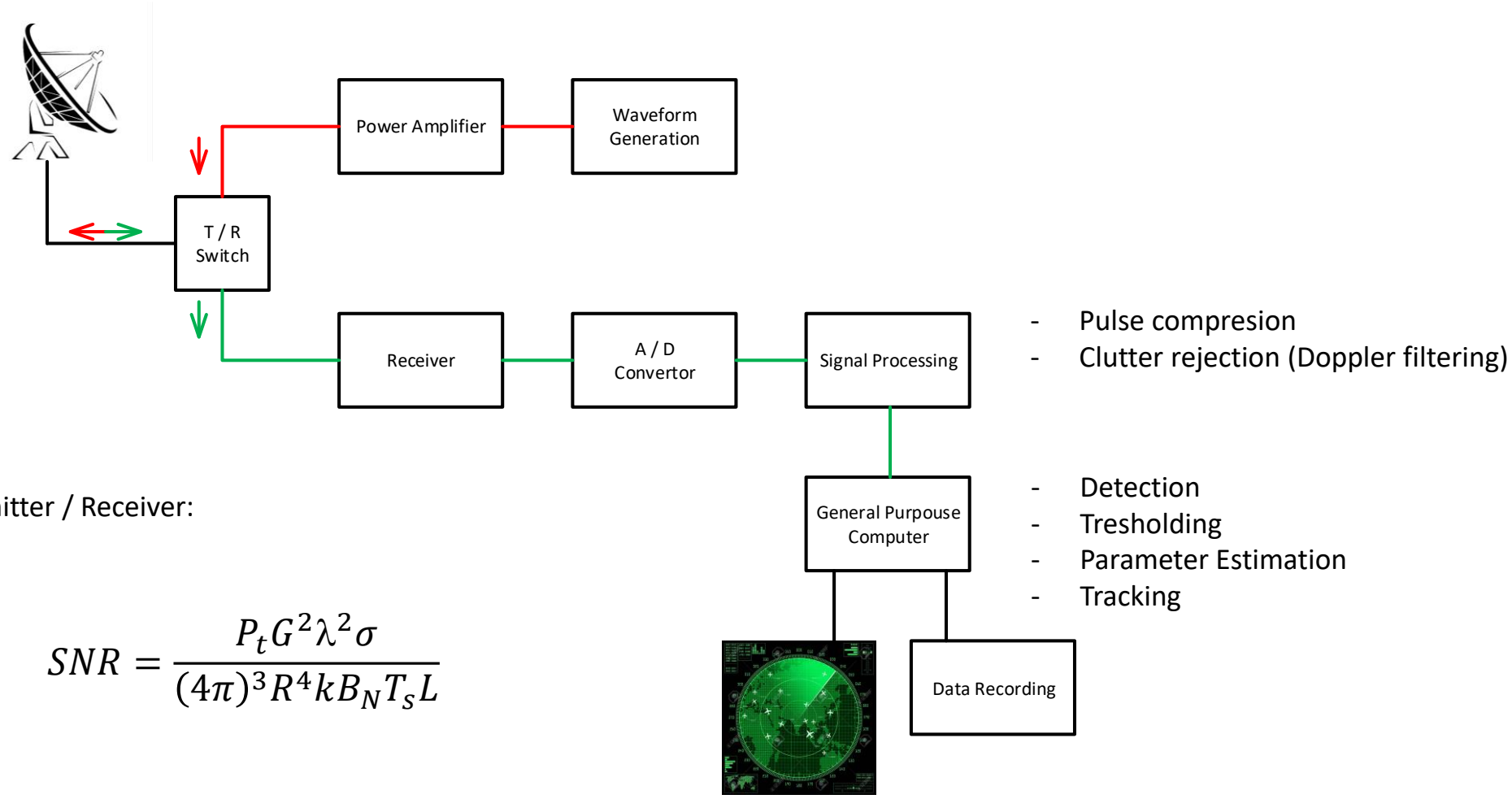
HW koncepce

Block Diagram of Radar System



- Pulse compresion
- Clutter rejection (Doppler filtering)

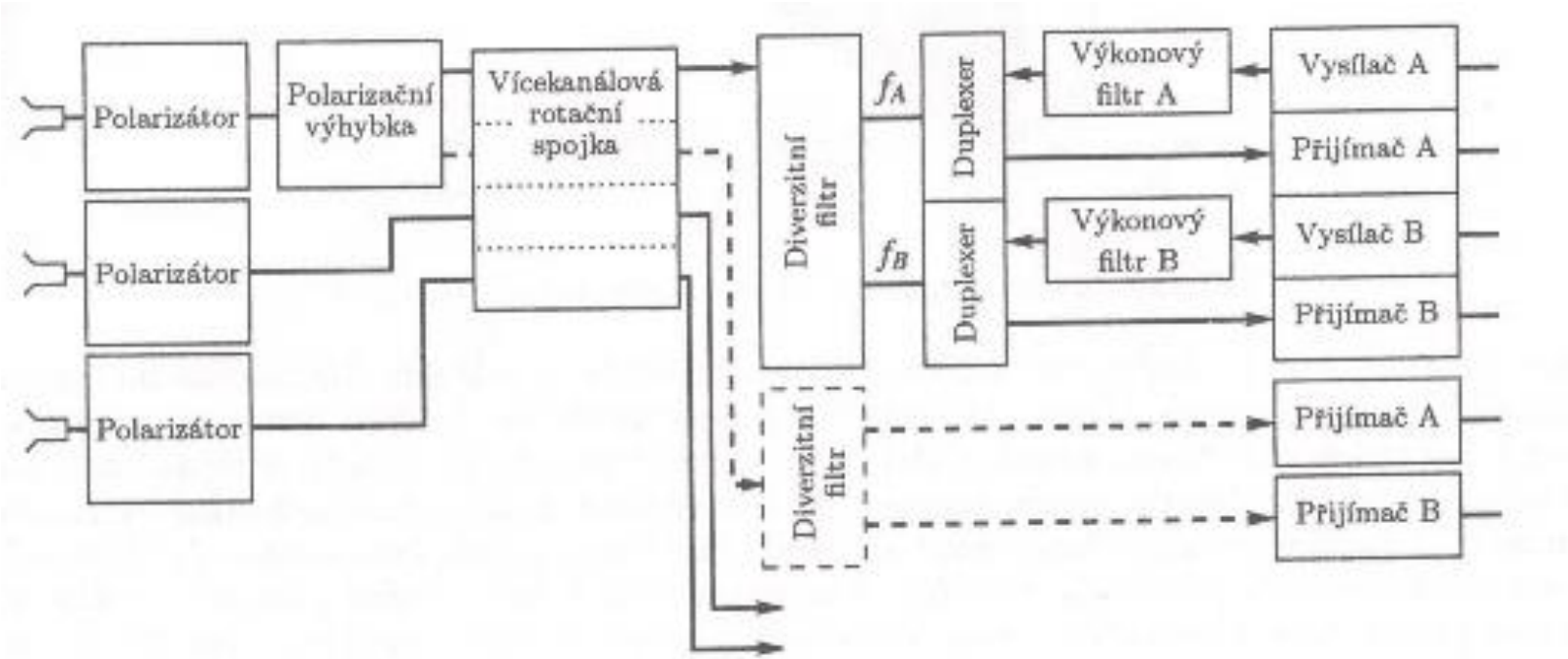
- Detection
- Tresholding
- Parameter Estimation
- Tracking

Parameters affected by Transmitter / Receiver:

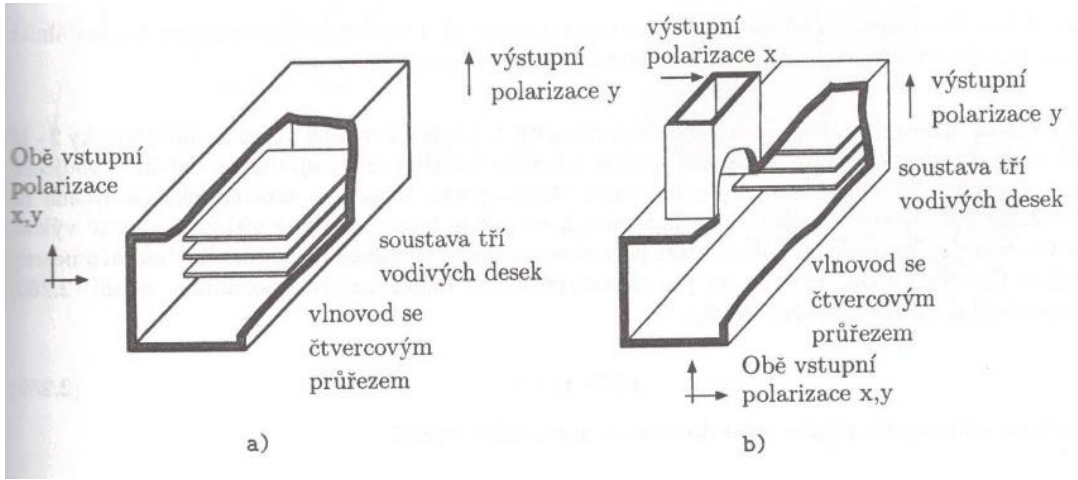
- Peak / Average power
- System noise
- System losses

$$SNR = \frac{P_t G^2 \lambda^2 \sigma}{(4\pi)^3 R^4 k B_N T_s L}$$

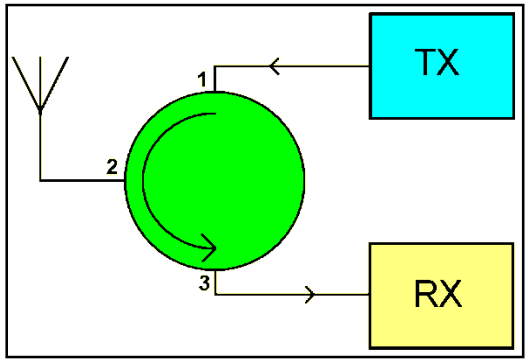
Block Diagram of Radar System

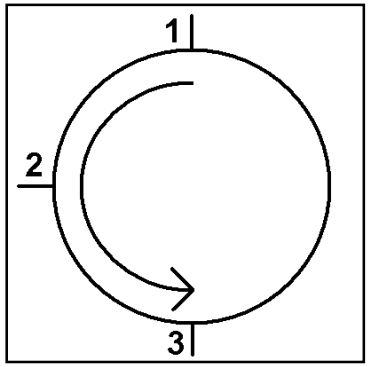


Phase Shifter, Filter



T / R Switch – Duplexer - Circulator

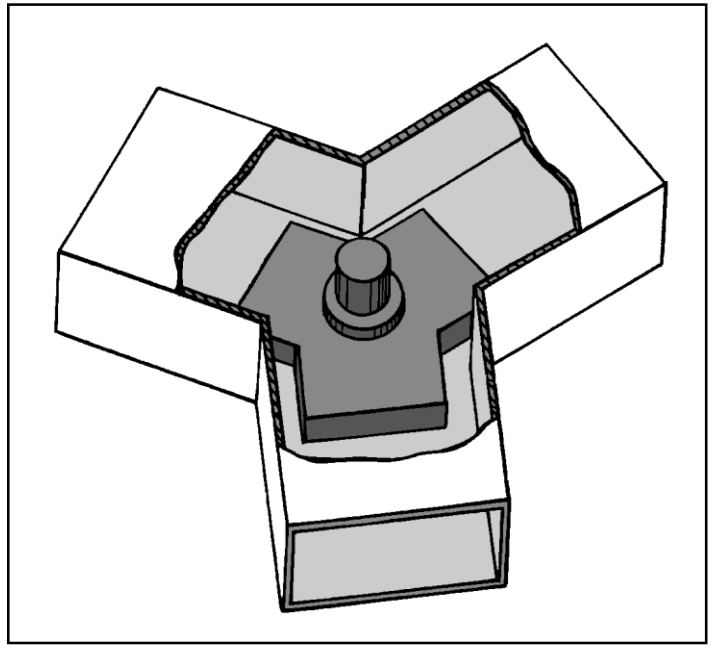




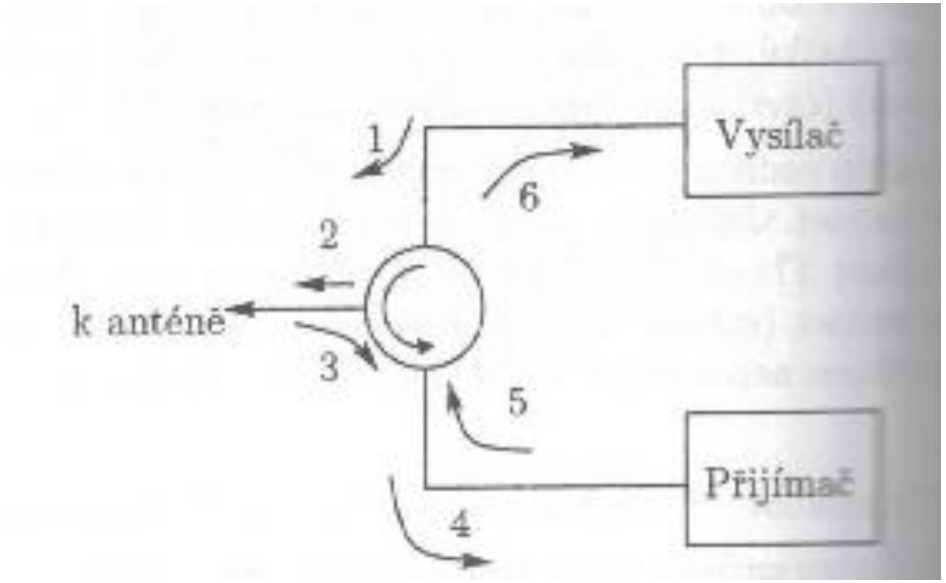
$$S_{11} = S_{22} = S_{33} = 0$$

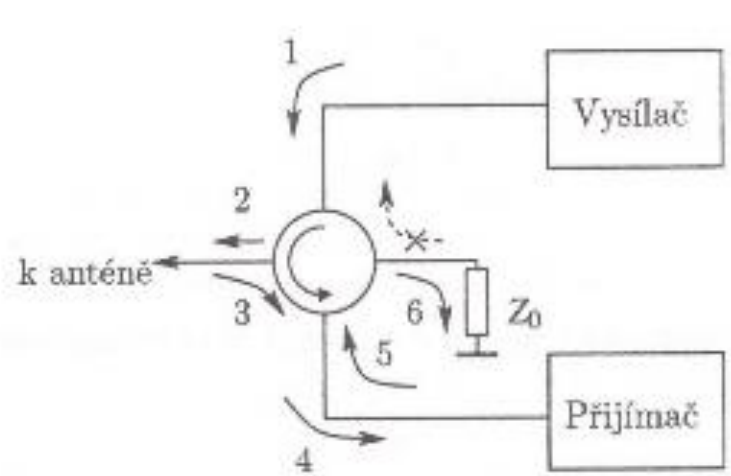
$$|S_{21}| = |S_{32}| = |S_{13}| = 1$$

$$S_{21} = S_{23} = S_{31} = 0$$

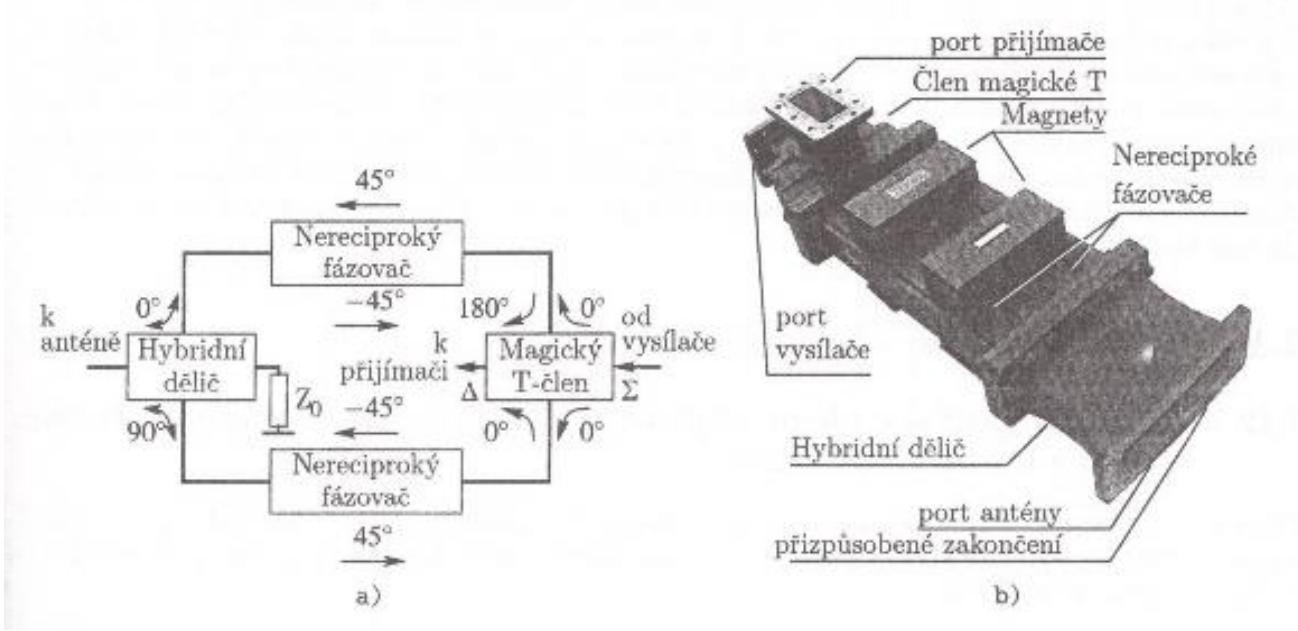


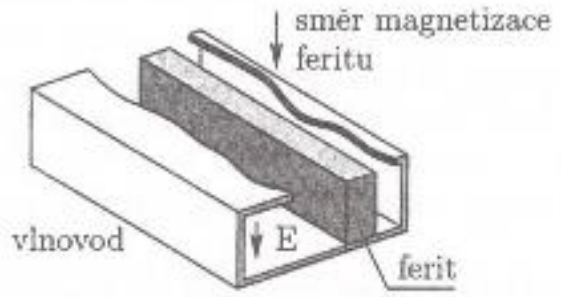
T / R Switch – Duplexer - Circulator



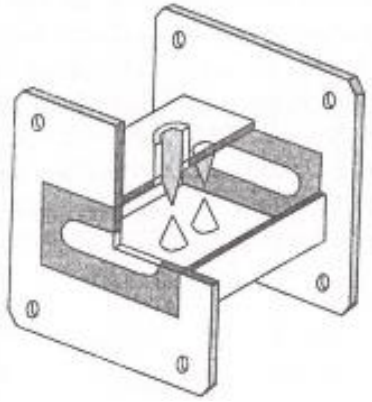


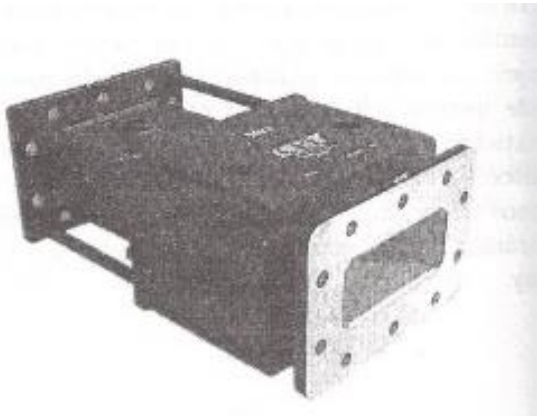
T / R Switch – Duplexer - Circulator



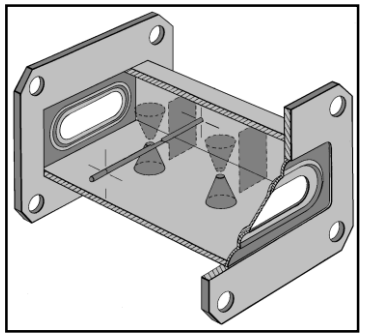


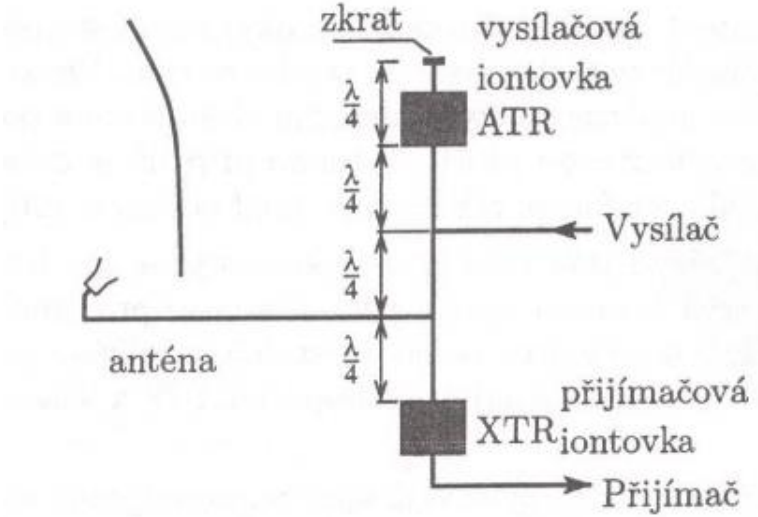
T / R Switch – Duplexer - Coupled Waveguides



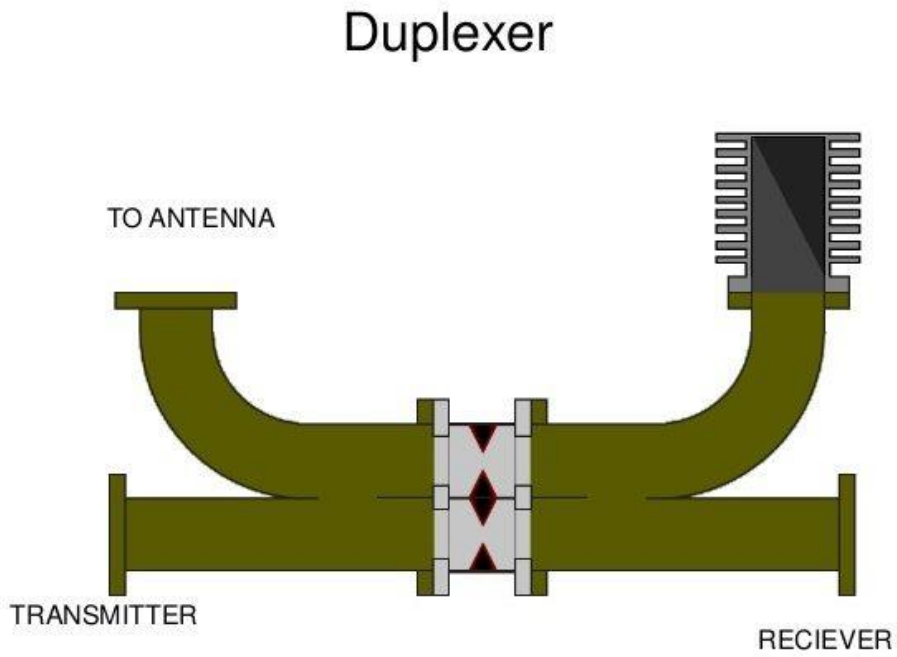


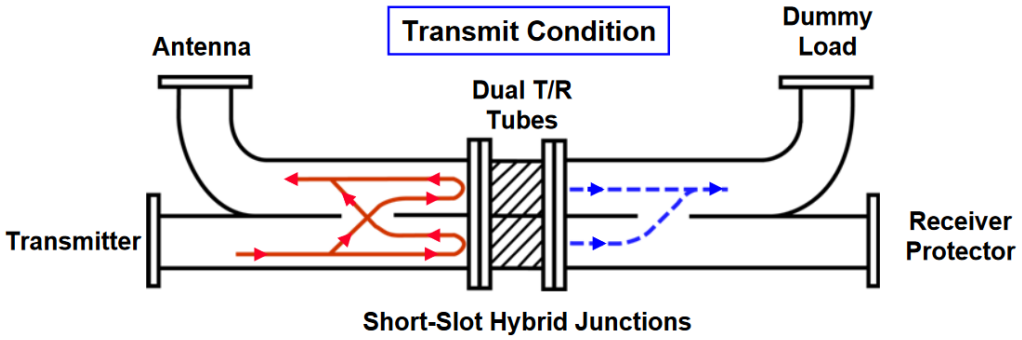
TR-cell

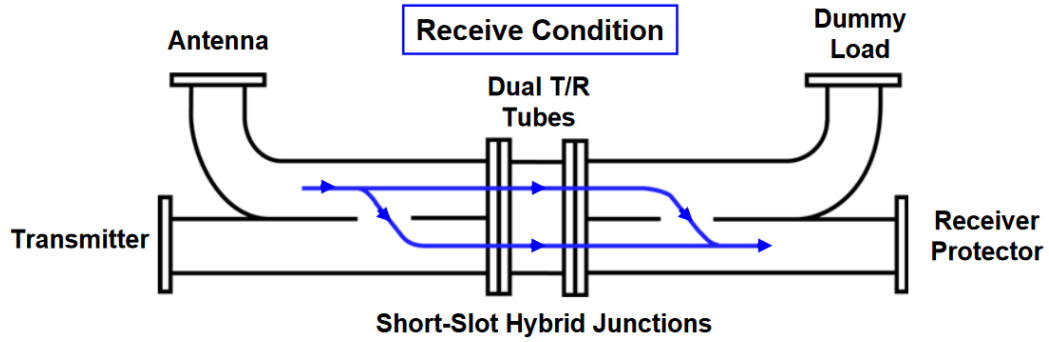




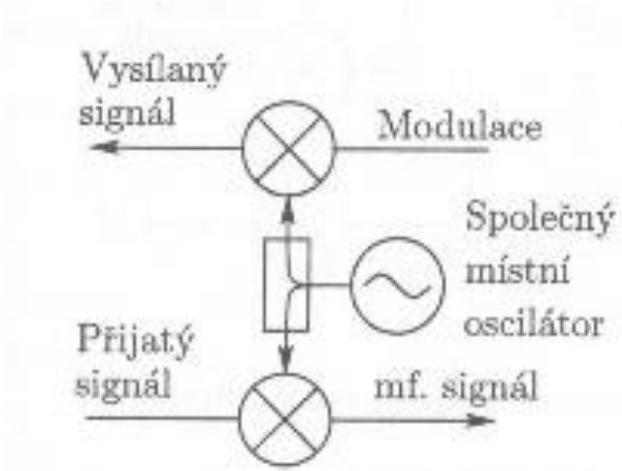
T / R Switch – Duplexer - Coupled Waveguides

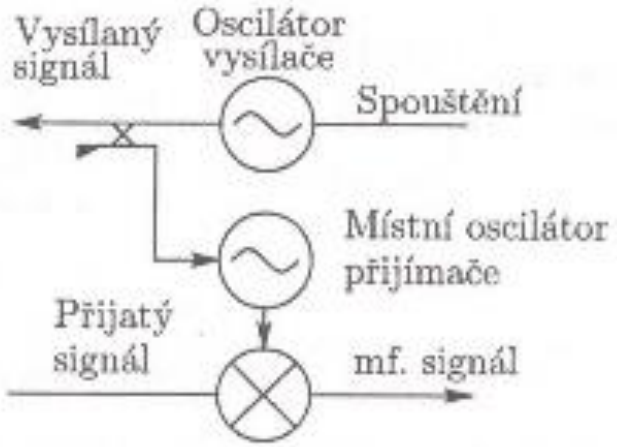




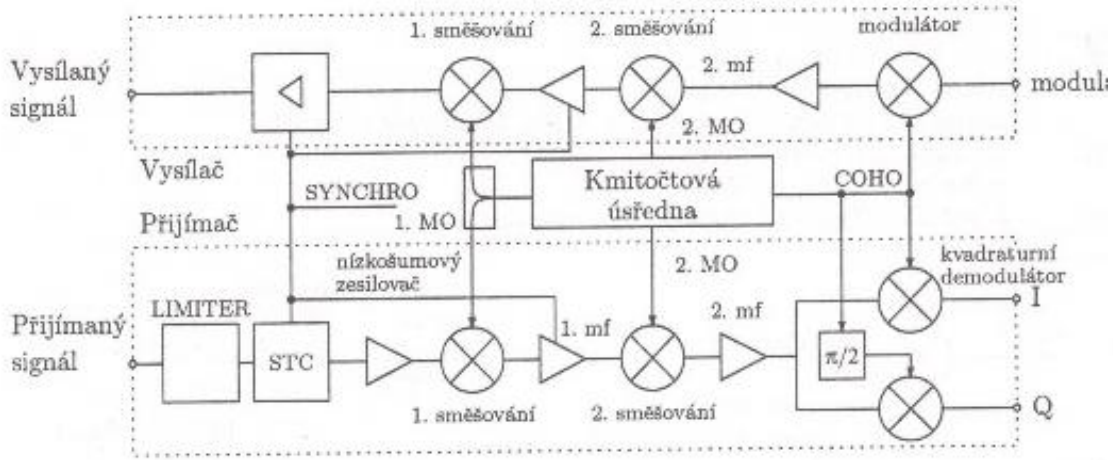


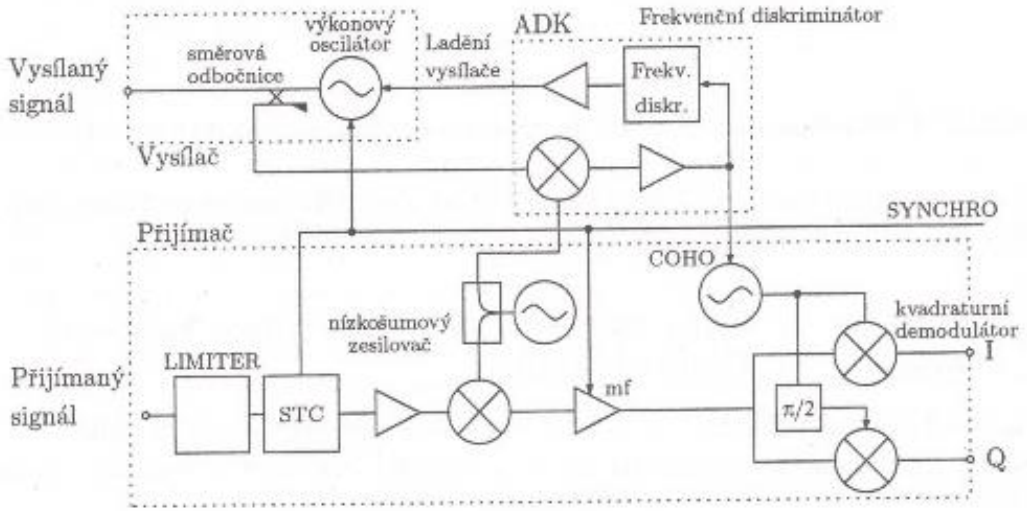
Simplified Block Diagram of Waveform Generation and Receiver



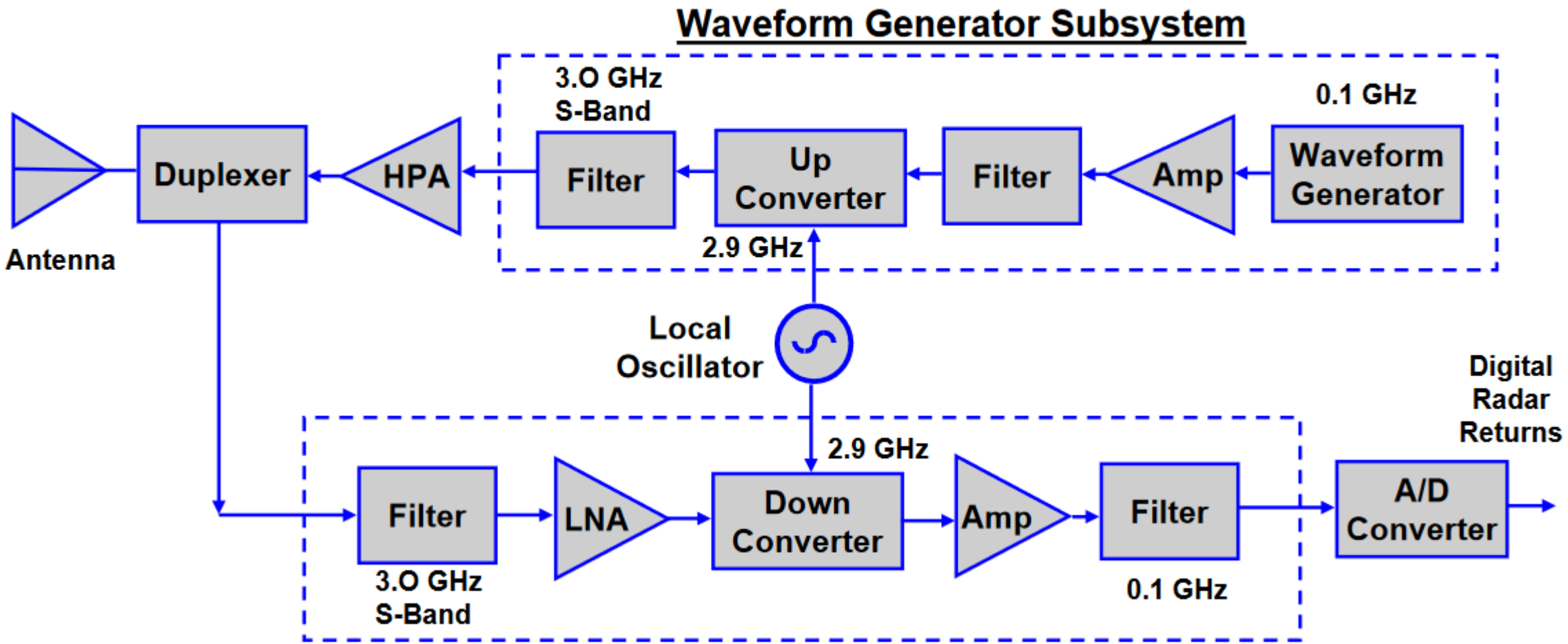


Simplified Block Diagram of Waveform Generation and Receiver

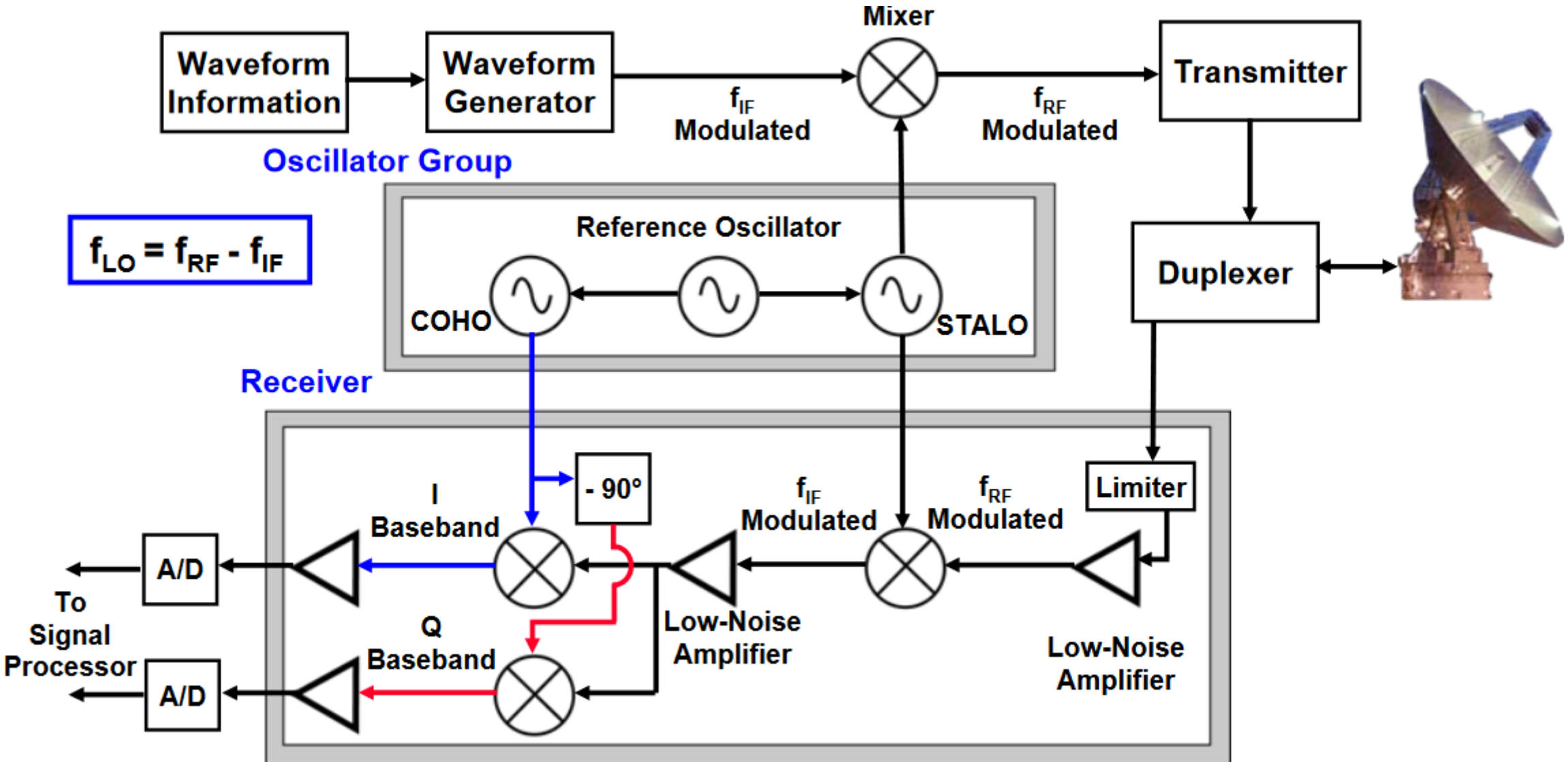




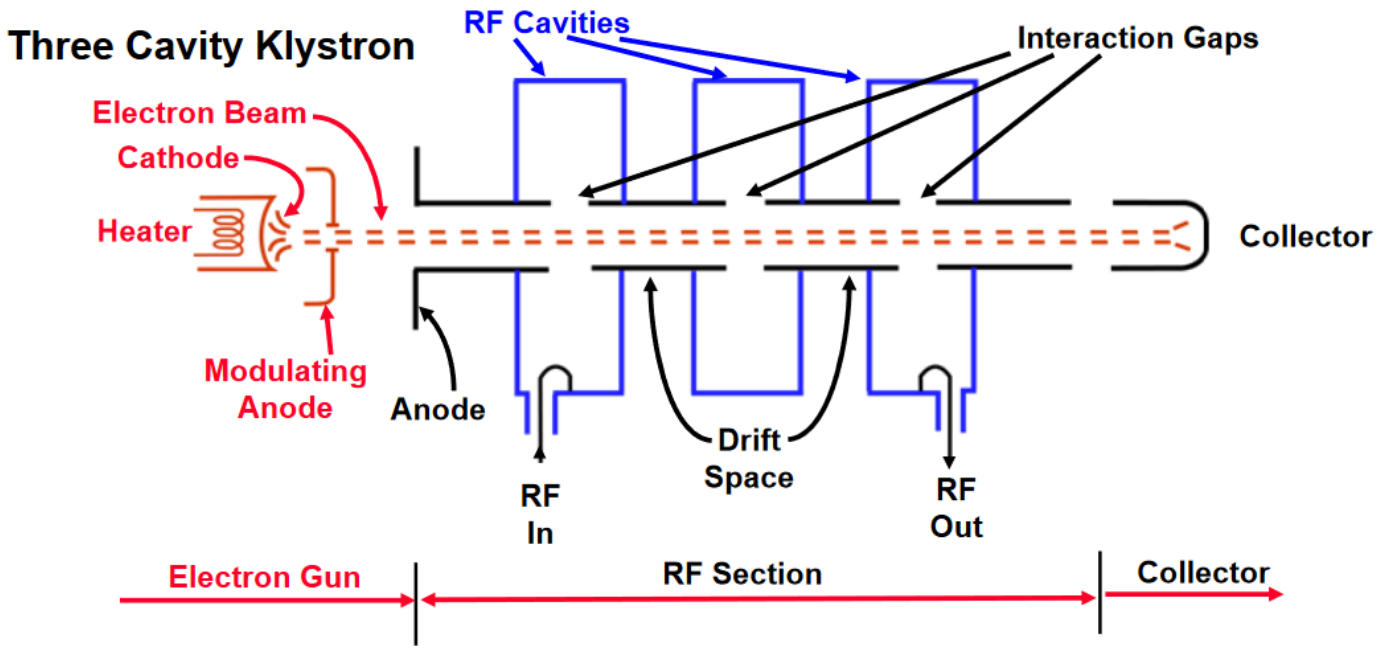
Simplified Block Diagram of Waveform Generation and Receiver



Block Diagram of Radar Receiver



Klystron



- Katoda (žhavená) je zdrojem volných elektronů
- Anoda elektrony urychlí do svazku
- V 1. rezonanční dutině se svazek rychlostně moduluje vstupním vf. napětím
- Na dráze mezi rezonančními dutinami je hustotně modulovaný svazek zesilován
- Ze 2. rezonanční dutiny je pak odebírán zesílený signál
- Zbylé volné elektrony jsou zachyceny kolektorem

VA-87F / VKS-8287

Air Surveillance / Weather Radar

6 cavity, S Band

Tunable over 2.7 to 2.9 GHz

Peak Power up to 2.0 MW

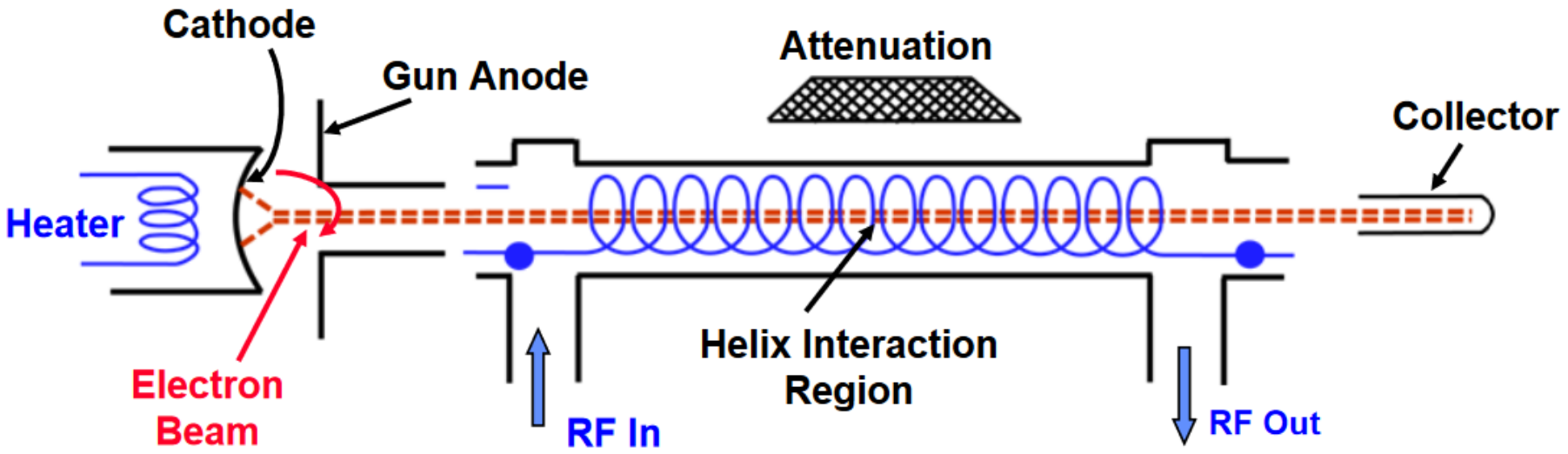
Ave Power up to 3 kW

Gain 50 dB Efficiency 45 %

Bandwidth 30 MHz typ.

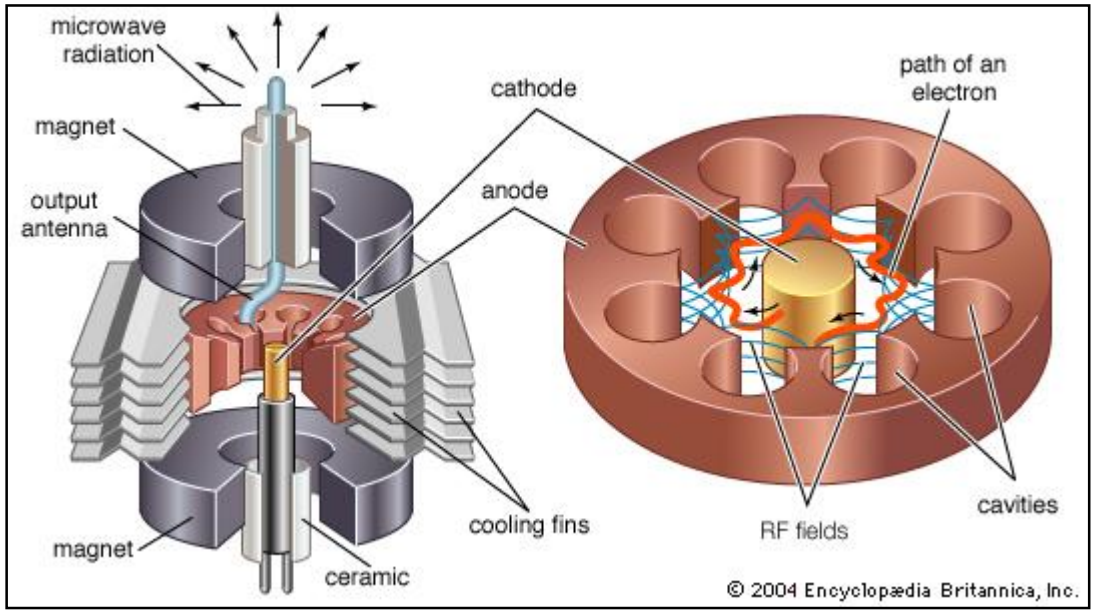
Pulse Duration up to 7.0 μsec

Permaktron (TWT)



- Katoda (žhavená) je zdrojem volných elektronů
- Anoda elektrony urychlí do svazku
- Elektrony prochází vf. vedením – zpožďovací struktura - svazek rychlostně moduluje vstupním vf. napětím, postupně je svazek hustotně modulován svazek zesilován
- Elmag. pole elektronů interaguje s polem selenoidu
- Zbylé volné elektrony jsou zachyceny kolektorem

Magnetron



- Soustava oscilačních dutin v silném magnetickém poli
- Do jedné se moduluje
- Z druhé se odebírá zesílený signál
- Velmi úzkopásmové - dáno dutinami

Solid State Power Transistors

Bipolar PH3135-90S Pulsed Power Transistor
3.1-3.5 GHz, 90 W

UF28150J MOSFET Power Transistor
100-500 MHz, 150 W