

Test 10.1: Geostationary Orbit

A satellite in geostationary orbit:

- (a) Does not move (remains stationary).
- (b) Moves, but does so at a very slow speed so it appears stationary from Earth.
- (c) Moves at a velocity governed by its mass.
- (d) Moves at a very high speed, over 10,000 km/hr, governed by the circumference of its orbit and the duration of a sidereal day.

Test 10.2: Satellite Transponder

Some satellite transponders use “*polarization diversity*” to:

- (a) Double the data rate for the same bandwidth.
- (b) Reduce the power requirement by a factor of 2.
- (c) Reduce receiver noise.
- (d) None of the above.

Test 10.3: Doppler Radar

A stationary 15 GHz Doppler radar is pointed towards a car speeding away at a radial velocity of 72 km/hr. What is the Doppler frequency shift measured by the radar?

- (a) $f_d = 2$ kHz
- (b) $f_d = -2$ kHz
- (c) $f_d = 1$ kHz
- (d) $f_d = -1$ kHz

Test 10.4: Monopulse Radar

A monopulse radar is used to:

- (a) Measure the shape of the pulse reflected by a target.
- (b) Measure the time delay of the signal reflected by a target.
- (c) Track the direction of a target.
- (d) Measure the velocity of a target.

Test 10.5: Satellite Orbital Period

A remote sensing satellite is in circular orbit around Earth at an altitude of 900 km above Earth's surface. What is its orbital period?

- (a) $T = 159.34$ minutes
- (b) $T = 102.95$ minutes
- (c) $T = 31.34$ minutes
- (d) $T = 17.18$ minutes

Test 10.6: Pulse Repetition Frequency

A collision-avoidance automotive radar is designed to detect the presence of vehicles up to a range of 100 m. What is the maximum usable PRF?

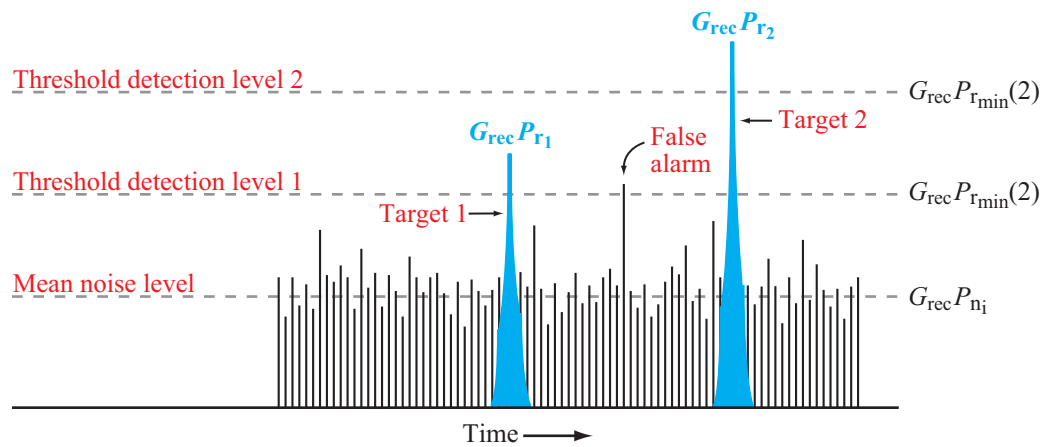
- (a) $f_p = 3$ kHz
- (b) $f_p = 1.5$ MHz
- (c) $f_p = 3$ MHz
- (d) $f_p = 30$ kHz

Test 10.7: Range Resolution

The range resolution of a radar that transmits pulses each $0.1 \mu\text{s}$ in duration is:

- (a) $\Delta R = 15$ m
- (b) $\Delta R = 1.5$ m
- (c) $\Delta R = 150$ m
- (d) $\Delta R = 15$ cm

Test 10.8: Detection vs. False Alarm



In target detection by radar, increasing the detection probability:

- (a) causes the false-alarm probability to decrease.
- (b) has no effect on the false-alarm probability.
- (c) may or may not influence the false-alarm probability.
- (d) causes the false-alarm probability to increase.