ФЕДЕРАЛЬНОЕ АГЕНСТВО ВОЗДУШНОГО ТРАНСПОРТА

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ПРОФЕССИОНАЛЬНОГО ОБРАЗОВАНИЯ
«МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ ГРАЖДАНСКОЙ АВИАЦИИ»

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AVIATION

ПОСОБИЕ
по английскому языку

для студентов I-II курсов
всех специальностей
дневного обучения

Москва-2010

ББК 4И (Англ.)
С 30

Рецензент: канд. филол. наук, доц. З.В. Руслякова

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С 30 Aviation. Пособие по английскому языку для студентов I-II курса всех специальностей дневного обучения. – М.: МГТУГА, 2010.- 46 с

Данное пособие издаётся в соответствии с рабочей программой учебной дисциплины ГСЭ.Ф.1 «Иностранный язык» по учебному плану для студентов I-II курсов всех специальностей дневного обучения, утверждённому в 2001 г.

Рассмотрено и одобрено на заседаниях кафедры 16.02.10 г. И методического совета специальности 230101 25.02.10 г.

Text 1
«Airports and runways»

Introduction

The first airports were simply grass fields (airfields) but as aircraft became heavier, paved **runways** were developed. This also meant that airplanes could land and take off in all weather conditions. Over the years airports have become bigger and busier with elaborate **terminal buildings** to improve passenger comfort and ofter retail services. The world's biggest airport is now considered to be Atlanta, with Heathrow airport generally recognized as the world's biggest international airport, though it faces serious competition from Charles de Gaulle (Paris), Frankfurt and Schipol (Amsterdam). Not everyone agrees on the 'biggest' though, as an airport's size can be measured in terms of the number of **movements** (landings and take offs) that occur in a year, the number of passengers that pass through, the number of runways available or even the surface area occupied.

Airports are sometimes referred to as **aerodromes**, though this term is considered old-fashioned and often implies a small airport. The term **airstrip** is used when not much more than a small basic runway is provided (often used by the military).

When talking about airports, 'big' is not always beautiful.
In recent years there has been considerable controversy concerning the environmental impact of increasing traffic at large airports. Noise pollution is a particularly controversial issue, and expanding existing airports or building new ones is becoming increasingly difficult in many parts of the world.

Organization

Airports are divided into **landside** and **airside** areas. Airside areas are where the airplanes can be found. These include runways and taxiways, as well as **stands**, where aircraft are parked for providing direct access to the terminal building through an **air bridge** or **jetway**. The airside area also includes the **apron**, where several aircraft may park at a distance from the terminal building (buses then take passengers to and from the aircraft). Access to all airside areas is subject to tight security controls. Landside areas, on the other hand, which include shops, restaurants, car parks and check-in areas, are more accessible to the general public.

Air Traffic Control (ATC) is usually provided from a control tower situated on-site. At major airports ATC is separated into **ground control** (responsible for aircraft and all other vehicles using the apron and taxiways) and **tower control** (responsible for aircraft landing and taking off on the runways). **Approach control** handles aircraft which have just taken off or are about to land. **En-route** traffic is controlled at an area control centre, which can be situated anywhere, as the aircraft are only visible on a controller's radar screen.

Runways

Small airports may have only one runway but most major airports have several. When a new airport is built or an existing one expanded, **runway layout** is of primary concern. Runways need to be laid out to make optimum use of the prevailing winds because aircraft need to take off and land directly into the wind if possible.

Crosswinds can be a dangerous hazard. Assuming that the airport will be busy, the layout should also be efficient, ideally allowing runways to be used simultaneously. A further important consideration is the way in which local resident communities will be disturbed by noise.

The three main runway configurations are **parallel** runways, **open-V** runways (they diverge but do not intersect, when viewed overhead the shape is a 'V'), and **intersecting** runways. The latter two types are relevant in locations where the direction of the prevailing wind changes.

Runways are labelled depending on their direction relative to the magnetic compass (to the nearest 10°, with the zero left off). This number is clearly indicated at the end of each runway. If a runway is labelled 09 at its starting point (**runway threshold**) because it runs due east (90°), then it will be labelled 27 at the other end which is the runway threshold should the pilot need to land in a westerly direction (270°). In this way, when a wind reverses direction, landings and take offs follow suit. All runways are thus designated by two numbers the difference between which is 18. For example, on runway 13-31 pilots can either land or take off with a heading of 130° or 310°.

At international airports all runways must have **ground markings** and **standardized lighting** according to agreed international standards. The threshold and direction of a runway should be clearly marked as well as the **touchdown zone** and **distance markers** at various points to show a pilot how much runway is left. The centre line should also be clearly visible as well as the **runway exits** leading to taxiways. Standardized lighting is as follows:

- Green **threshold lights** mark the beginning of a runway.
- Red lights mark the end of a runway.
- White or yellow lights mark the edges of a runway.
- Blue lights indicate taxiways.

Runway incursions

People often think that you are safe once you have landed on the runway and the pilot has slowed the aircraft down. In fact most accidents happen on the ground and not in the air. The world's worst ever civil aviation disaster (disregarding terrorist attacks) was the accident at Tenerife airport in 1977 when two Boeing 747s collided on a runway killing 583 people. As traffic increases at major airports, so do the risks of collisions on the ground.

A **runway incursion** is the unauthorized entry onto a runway by an aircraft, a vehicle, a person or an object. In such situations there is a serious danger to any airplane which may be taking off or landing. A runway incursion might be caused by an operational error on the part of an air traffic controller, a pilot deviating from issued instructions or by the driver of an airport vehicle.

Miscommunication can be the cause or a key contributing factor in a runway incursion. Problems with the lighting or markings of runways or taxiways, or just a general disorientation or failure to see a situation correctly are other potential factors.

When a runway incursion occurs, there is often more than one factor at work. In 2001 at Milan's Linate airport, an MD-87 collided in fog on the runway with a Cessna corporate jet killing 118 people. The pilots of the corporate jet were unfamiliar with the airport and wrongly followed the instructions they were given, the air traffic controllers on duty failed to pick up clear signs that they were on the wrong course and though there was a **ground radar warning system** available at this frequently fogbound airport (which would have alerted all sides to the problem) it had not yet been installed (it has now).

(From “Aviation” by John Kennedy)

I. Find English equivalents for the following word combinations:

1. взлётно-посадочная полоса (ВПП)
2. здание аэропорта
3. перемещение, передвижение
4. аэродром
5. взлётно-посадочная полоса (на небольших или военных аэродромах, в полевых условиях)
6. воздушное пространство (аэропорта)
7. наземное пространство (аэропорта)
8. рулежная дорожка
9. место стоянки воздушного судна
10. воздушный коридор, соединяющий самолёт и здание аэропорта (2 варианта)
11. бетонированная площадка перед ангаром, перрон (для стоянки самолётов)
12. управление воздушным движением
13. управление движением самолётов и других средств передвижения на земле
14. управление посадкой и взлётом самолётов
15. управление только что взлетевшим или заходящим на посадку самолётом
16. (находящийся) в пути, на маршруте
17. расположение ВПП
18. параллельные ВПП
19. расходящиеся ВПП, напоминающие по форме букву «V»
20. пересекающиеся ВПП
21. начало ВПП
22. наземная разметка
23. стандартизированное освещение
24. зона посадки
25. дистанционные указатели
26. конечная ВПП
27. огни, показывающие начало ВПП
28. (неразрешённое) вторжение на ВПП
29. наземная радиолокационная система предупреждения

II. Answer the questions:

1. Which airport is considered to be the biggest in the world?
2. Is there any difference between an airport and an aerodrome?
3. Why were paved runways developed?
4. Which areas are airports divided into?
5. What do airside areas include?
6. What do landside areas include?
7. Where is Air Traffic Control usually provided from?
8. Air Traffic Control is separated into different kinds of control, isn`t it? What are they?
9. How many configurations of runways are there? What are they?
10. What must all runways at international airports have?

III. Give the summary of the text

Text 2
«Navigation and flight planning»

Introduction

In the very early days of powered flight, pilots were content simply to get airborne and fly short distances. It was not long, however, before they began to fly further and had a need to find their way safely and efficiently to their desired destination, thus leading to the development of **air navigation**. This was initially based on nautical navigation, hence the term aeronautical. Navigating a course in the air is fundamentally different from navigating on land or at sea, as one cannot simply stop in order to decide the best course to follow. An airplane can also only carry a limited amount of fuel and failure to reach its destination (or another safe landing area) before this fuel runs out might have fatal consequences.

VFR / IFR

Nowadays all flights operate under **VFR (Visual Flight Rules)** or **IFR (Instrument Flight Rules)**. A VFR pilot is qualified and authorized to fly only in good weather conditions and is responsible for maintaining separation from other aircraft and obstructions on the basis of what he / she can see. An IFR pilot is permitted to fly in all weather conditions, when visibility may be low, and relies on **flight instruments** and **navigational aids** to follow a safe course. Most IFR flights take place in **controlled airspace** where air traffic control services issue instructions to pilots to ensure the safe and efficient flow of traffic. When you board a commercial flight, it is probably flying under IFR, but if a friend or relative offers to take you up in an airplane around your local area on a sunny day, then this is most likely flying under VFR.

Basic navigation (VFR navigation)

In the early days of flight, navigational aids did not exist and the basic technique followed was **pilotage**. Flights were at low altitude and the pilot simply looked out the window and navigated with reference to known landmarks. In some cases, it was just a question of following a road, river or railway to the desired destination. While a VFR pilot today will still use this technique, there is an obvious danger of getting lost, particularly if bad weather sets in suddenly. VFR pilots are nowadays advised to plan their flight carefully before taking off using the detailed **aeronautical charts** they have at their disposal. They plan their route, taking into account natural obstacles and airspace which may be restricted or controlled (they will either need prior authorization to enter or it may not be open to them at all). They then mark this route on their charts.

For all aircraft, and light aircraft in particular, wind is an important factor in flight planning. A pilot who tries to fly along a planned route risks being blown off course unless a suitable **heading** is chosen based upon meteorological forecasts of wind strength and direction. The chosen heading will probably need to be altered in flight in response to changes in the strength or direction of the wind. Note that the word **track** is also used to refer to the actual route taken by the pilot when, as frequently happens, the flight plan changes.

A **heading** is expressed in degrees with magnetic north as a reference. It should not be confused with the term **bearing**, also expressed in degrees, where an alternative reference is explicitly stated (e.g. a particular beacon). For example a pilot may be heading due west (a heading of 270°) having just passed directly over a beacon, in which case the pilot has a bearing of 180° in relation to this beacon.

A technique known as **dead reckoning** serves as a check that all is going to plan. The pilot selects some easily recognizable landmarks along the planned route and calculates how long it will take to reach these points taking into account both the planned airspeed and wind. These points are known as **checkpoints**, and when the planned time has elapsed the pilot expects to identify the landmarks on the ground. When this happens he / she has made a fix and can confidently proceed with the next stage along the planned route.

The **magnetic compass** is the basic navigational aid that a VFR pilot will use.

Despite all their training and the existing regulations, VFR pilots do get lost from time to time, fly into airspace that they shouldn't normally be flying in, or find themselves in **IMC (Instrument Meteorological Conditions)**, such as flying through cloud, for which they are not necessarily equipped or trained. The consequences are potentially very serious and it often falls to the highly skilled air traffic controllers or perhaps to other more experienced pilots who are flying in the vicinity to do what they can to help.

IFR navigation

The first and most obvious difference in navigation procedures for IFR is that pilots need to be qualified and licensed to fly IFR.

IFR pilots usually fly in controlled airspace. They have at their disposal special charts which indicate recommended **IFR routes** between **navigational beacons** (radio stations on the ground which emit signals). If they are travelling in remote areas where there are no navigational beacons, then they have to determine a suitable route by themselves. Distances between beacons, the bearings to be taken and the **Lowest Safe Altitude (LSALT)** are clearly marked for the recommended IFR routes.

If an IFR pilot is flying through controlled airspace, he / she needs to **file a flight plan** with air traffic control services. In the case of commercial airlines that repeatedly fly the same route, they would normally file a repetitive flight plan that is valid for a certain period.

Navigational aids

ADF (Automatic Direction Finding): ADF is a-fairly old system of radio navigation, but it is still in use today. A **Non-Directional Beacon (NDB)** emits a radio signal and the pilot's cockpit display will show the direction of the beacon from the aircraft.

VOR (very High Frequency Omni-directional Range):

This is a more developed system and is currently the primary air navigation system in countries where sufficient infrastructure is in place. A VOR station can determine and transmit to the pilot the exact direction that will take the pilot over the point where the VOR station is. Many VOR stations also have **Distance Measuring Equipment (DME)** which informs the pilot of his / her distance from the VOR station.

GPS (Global Positioning System): Many cars are now fitted with a GPS system so that you can drive without consulting a map. Pilots are also now making use of GPS satellite navigation. Originally very expensive, GPS equipment is now cheaper to buy and so even if a light aircraft is not fitted with a GPS cockpit system, many pilots will use a hand-held device.

One of the benefits of GPS is the greater degree of precision that it affords to both pilots and controllers. A pilot's position can now be identified within a few meters. For this reason, required minimum levels of separation between airplanes are less nowadays than in the past.

One of the criticisms of GPS is that it was developed and is owned by the US military. It has been freely available for civilian use for several years, but the worry that one day this might change has led the Europeans to develop their own new satellite navigation system, **Galileo**, which is expected to be operational in a few years' time.

Air traffic control

IFR pilots can obviously not follow their desired course blindly while disregarding other traffic. When flying through controlled airspace a pilot will often ask for or receive **vectors** (instructions as to which heading to take, or we can say that the controller **vectors the pilot**) from an air traffic controller who is responsible for ensuring and maintaining safe separation between aircraft.

(From “Aviation” by John Kennedy)

I. Find English equivalents for the following word combinations:

1. воздушная навигация
2. правила визуального полёта (ПВП)

3. правила полётов по приборам (ППП)
4. полётные приборы
5. навигационные средства
6. контролируемое воздушное пространство
7. пилотаж
8. аэронавигационные карты
9. курс
10. линия пути
11. азимут
12. навигационное счисление (пути)
13. контрольный пункт
14. определение местоположения (положения в пространстве)
15. магнитный компас
16. приборные метеорологические условия
17. маршрут полёта по приборам
18. навигационный радиомаяк
19. минимальная безопасная высота
20. представлять (подавать) план полёта
21. автоматический радиопеленгатор
22. ненаправленный радиомаяк, приводная радиостанция
23. всенаправленный радиомаяк очень высокой частоты
24. дальномерное оборудование (ДМЕ)
25. оборудование спутниковой системы навигации
26. курс самолёта
27. направлять пилота

II. Answer the questions:

1. What led to the development of air navigation?
2. Does air navigation differ from land navigation and sea navigation? What is the difference?
3. In what weather conditions can a VFR pilot fly?
4. In what weather conditions is an IFR pilot permitted to fly?
5. What does an IFR pilot rely on to follow a safe course?
6. What is pilotage?
7. Who has to plan his flight carefully before taking off using the detailed aeronautical charts he has at his disposal?
8. What is the basic navigational aid that a VFR pilot will use?
9. What does an IFR pilot need to fly through controlled airspace?
10. What does “GPS” stand for? What do you know about this system?

III. Give the summary of the text

Text 3
«Aviation technology»

Introduction

The speed of technological development during the twentieth century was fully reflected in the aviation world, whether it was in term of aircraft development, flight control systems or systems for controlling air traffic. The fast pace of change continues today. One of the most interesting, though controversial areas, is the development of automated systems.

Fly-by-wire

For the earliest aircraft, **flight control systems** were solely **mechanical** (using rods, cables and pulleys). The pilot in the cockpit made use of a **control stick** and **pedals** to carry out the three basic aerodynamic movements - **roll**, **pitch** and **yaw**. As aircraft got bigger, systems became **hydraulic** (using pumps, pipes, valves and actuators), so that pilots could move the important control surfaces without having to rely on their own strength. The development of these hydraulic systems was also an important way for the engineers to keep the weight of the aircraft down. As aircraft continued to grow in size and with the development of large passenger jets, this requirement to keep weight down led to the development of **fly-by-wire** systems. Fly-by-wire means that the aircraft is controlled by an electrical system. Nowadays fly-by-wire systems are digital and large aircraft are controlled by a computerized command system. The world's first digital fly-by-wire aircraft was the Airbus A320, which made its maiden flight in 1987. The greatest innovation was the in-built safety feature in which the computerized system prevented pilots making what would normally be considered unsafe manoeuvres (taking the aircraft outside **the flight envelope**). While this was the subject of much debate at the time, it is now a standard feature of all new Airbus aircraft. Boeing was also developing digital fly-by-wire systems, but their systems allowed the pilots to take the airplane outside the flight envelope in an emergency situation. Thus there was a fundamental difference in philosophy between the two major constructors, Airbus and Boeing, which still exists to some extent today.

An obvious question is what happens when the computer fails (**instrument blackout**). The pilot then has no control over the aircraft (a back-up hydraulic system would increase weight significantly). Large aircraft usually have at least four parallel computerized control systems to deal with situations where one or even two computers might be down.

With sophisticated computer controls in place, there is no longer any need for a control stick in the cockpit. Yet even the newest aircraft (the Airbus A380 or the Boeing 787) have something which resembles a control stick in the cockpit. Research conducted amongst pilots has shown that this should remain for reasons which have nothing to do with technology and everything to do with human psychology.

Automation in ATC

The computerization of cockpits led experts to question whether it was necessary for air traffic controllers to always give **verbal instructions** to pilots and whether there would be any benefits in a system where controllers sent messages electronically - **Datalink** systems. Such systems are currently under development and already in use to some degree. For example, in many parts of the world, **meteorological updates** are now sent this way (previously they would have been read to pilots).

There are generally recognized benefits for both safety and efficiency. Potential misunderstandings are a natural feature of all verbal communication. Pilots and controllers face this danger when they speak to each other and are urged to constantly check, confirm and clarify information. An instruction given by a controller should normally be **read back**. As well as the potential for important mistakes being made, this is a rather inefficient use of time where messages can be submitted electronically.

More controversial has been the idea of **free flight**, with research having been conducted into fully automated ATC systems. The improvements in flight control systems have led to considerable reductions in the workload of pilots during the **cruise phase** of flight, which can often be entirely conducted by the **autopilot**. The advent of GPS has also meant that pilots are now much surer of their precise positions in the sky. The basic idea of free flight is that pilots would become responsible for plotting their optimal route and working out their own separation from other aircraft through direct pilot to pilot communications. Air traffic controllers would intervene only when necessary to resolve conflicts. Free flight has been investigated as a model for **en route** traffic above certain flight levels with arrivals and departures at airports still subject to normal ATC procedures.

Debate continues as to the feasibility of such a solution. In the US the increased **efficiency** that it could provide (in terms of allowing pilots to choose more direct routings) is often cited. In Europe, skies are more crowded and air traffic controllers are generally unionized and opposed to a measure they see as designed to save money at their expense. In response to such criticism, advocates of free flight say that controllers will still be needed, simply that the nature of their job will change. At present, implementation of any free flight system is unlikely in the near future.

Pilotless airplanes

Even more unlikely in the near future is the idea that an airliner might take off with no pilots on board, though airlines would save a lot of money by not employing pilots. In fact the technology is almost in place for this to be feasible. Commercial flights can and often do conduct the entire cruise and landing phases on autopilot. Take-offs are manual for the simple reason that current research indicates that the decision to take off or to **abort** take-off is still best made by a trained human pilot. Once this last remaining problem is addressed, the only argument resting against the implementation of pilotless commercial flights will be the reaction of passengers and their likely refusal to board such aircraft. Most experts believe that pilotless airplanes will one day be used but not in the near future. For the moment, pilotless airplanes are not something airlines or pilots are talking about publicly.

Safety and human factors

For years it was assumed in the world of aviation, as elsewhere, that humans were somehow more reliable than machines. This is no longer the case. While machines and systems do fail from time to time, nearly all accidents in civil aviation in recent memory have been the result of human error.

Great progress has been made in ensuring the safety of civil aviation. Accident rates have steadily decreased throughout the history of flying and it is the safest form of transport (a cliche often repeated but, nevertheless, true). The continuing challenge is to make flying even safer. Any accident is a tragic event for those involved and their relatives. Images shown by the media have a very negative effect on the travelling public. As the number of flights increases, the number of airplane crashes appearing on the news will logically increase too, even if the very low rate of accidents remains constant. It is the opinion of most experts that there are gains in safety to be made from technological developments.

An example of an accident which could have been averted due to available technology was provided by the tragic mid-air collision of two airplanes over Uberlingen, southern Germany, in 2002. Both aircraft were equipped with **TCAS (Traffic Collision Avoidance System)**. This system not only informed both pilots that there was an aircraft nearby but also issued **avoidance instructions** to both cockpits, telling one pilot to climb and the other to descend. The problem was that one pilot followed an instruction from the air traffic controller (who was distracted at the time) and unfortunately both aircraft descended at the same rate and collided. Following this accident, a clear directive was issued to air crew worldwide that a TCAS instruction must always take priority over a conflicting instruction from ATC.

(From “Aviation” by John Kennedy)

I. Find English equivalents for the following word combinations:

1. механическая система управления полётом
2. ручка управления (самолётом)
3. педаль
4. крен
5. пикирование
6. рыскание по курсу
7. гидравлическая система управления полётом
8. электро-дистанционная система (управления самолётом)
9. пространство вокруг самолёта в воздухе, считающееся для него безопасным
10. отказ прибора
11. устная команда
12. система передачи команд электронным способом
13. самая последняя (новейшая) информация о метеоусловиях
14. повторить (команду диспетчеру)
15. полёт, контролируемый полностью автоматизированной системой управления воздушным движением, при котором пилоты разных самолётов общаются

друг с другом и сами определяют оптимальный маршрут и расстояние между самолётами

16. крейсерская фаза (полёта)
17. автопилот
18. (находящийся) в пути, на маршруте
19. эффективность
20. прервать взлёт
21. бортовая система предупреждения столкновений с воздушными судами
22. команда (инструкция) для избежания столкновения воздушных судов

II. Answer the questions:

1. What kinds of flight control system do you know? What is the difference between them?
2. Nowadays fly-by-wire system is digital, isn`t it?
3. What question did the computerization of cockpits lead experts to?
4. What disadvantages does the system of giving verbal instructions to pilots (by air traffic controllers) have?
5. When can the flight be entirely conducted by autopilot?
6. Do you believe in the idea of pilotless airplanes?
7. Why is the taking-off phase of plight always manual?
8. Do you think humans are more reliable than machines or not?
9. The result of whose error have nearly all accidents in civil aviation in recent memory been?
10. What was the cause of the collision of two airplanes in southern Germany in 2002?

III. Give the summary of the text

Text 4

«Animal hazards in aviation»

Introduction

Airports and runways naturally attract birds and other animals, as they offer wide open spaces with a minimum of buildings around. If animals are not kept away from runways, then the risk that they will interfere with an aircraft on take-off is high, and this can have very serious consequences. Airports typically attempt to make their environment less attractive to animals.

Bird strikes and other runway hazards

In aviation, bird strikes refer to incidents in which aircraft collide with birds. While one might think that bird strikes are unfortunate for the birds who are very unlikely to survive such collisions, they are in fact a serious safety hazard for aircraft and have caused fatal accidents as well as significant damage to airplanes. Quite simply, airplanes travel so fast that birds are unable to see them in time and avoid them. While bird strikes can occur at any time, even while cruising at high altitudes, in the vast majority of cases they occur when airplanes are flying at less than 3,000 ft as this is where most birds are to be found. For large passenger airliners the danger is greatest just after take-off or when coming in to land. The principal danger is that of a bird being sucked into one of the engines (known as **engine ingestion**). This significantly affects the airplane's performance or can even cause it to crash. When it's a case of a **multiple strike** (ingestion of a flock of birds), these risks are more serious still. Often the safest course for a pilot who suspects damage in one of the engines is to shut it down and follow the same procedures as in a case of engine failure. Airports often emit high frequency sounds to frighten the birds away. Measures such as this can provide short-term solutions, but often the birds return. Constant vigilance is required on the part of airport personnel (those who carry out **runway inspections** in particular) and pilots who are airborne. They can alert controllers whenever they spot flocks of birds that may threaten other aircraft. Aircraft manufacturers also have an important role to play and they try to minimize the damage that birds might cause to the engines or other parts of the aircraft. The cockpit **windshield**, for example, on a commercial airliner needs to be fully resistant to collisions with even the largest of birds.

While birds are the most significant hazard around runways, they are not the only one. Objects or debris on the runway can be just as lethal as animal, aircraft or vehicle intrusions. In 2000, a small piece of titanium debris from a recently departed aircraft (about 50 em long by 3 em wide) on a runway at Paris Charles de Gaulle airport caused a tyre burst and engine fire of a departing Concorde, leading to the deaths of 104 people. The lessons of this accident have led to an increased frequency of **runway inspections** at many locations.

Engine failure

There are many demands on **aircraft engines**. First they need to generate a great deal of power to provide sufficient **thrust**, the force that moves an aircraft forward. The engines operate at maximum power during take-off, but even during other phases of flight, such as **cruise**, they operate at high power settings. An engine should not add too much extra weight to an aircraft and should be of such a design and shape that minimizes **drag** (the reacting force caused by the passage of the airplane through the air). Engines also need to support fuel efficiency and be capable of operating effectively at extreme temperatures. Finally, there is increasing pressure on engine designers to minimize damage to the environment.

The most important requirement for an engine is that it should be **reliable**. Engine failure has potentially very serious consequences for a **single-engine** airplane. A lot of the basic training for pilots of such aircraft deals with how to make safe emergency landings in such situations, basically **gliding** the airplane that has lost all power. This becomes much more difficult in mountainous terrain or over water. There are thus certain areas where flying a single-engine aircraft is highly risky and in Europe it is a requirement that a passenger jet be a **twin-engine**.

When one engine fails on a twin-engine airplane, and despite improving levels of engine reliability this does happen on commercial jets, it is usually a fairly routine procedure to **divert** to the nearest airport (a pilot will always have, as part of the flight plan, a list of suitable diversionary airports). The pilot can also sometimes reach the scheduled destination. It all depends on his / her position and fuel situation.

One of the most dangerous times for an engine to fail is during take-off, on a twin-engine aircraft the thrust is unbalanced and the pilot will have to take immediate action to correct this. In some circumstances the pilot may be able to abort take-off (this is authorized if travelling at less than the decision speed, termed V1), but if travelling at higher speed then the required (and safest) procedure is to take-off in any case. This was the case with the Concorde accident mentioned above, where the pilots knew they had a problem before lifting off. Exceptionally, a captain has the authority to go against this and abort take-off, but with the aircraft travelling too fast the consequences may be very serious and it's a decision that will need to be justified afterwards. That's not to say that the recommended decision to continue take-off might not have equally serious or worse consequences.

Failure of one engine on a four-engine airplane, at least while cruising, should not be so threatening. If a pilot is worried about the unbalanced thrust, he / she may take the decision to shut down the corresponding engine on the other wing and fly reasonably safely on two engines.

In an incident in February 2005 on a four-engine Boeing 747, a British Airways captain had to shut down one engine just after take-off from Los Angeles. Rather than deciding to return to the airport, he chose to fly on across the Atlantic on three engines and landed safely in Manchester. The US controllers expressed their surprise at this decision but the pilot had the full backing of British Airways. The incident was the subject of much debate amongst experts.

Animals on board

Dangerous animals would never be allowed to travel in the **cabin** of a passenger jet, though they might be transported in the **hold** or on a special **cargo** flight. International rules on transporting animals by air are strict and the only kind accepted on board are household pets, typically cats and small dogs. Even then the number accepted on any particular flight is limited (advance reservation required), a health certificate has to be produced and a special fee will be charged. This is sometimes higher than the accompanying passenger's fare. Some airlines refuse to accept any animals at all. While airlines are primarily concerned with safety issues, there are also regulations concerning the welfare of the animal being transported.

Shipping animals in the hold or sending them by cargo is different, but still subject to strict regulation. The animals are much less likely to cause any disruption to the safe operation of the flight, providing they are properly secured. The welfare of the animals being transported is also a key concern.

Horses are not an uncommon cargo and often an extremely valuable one (when considering the worth of a racehorse or the horses that participate in show jumping). Transporting horses safely and with a minimum of stress (they can be badly affected by this) is a task which requires expertise. They are not generally sedated as this can be harmful. The recommended procedure is that the horse travels with its groom, who can comfort it as necessary during the flight and provide it with the right amounts of food and water. If horses became seriously upset, they could cause a safety risk to the operation of a flight, so horses are never flown on the same airplane as passengers. Pilots and air traffic controllers do sometimes need to adjust their procedures accordingly. Pilots are strongly advised to ascend and descend at a gradual rate (so as not to disturb a horse's balance). Air traffic controllers are advised to ensure as far as possible that delays to any flight with horses aboard be kept to a minimum.

The transportation of horses is a lucrative market with healthy profits to be made by the operators.

(From “Aviation” by John Kennedy)

I. Find English equivalents for the following word combinations:

1. попадание, засасывание в двигатель
2. удар, нанесённый стаей птиц
3. осмотр взлетно-посадочной полосы
4. лобовое стекло
5. авиационный двигатель
6. тяга
7. крейсерская фаза
8. лобовое сопротивление
9. надёжный
10. самолёт с одним двигателем
11. планирование
12. самолёт с двумя двигателями
13. отклониться от маршрута, отвести (самолёт в ближайший аэропорт в случае отказа одного из двигателей)
14. салон самолёта
15. багажный отсек
16. грузовой рейс

II. Answer the questions:

1. Why do airports and runways attract birds and other animals?
2. What consequences can collisions of aircraft with birds have?
3. What is done in airports to frighten birds away?
4. What caused a tyre burst and engine fire of a departing Concorde, leading to the deaths of 104 people? Where and when did it happen?
5. Are there many demands on aircraft engines? What are they?
6. What do you think is the most important requirement for an engine?
7. Why should a passenger jet be twin-engine?
8. Failure of one engine on a four-engine airplane isn`t so threatening, is it?
9. What are international rules on transporting animals by air?
10. Why do some airlines refuse to accept animals at all?

III. Give the summary of the text

Text 5
«Different ways to fly»

How an airplane flies

To become airborne in the first place, an airplane requires a force that will push it up into the air. This force is known as **lift** and it is generated by the wings. An airplane moves forward as a result of the force known as **thrust**, generated by the airplane's engines. The upper surface of an airplane's wings are curved and as the airplane accelerates and moves forward along the runway, air passes over the upper and lower surfaces of the wings. The air which moves over the upper surfaces has to travel further (because of the curvature of these surfaces) and therefore moves faster. The pressure generated by faster moving air is lower than that generated by slower moving air (the Bernoulli principle discovered by the Swiss scientist of the same name in the 18th century). Thus it is the higher pressure under the wings which creates the lift that eventually takes the airplane into the air. For this to happen the airplane must be moving sufficiently fast so that the difference in air pressure can overcome the gravitational force pushing downwards; that is the airplane's **weight**. When an airplane reaches its **cruising** altitude, lift and weight are acting in equilibrium as are thrust and **drag**. Drag is the reactionary force created by the movement of the airplane through the air.

For manoeuvring and turning an aircraft, a pilot will rely on three basic **aerodynamical** movements known as **roll**, **pitch** and **yaw**.

Roll is rotation around the longitudinal axis (the imaginary line from nose to tail) and is controlled by use of the **ailerons** (moveable surfaces of an aircraft's wings). There are two ailerons, one on each wing and they operate in opposite directions. When the pilot deflects the right aileron upwards the right wing will produce less lift. At the same time the left aileron deflects downwards creating greater lift on the left wing. This causes the aircraft to roll to the right. A reverse in deployment creates roll to the left.

Pitch is rotation around the lateral axis (the imaginary line connecting the **wingtips**) and is controlled by use of the **elevator**. The elevator is the moveable surface of the horizontal part of the tail. When the elevator deflects upwards the tail moves downwards and the airplane is said to be in a **nose-up** attitude. Deflecting the elevator downwards pushes the tail upwards and puts the airplane into a **nose-down** attitude.

Yaw is rotation around the vertical axis (the imaginary line running downwards through the centre of gravity of the aircraft) and is controlled by use of the **rudder**, which is the moveable surface of the vertical part of the tail. Deflecting the rudder surface to the right causes yaw to the right. Left rudder deflection means yaw to the left. Thus the rudder on an aircraft works in the same way as the rudder on a boat or ship, from where the word originates.

These three movements are the essence of controlled flight. They do not operate in isolation and to turn an aircraft a pilot will make use of all three to some degree.

Hydraulic failure

Hydraulic failure is very serious, as it usually means that the pilot will lose the use of the moveable surfaces which are essential for proper flight control. Nevertheless, emergency solutions exist. In case of such an incident the pilot immediately declares an emergency and plans his return to the airport. He is able to make basic turning movements by using **asymmetrical thrust** (setting the two engines to produce different degrees of thrust, whereas in a normal situation they would be in equilibrium). He has lost, however, the ability to turn with any degree of precision so it is still a precarious situation.

Partial or total hydraulic failure can also cause problems with the landing gear (the wheels). Even if the pilot cannot extend the **landing gear**, a safe landing can usually be performed but it won't be comfortable for the passengers and may cause major damage to the aircraft.

Alternative ways to fly

(a) Ultralight aircraft

Taking piloting lessons in a light aircraft at a flying club, with a view to obtaining a **PPL (Private Pilot's Licence)**, is usually a fairly expensive undertaking and outside the reach of many enthusiasts who have a strong desire to fly. The development of **ultralight** (sometimes termed **microlight**) airplanes was a response to the increasing demand for cheaper and less regulated means of flying. The safety regulations in place differ significantly from country to country and this is a barrier to cross-border flights of ultralight airplanes. In the US, for example, there is no legal requirement to undertake training or obtain a licence in order to fly an ultralight aircraft. It is, nevertheless, strongly recommended to undergo proper training. Flying ultralight aircraft can be highly dangerous if the pilot is not properly prepared and the accidents which do occur are nearly always a case of pilot error. The UK takes a very different approach from the US in choosing to strictly regulate this sector.

The ultralight aircraft GEN-H4, is a new and highly innovative model. Potential customers should check local regulations before purchasing, in order to ensure that they would actually be permitted to fly in their own locality. Assuming that they are, it is also interesting to note that they will have to manage the same basic aerodynamical movements of roll, pitch and yaw to control their flight.

(b) Gliders

To the uninitiated, the idea of flying an aircraft with no engines might sound highly dangerous. In fact flying a glider is one of the safest ways of becoming airborne providing certain sensible precautions are taken. When accidents occur, they often involve highly experienced glider pilots who have chosen to fly close to a mountainside in order to benefit from the strong air currents available in such areas. This is risky. For those who are less ambitious it's quite a safe leisure activity, and you can actually remain in the air for hours, should you wish, providing weather conditions are favourable.

Gliding is something every pilot needs to know about. This is because if you lose power on a single-engine airplane the only way to land is to glide downwards. Occasionally even large aircraft find themselves in such a situation. This occurred on an Airbus A330 in 2001. The flight left Toronto bound for Lisbon with 304 people on board. The pilots ran out of fuel halfway across the Atlantic. They lost nearly all hydraulic control as a result and had to rely on a minimal backup system. With no power they found themselves almost 100 miles from the nearest land (the Azores). Incredibly they were able to glide their Airbus 330 to a safe landing, with no casualties other than a few minor injuries. This incident demonstrated the value of training pilots for highly unusual and extreme situations.

(c) Aerobatics

Aerobatics is a sport in which flying manoeuvres are demonstrated, sometimes to entertain the public. Aerobatic displays may be performed by military pilots or by civilians. For military fighter pilots the ability to perform aerobatic manoeuvres is part of their training. Aerobatic displays may involve individual aircraft where the full range of manoeuvres may be attempted or a group of airplanes flying in formation. In the latter case, the close proximity of several airplanes will limit the range of manoeuvres which can be performed, though watching a number of airplanes performing in synchronization is a marvellous sight.

Although there are specialized aerobatic aircraft, many regular aircraft are **aerobatic capable**. While some civilian pilots may be at least partially trained on these aerobatic capable aircraft, learning some basic manoeuvres, the profile of a commercial pilot is entirely different. Commercial pilots spend their careers keeping carefully within a predefined, safe **flight envelope**.

(From “Aviation” by John Kennedy)

I. Find English equivalents for the following word combinations:

1. подъёмная сила
2. тяга
3. вес
4. крейсерская высота (полёта)
5. лобовое сопротивление
6. аэродинамические движения
7. крен
8. пикирование
9. рыскание по курсу
10. элерон
11. законцовка крыла
12. руль высоты
13. положение самолёта в воздухе, когда носовая часть поднята вверх
14. положение самолёта в воздухе, когда носовая часть опущена вниз

15. руль направления
16. ассиметричная тяга
17. шасси
18. лицензия на право управления самолётом
19. сверхлёгкий самолёт
20. планер
21. высший пилотаж, фигурные полёты
22. (самолёт) способный выполнить фигуры высшего пилотажа
23. пространство вокруг самолёта в воздухе, считающееся для него безопасным

II. Answer the questions:

1. What is necessary to push an airplane up into the air?
2. What force moves an airplane forward?
3. Do lift and weight act in equilibrium (as well as thrust and drag) when an airplane reaches its cruising altitude?
4. How many basic aerodynamical movements for manoeuvring and turning an aircraft do you know? What are they?
5. Which aerodynamical movement is controlled by use of the ailerons?
6. What does the elevator control?
7. What does the rudder control?
8. Partial or total hydraulic failure can cause very serious problems, can`t it? What problems?
9. What are cheaper and less regulated means of flying?
10. Who may perform aerobatic displays?

III. Give the summary of the text

<u>Text 6</u>
«Health and flying»

Introduction

Medical emergencies on board are one of the main reasons why an aircraft may need to divert if the emergency is serious enough and cannot be treated within the airplane itself.

The final decision as to whether a diversion is necessary or not rests with the captain on board. All aircraft have a medical bag on board and cabin crew receive first aid training. A request may be made for any doctor who happens to be travelling on a flight to make themselves known to the crew, with a view to a possible intervention. A recent innovation is the **MedLink** service where a specialist opinion may be provided at a distance.

Contributing causes to medical emergencies on board

Some passengers board an aircraft with an underlying medical condition which makes flying inadvisable. Airlines will try to screen such passengers and they have the right to stop them at the departure gate and refuse permission to embark. But unless the symptoms are very obvious, passengers at risk will remain undetected until it is too late. Sometimes the passengers themselves may not be aware of their own condition until a problem occurs. With the increase in leisure travel and particularly long haul travel by elderly passengers, the likelihood of a medical emergency during flight is on the increase. No airline would want to be seen to discriminate against the older generation so there is not much an airline can do about this other than following correct procedure when a problem occurs.

A further problem in international travel is that cabin crew may be unable to correctly assess the seriousness of a medical condition due to a language barrier. It may be that someone is unable to explain the seriousness (or otherwise) of a medical condition. In such circumstances the captain may choose to divert rather than to risk a more serious outcome.

When flying itself adversely affects health

Passengers may feel perfectly healthy when boarding an aircraft, but there are increasing concerns that flying itself can be bad for your health. Indeed the problems may start before you even get on board and increasingly, busy international airports have been identified as places where stress levels can greatly increase. We only have to think of the long queues to check in and pass through security, and long delays in boarding and taking off, to understand how this might lead to problems.

But even assuming passengers survive the airport experience unharmed (and most obviously do), there has been a lot of media attention in recent years on the condition known as **DVT (deep vein thrombosis)**. This is thought to affect frequent flyers in particular, especially those who often fly long haul. Some research has shown that long periods spent sitting in aircraft seats, with economy class being the worst of all, significantly increases the risks of developing a serious blood clot. The problem with DVT is that there are no clear symptoms and you probably won't know you're suffering from it until you actually have a blood clot, which could be life-threatening. Some research has suggested it's a risk for pilots too, but not usually for the cabin crew who spend a lot of time walking on board. Some sufferers have taken legal action against the airlines. They lost a case in the British courts in 2002 and they also lost two subsequent appeals against this decision. However, airlines became concerned about the problem and many have an advice leaflet in seat pockets warning passengers of the risks of DVT and suggesting that they take regular walks around the cabin. Most airlines now also serve less alcohol on board as drinking can increase the chances of DVT.

Turbulence can be sudden and severe and has, on occasion, lead to serious injuries or even death on board when passengers have been thrown out of their seats. Travellers are now advised to keep their seatbelts fastened throughout the flight.

High stress levels, excessive alcohol consumption or psychological problems have all been found to be possible factors in incidents of **air rage**, when a passenger becomes aggressive and may present a danger to the safety of others or to the flight itself.

Precautions on board

As already mentioned, cabin crew undergo first aid training for medical emergencies and the services of any doctor on board may be solicited too. The items contained in the medical bag on board are increasingly sophisticated. Airlines are also making use of the new MedLink service. When in doubt during a medical emergency, an airline pilot will divert rather than take any unnecessary risks.

The role of air traffic controllers

Air traffic controllers are also trained to deal with medical emergencies. While the decision to divert will always rest with the pilot, air traffic controllers provide an essential link with medical services on the ground. Once a decision to divert has been taken, the controller is responsible for making sure that the appropriate medical services are properly informed and standing by, ready for action when the airplane lands.

Human factors in aviation

Both pilots and controllers are prone to stress. An ability to recognize stress, and deal with it effectively, is an important part of the training that they receive in human factors. Pilots and air traffic controllers are taught that mistakes are often made when under pressure, when fatigued or when complacency sets in.

The worst civil aviation accident in history (in terms of the death toll incurred) took place in 1977 at Tenerife airport. While there were many factors which played a part in this accident, one of the most important ones was the decision of the KLM captain to take off before he had been cleared to do so. He was a highly experienced pilot and his actions that day seemed, on initial examination, incomprehensible. Experts suggested that he was fatigued, under stress and simply impatient to get airborne. In the years following the accident, greater emphasis during training was given to addressing the psychological factors that lie behind human error.

Training in human factors is now highly developed. It is worth repeating once more that flying is by far the safest way to travel. Yet accidents do occur and even though they are extremely rare, the statistics are no comfort to the families of the victims, nor do they always reassure the travelling public. Aircraft reliability and available technology have reached such levels that it is almost always human error that is found to be the main contributing factor to an accident. Further improvements in safety are thus conditional upon eliminating, as far as possible, such mistakes. Yet experts in the field of human factors will stress that you cannot eliminate human error entirely and it is important for both pilots and controllers to recognize this and understand their own weaknesses. The focus these days is upon building checks into any operating system, technology providing a very useful check in many cases with increasingly sophisticated warning systems. Sufficient checks in the system should mean that the eventual consequences of inevitable human error become less serious.

(From “Aviation” by John Kennedy)

I. Find English equivalents for the following word combinations:

1. служба, обеспечивающая дистанционные медицинские консультации специалистов

2. тромбоз глубоких вен
3. приступ сильного гнева, ярости, случающийся в воздухе

II. Answer the questions:

1. How do the crew of an airplane act in case of medical emergencies?
2. Can passengers with an underlying medical condition which makes flying inadvisable be stopped at the departure gate and refused permission to embark?
3. Passengers of what age have more risk to get medical emergencies on board?
4. In what way does a language barrier prevent from rendering first aid on board?
5. Is flying bad for our health?
6. What disease can frequent flyers get?
7. What can sudden and severe turbulence lead to?
8. Why is it important to restrict alcohol consumption before and during the flight?
9. What is the role of air traffic controllers when a pilot has decided to divert because of medical emergency?
10. Why is human error found to be the main contributing factor to an accident in civil aviation?

III. Give the summary of the text

Text 7
«Fire on board»

Introduction

Fire on board an aircraft is an extremely dangerous hazard. With powerful engines and the carrying of large quantities of fuel on board, a certain risk clearly exists. This was especially true in the early days of aviation. Since then, aircraft manufacturers have made great progress in minimizing the risks of fire. The materials for cabin fittings are carefully chosen, smoke detectors give an early warning to the flight crew and fire extinguishers are readily available on board to deal immediately with any minor incidents in the cabin. Moreover, there are strict rules as to what goods passengers may carry on board or place in the cargo hold. Fire outside the cabin (in the cargo hold or in one of the engines) can usually be put out quickly by use of strategically-placed fire bottles, controlled from the cockpit, provided of course that the fire can be detected soon enough.

Dangerous goods

All airlines must comply with the ICAO regulations regarding the transportation of **dangerous goods**. These are usually materials which may be safely stored in your house or garage. On board an aircraft, however, they may present an unacceptable risk. This is because they will be subjected to extremes in atmospheric pressure and temperature at a typical cruising level, as well as excessive vibration at times.

The policy of airlines is to take no risks and to ban any goods which might cause a problem, even if the possibility is remote. They have strict **screening** procedures to ensure that the regulations are obeyed. Indeed the greatly increased **security** measures in place since September 11, 2001 have made things safer in this respect.

The worst case scenario

In May 1996, a DC-9 aircraft took off from Miami bound for Atlanta. Just six minutes after take-off, passengers informed flight attendants that they could smell smoke. At the same time the pilots began to experience electrical problems and requested an emergency landing at the nearest airport. Almost immediately the cabin began to fill up with smoke. The cabin crew were unable to inform the pilots in the cockpit of the problem, without opening the cockpit door (the intercom was no longer functioning). This they did and the pilots themselves were soon affected by the toxic fumes. Unfortunately they lost control of the airplane which crashlanded, with no survivors.

Subsequent investigation showed that one of the airline's subcontractors had illegally loaded expired but full oxygen generator canisters in the cargo hold without safety caps. One of these had ignited causing a fire which quickly spread to the cabin. There was no fire detection system in the cargo hold and in any case no way to extinguish the fire. After this accident the **FAA (Federal Aviation Agency)** made the presence of detection equipment and fire bottles mandatory in all aircraft cargo holds.

Engine fire

A fire in one of the engines is always a possibility, though modern engine reliability is continually improving. The pilot usually receives an immediate warning in the cockpit and the safest procedure is **to shut down** the affected engine by cutting off the fuel supply to it. The pilot can then extinguish what remains of the fire by discharging the fire bottles. The next stage (not required for a jet engine) is to **feather** the propeller of the affected engine, in other words to turn the propeller blades to an angle causing the least air resistance **(minimum drag)**. Afterwards the aircraft can either continue to its destination or the pilots can look for a suitable diversionary airport if they judge the distance to destination to be too great to continue safely.

Evacuation procedures

When an aircraft carries out an **emergency landing**, firefighting services should be on standby to deal with any fire which might break out. One major risk is that of the aircraft being unable to stop before the end of the runway. This is known as a **runway overrun** and the airplane may catch fire if it crashes into something. In such cases passengers will need to be evacuated without delay. Cabin crew are trained for this scenario and the rules governing the availability of **emergency exits** and **escape chutes** on all aircraft are strict. If the cabin is filled with smoke, the strip lighting on the floor will guide passengers to one of these exits.

In August 2005, an Airbus A340 skidded off the end of the runway at Toronto airport in severe weather conditions and plunged into a ravine. Fire broke out immediately, but all 309 passengers and crew were able to escape unharmed. The cabin crew were highly praised for being able to evacuate the airplane as fast as they did.

Regulations state that an emergency evacuation of an aircraft should be possible within 90 seconds. Training exercises are conducted regularly. New aircraft need-to be certified for their capability in meeting this standard (that is emergency exits need to be well-placed and should be sufficient in number). There was some doubt about how the new Airbus A380 might meet this standard with its record-breaking passenger capacity. In a simulated exercise in Germany, in 2006, 873 volunteers were all able to escape down the emergency slides in just 80 seconds. There were strict rules for this simulation. The cabin was darkened and half of the emergency exits (chosen at random) were blocked and so out of service. The volunteer passengers were chosen to be representative of the average passenger load - 35% were over the age of 50 and 45% were women. The exercise was recorded on infra-red cameras to be subsequently validated by a panel of experts. The risk of injury even during a training exercise such as this is considerable. One volunteer sustained a broken leg, but organizers had feared that there would be more injuries.

Air traffic control and fire-fighting services

When a fire breaks out on board an aircraft, it is the pilot's responsibility to deal with the situation. The pilot may declare an emergency and may need to land as soon as possible. In this case the air traffic controller will need to make sure that the fire service are standing by on the ground and that they have as much information as possible about the problem. The importance of the fire service being able to act as soon as the aircraft lands cannot be overstated.

Even when there is no actual fire on board, a controller may need to alert the fire service if a pilot is making an emergency landing, as in many emergency situations there is a real risk of fire breaking out.

(From “Aviation” by John Kennedy)

I. Find English equivalents for the following word combinations:

1. товары, которые представляют опасность
2. производить слежение на экране
3. безопасность
4. министерство гражданской авиации США
5. выключать двигатель
6. циклически изменять
7. лобовое сопротивление
8. аварийная посадка
9. движение накатом по ВПП
10. аварийные выходы
11. спасательные спуски

II. Answer the questions:

1. Why is fire on board an aircraft an extremely dangerous hazard?
2. Are there strict rules as to what goods passengers may carry on board?
3. What regulations must all airlines comply with?
4. Why may dangerous goods present an unacceptable risk on board an aircraft?
5. When have the greatly increased security measures made things safer?

6. Can you tell me what happened to DC-9 aircraft in May 1996?
7. What can the pilot do if he receives an immediate warning in the cockpit?
8. What is one major risk when an aircraft carries out an emergency landing?
9. In what cases will passengers need to be evacuated without delay?
10. When may the pilot declare an emergency?

III. Give the summary of the text

Text 8
«Weather»

Introduction

Weather is of crucial importance to pilots, both in flight planning and in the safe operation of a flight, and it affects all phases of flight. Modern aircraft are undoubtedly much better equipped to deal with different meteorological conditions than the machines which took to the air in the early days of powered flight. Weather reports are also a lot more reliable. None the less, pilots of today's jet airliners need to deal from time to time with several potential dangers presented by bad weather.

VFR flights are much more dependant upon good weather. Indeed VFR flying is only permitted in **VMC (Visual Meteorological Conditions)**, that is in conditions of clear visibility when the pilot can both see and be seen. Nevertheless, frequently a VFR pilot will take off in VMC but conditions change to **IMC (Instrument Meteorological Conditions)** for which he / she is neither equipped nor qualified. A VFR pilot who is not assured of suitable weather conditions along the planned route should not leave the ground. IFR flying is possible in most weather conditions but there are still some constraints, e.g. no pilot, no matter how well-trained, nor how sophisticated their aircraft might be, should knowingly fly through a thunderstorm.

Weather reports

Clearly weather reports are of great importance to pilots. They need to be informed of the conditions at the departure airport, along their planned route (known as a **route forecast**) and at their destination. Weather conditions can change and pilots need updated weather reports. **PIREPs (pilot reports)** are sent by pilots who have recently flown through an area and can keep other crews usefully informed. **Terminal aerodrome forecasts (TAF)** are continually updated and allow pilots to predict the weather at their destination.

Air traffic controllers will always relay whatever important up-to-date weather information they have to pilots, but the responsibility for the decision to take off from or land at a particular airport rests firmly with the pilot. This was the subject of some debate after an Airbus A340 accident in. Prior to this accident, Toronto airport had been closed for a short period due to the high winds and storm activity that day. It had recently reopened, but the decision to reopen the airport did not mean landings were safe and the position of the Canadian authorities was (as always in such cases) that landings were at the pilot's discretion. In the light of what happened, the general opinion was that it would have been safer to divert to another airport.

Wind and wind shear

Forecast wind strength and direction is a major factor in flight planning, and the navigation will need to be constantly updated to take into account the actual wind experienced. Aircraft should, as far as possible, land into the wind. Crosswinds can make landings much more difficult but they may be unavoidable at an airport which has only one runway, or two or more parallel runways.

Another danger presented by wind is the phenomenon known as **wind shear**. This occurs when two winds moving in opposite directions meet. The result can be severe turbulence and a loss of control. While wind shear can occur at any altitude, an airplane is most vulnerable when it is coming in to land. When wind shear can be predicted, it will be less threatening than when it occurs suddenly and the flight crew are unprepared. Controllers will do their best to warn pilots of any known wind shear activity near their airport. A pilot who is forewarned of this danger will almost always choose **to go around**, that is to climb and try to reposition for another attempt at landing, or to divert to another airport.

Low visibility

Air traffic can come to a complete halt at a fogbound airport. IFR traffic can usually take off reasonably safely in fog, but the problem is that landings may not be authorized until the fog lifts, thus effectively paralysing the airport (no inbound aircraft eventually means no outbound aircraft). This is especially the case for smaller airports. The regulations concerning landing in low visibility depend on the navigational aids available at a particular airport, the type of aircraft involved and the qualifications of the pilot. At a well-equipped airport it is possible to land even if the pilot cannot see the runway beforehand. For smaller airports and less well-equipped aircraft, visibility will need to **be above landing limits**, that is there is a minimum altitude at which the pilot will need to be able to see the runway. There will also be a stricter requirement for **RVR (Runway Visual Range)**, which is visibility along the runway once a pilot has landed.

Ice and snow

Ice or snow on a runway present obvious dangers to aircraft as they greatly increase the possibility of a runway overrun, that is skidding off the runway. Even worse, they could slow down an aircraft during its take-off roll. The airport authorities have a major responsibility to either keep runways clear of ice or snow, or to close a runway in conditions where this becomes impossible.

Icing

Ice building up on an aircraft's wings can greatly reduce the available lift and thus cause it to stall. Before an aircraft attempts to take off in icing conditions, it needs to be **de-iced** as reduced lift at take-off could be catastrophic. Special vehicles exist at airports for this fairly routine operation and it needs to be performed just prior to take-off as ice can build up again quickly. Once airborne, most commercial airliners are able to keep the wings free of ice by routing the heated air from the engines through the leading edges of the wings.

For smaller aircraft the risks are higher and pilots will need to avoid exposing their airplanes to icing conditions when in the air. If they notice ice building up on the wings, they will need to quickly descend to a warmer altitude where the ice will melt.

Storms, lightning and hail

Pilots will do what they can to avoid flying through a storm. Normally if there is a storm around an airport, controllers will warn pilots that take-off is at their own risk and this is a risk that pilots are trained not to take. For the pilot, the passengers and the airline, the financial costs of a delay are clearly to be preferred to the safety risks in choosing to take off. When an airplane is coming in to land, a decision not to land at that airport and divert elsewhere should be based on exactly the same principle of safety first. No pilot should take a risk, but it is important to recognize that the temptation to do so does exist as landing at another airport will be inconvenient for the passengers and crew as well as costly for the airline. Human factors training alerts pilots to the dangers of being swayed by such considerations.

Pilots are frequently alerted to the dangers of storms en route and do their best to navigate around them. Occasionally though, they can find themselves in the middle of a storm. Passengers would experience **severe turbulence** in such a case. There is also the danger of being struck by lightning. Most modern aircraft can resist such a strike but it is a rather frightening experience for the passengers.

Being caught in a hailstorm can cause structural damage to the aircraft, depending on how big the hailstones are. Flight crews are particularly alert to this danger.

(From "Aviation" by John Kennedy)

I. Find English equivalents for the following word combinations:

1. визуальные метеорологические условия
2. инструментальные метеорологические условия
3. прогноз погоды по маршруту
4. донесения пилотов
5. сдвиг ветра
6. заходить на второй круг
7. выше границ посадки
8. дальность видимости на взлетно-посадочной полосе
9. удалить образовавшийся лёд (на ВПП)
10. сильная турбулентность

II. Answer the questions:

1. What affects all phases of flight?
2. When is VFR flying permitted?
3. Why are clearly weather reports of great importance to pilots?
4. Who is responsible for the decision to take off from or land at a particular airport?
5. What do you think is a major factor in flight planning?

6. Can you tell me what phenomenon is known as wind shear? When does it occur?
7. What will a pilot who is forewarned of this danger always choose to do?
8. What do the regulations concerning landing in low visibility depend on?
9. Do you think ice or snow on a runway present obvious dangers to aircraft and why?
10. I wonder if pilots are frequently alerted to the dangers of storms on route?

III. Give the summary of the text

<u>Text 9</u>
«Landing an aircraft»

Introduction

While landing an aircraft is probably the most complicated phase of flight, most landings are quite routine. Meteorological conditions may at times cause some added difficulties and pilots might also have to deal with situations in which their aircraft has developed some problems en route. However, even when such difficult conditions exist, pilots will have been trained in the special procedures required to deal with them and will still be able to land safely.

Routine landings

Navigational landing aids are available at major airports and also at more minor well-equipped locations. The main navigational aid for pilots in landing an aircraft is the **Instrument Landing System (ILS)**, which is available on one or several runways at large airports. ILS enables pilots to make precision landings, even in conditions of low visibility. For each runway equipped with ILS, two beams are provided from stations installed on the ground to the cockpit. One beam provides the **localiser** which the pilot **intercepts** to line up and land in the precise direction. The second beam provides the **glide slope** which allows pilots to descend at the optimum rate. At an airport or on a runway where ILS is not available, a VOR / DME approach may be possible. In this case the pilot will use the VOR to line up in the precise direction required but will have to calculate the best rate of descent through the information provided by the DME (which informs the pilot of the distance remaining to be covered).

Where no such navigational aids exist (at small aerodromes, for example) or when navigational aids are out of service, a **visual approach** will be required. In a visual approach, as the name suggests, pilots use their own judgement to line up correctly and approach at a suitable rate of descent. This is in any case the normal procedure for VFR traffic and it is part of every pilot's initial basic training.

The basic mechanics of landing a modern jet aircraft are similar whichever of the three types of approach a pilot may be conducting. The pilot reduces airspeed sufficiently and extends the **landing gear** of the aircraft (also called **undercarriage**). The next stage is to **flare** (raise the nose slightly) just prior to landing. This important movement ensures that it is the wheels of the main landing gear which touch the runway first and take most of the force of the landing. Then the pilot will gradually lower the **nose** gear and apply **reverse thrust** (a surge of power backwards from the engines which significantly slows the aircraft). Afterwards **braking action** can be safely applied. Applying the brakes directly without using reverse thrust is possible but not always desirable as it can significantly increase the risks of skidding. Light aircraft are only equipped to apply the brakes to slow down, but they are able to stop a lot easier and quicker than a large passenger airplane.

Major airports and even small aerodromes can be congested at times and aircraft may need to enter a **holding pattern** while they wait for authorization to land. The normal arrangement is that they circle at different altitudes (to ensure safe separation) until the controller gives them clearance to come in and land. This arrangement is known as a **stack** (in a diagrammatical representation the aircraft seem to be 'on top of' each other). The trend nowadays is to try and avoid stacks for commercial traffic if at all possible. Often aircraft will not take off until they can be provided with a **direct route** to their destination. Safety concerns have been expressed by some experts about regularly having large aircraft circling over major cities, though they have not been able to prove that there is a real danger. Increasingly it is the question of additional aircraft fuel consumption (which is expensive for the airlines) and emissions, which influence the decision-making progress.

Hazardous landings

When an aircraft attempts a landing but subsequently has to climb and complete a circuit around the airport, this is termed **a go around**.

The pilot may go around for a number of different reasons which have nothing to do with meteorological conditions. lf a pilot discovers that the landing gear is not extending properly (or not extending at all), several options exist. One is to **make a low pass** which means flying low over the airport so that the controllers can look out from the control tower and inform the pilot as to how well the gear is extended. Pilots can also ask to enter a holding pattern to give themselves time to sort the problem out. In the worst possible scenario, when the gear is not working at all and the pilot is unable to sort the problem out, the only option remaining is to make what is known as a **belly landing**. It certainly isn't comfortable for passengers and the aircraft may suffer damage and require expensive repairs.

It is possible for a pilot to request a **priority landing** for problems which are relatively minor. When a pilot has to declare an emergency for a more serious problem then there clearly is a risk to safety. An aircraft on an **emergency landing** will always have priority over all other aircraft. The appropriate emergency services will also be alerted.

Failure to declare an emergency proved fatal for a Boeing 707 flight in January 1990. The aircraft had left Medellin, Colombia bound for JFK airport in New York. Due to traffic congestion the aircraft had to enter a series of holding patterns which added around 90 minutes to the estimated flight time. When the flight was finally cleared to land, the first attempt failed due to poor visibility. While going around to come in for a second attempt at landing the engines ran out of fuel completely, resulting in a crash landing in a wooded area several kilometres short of the airport. About half of the passengers on board managed to survive.

The subsequent investigation showed that the flight crew had informed air traffic control that they were running short of fuel and had said 'we need priority', but at no time did they use the words 'fuel emergency'. For this the flight crew were criticized. But the controllers at JFK were also criticized for not having realized the gravity of the situation. Communication problems were also identified as a crucial factor in this accident. The captain on board spoke no English and was communicating with the controllers through the younger less experienced first officer. After analysing the transcripts of what was said in the cockpit and on the frequency, investigators were left with the impression that the captain wanted to declare an emergency but that the first officer was rather reluctant to do so.

Several months later another flight to the same airport reported having only fifteen minutes of fuel remaining. The pilot when asked if he wanted to declare an emergency declined to do so. The controllers themselves decided to take the initiative and declare an emergency for the flight (an unusual but authorized procedure) and the aircraft landed safely.

VIP Flights

An interesting part of a controller's job is that they may have VIP flights passing through their sector. ATC provides a service that is as safe as possible for commercial air traffic so they couldn't improve this in any way for VIP flights. Depending on the country they work in and the importance of the person or people concerned, ATC might be asked to give priority to a VIP aircraft (for example, arrange a priority take-off or landing, or a preferred faster routing).

I. Find English equivalents for the following word combinations:

1. инструментальная система посадки
2. курсовой маяк
3. перехватить
4. посадочная глиссада
5. визуальный заход на посадку
6. шасси самолёта
7. передняя опора шасси
8. обратная (реверсная) тяга
9. торможение
10. ожидание посадки
11. эшелонирование самолётов перед заходом на посадку
12. прямой маршрут
13. заходить на второй круг
14. лететь низко над аэродромом
15. посадка с убранным шасси
16. посадка вне очереди
17. аварийная посадка
18. слегка приподнять переднюю часть самолёта

II. Answer the questions:

1. What is the main navigational aid for pilots in landing an aircraft?
2. What does ILS enable pilots to do?
3. When will a visual approach be required?
4. What is the basic mechanics of landing a modern jet aircraft?
5. When does the pilot make a belly landing and request a priority landing?
6. What is an interesting part of controller`s job?
7. I wonder whether an aircraft on an emergency landing will always have priority over all other aircraft?
8. What service does ATC provide?
9. What may aircraft need to do when major airports can be congested at times?
10. What arrangement is known as a stack?

III. Give the summary of the text

<u>Text 10</u>
«Fuel consumption and environmental issues»

Introduction

The environmental debate which surrounds civil aviation is not new. Noise around airports has been a major concern of local residents for years and in the 1970s the entry of Concorde into service created great controversy. In the end, Concorde was authorized to land on the east coast of the US, but not to fly over the rest of the country, effectively preventing it from serving more than a minority of airports. Some analysts claim that it was this restriction which seriously affected the long-term commercial viability of supersonic travel.

Environmental concerns over the impact of civil aviation in general have grown significantly in recent years. There is no sign that they will diminish and nearly everyone agrees that the debate will grow in importance in years to come with the increase in air traffic. Passenger numbers fell after September 11, 2001 and during the SARS crisis in 2004, but the current and forecast worldwide growth rate is at least around 5% per year. Specific issues include aviation's contribution to global warming, noise and air quality around airports, as well as the destruction of the environment caused by airport development itself.

Aviation and global warming

Over the last couple of years it has been the subject of particular attention by the media in most developed countries. Civil aviation authorities are usually backed by their governments when they claim that effects are minimal. This is because civil aviation provides a major contribution to a country's economy. As well as directly generating revenue, the sector provides many jobs. Aircrafts bring people doing business into the country (thus helping expand other sectors of the economy) as well as visitors and tourists who will spend money. Any attempt to limit or even reduce flights could have serious economic consequences. However, the environmental lobby argues that the economic consequences would be a price worth paying for the preservation of our planet. Both sides have different sets of figures and cite different sources to support their positions. It is a serious issue which will continue to be debated.

One of the most serious questions surrounding the issue is to what extent aircraft emissions at 30,000 ft might cause more serious damage than ground-level emissions (by cars, for example). Scientific evidence on this point is inconclusive at present.

The spotlight has also been on **low-cost** airlines in recent years as they have been at the forefront of a general reduction in fares for short haul European travel, leading to an increase in air travel. In many countries, it is now more expensive to take a train than to fly.

One recent argument by the environmental lobby is that aviation fuel should be taxed. As part of a global agreement to encourage the growth of aviation (in the days when it needed encouraging) aviation fuel has been exempt from tax for many years. Demands for this exemption to be lifted are growing. But the airlines claim that higher fares and less passengers would bankrupt them.

Other environmental impacts of aviation

Concerns over aircraft noise led to **noise abatement** procedures to minimize noise for people living near airports. The procedures are not new but they are becoming stricter as traffic increases and complaints grow. Depending on the airport concerned, authorities might restrict the hours when aircraft can land or take off, impose a steep rate of climb or descent on aircraft or ban older, noisier airplanes from using the airport altogether. Aircraft constructors are under increasing pressure to produce quieter aircraft and to a certain extent they are succeeding. When the Airbus A380 flew for the first time in 2005, many people were amazed by how quiet it was.

Air quality around busy airports is another concern. In recent years, partly because of the low-cost boom, traffic flying over London has increased greatly. Some child welfare groups claim that there is a direct link with the increasing rate of asthma among children in the London area. The aviation authorities contest this.

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In many western countries it is now almost impossible to develop an existing airport or to locate a site for building a new one due to the powerful objections of local residents' groups. Heathrow airport authorities have won provisional approval to build a third runway, but it is an extremely controversial development and those objecting believe they will be able to prevent it from ever happening. A few years ago the French authorities announced that they intended to construct a third airport for Paris. Once they began to name potential sites for the construction they encountered angry protests from the local people in the areas identified. They eventually withdrew the project and upset the people living near the other two Parisian airports who were hoping for a reduction in noise with some aircraft flying elsewhere.

Fuel requirements

One critical question to be taken into account when planning a flight is how much fuel to take on board. In the case of commercial airlines, it is usually the job of a **flight dispatcher** to make the appropriate calculations and ensure that the fuel is correctly loaded. Running out of fuel (**fuel starvation**) in an aircraft is potentially. The first question a pilot (or flight dispatcher) needs to ask is what should be the normal **fuel consumption** assuming all goes according to plan en route. Fuel consumption will depend on the type of aircraft being flown, the **payload** (weight of passengers, bags and cargo) as well as the weight of the fuel itself. After that, the pilot or flight dispatcher must add a certain reserve to cope with unexpected circumstances. These can result from changing weather conditions (e.g. increased headwind), the need to divert to another airport, the need to enter a holding pattern for some considerable time before descending to the planned destination and also the need to carry out a missed approach and go around. Excess fuel on board means more weight and less efficiency, but it is obviously better to think of safety and carry more fuel than is really necessary. A further consideration is that an aircraft should not have too much fuel remaining when it lands as the extra weight will cause what is termed an overweight landing.

An overweight landing can be a safety hazard and can also seriously damage an aircraft. In the case where an aircraft has to return to the airport just after take-off (for example an engine problem) the pilot may want to **dump fuel**. Air traffic controllers will then direct the pilot to a pre-designated area to carry out this operation.

There was an incident involving an A330 which ran out of fuel halfway across the Atlantic. The pilots managed to glide the aircraft almost 100 miles to a safe landing in the Azores. Initially the story was of a heroic rescue by the pilots, which was undoubtedly a fair assessment as the consequences would usually be fatal for a large passenger aircraft in a situation such as this. But inevitably attention turned to how the aircraft had run out of fuel. It emerged that a serious **fuel leak** had developed in one of the aircraft's two engines. This was subsequently blamed on inadequate maintenance work prior to departure. The pilots were not aware of this, they were only aware that there was a **fuel imbalance**. They decided to open the **cross-feed valve** to divert fuel from the wing tank which was functioning properly to the engine with the leak, thus inadvertently emptying all their remaining fuel into the ocean. Following this serious incident, updated instructions were issued by the aircraft manufacturers which warn flight crews not to feed fuel from one side to the other unless absolutely sure that no fuel leak exists.

If there is any doubt as to whether an aircraft will have enough fuel to enter a holding pattern, a controller will always ask the pilot to state the aircraft's **fuel endurance** or 'endurance' (how long the aircraft can continue to fly).

Depletion of oil reserves

Aviation fuel is a derivative of oil. Everyone agrees that oil will run out one day. Nobody seems to agree on exactly when but increasingly scenarios are suggesting it could be sooner than most people think. For the moment the price of oil remains high and this has already had a negative effect on the profitability of many airlines (hence the controversial fuel surcharge that some airlines place on tickets). Few analysts expect the price of oil to fall in the foreseeable future. The search for alternative fuel sources to power aircraft has begun but its still in its very early stages. The automotive industry, for example, has conducted a lot more research and is better placed to deal with the future problems which will undoubtedly arise in both sectors.

(From “Aviation” by John Kennedy)

I. Find English equivalents for the following word combinations:

1. авиакомпании, предоставляющие недорогие услуги
2. снижение уровня шума
3. авиадиспетчер
4. недостаток топлива
5. расход топлива
6. полезная нагрузка
7. сбрасывать топливо
8. утечка топлива
9. топливный дисбаланс
10. поперечный пропускной клапан
11. запас топлива (в часах и минутах)

II. Answer the questions:

1. Do you think civil aviation provides a major contribution to a country`s economy?
2. Can you tell me why the spotlight has also been on low-cost airlines in recent years?
3. What is one recent argument by the environment lobby?
4. What did concerns over aircraft noise lead to?
5. Who makes the appropriate calculations and ensures that the fuel is correctly loaded?
6. What will fuel consumption depend on?
7. Why do you think the pilot or flight dispatcher must add a certain reserve after that?
8. When will a controller ask the pilot to state the aircraft`s fuel endurance?
9. What has had a negative effect on the profitability of many airlines?
10. I wonder whether the search for alternative fuel sources to power aircraft has begun?

III. Give the summary of the text

Text 11
«Pressurization and depressurization»

Introduction

In the late 1930s, researchers began to explore the possibility of flying at altitudes much higher than had previously been thought possible. They felt that this would improve passenger comfort (flights would be less affected by wind and other meteorological factors), that aircraft would be able to travel faster (less drag at higher altitudes) and that aircraft would therefore have a longer range, that is they could travel further. This led to the introduction of **pressurized** airliners, which began flying passengers in the 1940s. Although taken for granted nowadays, pressurized airliners were a revolutionary development at the time.

Pressurization and depressurization

When an aircraft climbs above about 10,000 ft, its passengers require extra oxygen if they are to remain at the higher altitude for any length of time. In early solo attempts to fly at higher altitudes, extra oxygen was supplied to the pilot, through an **oxygen mask**. Following the success of these attempts work started on providing a system of **cabin pressurization** for commercial air transport. Early systems were manually controlled by the flight engineer but it wasn't long before fully automatic systems were introduced. Nowadays, pressurization is a standard feature of commercial passenger aircraft. You might typically be cruising at 30,000 ft but inside the cabin the air pressure experienced will be approximately equivalent to the pressure experienced when flying at around 7,500 ft. The cabin pressure could be set lower, equivalent to pressure at sea level for example, but too great a pressure differential between the inside and outside of the aircraft can cause **metal fatigue**. The new Boeing 787 currently claims to be able to provide cabin pressure equivalent to flight at 6,000 ft. According to the manufacturers, this will provide a noticeable improvement in comfort on a long flight.

Most passengers on board an aircraft are probably not aware of the way in which pressurization works. However, many people do experience some discomfort as an aircraft climbs or descends, for example, when their 'ears pop'. This is a reaction to the changing pressure within the cabin as the cabin **pressurizes** (after take-oft) or **depressurizes** (prior to landing). While cruising, cabin pressure will normally be constant.

Normally a passenger airplane pressurizes as it climbs without the pilots having to do anything. If the system is not working for any reason, an alarm in the cockpit will alert the pilots. Once alerted, the pilots will not climb above 10,000 ft until the problem is resolved.

If an aircraft happens to be at its cruising level when something goes wrong, then once again the pilots will be alerted immediately of the **depressurization** or **decompression** being experienced. The procedure to be followed is quite routine but it is of critical importance that everyone acts quickly. Oxygen masks drop down automatically in front of passengers at the same time as the pilots are alerted to the danger. Passengers, pilots and cabin crew need to put on their masks immediately. Failure to do so can result in a rapid loss of consciousness. This is why in the **safety briefing** before take-off, parents are told to put on their own masks before attending to their children. The pilot will then request an immediate **emergency descent** from air traffic control to 10,000 ft - a safe level for flying without supplementary oxygen. Passengers will probably find the experience rather frightening but if procedure is properly followed, and assuming there is no other major problem with the aircraft, then there is no significant danger. The pilots will try to solve the problem once they have reached a safe altitude. They may continue flying at this low altitude if they are not too far from their destination, or they may choose to divert to another airport.

Oxygen generators on board typically provide about ten minutes supplementary oxygen supply for each passenger. The pilot should have no difficulty descending within this time. To carry more oxygen on board than is necessary simply adds unnecessary weight. However, flights over mountainous areas are more problematic. If the mountain range is high (imagine the Himalayas for example, which can be over 20,000 ft) a straightforward descent to 10,000 ft becomes impossible. The pilot will need to choose a heading which takes the aircraft away from the mountains altogether. This may take considerably longer than ten minutes. It is a critical factor in planning a flight over such terrain. The time needed to descend the airplane in the worst-case scenario (depressurization could happen anywhere) needs to be calculated and oxygen for the corresponding time period (plus a little extra) needs to be carried for each passenger. The pilots should also have clearly marked on their flight planning, at each point along the route, the optimal heading to take should an emergency descent prove necessary. Inexperienced pilots or aircraft which are not properly equipped will need to avoid such mountainous areas altogether, taking a longer more circular route.

Reasons for sudden decompression

There are numerous reasons for a sudden rapid decompression on an aircraft. It may be as a result of an underlying structural problem such as metal fatigue. Alternatively an in-flight event such as a serious bird strike or a meteorological event such as a hailstorm may cause the problem. In extreme cases where a hole appears in the aircraft, passengers or crew have been known to have been sucked out. Such events are extremely rare, but when such a serious event occurs a pilot will need not only to descend rapidly, but to plan an emergency landing as soon as possible.

Incidents of aircraft being damaged by being hit by airport vehicles which are servicing them **on the ramp** (the area where they park between landing and take-off) are unfortunately rather common. This is a major problem for airlines, because even the smallest scratch or dent in an aircraft's **fuselage** (the main body of the aircraft) has to be properly investigated as it could cause decompression. While the new Boeing 787 has been innovative in its use of **composite materials** (materials which offer significant weight-saving) for most of its structure, critics have suggested that these new materials may tear more easily, increasing the possibility of ramp damage.

Confusion in the cockpit

In August 2005, a Boeing 737 crashed near Athens. Preliminary investigations soon identified the failure of the airplane to pressurize after take-off as the main cause of this accident. It is thought that a pressurization switch was left out of position after maintenance the night before and that the pilots missed this problem when performing their pre-flight checks. Once the aircraft had climbed to 10,000 ft an alarm went off in the cockpit to warn the pilots that the aircraft was not pressurizing. However, the pilots believed that the alarm related to something else of no real importance. They were further distracted by another alarm which was sounding, concerning a relatively unimportant matter. As the aircraft continued to climb on autopilot, both pilots became increasingly disoriented due to lack of oxygen and began to suffer from hypoxia (they had not put on their masks, not realizing the serious danger they faced). Before long they both lost consciousness. The aircraft continued as far as Athens on autopilot, escorted by military jets who at first feared a terrorist attack when contact was lost with the crew. It entered a holding pattern and circled until it ran out of fuel and crashed.

(From "Aviation" by John Kennedy)

I. Find English equivalents for the following word combinations:

1. герметичные самолёты
2. кислородная маска
3. герметичность салона
4. герметизировать
5. разгерметизировать
6. потеря давления, разгерметизация
7. усталость металла
8. инструктаж по безопасности
9. аварийное снижение
10. генераторы кислорода
11. место стоянки, стоянка (самолёта)
12. фюзеляж
13. композитные материалы

II. Answer the questions:

1. Can you tell me if pressurized airliners were a revolutionary development at the time?
2. How was extra oxygen supplied to the pilot in early solo attempts to fly at higher altitudes?
3. What work do you think started for commercial air transport?
4. What can cause metal fatigue?
5. When will not the pilots climb above 10.000 ft and when will they be alerted immediately of the depressurization or decompression being experienced?
6. Why are parents told to put on their own masks before attending to their children in the safety briefing before take-off?

7. What is a safe level for flying without supplementary oxygen?
8. How long do oxygen generators on board provide supplementary oxygen supply for each passenger?
9. What reasons are there for a sudden rapid decompression on an aircraft?
10. What is the main cause of the accident in August 2005?

III. Give the summary of the text

Text 12
«Security in aviation»

Introduction

Aviation has been a target for terrorists for many years. Despite continuous improvements in security procedures making it increasingly difficult to mount an attack on a civilian aircraft, the fear still exists that terrorists will always try to target aircraft because of aviation's high profile and the resulting publicity to be gained. Security is likely to be a key concern for airlines for many years to come.

The first attacks on airliners in the 1960s and 1970s were almost always **hijackings** with terrorists managing to smuggle weapons on board and demanding that the pilots fly them to a destination of their choice. Once there, they would seek asylum or make political demands threatening to kill some or all of the passengers if these demands were not met. Such hijackings caused a lot of fear and sometimes resulted in the loss of many lives. They only subsided when airport security measures were sufficiently enhanced to effectively prevent the smuggling of weapons on board.

In 1981, a bomb exploded on a flight as it flew over Lockerbie in Scotland, killing everyone on board and a further eleven people on the ground. It was subsequently discovered that the bomb had been placed in a suitcase in the hold, checked in by a passenger who had been due to board the aircraft in Frankfurt but who had not done so. To prevent any repeat of such a horrific attack, authorities worldwide outlawed the carrying on board of any baggage which isn't accompanied by the passenger who had checked it in, a rule still in place today. This is why aircraft are often delayed by having to **offload baggage** at the last minute. While the reasons for a passenger not boarding a flight they have checked in for are almost always innocent (they may just be late reaching the gate), removing their baggage is undoubtedly a prudent precaution.

The above-mentioned precaution, however, is obviously insufficient to prevent a suicide attack. Ever since September 11, 2001, security fears have centred around such attacks. As well as being prepared to die themselves, the September 11 hijackers were capable of **piloting** the airplanes and using them as extremely lethal weapons. It was this latter aspect of the attacks which took virtually everyone by surprise and resulted in a major rethinking of security procedures.

Security precautions

Since September 11 , security has become much tighter. Many of the new precautions are clearly visible to passengers, with new rules as to what may be carried on board. Anything which could possibly be used as a weapon, even nail scissors, is strictly forbidden in the cabin. Much stricter controls are carried out on the identity of passengers, with authorities ready to use fingerprinting or biometric profiling as an extra security precaution. All baggage entering the hold is systematically screened for any signs of explosive materials, through the use of explosive detection machines. The assumption nowadays is that terrorists are not afraid to blow up an aircraft they are travelling on themselves. A rule is now in place banning liquids (except for very small quantities carried in transparent bags) on all flights to or from an EU airport. This measure was introduced to prevent the possibility that liquids would be carried on board by different people and then mixed together to create an explosive device.

Anonymous armed **air marshals** operate on board aircraft in the US. While they existed prior to September 11, the US government was quick to recruit many more shortly afterwards and to declare their presence in order to deter terrorist attacks. When the British government considered their use they were met with an angry reaction on the part of the British Airline Pilots Association who claimed that having any guns on board would be counterproductive. For one thing they feared the risks of the **depressurization** that a stray bullet might cause and they also pointed out that terrorists might try to identify air marshals and seize their weapons.

Suspicious behaviour is no longer tolerated. Any passenger who seems to be acting in a way that suggests to security personnel that they have something to hide will be prevented from boarding a flight. In almost all such cases the passenger turns out to be innocent, but no airline wants to take the risk of suspicious behaviour once airborne as this would result in a costly diversion. Numerous cases of suspicious behaviour which starts in the air have likewise almost always had an innocent explanation, but the flight crew who choose to make a precautionary diversion are praised for their prudence. Shoulder-launched missiles are considered to be a plausible threat to aircraft and this is why **perimeter fencing patrols** have been stepped up at airports. Military aircraft are routinely fitted with **anti-missile defence systems** and the same technology could be used on civilian aircraft as well, but it is expensive and for the moment there do not seem to be any plans to make this a standard feature.

Cockpit doors have been reinforced and are now locked during flight. No visitors to the cockpit are allowed.

The lessons of the past have led those responsible for the security of civil aviation to attempt to stay one step ahead of terrorists by predicting future threats and responding before these threats become a reality.

Air rage

Aggressive behaviour or air rage can be a major problem on board an aircraft, presenting a threat at times to the cabin crew or other passengers, or even more seriously, to the safe operation of a flight. There are several reasons why the experience of flying itself might cause a passenger to behave in such a way. The feeling of being enclosed, the stress of the pre-flight check-in and security procedures, the stress caused by any delay, a fear of flying or the side effects of any drugs or alcohol the passenger may have consumed are all possible causes of subsequent unreasonable behaviour on board. A passenger may also have an underlying mental health problem which becomes worse when they are subjected to the stress of flying.

The consequences of antisocial or aggressive behaviour during a flight can be serious. Apart from the actual harm unruly passengers may cause to themselves or others, the pilots might decide that a diversion is necessary In the interests of the safety of all on board. This will be costly for the airline. Unruly passengers can expect to be arrested once on the ground and may face serious legal repercussions. Increasingly, prison sentences, sometimes lengthy, are handed out to act as a deterrent.

The main precaution that an airline can take is to stop any passengers who exhibit signs of unruly behaviour on the ground from boarding. Passengers who are drunk, for example, can often be identified and stopped at the gate. Many airlines serve less alcohol on board than they used to, or even no alcohol at all, particularly on short haul flights. But unruly behaviour has many other causes which can often not be detected until it is too late. Cabin crew undergo training as to how to respond to unruly behaviour on board in an effort to contain the problem before it becomes too serious and a diversion becomes necessary.

(From "Aviation" by John Kennedy)

I. Find English equivalents for the following word combinations:

1. угон самолёта
2. разгружать багаж
3. пилотировать
4. воздушные маршалы (представители службы безопасности, работающие на борту)
5. разгерметизация
6. подозрительное поведение
7. системы противоракетной обороны
8. двери кабины экипажа
9. системы безопасности, расположенные по периметру аэропорта

II. Answer the questions:

1. What were the first attacks on airliners in the 1960`s and 1970`s?
2. Why are aircraft often delayed?
3. Do you think security has become much tighter since September 11?
4. What are much stricter controls carried out on? (What is all baggage entering the hold systematically screened for?)
5. Who operates on board aircraft in the US?
6. Why is suspicious behavior no longer tolerated?
7. Why have perimeter fencing patrols been stepped up at airports?
8. Why can aggressive behavior or air rage be a major problem on board an aircraft?
9. What are possible causes of subsequent unreasonable behaviour on board?
10. What is the main precaution that an airline can take?

III. Give the summary of the text