Frequency Mixing

An introduction to Heterodyning Signals
Heterodyning or Mixing

• Heterodyning creates new frequencies by combining or mixing two frequencies.

• The result is the original frequencies, the difference of the two frequencies and the sum of the two frequencies.

• The two frequencies are combined in a nonlinear signal-processing device usually called a mixer. In the 88D RADAR the “Mixer” is located in the “Antenna Mounted Electronics” box.

• A filter on the output of the mixer can be used to select which output to use in a circuit.
A simple mixer

Input Signal

Local Oscillator

Output Signal
Mixer outputs are inputs plus the sum and difference

Input Signal

Output Signal = Input Signal + Local Oscillator

Input Signal

Output Signal = Input Signal - Local Oscillator

Local Oscillator
Mixer outputs are inputs plus the sum and difference

Input Signal + Local Oscillator
Input Signal - Local Oscillator
Add a low pass filter to only pass what is needed.

Add a few RADAR/radio terms to the drawing

Input Signal → Mixer → Low Pass Filter → "Intermediate Frequency"

"RADAR Return" → Local Oscillator

"Stable Local Oscillator"
Simplify and add acronyms

“RADAR Return”

Site Freq +/- Doppler shift

Mixer

Low Pass Filter
57.549 MHz

“Intermediate Frequency”
Center Around 57.549MHz “IF”

“Stable Local Oscillator”
=Site Freq - 57.549MHz “STALO”
Creating site frequency by mixing STALO & COHO

“Coherent Oscillator”  
57.549MHz  
“COHO”

“Stable Local Oscillator”
= Site Freq - 57.549MHz  
“STALO”

Mixer

High Pass Filter

RADAR Site Frequency