

Pulse-Pair Processing

To distinguish a moving target of a fixed object with help of the Doppler frequency, at least two periods of the deflection must be compared with each other.

Since the Doppler- frequency (few Hertz) is small relatively to the transmitted frequency (much Mega-Hertz), therefore a phase comparison is more easily to carry out than a direct frequency comparison technically.

The storage of a deflection is carried out in suitable memory media, in the past in special analogous vacuum memory tubes, later also with a chain of condensers (distance: digital, signal: analogous) and today only in digital memory cells.

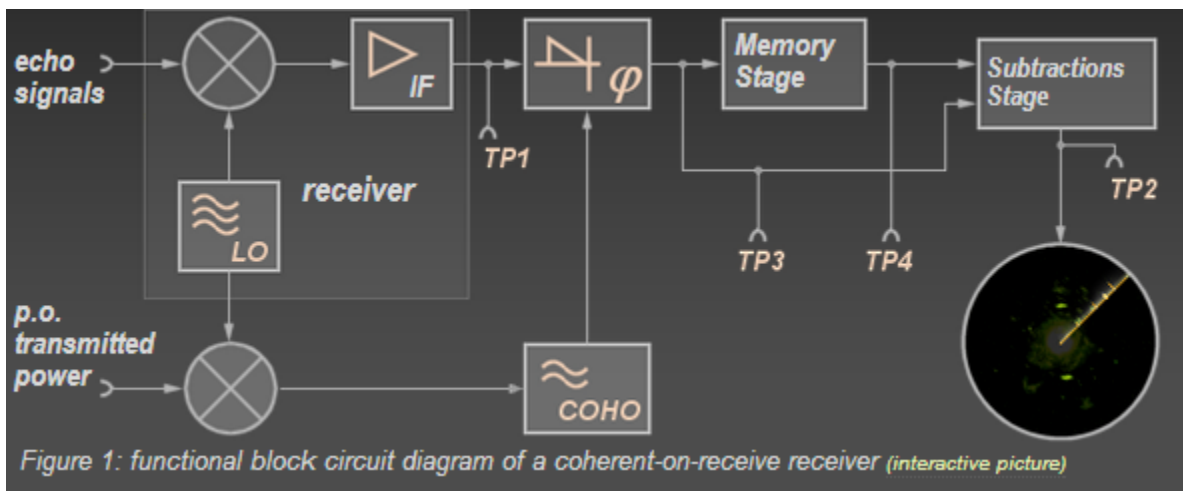


Figure 1: functional block circuit diagram of a coherent-on-receive receiver (interactive picture)

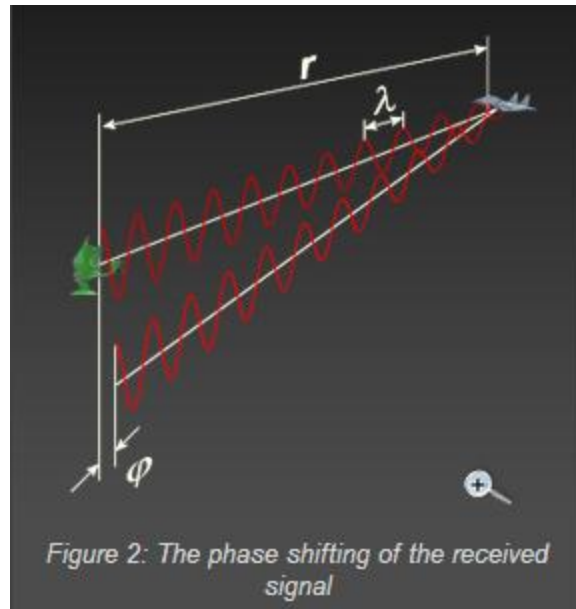


Figure 2: The phase shifting of the received signal

Well, a fixed target suppression happens by the phase comparison of the echoes received by several pulse periods (pulse-pair processing). If the phase relationship is always equal, then there isn't any phase difference and the target will be suppressed. If the target has moved, the phase difference is unequally zero and the target will be shown on the screen.

To get the necessary frequency-reference for the phase-detector, a high correct coherent oscillator (called: "Coho") is synchronized with the down converted on the IF- frequency transmitting pulse.

Oscillogramm of an outputsignal of a phase-detector: The echo signal of a moving target at the output of the phase-detector changes it's value and also the polarity in every pulse period. A fixed clutter signal will keep it's value and polarity in every pulse period.

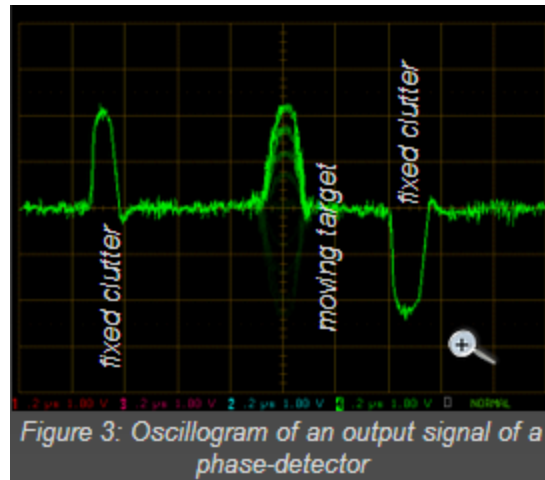


Figure 3: Oscillogram of an output signal of a phase-detector

The echo signal of a moving target at the output of the phase-detector changes its value and also the polarity in every pulse period. A fixed clutter signal will keep its value and polarity in every pulse period.

A pulse period is stored in a memory. This memory stage has got a memory cell for each range cell and delays the whole scan for one pulse period (PRT). Both periods, the actual period and its predecessor, are led to an extractor. The output of this stage is the difference of both input signals. Clutter with a constant amplitude will be eliminated. Moving targets pass this stage. On this way the moving target produces an output signal and the fixed clutter doesn't do this. (see the tooltip on test point TP2 in Figure 1!)

Source: <http://www.radartutorial.eu/11.coherent/co07.en.html>