

Θέμα 8^ο

Navigation I (2)

Pre-reading Activity

Match the terms on the left with their definitions on the right.

1. supplementation	a. The systematic observation of aerospace, surface, or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means.
2. broadcast	b. A quantity added (e.g. to make up for a deficiency).
3. implementation	c. To propel with force.
4. surveillance	d. To send out or communicate, especially by radio or television.
5. launch	e. The act of accomplishing some aim or executing some order.

1. 2. 3. 4. 5.

Reading (ΜΕΤΑΦΡΑΣΗ)

Read the text below and check your answers.

Global Navigation Satellite Systems (GNSS)

GNSS is the generic term covering satellite based area navigation systems. The first such (and currently predominant) system is GPS, initially developed by the United States Department of Defence (DoD) for military aircraft and cruise missiles. GPS has since become freely available -as a valuable **supplementary** navigation aid- to civilian aircraft of all types and all nations, with the compliments of the U.S. DoD. The Russians implemented their GLONASS GNSS system some time ago but currently lack the finances to maintain a global satellite network.

The European Union is now establishing Galileo, a companion GNSS system to GPS but **implementation** is suffering considerable delays.

GPS

The Global Positioning System (GPS) is a U.S. space-based global navigation satellite system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth which has an unobstructed view of four or more GPS satellites.

GPS is made up of three segments: Space, Control and User. The Space Segment is composed of 24 to 32 satellites in Medium Earth Orbit and also includes the boosters required to **launch** them into orbit. The Control Segment is composed of a Master Control Station, an Alternate Master Control Station, and a great number of dedicated and shared Ground Antennas and Monitor Stations. The User Segment is composed of hundreds of thousands of U.S. and **allied** military users of the secure GPS Precise Positioning Service, and tens of millions of civil, commercial and scientific users of the Standard Positioning Service. GPS satellites **broadcast** signals from space that GPS receivers use to provide three-dimensional location (latitude, longitude, and altitude) plus precise time.

GPS has become a widely used aid to navigation worldwide, and a useful tool for map-making, land surveying, commerce, scientific uses, tracking and **surveillance**, etc.

Also, the precise time reference is used in many applications including for instance the scientific study of earthquakes.

GPS has become a mainstay of transportation systems worldwide, providing navigation for aviation, ground, and maritime operations.

Disaster relief and emergency services depend upon GPS for location and timing capabilities in their life-saving missions. The accurate timing that GPS provides facilitates

everyday activities such as banking, mobile phone operations, and even the control of power grids. Farmers, surveyors, geologists and countless others perform their work more efficiently, safely, economically, and accurately using the free and open GPS signals.

“The Global Positioning System (GPS) is a U.S. space-based global navigation satellite system.”

Reading Activity – Comprehension Questions

Read the text again and answer the following questions.

1. For what purpose was GPS initially developed?
2. Are there any other operational global navigation satellite systems in the world?
3. What does GPS provide?
4. What does GPS consist of?
5. What are some of the non-military uses of the GPS?

Word Study

Rearrange the bold capital letters to form words which appropriately complete the statements below.

1. GPS offers two services: the Precise Positioning Service (PPS) for U.S. and military users, and the Standard Positioning Service (SPS) for worldwide civilian users. **(ELLADI)**
2. GPS satellites circle the earth twice a day in a very precise and transmit signal information to earth. **(TROBI)**
3. Tall buildings, mountains, and other large objects, even highway overpasses, can interfere with or interrupt the GPS **(LANGIS)**
4. Many of the future GPS-based aviation systems will provide both surveillance and weather information. **(LUNAVELCEIRS)**
5. The of Galileo (European Satellite Navigation System) will be a welcome improvement to navigation services. **(NEPOMETAMINLIT)**

Reading Comprehension – How The Differential GPS Works

Pre-reading Activity

Match the terms on the left with their definitions on the right.

1. differential	a. Precise to a fine degree.
2. ACARS	b. Involving differences in speed or direction of motion.
3. refined	c. An instrument approach with lateral and vertical guidance with integrity limits, similar to barometric vertical navigation.
4. Global Landing System (GLS)	d. A digital datalink system for transmission of short, relatively simple messages between aircraft and ground stations via radio or satellite.

1.	2.	3.	4.
---------	---------	---------	---------

Reading Activity (OXI ΜΕΤΑΦΡΑΣΗ)

Read carefully how the differential GPS works and put the following statements in the correct order.

Differential global positioning is a more accurate Global Positioning System than a normal GPS. More specifically, GPS signals are received at a ground installation, which has been surveyed accurately. The ground installation then computes the differences between the known position and the position at which the GPS says it is (known as differential position error). It then sends a differential correction factor to any aircraft within seventy nautical miles using an Aircraft Communications and Reporting System (ACARS) link that enables the aircraft's onboard GPS navigation computer to correct its own normal GPS-derived position into a refined differential GPS position that is accurate to within 1 to 3 meters. Therefore, differential GPS has the potential accuracy to be suitable for precision landing approaches, that is Global Landing Systems (GLSs).

- A. The ground installation sends a differential correction factor to any aircraft within seventy nautical miles using an ACARS link.
- B. The aircraft's onboard GPS navigation computer corrects its own normal GPS-derived position into a more precise differential GPS position.

- C. The ground installation computes the differences between the known position and the position at which the GPS indicates it is.
- D. GPS signals are received at a ground installation.

1.

2.

3.

4.

Reading Comprehension - The History of Aviation, Part VI

Lead-in

Answer the following questions.

- Which were the four major air forces operating during WWII?
- What was the invention which helped the British shoot down hundreds of German planes during the Battle of Britain?
- Who were “Kamikazes” and what did they do?
- What major event brought about the Japanese surrender almost immediately after its occurrence.

Focused Reading

Read the text below about the Air War during WWII and answer the following questions.

1. What were the British nightly bombing raids on German cities aiming at?
2. What was the USAAF's contribution to WWII?
3. Which was the first jet fighter of the war and what was its role?
4. Which were the characteristics of the Japanese fighter planes?

THE AIR WAR DURING WWII (ΟΧΙ ΜΕΤΑΦΡΑΣΗ)

Grasping the whole concept of such a massive war that depended so much on air superiority is a difficult task. Operations involving air units were often unorganized and done on a “whenever the CO (Commanding Officer) sees fit” kind of fashion. The success of missions often relied solely on the orders of the officers in charge and the strength of the aircraft. Introducing someone to the

general ideas of what happened in the skies over Europe and the Pacific during WWII is no easy task.

To start off, you will need a good idea of the four major air forces at work during WWII. There was the USAAF (United States Army Air Forces), RAF (Royal Air Force - British forces), Luftwaffe (German air force), and the Japanese Army Air Force or Navy (IJAAF or IJN). The countries participating in the air war were not limited to these forces, however. Hundreds of countries were participated.

During the Battle of Britain in 1940, Supermarine "Spitfires" of the RAF shot down hundreds of the Luftwaffe's Messerschmitt Bf-109's with the aid of radar, which was new to the British. Not only did the RAF fighters go up to meet the advancing Luftwaffe fighters and bombers, but they proved efficient on the offensive too. Nightly bombing raids on German cities and military installations was commonplace, and was designed to break the will of the people to fight. It also stalled the German war effort of production, and gave the Allies a slight edge. With waves of fighters meeting single German planes that entered British airspace, the Luftwaffe were pushed back to the defensive position.

On the other hand, the USAAF proved to the world America's power in the aircraft industry during WWII. The massive production of aircraft during WWII has carried the USA into the spot as a major manufacturer of aircraft, by companies such as the widely-recognized Boeing and Lockheed corporations. Great fighters such as the world-famous P-51 Mustang, the P-38 Lightning, P-40 Warhawk, F4U Corsair, and more were produced in the USA and used by Allied forces everywhere. Bombers such as the B-17 Flying Fortress, B-24 Liberator, B-29 Superfortress, and B-25 Mitchell claimed fame across the globe. These warbirds helped win the war, and did a superb job at it too.

The pride and power of the Nazi regime, the Luftwaffe was deadly to Allied air forces. Their bombers were not successful in most occasions (due to high loss rates) but the fighters scored innumerable kills on Allied bombers. American B-17's and British Lancasters were big sitting ducks in the sky. Some kills were scored with the bomber's machine gun defenses, but a quick burst from a Luftwaffe Messerschmitt Bf-109 or Focke-Wulf 190 could mortally wound the slow bombers. Most of the American and British bombers did not survive the swift attacks from the Luftwaffe fighters, especially if they had already met the outer-ring of German flak guns protecting Germany. Many thought the powerful Luftwaffe would lead Germany to a grand victory before American fighters entered the picture. Towards the end of the war, the Luftwaffe slowly disintegrated with the rest of the Nazi power, but a small come back was made with the war's first jet fighter, the Messerschmitt 262. If Hitler hadn't made his grand blunder with his insistence that the Messerschmitt 262 be a more powerful fighter-bomber, this aircraft could have turned the tide of the Allied victory. The few Me-262's that were used primarily as fighters had extremely high kill rates against bombers and fighters alike. Thankfully, the shortage of available Me-262's and their late entry into the war let the bombing campaign go unstopped. The Luftwaffe crumbled with the rest of the German army.

After the massive bombing on December 7th, 1941 of Pearl Harbor, the US was clearly aware of the Japanese air strength. The mighty Mitsubishi A6M2 "Zero" was deadly to US naval fighters and torpedo/attack aircraft. They were swift and carried quite a firepower punch. Although the Japanese aircraft were deadly, they were gradually surpassed by new American planes. As Japanese death rates rose, a new idea was implemented. Commonly known as "Kamikazes," these suicide pilots would dive bomb US ships with aircraft full of explosives. These pilots were extremely honored by the Japanese and operated under a special code of conduct called the "Bushido code." The basic thing to know is that the Japanese air forces started off strong but gradually lost their effectiveness, even though tough fighting was still present on the ground.

Before the US was forced to invade Japan, atomic bombs were dropped on the cities of Hiroshima and Nagasaki by US B-29 Superfortress bombers. Millions of Japanese lives were lost, and the surrender came almost immediately after the attacks. The USAAF had planned several more atomic bomb drops had two not been adequate.