

AERIAL GUNNERY

– Widowmaker

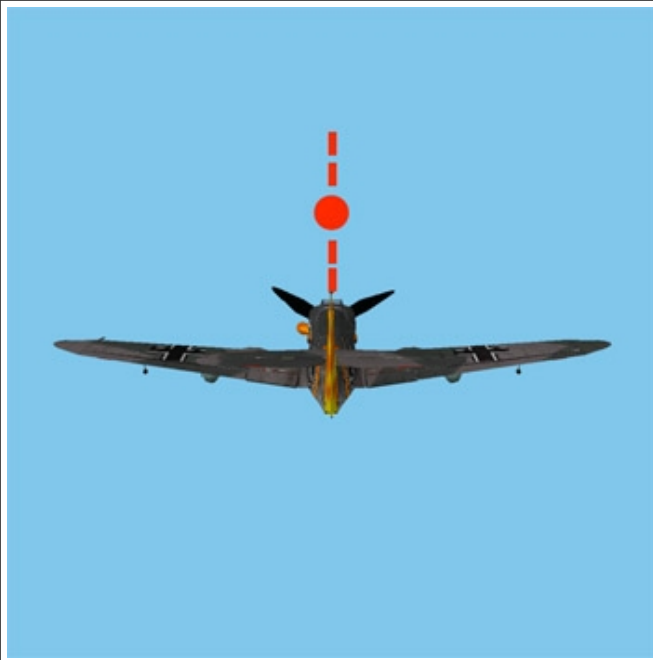
One of the more difficult aspects of combat, is lead computation. It is the most important aspect of aerial gunnery. Lead computation consists of several parts or factors. The first factor is determining the enemy aircrafts directional vector. This of course is the direction the enemy aircraft is heading. The second factor to determine is the distance to the target. The third, fourth and fifth are the muzzle velocity, the size of your projectiles, and rate of fire of your weaponry. The first two things effect the drop rate of your bullets. Low muzzle velocity equals a higher drop rate. Larger projectile size equal a higher drop rate. The last one, rate of fire. A higher rate of fire means a much higher chance of getting bullets on the target. If you shoot at a spot and are firing 2,000 rnds a minute versus 1,000 rnds a minute. When the enemy flies through that spot, at 2,000 rnds per minute, you have twice as many projectiles in the area as a gun would thats rated 1,000 rnds per minute.

Those are your prime concerns when computating where to shoot. The next thing you have to understand, is that you must think ahead. You are not shooting at the target. You are shooting where the target is going to be.. when your bullets get there. For hunters or skeet shooters this is second nature. For others this is something that takes time to develop. By looking at the vector of the enemy, distance and gun type, you can get an “idea” of where to shoot, so that if he does not radically change direction, he will fly into your bullets.

One problem many will have, is “shooting blind”. This occurs when you are in a tight turn and have to position the bandit out of sight below your nose in order to shoot out in front. This is accomplished by lining up your flight vector with his (or setting up a cross), then pulling back harder on the stick, letting the enemy vanish below the nose and pulling the trigger. Fire a few bursts and ease back on the stick to see if you've made contact.

Also take note that when firing cannons and machine guns together, you will have different drop rates. You might be scoring hits with your machine guns, but because your cannon rounds are heavier they are dropping off behind the target.

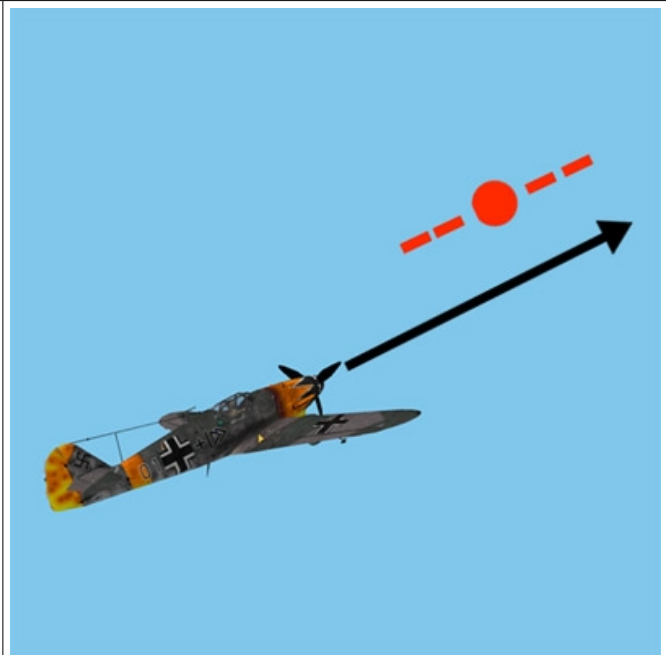
Lets start looking at this visually.

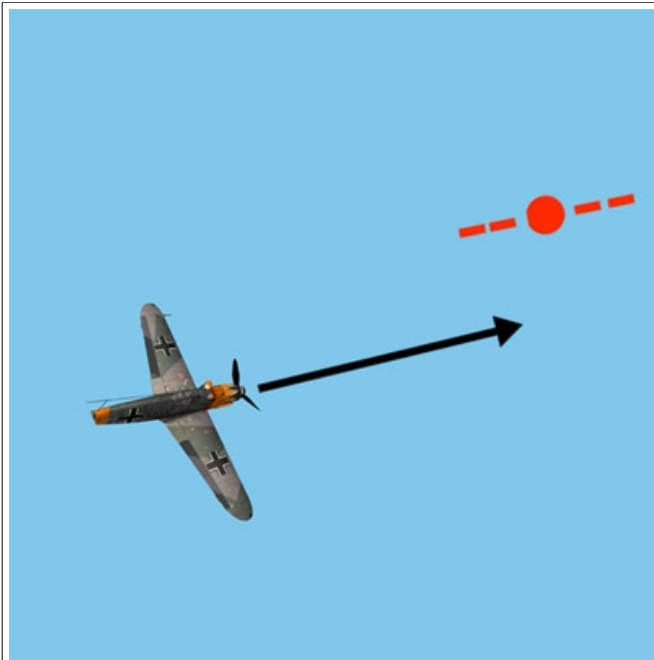


From the dead 6 position you have a very easy time to hit, however its much more difficult to kill. Straight away shooting only chews up the tail. In this position you are best suited to shoot for the wing root in order to try and sever the wing. Or, on a multi engine aircraft, aim for an outboard engine.

Computating lead, you only have to adjust for elevation. The further away you are/heavier the projectile, the higher you have to aim. You are adjusting for gravity pulling the bullet back to earth. As you shoot, the bullet will arc, so you shoot above the target. As the bullet arcs back towards the ground, it strikes the bandit.

In this example you are now in a deflection situation. You have about a 45 degree aspect angle. So you know he is heading away and climbing. The black line shows his flight vector. You adjust for two things now. You have to adjust for lead and elevation thereby putting your targeting point along the red Dot path. Fire, adjust where the bullets fall and then move your target point up and down the line. With practice time in a particular aircraft, you will be able to quickly judge where to aim based on your distance. (tip, always bank your aircraft to the direction of travel, putting your lift vector along the enemy aircrafts flight path. So you are adjusting your target point by moving the stick backward and forward).

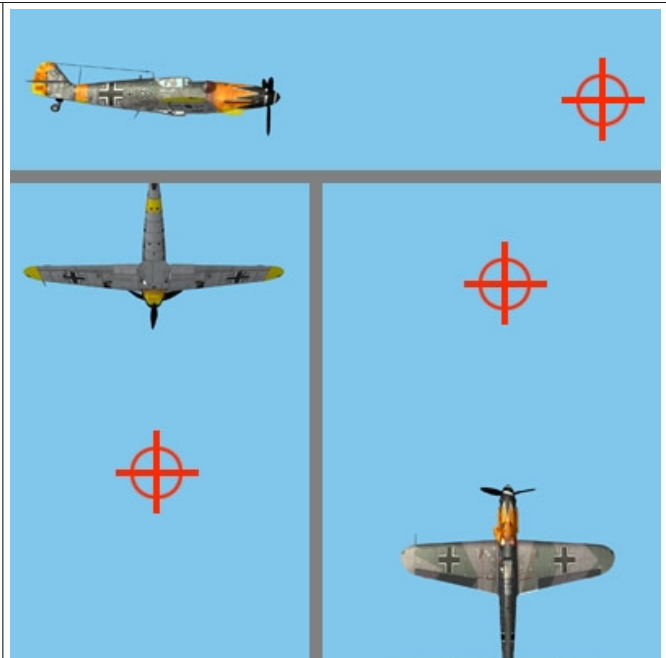




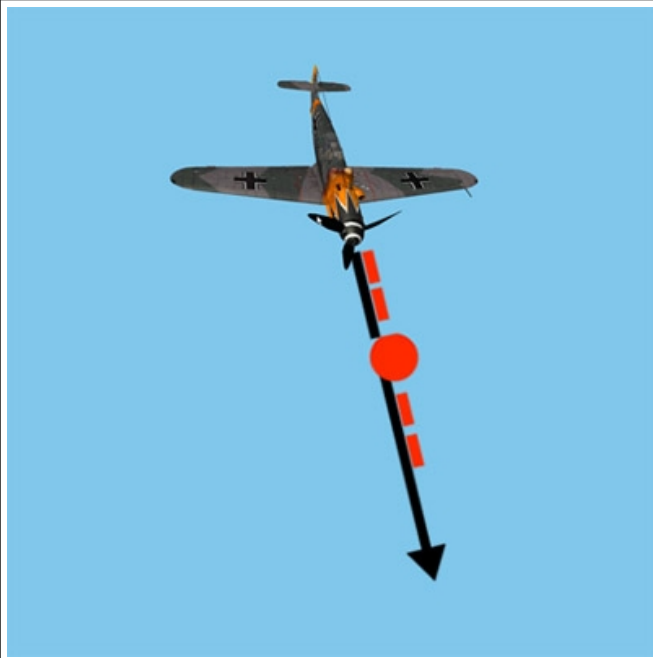
This next example, the aspect angle is much higher, closer to 80 degrees. This means the aircraft is more traveling from your left to right than in the same direction as yourself. With a higher aspect angle, the closure rate will be higher and you will have to lead further to the front. With a larger lead computation, you have to also adjust higher. Distance to target, Closure and aircraft speeds factor in here for your height adjustments. It is a “feel” you will gain with stick time as to how close you are to the enemy, how fast he is traveling, how fast you are going, as to how high you must aim.

SPOT SHOOTING / SNAP SHOTS

Sometimes you will find yourself with an angle to target where you can't really get in trail and follow and you have to take a snap shot or , spot shooting. You might come out of a loop and find a guy below you, or in any instance where you cannot actively chase. You will have to take a spot shot or snap shot. This is a one timer on the bandit. First, determine where he is going, then pick a spot out in front of him that you can close on and you expect him to be near when you get within kill range. Fly your aircraft **DIRECTLY** towards that spot while keeping your eye on the bandit. **FIRE** when you feel that the distance and his range will have him colliding with your bullets when he reaches the spot. **DO NOT** fly to the bandit. Fly to the spot!



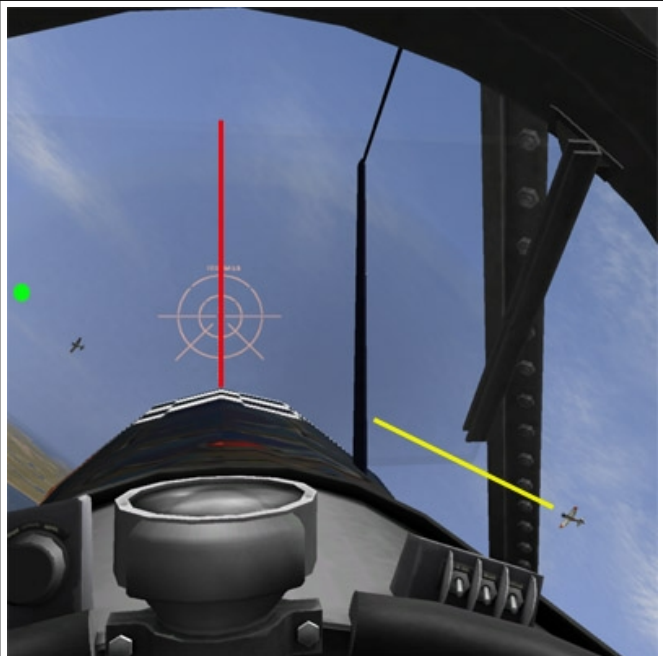
HIGH ASPECT SHOOTING

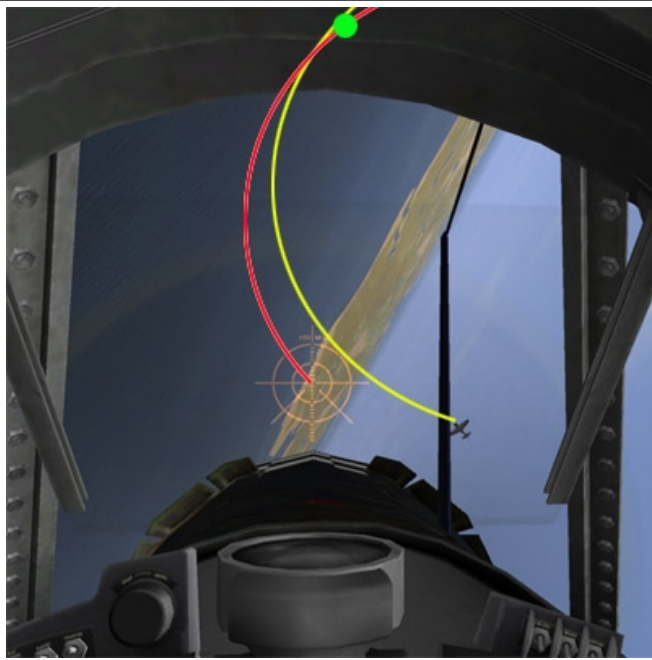


High aspect shooting is a little bit different. With an aspect angle of 130-180 degrees you have the enemy aircraft coming close to head on. In these cases your elevation adjustment is usually quite close if not dead on to the enemy aircrafts vector line. When the enemy aircraft is coming towards you your closure rate is now 150-200% or greater than that of a 90 degree or less aspect shot. This is in fact more along the lines of spot shooting though you can nose low or invert and pull to get an extra burst or two off. Your lead for this shot is much less since the closure rate is much higher. He is still flying into the bullets.

BLIND DEFLECTION

For blind deflection shooting, you have to have already gotten good at guessing shot locations. This is a dangerous maneuver because you lose sight of the enemy. Anytime that happens, he could maneuver and you could lose contact. In this example, I am cutting off their turn. I am nose up and pointed inside the target. You can see my lift vector in Red and the bandits flight vector in Yellow. I have quickly decided where I need to place my bullets and marked that spot with the green dot. To complete the shot, I will bank the bird to the left and put my lift vector (the red line) on the green dot and pull on the stick. This maneuver will move me closer to the bandits flight vector. Because of the range and the G's we are pulling, he will vanish behind my cowling going from right to left and I will fire my guns while he is hidden below my nose.





In this example, the bandit is maneuvering in more than one plane. His path being the Yellow line, my path being the Red line. What you cant see, is the roll of his wingtips which tell me he is rolling more flat. A quick check with my experience and I estimate his location in the future with the green dot. I roll to the left and pull back and then roll back to the right, keeping him just to the side. As we approach the the dot I'm pulling him down beneath my nose for the gun shot.

In this image, the bandit has emerged out the other side unscathed. But he is still in perfect position. A little roll left and then back right and he's scrap metal.

You might ask, why not just turn into him at the beginning and take your shot. The reason you don't want to do that, is you would be turning your aircraft outside the direction of the fight. You would then be going in a completely different direction as your target. This is bad against fighters. You will have to burn energy AND distance to turn back into the direction of the fight after you took your shot. With this approach, you are still in the same plane of motion with the bandit. Don't give up your advantageous position for a quick shot. If you are not comfortable with blind shooting, just keep maneuvering until you have a better view.



.. and by the way.. DONT SIT ON THE 6 OF ENEMY BOMBERS