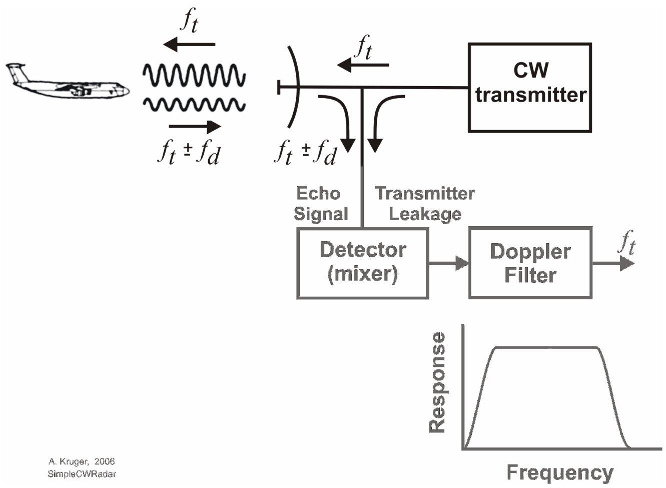
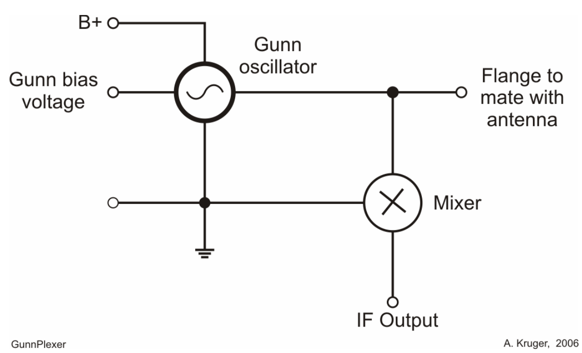
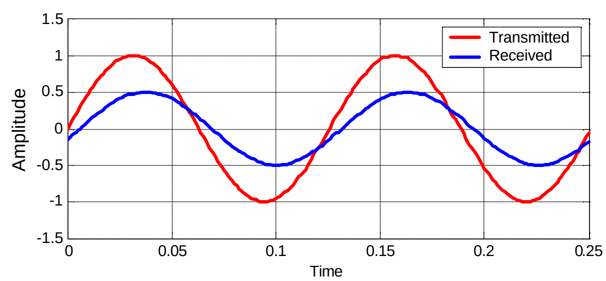
CW Radar

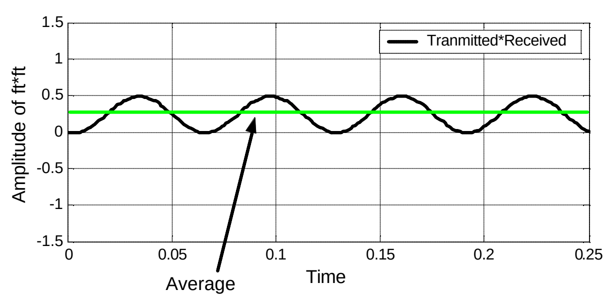


Simple CW Radar



Gunnplexer Schematic





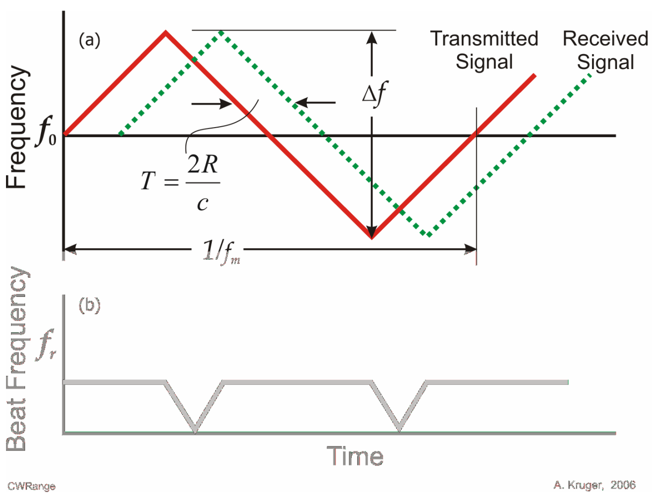
Applications

Police radars, baseball speed gun, artillery-projectile muzzle velocity measurement, docking radars (ships, cars), airborne Doppler navigator, vibration measurement, flow measurement, ground speed of vehicles, monitoring of respiration in humans and animals.

Characteristics

- More sensitive to clutter – can't use gating to ignore clutter
- Direction of target with simple CW radar unambiguous
- Matched filter considerations
- FM-CW Radar for range measurement
- Much lower peak power that equivalent pulse radar – hard for hostile electronic warfare receiver to intercept
- Multiple antennas are often required (no circulator)

Range detection with CW-FM radar



In the figure, (a) is the frequency-time relationship of an FM-CW radar with triangular modulation. The received signal (dashed line) from a target at range R is delayed a time T=2R/c. Δf is the frequency excursion and f_m is the modulation frequency. In (b) is the difference (beat) frequency between the transmitted and received signals. One can show that for a stationary target:

$$f_r = 4Rf_m\Delta f / c$$

If the target moves there is a Doppler shift f_d the difference frequency is $f_r + f_d$ during the first half and the f_r-f_d the second half of the modulation period. One can average over a modulation period and get the range.