

Θέμα 12^ο

Navigation II: Radar

Reading 1 – Crowded Skies (ΜΕΤΑΦΡΑΣΗ)

a. Read the text below and decide whether the following statements are true (T) or false (F).

1. When navigating away from controlled airspace, pilots use VOR beacons.
.....
2. The authorities draw up and approve the flight plan of the route to be flown.
.....
3. Air traffic controllers use sonar screens to track the paths of the aircraft.
.....
4. The risk of collisions can be diminished by strict air traffic control procedures.
.....

The tremendous growth in air traffic has resulted in increasing congestion of the airways. Strict air traffic control procedures minimize the risk of collisions occurring and keep the aircraft moving as efficiently as possible. An aircraft cannot merely takeoff at any time and fly anywhere. A flight plan of the route is drawn up and approved by the authorities. The aircraft's progress is checked at every stage by air traffic controllers. At peak periods, the airspace is



overcrowded resulting in considerable delays with aircraft unable to takeoff. For example, at Chicago O'Hare airport, one of the world's busiest, there is an aircraft landing or taking off every 40 seconds on average. Small aircraft following larger ones, are spaced farther apart on their final landing approach to avoid turbulence in the air caused by the larger aircraft.

Navigation

Navigation in controlled airspace generally involves flying along airways marked by VOR (Very high frequency omni-directional range) beacons. Away from controlled airspace the simplest form of navigation is dead reckoning. The navigator calculates the aircraft's position from the known starting point and the flight speed, time and direction, making corrections for wind effects. Airlines generally have inertial navigation systems (INS). These use a set of accelerometers on a gyroscope-stabilized platform¹ to measure the acceleration

¹ A platform that helps the gyro align with the desired direction (e.g. true north, etc.). Orbiting spacecraft use a small, gyroscope-stabilized platform for their navigation systems. This characteristic of gyroscopes to remain stable and define direction to a very high degree of accuracy has been applied to gunsights, bombsights, etc.

of the aircraft in all three directions (forward, sideways, and up or down). A computer then calculates the position of the aircraft in relation to its starting points. The NAVSTAR² navigation system calculates positions using signals from at least four satellites orbiting the Earth. The civil version can establish positions to within 200 meters (600 feet), and the military version is accurate to 10 meters (30 feet).

Radar control

Air traffic controllers are responsible for a particular airspace sector, and they use radar screens to track the paths of the aircraft passing through it. Extra information is provided by an aircraft's transponder, which transmits a positive identification signal and a height reading. Within the sector, the controller tells the pilot the height and speed to fly at and the route to follow. A buildup of arrivals at an airport creates a line of aircraft waiting to land. The controller may direct the pilots to join a stack of aircraft circling at specified heights around a beacon. The aircraft is then moved out of the stack and handed over to the Airport Control Tower, which handles the aircraft's final approach and landing.

b. Read the text again and continue the sentences.

1. An aircraft's transponder
2. At peak periods, the airspace is.....
.....
3. Air traffic controllers are responsible for
4. Within his sector of responsibility, the controller tells the pilot the
.....
5. Away from controlled airspace, the simplest form of
.....
6. The NAVSTAR navigation system calculates

² *Navigation Satellite Time and Ranging. A global positioning system (GPS), often referred to (particularly in the U.S.) as the GPS or NAVSTAR-GPS, which is based on a global system of 24 Department of Defense navigational satellites (21 operational plus 3 spares), completed in 1993 and designed to provide time, position, and velocity data for ships, planes, and land-based vehicles, and for many other purposes. The NAVSTAR satellites are arranged in six planes, each in a 12-hour, 20,000-km-high orbit. They transmit signals that allow the determination, to great accuracy, of the locations of special receivers. These receivers can be fixed on Earth, or in moving vehicles, aircraft, or in satellites in low Earth orbit. NAVSTAR is used in navigation, mapping, surveying, and other applications where precise positioning is necessary. Both military and civilian users can use NAVSTAR-GPS receivers to receive, decode, and process the signals to gain 3-D position, velocity, and time information. Civilian receivers are somewhat less accurate than their military counterparts, owing to their inability to read the coded portions of the satellite transmissions.*

Vocabulary Review – Air Traffic Control Radar Beacon System (ATCRBS)

Fill in the gaps of the following text using the words below.

surveillance	transponders	decode	detected	respond
pulses	transmission	receiver/transmitter	installed	air traffic

The ATCRBS is a system adopted by the Federal Aviation Agency (FAA) for use in controlling **1.** over the United States; the aircraft carry identification **2.** designed to transmit an airplane identity code, altitude, and additional message when interrogated by an air-traffic controller's equipment. More specifically, the ATCRBS is a radar system in which the object to be **3.** is fitted with cooperative equipment in the form of a radar **4.** or a transponder. Radio **5.** from the interrogator (transmitter/receiver) site are received in the cooperative equipment and used to trigger a distinctive **6.** from the transponder. This latter transmission, rather than a reflected signal, is then received back at the transmitter/receiver or interrogator site. The interrogation is done at 1030 MHz, whereas the response is at 1090 MHz. The system provides an automatic altitude reporting facility. The system consists of transponders, **7.** in aircraft, and secondary surveillance radars (SSRs), installed at air traffic control facilities. The SSR is co-located with the primary surveillance radar, or PSR. These two radar systems work in conjunction to produce a synchronized **8.** picture. The SSR transmits interrogations and listens for any replies. Transponders that receive an interrogation **9.** it, decide whether to reply, and then **10.** with the requested information when appropriate. Note that in common informal usage, the term "SSR" is sometimes used to refer to the entire ATCRBS system, however this term (as found in technical publications) properly refers only to the ground radar itself.

Reading 2 – A True WWII Story (OXI ΜΕΤΑΦΡΑΣΗ)

a. Lead in

Answer the following questions.

1. Do you know any true war stories that took place during WWII? If yes, give a brief account of what happened.
2. What do you know about WWII Greek fighter pilots? You can refer to training, air battles, accomplishments, etc.

b. Focused Reading

Read the text below about the true story of Haralambos Stavropoulos and answer the following questions.

1. Why did WO Haralambos Stavropoulos not leave for Alexandria on June 16, 1943?
2. What was the purpose of the mission that the British Air Command requested that day?
3. What did Haralambos Stavropoulos not do before taking off, and why?
4. Why did he decide to abandon his aircraft?
5. What was troubling the Greek pilot as he was falling into the sea?
6. How did Pilot Officer Stratis Xydis spot his wingman?
7. How was Haralambos Stavropoulos rescued?
8. Why did the British warship's crew consider the Greek pilot's rescue a "historical event"?
9. How was the Greek pilot treated by the Admiral and the crew of the ship? Why?

**HARALAMBOS STAVROPOULOS,
GREEK ACE FIGHTER PILOT (HAF/RAF) WWII³**

Air cover mission, 16 June 1943 – Air base: Ismailia (north-east Egypt, on the west bank of the Suez Canal), LG⁴ 207, 71 O.T.U.,⁵ Royal Air Force (RAF).⁶



Haralambos Stavropoulos in flight suit, 1943. His flight gear, as shown in the picture, consisted mainly of a helmet, an oxygen mask, an inflatable life jacket, a parachute, gloves and boots, and the inflatable dinghy (rubber life raft) attached to the parachute harness and belt⁷.

The British Air Command had requested an extra flight mission in addition to the already programmed missions of the Squadron. The announcement had been posted on the pin board in the Operations Room and already seen by the pilots. The problem was that there were no available pilots, except for Pilot Officer (Plt Off) Stratis Xydis, the Squadron Leader (Sqn Ldr). Thus, the Operations Centre staff were forced to 'recruit' Warrant Officer (WO) Haralambos Stavropoulos as his wingman. H. Stavropoulos was just about to take a four-day leave to Alexandria. Wearing civilian clothes – no time to get into his flight suit and without having attached his inflatable dinghy to his belt –, WO H. Stavropoulos jumped into his Hurricane⁸ and flew off to an

³ Haralambos Stavropoulos is 92 years old today and lives in Athens. For further information on Greek fighter pilots during WWII, see <http://aces.safarikovi.org/victories/greece-ww2-raf.html>; http://en.wikipedia.org/wiki/List_of_World_War_II_aces_from_Greece.

⁴ Landing Ground.

⁵ Operational Training Unit: an intermediate step between flight training and operational duty. The No. 71 OTU's main task was to acclimatize fighter and army co-operation pilots to desert conditions. See http://www.rafweb.org/OTU_4.htm; <http://www.rafweb.org/Stations/Stations-I.htm#Ismailia>.

⁶ For further information, see <http://www.rafweb.org/Sqn071-75.htm>. As far as the common military ranks are concerned, see http://en.wikipedia.org/wiki/Pilot_Officer; http://en.wikipedia.org/wiki/RAF_officer_ranks.

⁷ For further information on WWII RAF and allied forces flight suits and gear, see <http://www.303rdbg.com/uniforms-gear-fighter.html>; <http://www.alliedflightgear.com/>.

⁸ Hawker Hurricane IIc. See: <http://www.aviation-history.com/hawker/hurricane.html>. The Hurricane was less fast but more flexible than the German Messerschmitt (<http://en.wikipedia.org/wiki/Messerschmitt>). They also were superior as far as armament was concerned.

unknown destination following his skipper. While airborne, they followed instructions from their Operations Centre and headed north-west. After approximately 100 kilometres, they approached Tobruk, Libya, flying over a large warship speeding through the Mediterranean with no escort. It was a newly built heavy cruiser, carrying high rank officers, heading towards the Indian Ocean. It had taken off from Malta, where it had participated in the bombing of the island of Pantellaria⁹. Italian and German planes had tried unsuccessfully to sink it, and there was still the fear it might be attacked again from the air or from the sea and it needed cover and support. It was 7.30 p.m. and the Greek fighter planes had taken their air cover positions in order to protect this naval giant. They were expected to restrain and repulse any raids by German bombers. Half an hour later, though, H. Stavropoulos's plane started having engine trouble, which resulted in engine failure a few minutes later.

"It was obvious – H. Stavropoulos explains – that I had to say 'goodbye' to my plane. However, I faced the dilemma whether to abandon the aircraft and bail out or to try an emergency sea landing... To make matters worse, I could not get in touch with S. Xydis as the use of radio communication was strictly forbidden. So, at an altitude of 2.500 metres I made up my mind to abandon the aircraft. I dipped the nose to increase its speed, moved the controls to turn the plane upside down and pushed the stick forward abruptly so that the centrifugal force would throw me out of the plane without hitting the vertical helm of its tail. I was thrown off the aircraft, not avoiding a leg injury, as the plane had developed a velocity of 150-200 miles per hour. (...) I lost consciousness temporarily but soon regained both my consciousness and balance and I managed to open my parachute. Looking at the boundless blue below, I was horrified at the thought that I couldn't swim. This had never worried me before, as I flew above the sea feeling secure in my flying machine! (...) I inflated my life jacket by blowing into it, I took off my new suede shoes and threw them into the sea with regret and then placed my gold watch in my mouth to protect it. (...) About 10-15 metres before 'touchdown', I let go of the parachute and continued my fall feet first, holding on to my dinghy which had not been attached to my belt... Unfortunately, a huge wave hit me and washed my dinghy away. It sank immediately due to its weight (10-15 kilos), so I was left only with my life jacket."

It was about 8 p.m.; there would be one more hour of daylight. The Greek pilot scattered a special powder to repulse a shark attack. He would be protected for about 45 minutes. 'God knows what will happen after that', he thought as he was panic stricken. Neither his fellow pilot nor the crew of the British ship had any idea what had happened, as radio communication was banned in order to avoid being detected by the German radar. However, after the impact of the aircraft on the water, a massive spill of fuel, oil and glycol, appeared on the surface of the sea, which caught the eye of Plt Off S. Xydis, who thought it was some enemy submarine surfacing. He therefore flew low above the spot to check what was happening, and luckily located WO Stavropoulos who was not too far from his crashed plane. A message was sent immediately to the Search and Rescue Squad in Alexandria, and subsequently instructions were sent to the British cruiser to turn back and collect the 'floating' pilot. The cruiser risked being attacked by a German submarine, as it lacked any appropriate protection. WO H. Stavropoulos was soon picked up by the crew of the British cruiser. As he was the first shipwrecked person saved by the crew of that ship, it was considered a 'historical event'. The Admiral invited WO H. Stavropoulos to his cabin and had a brief discussion with him. As soon as he found out that Stavropoulos

⁹ See http://320thbg.org/pantelleria_1.html; <http://www.combinedops.com/pantelleria.htm>.

was a Greek pilot, whose mission was to protect his ship from enemy attack, the Admiral, obviously touched and grateful, gave the pilot a warm embrace and offered him a glass of whisky. H. Stavropoulos was given dry clothes and his injured leg was taken care of. He was soon wearing a freshly pressed uniform of a Royal Navy Acting Sub-Lieutenant¹⁰ and new shoes, and his gold watch was cleaned and serviced. He was also offered a cabin, where he met all the officers on the ship who wanted to meet him in person and congratulate him. On the next day, “Acting Sub-Lieutenant” Stavropoulos got off the ship at Port Said, Egypt, and from there was flown to Alexandria on a RAF plane to enjoy his four-day leave, the whole time wearing the uniform he was given as a present. This uniform is still in his possession today, reminding him of this incident.

Writing – Letter to the Editor

You have read an article in a magazine entitled “The Radar, the Most Important Invention in World War II.” The magazine has invited its readers to contribute their suggestions on one or two other inventions which they consider just as significant, if not more, both for the outcome of the war as well as for the evolution of science and technology. Write a letter to the editor (180-220 words) giving your suggestion(s) and providing examples to support your view. Begin your letter with: “Dear Editor,…”

¹⁰ For the Royal Navy ranking system, see <http://www.naval-history.net/WW2aaRN-PayTables00Ranks-Badges.htm>.