

---

\* APPENDIX F

## AERIAL DEFENSE

*The two methods for defending against aerial attacks are passive air defense and active air defense. Passive measures are taken to avoid air detection; active measures combat air attacks.*

### F-1. PASSIVE AIR DEFENSE

Passive air defense measures are a first line of defense. They include troop or vehicle dispersion, concealment and camouflage, and observation and reporting. Attack avoidance is based on the reasoning that what can be seen from the air can be destroyed and what cannot be seen will probably not be attacked.

### F-2. ACTIVE AIR DEFENSE

Active air defense comes into play when a unit has been detected by hostile aircraft or when ordered to interdict hostile aircraft. Volume of fire is the key to its effectiveness. Because the action is so fast, the response must be coordinated and tightly controlled, usually at platoon level. At company level, too many are involved, making response time too slow. At section and squad level, too few are involved to achieve the volume of fire needed for an effective defense.

NOTE: All aircraft engagement firing is done at the cyclic rate.

### F-3. AERIAL ENGAGEMENT

In engaging aerial targets, there are two requirements that must be considered: lead and line. Superelevation (compensation made for the pull of gravity on the projectile) is another consideration for some weapons, but the caliber .50 MG projectile is basically flat out to 800 meters. Therefore the gunner does not have to worry about it. He can instead observe the tracers crossing the target course line and make the required adjustment from them.

a. **Lead.** Leading the aircraft is the compensation made for its speed when aiming the weapon so the projectile and the aircraft will arrive at the same spot at the same time. The required lead for a given aircraft is always calculated as a certain number of lengths of that aircraft. A high performance aircraft will need a greater lead factor than a slow one. The gunner should be taught to estimate leads by projecting images of the fuselage in the front of the aircraft.

(1) If the gunner is able to track an aircraft and lead the air craft with a constant number of leads, there will be two points along the target course line where he will attain hits. As long as the gunner understands this principle, he can bring effective fire on an aircraft.

\* (2) There are many different types of hostile aircraft (FM 44-80). To simplify things for the gunner, all aircraft are classified into two types: high performance and low performance. Any aircraft that has an estimated speed of more than 150 knots is classified as high performance and anything slower is low performance.

b. **Line.** Line is the requirement that the projectile must intersect the target course line of the aircraft. If the projectiles do not pass through this target course line, the aircraft cannot be engaged.

#### F-4. FLY-THROUGH TECHNIQUE

As an aerial target moves along its target course line, the lead required to engage the target changes because the range and angle between the aircraft and the gun position are changing. The lead required increases from the initial sighting (A in Figure F-1) to midpoint (B in Figure F-1). The required lead is at its maximum at midpoint.

a. As the aircraft moves beyond the midpoint on the target course line, the lead needed begins to decrease. Therefore, by leading an aerial target by less than the maximum required lead, there will be two points along the target course line where the constant lead will be the correct lead and the aircraft will fly through the projectiles.

b. In instructing the fly-through method of engagement, do not teach the gunners to bring continuous fire from points A through E, teach them to bring fire at points A through B and again before point D through the second fly through. As the gunner becomes proficient in this method, he will learn to adjust his lead and bring longer and more accurate fire on the target.

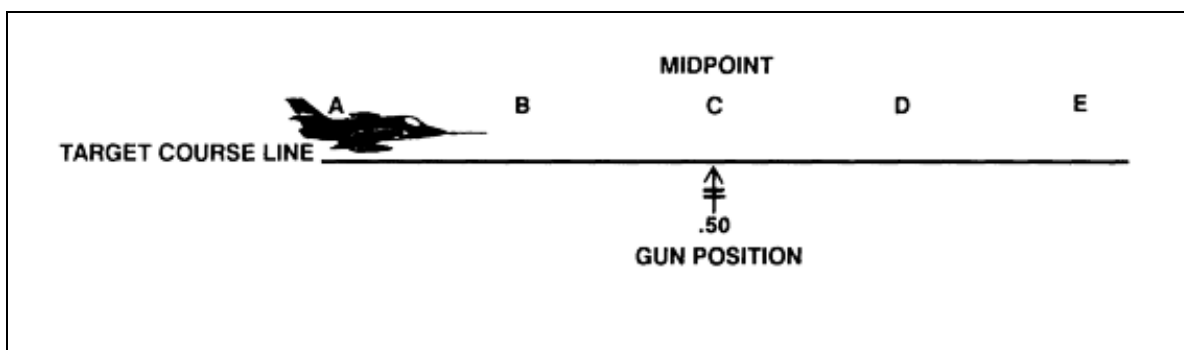


Figure F-1. Aerial target engagement.