

**Chapter 3**  
**Short answer question**

This question is about early radar systems which used radio waves with a wavelength of 1.5m to detect other aircraft. The radio waves were emitted from an aerial mounted in the nose of the plane.

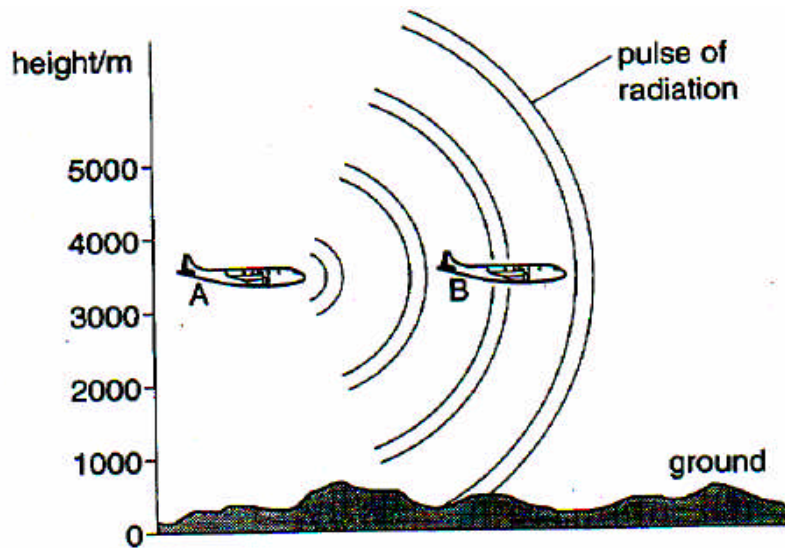


Fig. 1

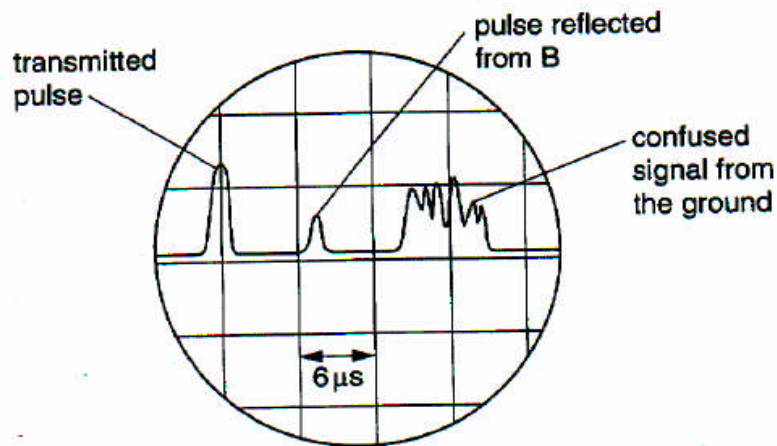


Fig. 2

Fig. 1 shows pulses of 1.5m radiation emitted from aircraft A travelling towards aircraft B.

Fig. 2 shows the oscilloscope screen in the cockpit of aircraft A. The trace shows the transmitted pulse and the resulting reflections.

(a) Use Fig. 2 to estimate the distance separating aircraft A and B.

$$c = 3.0 \times 10^8 \text{ m s}^{-1}$$

time  $\approx 8\text{ms}$

$$\text{distance} = (3 \times 10^8) \times \left(\frac{8 \times 10^{-6}}{2}\right) = 1200 \text{ m}$$

(b) The 'confused signal' shown in Fig. 2 is due to radio waves reflected from the ground below aircraft A. How do ground reflections limit the usefulness of the system?

Reflections off ground confuse pulsed signal. Only works well at high altitude.