Enhancement of Weapons Capability in Airplanes, Drones, and Helicopters

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Bombs Away!

Traditionally, fighter airplanes fire at line-of-sight targets. Its weapons do not fire vertically. Bomber aircraft can attack ground based targets from the air by dropping weapons vertically.

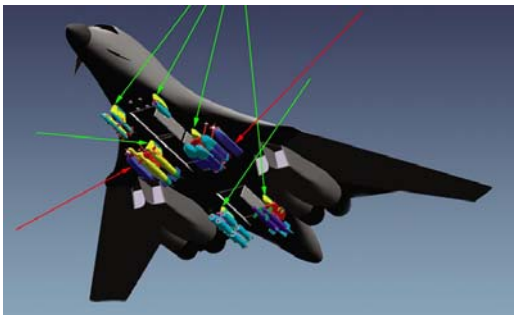
The Norden Bombsight

During World War II, the Norden Bombsight was used in US bomber aircraft with great success. Without an accurate bombsight, bombs would fall on targets randomly. The Norden bombsight greatly enhanced delivery of bombs to their target. The Norden bombsight was used on the Enola Gay when she dropped the first atomic bomb on Hiroshima.

Bombardier

However, a bombardier needed to look at the ground below through a telescope to determine when to drop bombs on the target. A telescope provides a two-dimensional image. This is acceptable for bombers because bombing targets are normally very far away. For this purpose three-dimensional displays are not necessary. For closer vertical targets, three dimensions are needed.

Of course, a bombsight could have been constructed using binoculars instead of a monocular telescope. This would have created a magnified three-dimensional image. The problem here is that three-dimensional images cannot be magnified uniformly by ordinary optics. There would be severe vertical distortion of the image. Hitting a target would not be intuitive. A computer could calculate distance to the target, but the display would not be visually friendly. In addition, it is difficult to manipulate a bombsight to turn away from a fixed angle. If a fighter pilot wants to fire onto an aircraft that is immediately below or above him close by, no instrumentation is currently available to assist him.



FIGHTER AIRCRAFT

Today, in modern jet fighters, weapons are mounted beneath the plane's wings and fuselage. They are in a perfect position to be fired vertically as well as horizontally. Yet, the capability allowing the pilot to do this is lacking.

In the photograph shown on page 1 (above) entitled, "The Norden Bombsight," at the front of the bomber is a picture window windshield. This made viewing vertical bomb targets somewhat more convenient. However, this is not very useful for aerial dogfights.

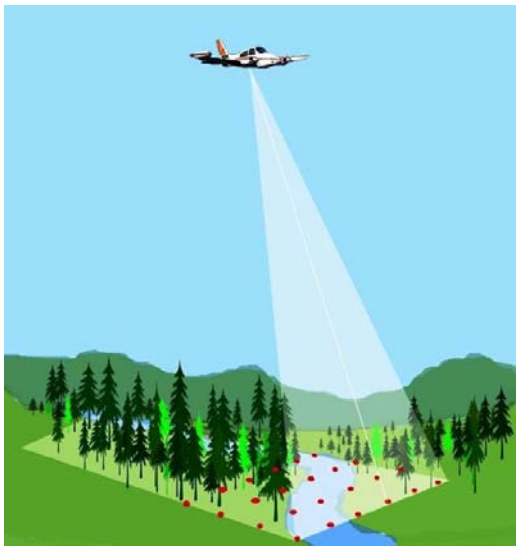
The Quantum Optics Process produces three-dimensional images with uniform magnification. A Holophoto™ screen affixed to the floor of the cockpit or on a head-up display, in which the pilot can view a target vertically, would solve the problem. Furthermore, the viewing angle is flexible and is not limited solely to the

vertical direction. Although the display would appear to the pilot as if the floor of the aircraft were transparent (*i.e.,* a picture window on the floor), he is only looking at a screen. The cameras are mounted underneath the aircraft. Their viewing angle can be controlled by the pilot. With such a device, vertical air warfare is feasible.

DRONES

Drone aircraft is used to attack vertical targets. They are remotely controlled from stations that could be located half-a-world away from the target. These drones have high resolution video cameras mounted below. They transmit real time moving images back to the controllers who then make navigation and firing decisions. However, once again, these images are two-dimensional. It would be possible to use a two-lens camera that would transmit stereoscopic pair images back to the controller. The controller could view the targets in stereoscopic 3-D. In that case, the controller would need to wear a special viewing aid, such as a stereoscope or 3-D glasses.

However, while stereoscopic 3-D gives the illusion of depth, it fails to provide the proper visual depth cues necessary to determine distance to the target. In a proposed configuration, a remote controlled Holophoto™ camera would be mounted to the belly of the drone. It would photograph while pointed downward, but the viewing angle could change. At the controller's station would be a Holophoto™ screen. The controller could see the scene in true three dimensions, and it would appear to him that he is really on the airplane. This would create enhanced control over the weapons carried by the drones. As with the fighter and bomber planes, weapons could now be fired vertically.



HELICOPTERS

Although commercial helicopters have front picture windows, military helicopters are blind below.

Shown above is a photograph of a commercial helicopter, while below is a photograph of a military helicopter.

Helicopter gunners can see below vertically by sitting on the edge of the craft on both sides at the openings. Even so, it is dangerous and very difficult for a soldier to look directly below the helicopter. Here, the pilot and crew would benefit greatly from the same technology proposed for fighter planes. In this case, not only would the three-dimensional display assist gunners in firing the weapons vertically below, but such a display would also be a very useful aid in landing the aircraft.

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