



ADAPTIVE MISSILE GUIDANCE USING GPS

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The name adaptive means we can guide any missile using GPS in any critical conditions. GPS guided missiles, using the exceptional navigational and surveying abilities of GPS, after being launched, could deliver a warhead to any part of the globe via the interface of the on board computer in the missile with the GPS satellite system. GPS allows accurate targeting of various military weapons including ICBMs, cruise missiles and precision guided munitions. Artillery projectiles with embedded GPS receivers able to withstand accelerations of 12,000 G have been developed for use in 155mm. GPS guided weapons, with their technological advances over previous, are the superior weapon of choice in modern days pollutant impact on the building occupant and the environment.

Index Terms: Artillery Projectiles, CEP, GPS

1. INTRODUCTION

Missile guidance systems have evolved at a large rate Over the past four decades, and recent breakthroughs in Technology ensure that smart warheads will have an Increasing role in maintaining our military superiority. Missile guidance concerns the method by which the missile receives its commands to move along certain Path to reach a target. On some missiles, these commands are generated internally by the missile computer autopilot. On others, the commands are transmitted to the missile by some external source. The missile sensor or seeker is a component within a missile that generates data fed into the missile computer. This data is processed by the computer and used to generate guidance commands. Sensor types commonly used today include infrared, radar, and the global positioning system. Based on the relative position between the missile and the target at any given point in flight, the computer autopilot sends commands to the control surfaces to adjust the missile's course. There are the seven elements that constitute a complete passive solar design, using a direct gain design as an example. Each performs a separate function, but all five must work together for the system to be successful.

II. HISTORY

Radar guidance systems detect and home in on their Targets by sensing electromagnetic energy reflected from the target's surface. The source of the reflected radiation is a radar transmitter; in the instance of weapons with active radar guidance, this transmitter is situated within the missile; in the case of semi active guidance, it is carried by the launch aircraft. In either case the transmitter must beam electromagnetic radiation at the target, this radiation must travel to the target, reflect, travel back to the receiving antenna of the missile, be amplified, demodulated and analysed to determine the direction of the target, this information then enables the guidance computer to steer the weapon toward the target to achieve a kill. An effective weapon must have the ability to discriminate between the target's return and reflections from its background. A wire-guided missile is a missile that is guided by signals sent to it via thin wires connected between the missile and its guidance mechanism, which is located somewhere near the launch site. As the missile flies, the wires are reeled out behind it. This guidance system is most commonly used in anti-tank missiles; where its ability to be used in areas of limited line-of-sight make it

useful, while the range limit imposed by the length of the wire is not a serious concern. The longest range wire-guided missiles in current use are limited to about 4 kilometres. The Tube-launched, optically tracked, Wire-guided Missile System (TOW) has a range of 3,750 meters but it would be unlikely to be used at extreme range.

III. NECESSITY

Previous guided missiles had to be delivered within a certain range of the target and then released. The early guided missiles were affected by bad weather conditions, physical phenomena or air current. In missile guidance using wire there were limitations of distance. The distance is limited about 4 kilometres. To avoid the limitations of previous guided missile the new technology used to guide the missile, in which target does not affected by the harsh weather conditions.

IV. TYPES OF MISSILE GUIDANCE

1. Using RADAR
2. Using wires
3. Using Laser
4. Using GPS

Most radar guided missiles are very successful in acquiring their targets; however, these missiles need a source to pump out radar signals so that they can acquire their target. The countermeasures home in on the radar signal source and destroy the antenna array, which essentially shuts down the radar source, and hence the radar-guided missiles cannot acquire their targets. Wire-guided missiles do not see the target. If for some reason the wire breaks, the missile will never acquire the target. Wire-guided missiles carry no instrument array that would allow them to acquire a target. Laser-guided missiles use a certain frequency bandwidth to acquire their target. Once the missile locates the target is acquired, and the missile will home in on the target even if the target is moving. Radar-guided missiles entered GPS as a method of navigating the missile to the target.

V. MISSILE GUIDANCE USING GPS

The central idea behind the design of GPS-guided weapons is that of using a 3-axis gyro/accelerometer package as an inertial reference for the weapon's autopilot, and correcting the accumulated drift error in the inertial package by using GPS PPS/P-code. Such weapons are designated as 'accurate' munitions as they will offer CEPs (Circular Error Probable) of the order of the accuracy of GPS P-code signals, typically about 40ft. The next incremental step is then to update the weapon before launch with a DGPS

derived position estimate, which will allow it to correct its GPS error as it flies to the target, such weapons are designated 'precise' and will offer accuracies greater than laser-guided weapons, potentially CEPs of several feet.

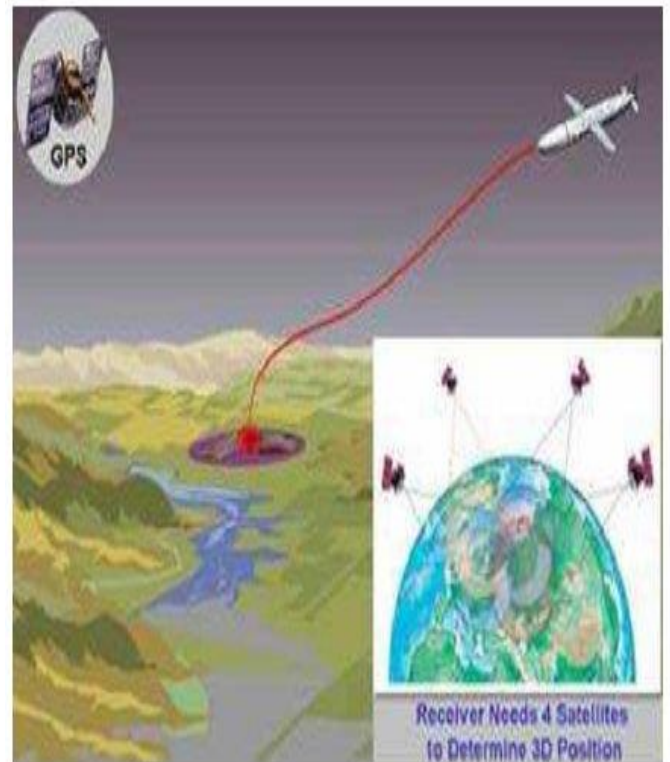


Fig.1. Missile Guidance using GPS

For an aircraft to support such munitions it will require a DGPS receiver, a GPS receiver and interfaces on its multiple ejector racks or pylons to download target and launch point coordinates to the weapons. To overcome the disadvantages of laser-guided missiles presented in unsuitable atmospheric conditions and radar-guided missiles entered GPS as a method of navigating the missile to the target. The development of purely GPS/inertial guided munitions will produce substantial changes in how air warfare is conducted. Unlike a laser-guided weapon, a GPS weapon does not require that the launch aircraft remain in the vicinity of the target to illuminate it for guidance - GPS/inertial weapons are true fire-and-forget weapons, which once released, are wholly autonomous, and all-weather capable with no degradation in accuracy. Existing precision weapons require an obscured line of sight between the weapon and the target for the optical guidance to work.

VI. ADVANTAGES

1. Navigation System Timing and Ranging (NAVSTAR) GPS is now available at any time, in any weather, and at any place on or above the earth. NAVSTAR also provides precise time within a millionth of a second to synchronize the atomic clocks used in various military applications.
2. GPS is even used in locating the present position of living and nonliving things; this is the concept which is used in famous "GOOGLE EARTH".
3. Military GPS user equipment has been integrated into fighters, bombers, tankers, helicopters, ships, submarines, tanks, jeeps, and soldiers' equipment.
4. In addition to basic navigation activities, military applications of GPS include target designation of cruise missiles and precision-guided weapons and close air support.
5. To prevent GPS interception by the enemy, the government controls GPS receiver exports.
6. GPS satellites also can contain nuclear detonation detectors.

VII. FUTURE SCOPE

Depending upon the nature of activity (i.e., navigation or precise target location), a particular kind of GPS may be used. It may thus be summarized that the GPS based weapon systems are here to stay and will form the backbone for the future development of better, more accurate and lethal munitions.

VIII. CONCLUSION

GPS guided weapons are not affected by bad weather conditions or restricted by a wire, nor do they leave the gunner vulnerable for attack. GPS guided weapons, with their technological advances over previous, are the superior weapon of choice in modern day warfare.

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