

RADAR Examples

Last updated 3/27/24

RADAR Examples

- Airport Tracking RADAR
 - RADAR parameters

RADAR SYSTEM PARAMETERS

Peak Power	1.4 MW	61.46 dB
Antenna Aperture	5 m x 3 m	
Pulsed Signal Frequency	2.8 GHz	
Pulse Signal Wavelength	103 mm	-9.9 dB
Pulse Width	600 ns	
Pulse Repetition Rate	1200 Hz	
Pulse Duty Cycle	0.00072%	
Receiver Noise Bandwidth	1.5 MHz	61.7 dB
Effective Noise Temperature	900 K	29.5 dB
Typical system Losses	6.3	8 dB
Antenna Rotation Rate	12 rpm	
Azimuth Beamwidth	1.3 °	

Calculated Parameters

Antenna Gain $4\pi A / \lambda^2$	17,767	42 dB
with beam forming losses	1,700	32.3 dB
Pulses per Beamwidth	22.5	

Constants

4pi	12.566	11 dB
k	1.38E-23	-228.6 dB

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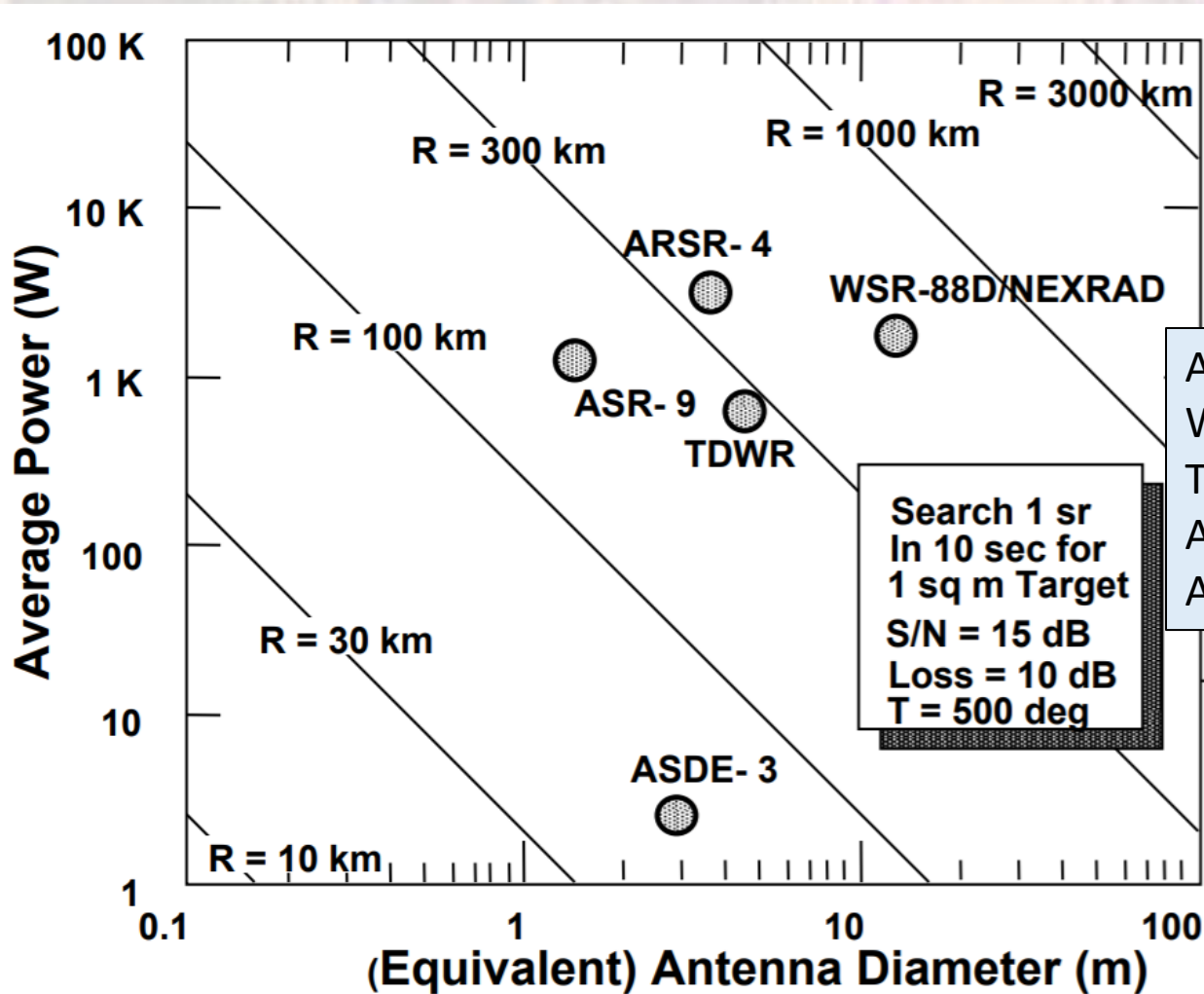
$$S/N = \frac{P_T G^2 \lambda^2 \sigma}{(4\pi)^3 R^4 k T_S B_N L}$$

$$S/N \text{ per pulse} = 1.84 \times 10^{20} \frac{\sigma}{R^4} = 202.6 \text{ dB} \frac{\sigma}{R^4}$$

- given a 1m^2 target at 70miles
 - S/N per pulse = 1.14 = 0.569dB
 - S/N per dwell = 25.7 = 14.09dB

RADAR Examples

- Range/Power/Antenna Parametrics

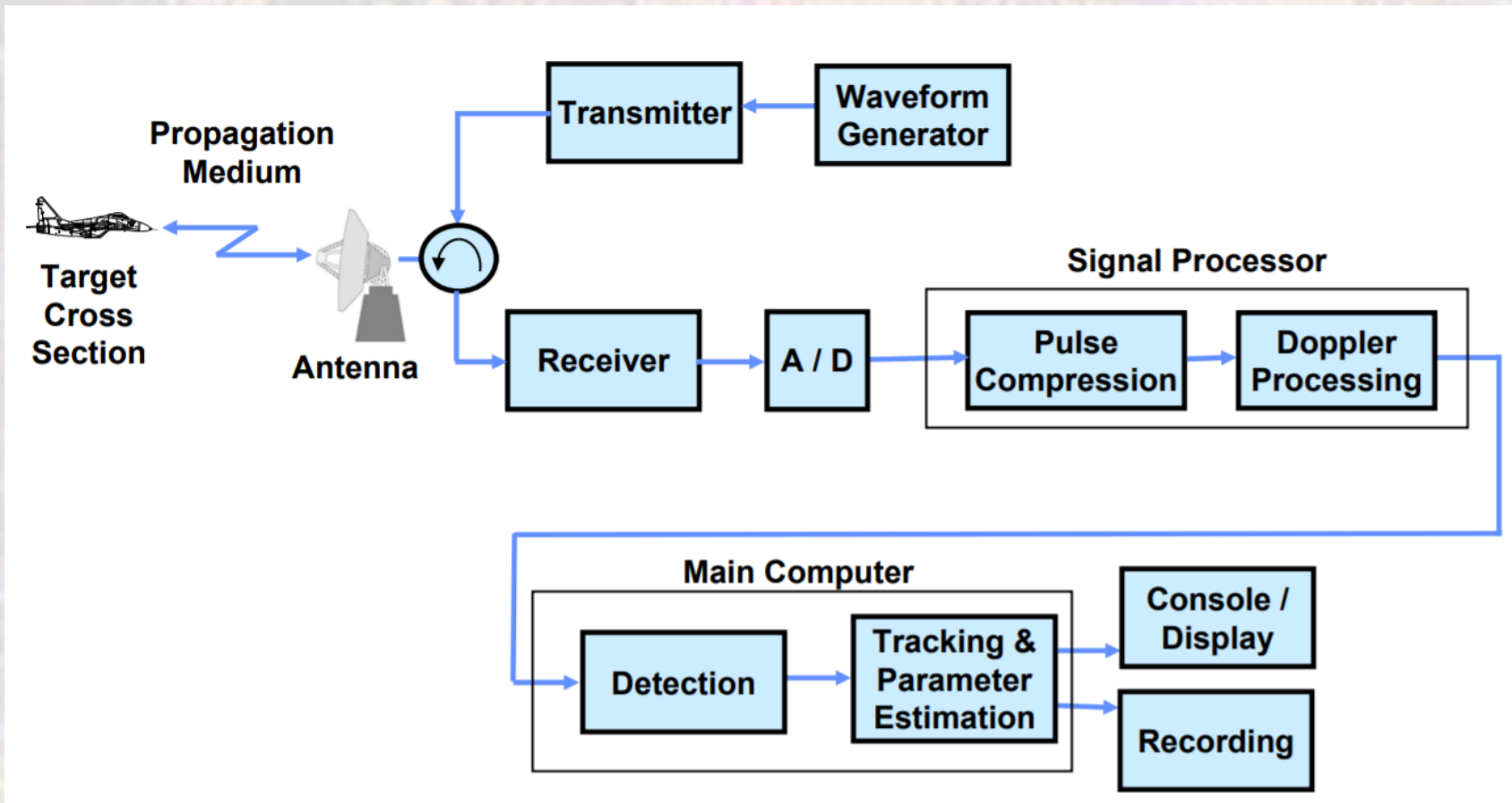


ARSR: Air Route Surveillance
WSR-88D: Weather
TDWR: Doppler Weather
ASR-9: Airport Surveillance
ASDE-3: Airport Surface

src: MIT Lincoln Laboratory

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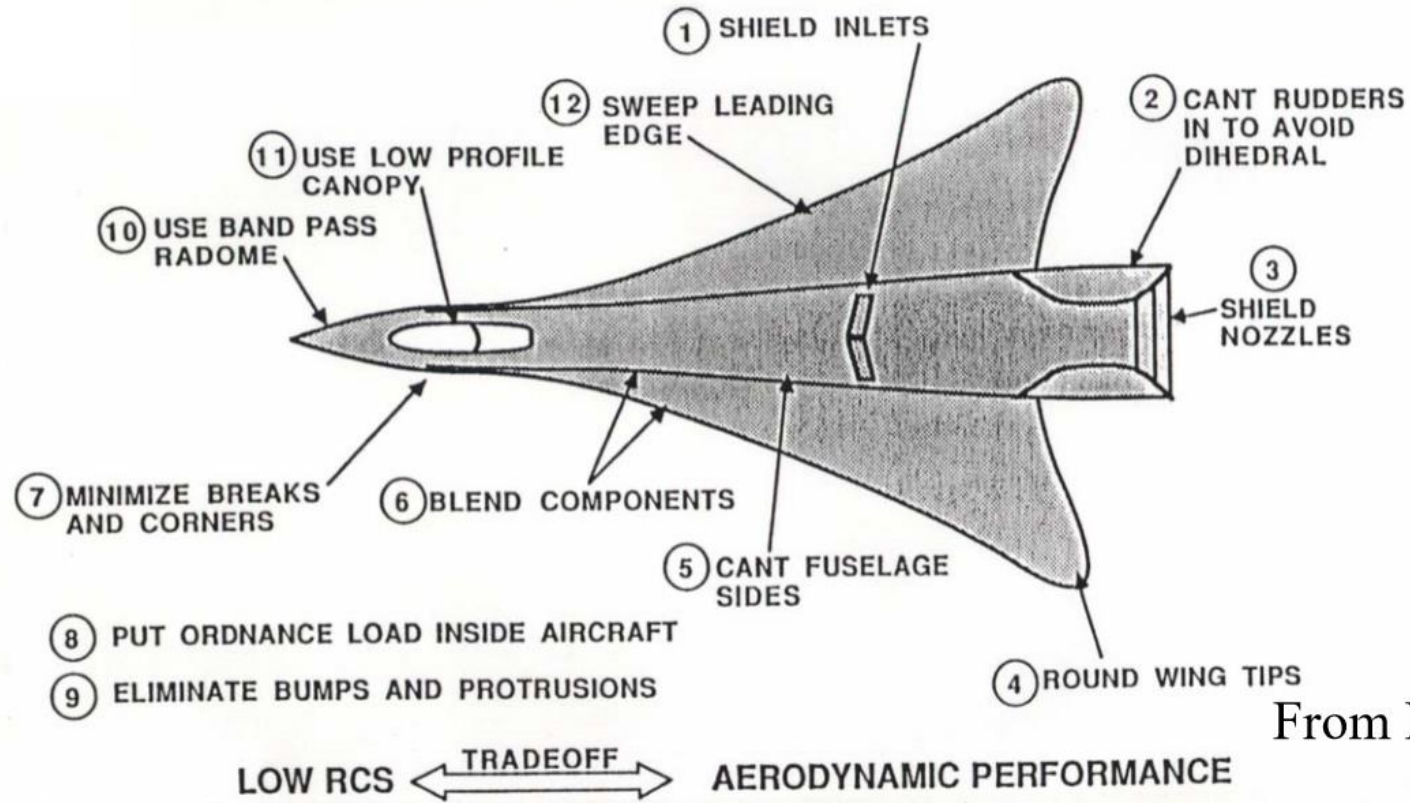
- RADAR System



src: MIT Lincoln Laboratory

RADAR Examples

- RADAR Mitigation



From Fuhs

RADAR Examples

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