

Application Note

Ref. : ARF SuperReg vs SuperHet

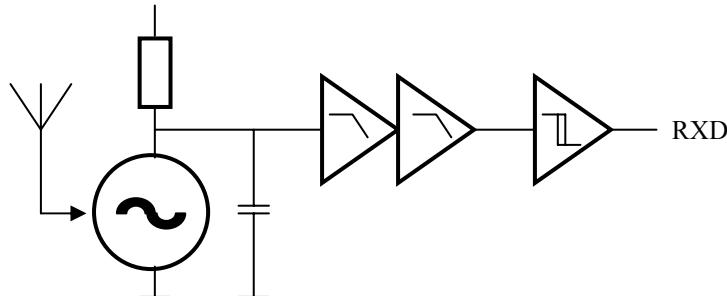
Author : PCY

SUPERREGENERATIVE VS SUPERHETERODYNE

1 - PRESENTATION OF THE DOCUMENT

This document presents the different structures of simple Low Cost Receivers used today in radiofrequency transmission.

2 - SUPER REGENERATIVE



Super regeneration is based on an oscillator in on / off operating mode. When it is switched on, the oscillation phase is preceded by a short period of very high sensitivity. The time required for oscillation to begin is then a function of the external energy input to the oscillator (detection of an incident carrier). When it is in amplifier mode, super regeneration does not permit a class A consumption, it switches to class C as soon as the oscillations start. A high amplification of its current image therefore reproduces the variations of the incident wave constituting modulation.

- Advantages:
 - Very economical structure: a single HF stage + an AOP !
 - Very low consumption possible.
- Drawbacks:
 - ASK detection only
 - Wide passband (several MHz!!!)
 - Reduced sensitivity

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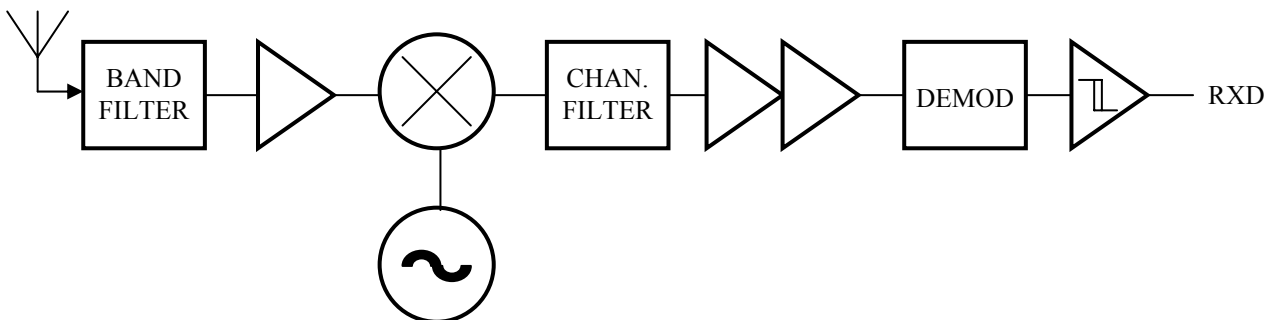
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Radio characteristics difficult to control
 High re-radiation (oscillatory phase)
 No cohabitation possible at a distance of less than 5 m.
 Wake-up time of several seconds
 Reduced temperature range
 Non-integratable structure
 Widely dispersed manufacturing

- Fields of use:
 - Toys
 - Household remote control
 - Automobile industry (security due to very high-level rotating codes)

N.B.: The radio characteristics of a super regenerating receiver can however be controlled individually by means of various calibration and correction devices; the receiver then loses all its economic advantages.

3 - SUPER HETERODYNE :



The super heterodyne system is composed of a LF processing channel where each stage performs control of one of the radio characteristics. Selectivity is achieved by means of the Channel Filtering. The sensitivity is obtained by means of a high amplification channel. The choice of demodulator enables any type of modulation to be processed. Transposition of the radio spectrum received to the lower processing frequency is performed by means of one or more devices called "Frequency changers".

- Advantages:
 - Accepts any type of modulation
 - Greatly reduced passband possible
 - Very high sensitivity possible
 - Radioelectric characteristics dissociated and therefore easily controllable
 - Very short wake-up time

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- Wide temperature range
- Very integratable structure
- Very great reproducibility
- Drawbacks:
 - Complex structure if low integration
 - Low consumption possible only by power supply sampling
- Fields of use:
 - All fields ! (The receiver par excellence).

N.B. : A receiver structure also exists called Homodyne (or Zero IF). We will limit ourselves here to presenting it as a heterodyne where frequency transposition is performed directly at "zero frequency". The structure is then much lighter but requires a high frequency precision and complicated (but fully integrated) demodulators. It is widely used in Pagers and in Digital Video Broadcasting (DVB).