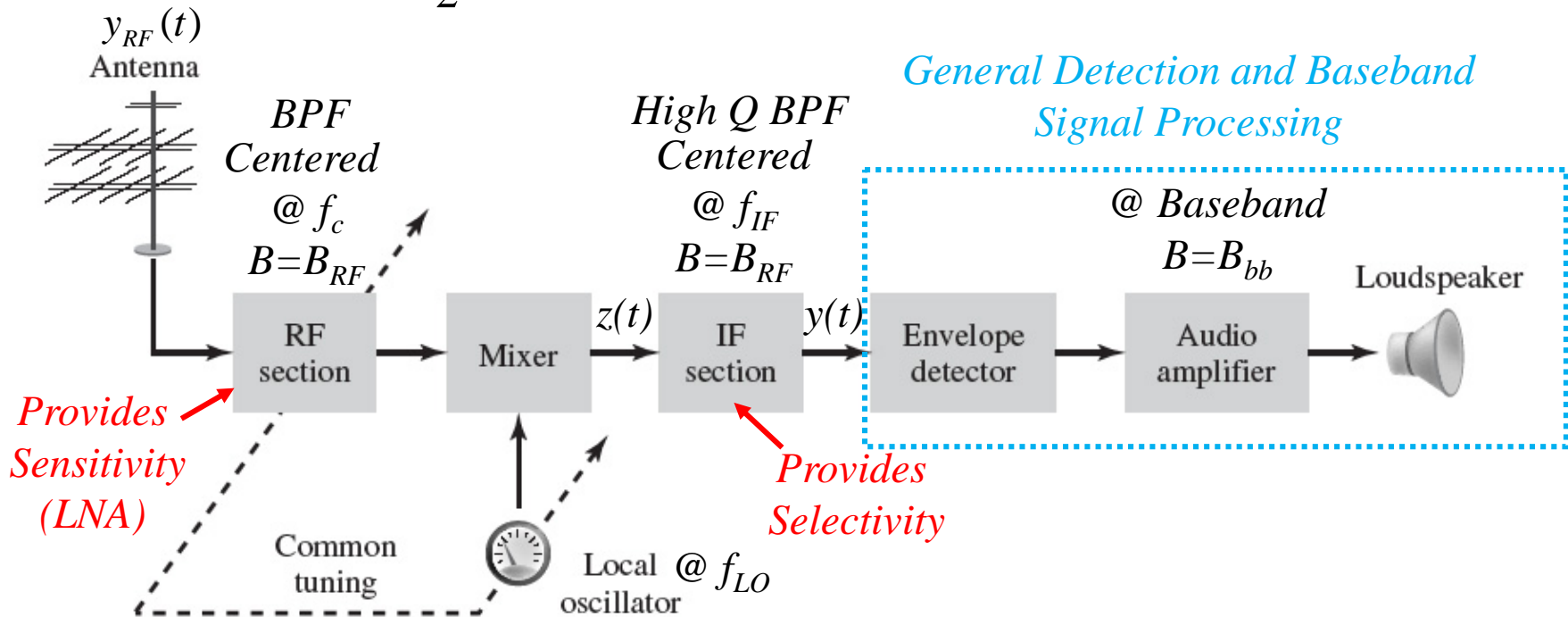


$$\cos \alpha \cos \beta = \frac{1}{2} [\cos(\alpha - \beta) + \cos(\alpha + \beta)]$$

$$z(t) = \overbrace{x(t) \cos(2\pi f_c t)}^{y_{RF}(t)} \cos(2\pi f_{LO} t) = \frac{1}{2} x(t) \cos(2\pi(f_{LO} - f_c)t) + \frac{1}{2} x(t) \cos(2\pi(f_{LO} + f_c)t)$$

$$y(t) = \frac{1}{2} x(t) \cos(2\pi(f_{IF})t) \quad f_{IF} = f_{LO} - f_c \quad f_{LO} = f_{IF} + f_c$$



**FIGURE 3.27** Basic elements of an AM radio receiver of the superheterodyne type.