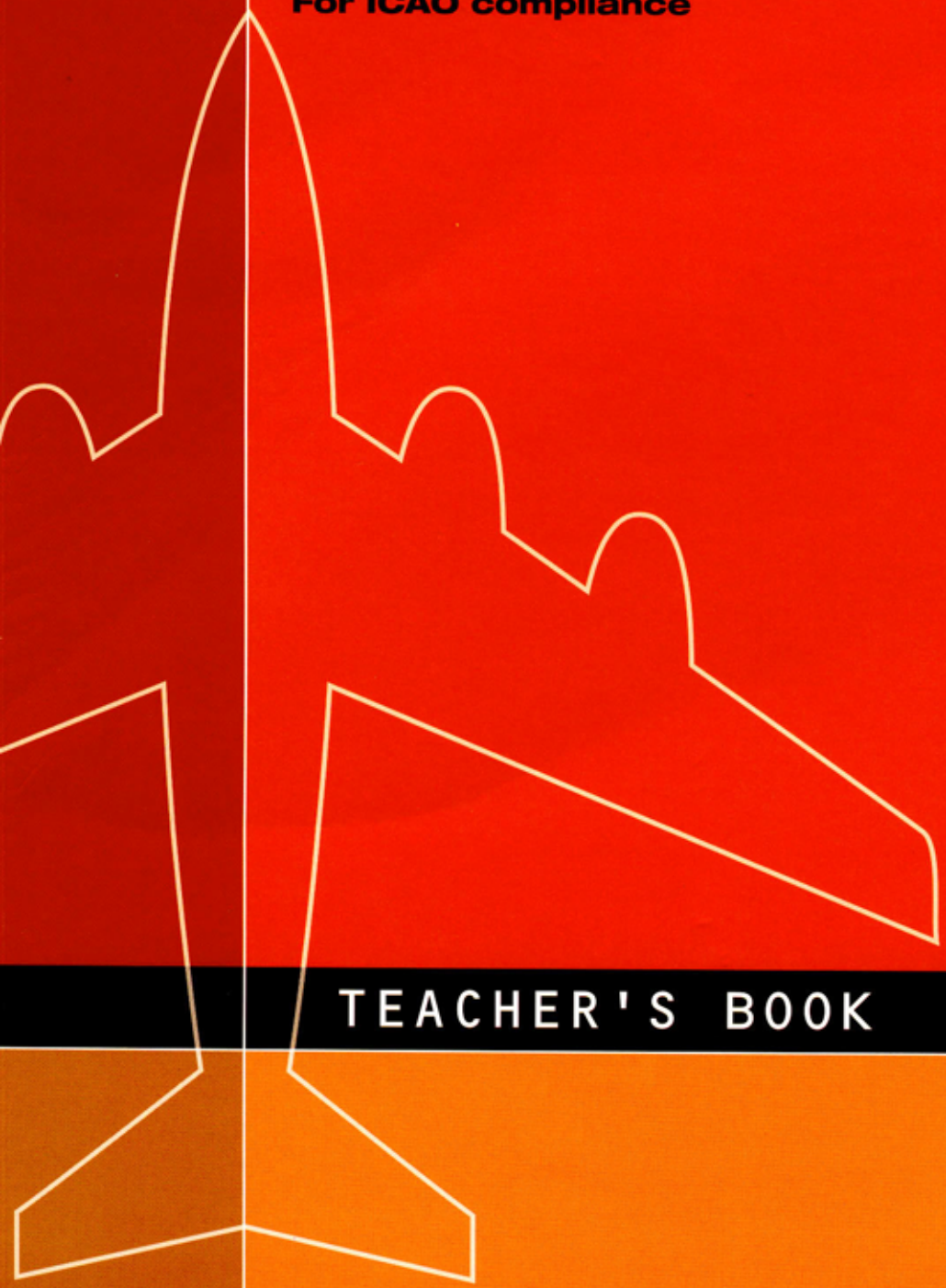
Aviation

ENGLISH

For ICAO compliance



TEACHER'S BOOK

John Kennedy

MACMILLAN

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INTRODUCTION

This book has been written to support the teaching of the course book, *Aviation English*. Air traffic controllers and pilots who attend English courses have the same language needs as any other students who wish to improve their English for professional purposes. They are not attending English courses to learn the technical vocabulary they need for their jobs, but rather to improve their general ability to communicate on work-related matters in English.

You may have limited or no experience in the teaching of English for civil aviation. If so, this Teacher's Book has been written to help you. There are comprehensive explanations for non-specialists of the issues and the particular situations which air traffic controllers and pilots have to deal with. Detailed teaching notes are also provided for each unit. The Teacher's Book therefore has a dual function. To provide background information and explanations on aviation contexts and to provide some suggestions as to how to teach the material most effectively.

Language skills for pilots and controllers

English language training of pilots and controllers focuses almost exclusively on improving their listening and speaking skills. Effective verbal communication is essential to ensuring safety in civil aviation. Communications are voice only, that is controllers and pilots talk to each other at a distance, through radiotelephony communications. The verbal message is the only communication tool at their disposal (though basic routine messages are sometimes exchanged electronically).

A certain degree of **fluency** is required because controllers have to communicate with several aircraft at the same time and they cannot wait for an unreasonably long time for a pilot to pass a message. Pilots need to receive information and instructions in good time to react accordingly. The **interaction** between pilots and controllers must be effective, as both parties need to be able to check, confirm and clarify when misunderstandings occur. Controllers and pilots require sufficient **vocabulary** to be able to communicate in both the routine and non-routine situations which may occur in their jobs. In addition, controllers and pilots need to have a good command of basic **grammatical structures** so that they can communicate information in a format which will be understood by their interlocutor. And finally, **pronunciation** needs to be sufficiently clear and intelligible to the international aviation community.

The five features highlighted above (fluency, interaction, vocabulary, grammatical structure and pronunciation) are the criteria which appear on the ICAO (International Civil Aviation Organization) language proficiency scale. The sixth and final feature to be assessed on the scale, which is also of fundamental importance, is **comprehension**. Controllers and pilots must be able to clearly understand their interlocutor in routine everyday situations, and where an unusual or an unexpected situation might cause confusion, they must have clarification strategies available.

The communication skills of both controllers and pilots are evaluated according to this ICAO scale, with six different descriptors for each of the six features mentioned above. The levels are defined as follows:

Level 6	Expert
Level 5	Extended
Level 4	Operational
Levels 1–3	Non-operational

Controllers and pilots learn to communicate in what is termed **standard phraseology** during their basic training, and they put it into practice on a daily basis. This phraseology is sufficient to communicate at least 95% of what pilots and controllers need to say. It consists of simple clear messages designed for routine situations. There is an absence of grammar, prepositions, complexity, words that are difficult to pronounce, words with ambiguous meanings, etc. The manual on standard phraseology can be simply memorized. Through repetition on a daily basis, controllers and pilots can become highly proficient in their use of phraseology. They can use and understand phraseology without necessarily being able to speak or understand English.

The problem is that a good knowledge of phraseology, which is appropriate for exchanging expected routine messages, is not sufficient to deal with a non-routine situation. A non-routine situation may also be an emergency situation, or have the potential to develop into an emergency situation.

The only way that pilots and controllers can be sure to be able to communicate in a non-routine situation is if they both have a sufficient level of proficiency in a common language. For the international aviation community, this language is English. Due to this need to communicate in unexpected situations, ICAO now requires all controllers and pilots to demonstrate a minimum of level 4 on their six-point language proficiency rating scale. The descriptors of level 4 measure the ability to communicate in what ICAO terms **plain language**, in order to make a clear contrast with the phraseology suitable for routine situations.

Aviation English focuses on plain language throughout. A brief look at the contents page and the topics included in the book will give you an idea of the topics your students need to be able to talk about.

In many other professions, students have the opportunity to use and indeed develop their English at work every day. If one considers that phraseology is 'not really English', and that neither controllers nor pilots deal with non-routine situations regularly (nor would we want them to), then we can see that pilots and controllers do not communicate in plain English on a daily basis. This together with the potentially serious consequences of any misunderstanding which might occur when they do need to use plain English, provide two important justifications for English language training for controllers and pilots.

Many controllers and pilots need the opportunity to improve and practise their English in a language classroom, guided by a teacher, and they need suitable materials to aid them in doing so.

The aviation English teacher

The first and most important point to make is that an aviation English teacher cannot and is not expected to be an expert in aviation. Of course, it helps to have a general knowledge of how airports, aircraft and airlines operate, as well as having some idea of what the jobs of air traffic controller and pilot involve. Assuming you have flown before as a passenger, then you will already have some ideas before meeting your students.

Students will want to learn about and discuss situations which are relevant to their jobs, but they are unlikely to ask you any questions of a technical nature. They know where they can find the answers themselves to such technical questions. Indeed you will probably find that you can ask your students questions about their work, about the procedures followed and about why things are done in a particular way. They, as experts in their own field, will be able to provide answers which you, as an expert English teacher, can help them formulate in English. They may derive some satisfaction from the fact that they are teaching you just as you are teaching them.

Perhaps the most important attribute you need to become an effective aviation English teacher is an enthusiasm for and a general interest in aviation. This, coupled with a desire to learn more, is likely to be appreciated by your students.

Components of the *Aviation English* Teacher's Book

Each unit begins with a two-page introduction to the unit topic. The introduction has been written for the teacher who has little or no knowledge of civil aviation and explains key terms which appear in the unit. It is a good idea to read the introduction before you look at the material to be taught in the Student's Book. The introduction also features the section *For fun ...* which presents a joke relevant to the unit topic that you could share with your students.

Detailed teaching notes are then provided for the activities to be found in the Student's Book, as well as answer keys and listening scripts. The ⏸ in the listening scripts indicates when the audio could be paused for a more authentic time frame.

The teaching notes include suggested warmers, extension activities, suggestions for alternative ways to set up certain activities and some general advice and teaching tips.

At the end of each unit there is a one-page photocopiable activity which you could use if you have sufficient time available.

Organization of the *Aviation English* Student's Book

Section 1 of each unit introduces the theme of the unit, usually through a reading text and a separate presentation of the basic vocabulary needed to talk about the topic. Section 2 contains a detailed listening activity. As well as comprehension activities, language functions and pronunciation skills are also taught (note that these sometimes appear in Sections 1 and 3 as well). The main focus of Section 3 is a non-routine situation (or incident), in which students listen to the communication between pilot(s) and controller(s) to find out how the situation develops and how it is finally resolved. Finally, Section 4 contains activities which practise the language functions and the vocabulary taught in the unit. These activities can be set as homework.

General advice for using the *Aviation English* Student's Book

Let your students speak! The subjects to be found in the book will arouse their interest and there are frequent opportunities, built into the structure of each unit, for them to express their views on particular issues, or to role-play certain situations. Allow students to take full advantage of such activities. Speaking is of fundamental importance for both pilots and controllers.

Make full use of all the listening comprehension activities. Practising and improving comprehension is the other main goal for your students, and if their listening comprehension develops, improved speaking skills usually follow.

Support the efforts of your students to speak by drawing their attention to the vocabulary and the language functions contained in each unit. Be ready to supply your students with additional language as and when they require it.

Act as an interested interlocutor in class discussions. If you don't understand something, tell your students, as this gives them the chance to explain in English.

Aviation English, while designed to be taught in order from Unit 1 to Unit 12, is quite flexible. It will work equally well if you leave out certain units or change the order in which you approach them. If you are using this book for a short course, and you know that it won't be possible to complete all the material, you could ask students to choose the units which look most interesting to them.

Don't forget that although your students all work in civil aviation, they may have very different knowledge, experiences and ideas to share. Be ready to exploit this in the classroom by encouraging students to share experiences and to explain technical matters to each other.

Recommended websites

There are literally thousands of websites providing useful and interesting information on civil aviation. The following are a small selection which might be of interest to you should you wish to further develop your knowledge of civil aviation.

You might also consider recommending one or more of these websites to your students, for their own general interest, and also to encourage them to read and to listen to more aviation English outside the classroom.

Students may already be familiar with some of these sites, or they may have their own favourites, which they can then recommend to you and to each other.

As in any other English language course, the more things you encourage your students to do using English outside the classroom, the better!

www.liveatc.net/feedindex.php?type=all

LiveATC.net: This is an excellent site if you wish to listen to some real air traffic control from different locations around the world. You can choose your geographical area at the top of the page and the locations which are marked in green are accessible. Most of what you listen to in this way is entirely routine, but the site also collects particularly interesting segments where 'something happened', though you need to join up to listen to these.

www.pprune.com

The Professional Pilots Rumour Network: This site is an interesting exchange of news and views. As its name suggests, it's a site for pilots, but anyone concerned with aviation will find many interesting topics and stories to read about.

www.virtualskies.arc.nasa.gov

Virtual Skies: This site is an excellent resource for the teacher who is new to the world of aviation. It is an educational site, set up by NASA education, designed for schools and featuring many of the subject areas included in this course book. Technical explanations are clear to follow and interesting interactive activities are included.

www.ntsb.gov/ntsb/query.asp

NTSB Aviation Accident Database & Synopses: The NTSB (National Transportation Safety Board) is the body which investigates all aviation accidents in the US. They also investigate accidents abroad when a US registered aircraft is involved, or when their expertise is called upon. You can use their extensive database to research a particular accident or a type of accident. There is also a section dealing with incidents.

www.faa.gov

FAA (Federal Aviation Administration): The FAA is the civil aviation authority of the US. Their site is extremely comprehensive and contains interesting and official information and statistics on a wide range of safety issues, amongst other things. This site is worth browsing or visiting when you have a particular subject to research.

www.pilotfriend.com

Pilot resources and aviation weather for general aviation: This heading on the home page is somewhat misleading as the site contains information on many issues. Amongst others, it's worth looking at the sections on flight safety, aviation history and aviation humour.

www.atwonline.com

ATW (Air Transport World) Daily News: This is an excellent site for keeping up to date with the latest aviation news. You might wish to register for free daily news updates to your email address. You can advise your students to do likewise.

www.aopa.org/pilot/never_again

AOPA (Aircraft Owners and Pilots Association) Online: This is another very comprehensive site and the title reflects its content. You may wish to browse this site to see what could interest you or your students. The address above will take you directly to an extensive series of pilot stories, each entitled 'Never again'. These stories are all about an error of judgement on the part of a private pilot, which could have been fatal and the pilots explain what they learned from these experiences.

SUBJECT BACKGROUND:

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 offer 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. The airport featured in Section 2 of the unit, JFK (New York), is another of the world's biggest and most famous.

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 (see Unit 10). 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 **airside** and **landslide** 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. At the end of Section 2 in the unit, students are given the opportunity to design their own airport layout.

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 clear illustration of this is the incident in Section 3 of the unit. 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, as seen in the reading text in Section 1. 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).

for fun

When a pilot gets nervous ...

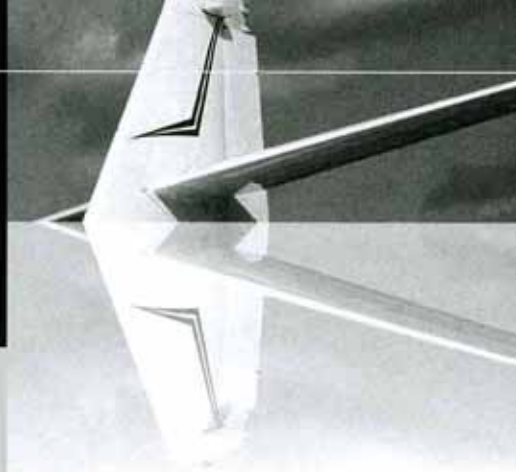
Beech Baron: Uh, ATC, verify you want me to taxi in front of the 747.

ATC: Yeah, it's OK. He's not hungry.

A Beech Baron is a small aircraft, usually with four seats, a 747 was, until very recently, the largest passenger aircraft. The initial instruction from air traffic control was quite normal. Taxiing behind a 747 could be very dangerous due to the jet blast from its engines.

UNIT 1

RUNWAY INCURSION



Section one – Avoiding miscommunication

This section deals with the important area of miscommunication between pilots and controllers. It introduces key vocabulary which relates to the routine messages exchanged between pilots and controllers for aircraft manoeuvring on the ground. It teaches the language function of asking for information and provides students with an opportunity to talk about the importance of English in their professional lives.

1 As air traffic increases and airports become more congested, ground operations at international airports are becoming more complex and this is an area of increasing difficulty for pilots and air traffic controllers (though the latter are at least familiar with their airport). As well as trying to taxi around an unfamiliar airport, a pilot may also have some difficulties communicating with the local controllers.

Students should have some interesting ideas to share on the two discussion questions. With regard to Question 2, they will probably also point out that miscommunication can be an issue between native speakers of the same language. If they don't mention this, you might like to prompt them to do so.

2 Note the example of the maintenance truck at the beginning of the article. Standard ICAO (International Civil Aviation Organization) phraseology is now *pass your message* rather than *go ahead*, to eliminate the possibility of such a dangerous misunderstanding.

3 Ask students to check answers in pairs.

1 misunderstood
2 misheard
3 both the pilot and the controller
4 do not involve
5 very complicated
6 simple English

4 (Suggested answers)

1 Speak clearly / use standard ICAO phraseology at all times / be ready to rephrase if a pilot hasn't understood

2 Situation 1: the controller should have said *pass your message*; Situation 2: could be avoided with a more complete message such as *hold short of runway 26*; Situation 3: could be solved by replacing the pronouns *he* and *we* with the call sign of the aircraft concerned.

Vocabulary – Communication

1 make
2 receive
3 give
4 read back
5 realize
6 repeat
7 confuse
8 give

Functional English – Asking for information

1 Before students begin this activity, you could review how questions are formed in the following tenses:

Present simple: (*do / does*) + subject + verb, e.g. *Do you fly?*
Present continuous: (*am / is / are*) + subject + verb (*-ing* form), e.g. *Are you flying?*
Past simple: *did* + subject + verb, e.g. *Did you fly?*
Present perfect simple: (*has / have*) + subject + verb (past participle), e.g. *Have you flown?*
Present perfect continuous: (*has / have*) + subject + *been* + verb (*-ing* form), e.g. *Have you been flying?*
Future: *will* + subject + verb, e.g. *Will you fly?*

You could also review forming questions with question words, e.g. *how, what, when, how much / often / long.*

Make sure the students know that some verbs will be used twice. For Question 3, *will* rather than *do* can be used if students want to talk about future intentions.

1 did
2 have
3 do / will
4 have
5 do
6 do
7 does
8 are
9 will
10 must

2 This is an interesting introductory activity at the beginning of the course, particularly if the students don't know each other well. Even if they do, it's a relaxed way of discussing some important issues. If time allows, students could change partners several times, conducting several interviews. For feedback, you can choose particular students and ask their peers to tell you one or two interesting things about them.

Speaking – English in aviation

(Suggested answers)

1 Probably disagree: most French airports have international flights. Even in an airport with no scheduled international flights, an aircraft may need to divert in an emergency, and clear communications in English will be vital. Some argue that there should be a policy whereby French controllers speak English to the French pilots so that foreign pilots in the vicinity can understand.

2 Possibly agree: Americans are sometimes criticized for not making enough effort to adjust their rate of speech, to use standardized expressions or to moderate their regional accents in order to be easily understood by the international aviation community.

3 Probably disagree: under ICAO regulations only a pilot who never crosses international borders is permitted to fly without English language certification.

4 Probably disagree: R / T phraseology is only sufficient in routine situations.

5 Probably agree: level 4, to be retested after three years, is the minimum required level. For younger controllers and pilots, level 5, to be retested after six years, or even level 6, certification for life, might be desirable and realistic aims.

Section two – Airport layout

This section deals with the difficulties for pilots in taxiing around JFK International Airport in New York, with a description of some particular areas of the airport which cause problems. The students listen to a controller talking about these problem areas. The section also introduces prepositions.

1 Before opening the Student's Book, ask students about the world's busiest airports and whether they have ever flown into them (if you are teaching pilots), or if they have passed through as passengers. You might then ask them about any experiences or knowledge they may have of the JFK Airport (e.g. *How many runways are there? (four)*). Then ask them to open their books and explain the task.

As well as providing practice in describing positions and use of prepositions, this activity familiarizes students with the airport diagram in preparation for the listening comprehension task.

2 01,02,03 Ask students what *hotspots* mean. In this context, *hotspots* are areas of an airport where there is a risk of pilots becoming confused when taxiing and a danger that they will take a wrong turning. Have students look at the five possible hotspots before listening.

1 D 2 E 3 C

01 Listening script

Our first hotspot is taxiway E as we approach from taxiway C en route to runway 22R. The signage is confusing, and a blast fence blocks the view of the end of the runway. Aircraft taxiing to 22R via C often turn left too soon and end up on taxiway E. This can mean a very long taxi behind 22R.

02 Listening script

A second problem area is taxiway Z crossing runway 13R / 31L. A right turn is required when crossing 13R to taxiway Z on the opposite side. There are two taxi lines leading across. If you follow the wrong one, you could end up with a conflict with arrival traffic on runway 13R. In this situation, advise ATC immediately and get off the runway as quickly as possible.

03 Listening script

A third area of concern is using Juliet to transition from A to B south-eastbound. Aircraft outbound from K and KK may sometimes be issued the instruction 'Taxi left A. At J, transition to B.' It's very important not to miss the turn onto B, because J leads across runway 22R.

3 01,02,03 Students may need to listen a third time if they are having difficulty, or you could choose to refer them to the listening script.

1 C 2 D 3 E 4 D 5 E

4 For trainees who do not have much first-hand experience, this activity could be set as a homework task. They could speak to their instructors or more experienced colleagues and report back on what they said to the class. Controllers who work in en route centres rather than airports may need to do the same thing.

Pronunciation – The ICAO alphabet

1 04 If students are unfamiliar with the concept of word stress in pronunciation, you could demonstrate where the stress lies on *Quebec* (second syllable).

You could either ask students to listen to the other letters and complete the table or to predict where the stress lies before listening.

oO	Oo	Ooo	oOo
H			
	Z, A		
		R, J	
			N, S

04 Listening script

Quebec
Romeo
Zulu
November
Hotel
Juliet
Sierra
Alpha

2 / 3 04 Students practise saying the ICAO alphabet. Note that these letters were chosen to be perfectly comprehensible even with a neutral stress pattern, which is the way they are often pronounced in practice.

4 This activity provides further practice of all the letters. Encourage students to maintain the correct stress patterns during this activity.

Vocabulary – Prepositions

Students could refer back to the original airport diagram for a fuller picture. You might need to explain that *taxi towards* means *in the direction of* whereas *taxi to* is an instruction *to go to that point*. Note that *runway holding position markings* refers to places where an aircraft must stop before receiving permission from the tower to cross a runway. An *active runway* is a runway which is in use at that time for landings or take-offs or both.

1 on
2 from
3 to
4 via
5 along
6 across
7 onto
8 into
9 At
10 ahead / on
11 towards

Speaking – Sketching out an airport

1 / 2 This activity provides students with free practice. With 1,100 movements per day, this will be a very busy airport. IFR / VFR implies that light aircraft (VFR traffic) as well as passenger jets (IFR traffic) will be using the airport. See the introductory notes to Unit 2 for a full explanation.

Students may ask additional questions, e.g. *How much land is available? How many runways are planned? What are the environmental constraints?* Suggest that they should try to be as cost effective, space efficient and environmentally friendly as possible.

You could do this activity in groups rather than in pairs if you think some of your students may struggle with it. Alternatively, students who are still having problems could describe an existing airport they know well. Preparation could also be set as a homework activity.

Allocate each pair or small group some time to present their plans to the class. Their presentation should prompt further questions and provide useful communicative practice.

Section three – Ground operations

This section deals with an incident relating to a dangerous runway incursion by a pilot who was confused and did not correctly follow his taxiing instructions. As well as further comprehension practice, the activities present and practise the vocabulary and language function for describing actions and position.

1 Runway incursions are one of the key safety issues at many airports. A rising incidence of runway incursions alerts experts to the risk of a serious accident. Students are likely to be aware of the seriousness of the problem. Nevertheless, some of their stories may be humorous, involving, for example, the appearance of unusual animals.

1 An incident where an aircraft, a person or a vehicle mistakenly goes onto a runway that has been assigned for the landing or take-off of an aircraft.

2 (Suggested answers): miscommunication, animals, pilot / controller error, construction work, unauthorized personnel, lack of visibility.

3 (Suggested answers): improve communication as in recommendations from Section 1, improve security and maintain perimeter fences to prevent unauthorized personnel or animals from entering.

2 05 Tell the students that this listening is an example of communication problems during a runway incursion.

You could ask students to read the summary and predict or speculate on the likely answers. At the same time they should ask you about any vocabulary in the paragraph which is unclear. Ask them if they think that runway incursions are more likely to occur in marginal weather conditions. (Although it's easier to take a wrong turning in conditions of low visibility, in good weather conditions there might be a tendency to become complacent.)

marginal, inbound, active, takes off, stop, clears

05 Listening script

C = controller, P = pilot

C MC798, say your position.

P We're clear of the runway on … er … N by B, MC798.

C MC798, thank you. Taxi to the ramp via taxiways N and T. Report crossing runway 16.

P Roger. N, T and report crossing 16, MC798. (II) MC798 is on N by the runways here … er … we can't see much because it's so foggy. Are we cleared to cross straight ahead on N?

C MC798, cross runway 16. Join taxiway NT on the opposite side.

P NT on the opposite side. We're approaching Kilo here …oh … There's somebody taking off!

C MC798, you shouldn't be near K. Hold your position!

P Tower, this is MC798. We are on a runway. I'm currently looking to the right at K. We are on 23R at the intersection of 16. We did not connect on N. We are by K. K is to our right. We're on an active runway. MC798.

C MC798, 23R is not an active runway.

P Er … I'm sorry. Ma'am. We're on 23L and 16 and I am facing K. I'm looking out the window and I can see a sign that says '23L' to my right and there is a sign saying '16' to my left and a yellow sign saying 'K' to my right and another sign to my left.

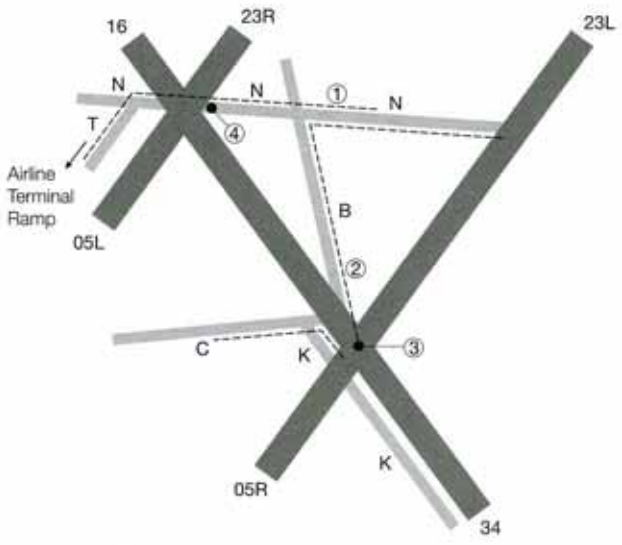
C MC798. Just go straight ahead. Tell me when you get to the next sign please.

P OK, we're on 23L. We are approaching K now.

C MC798. Roger. Turn right at K and make a slight left turn onto taxiway C. Hold short of runway 23R.

P We're on K and we're clear of the runway. We're approaching C on K.

3 05 After they correctly mark what happened on the diagram, you could ask how this incident could have been avoided. Students may choose to criticize the controller, the pilot or both. In this particular listening it seems that lighting and runway markings were not up to the required standard, so students may also talk about the responsibility of the airport authorities. If they seem particularly interested in the deficiencies in communication, you might direct them to the listening script for further analysis and discussion.



Pronunciation – Numbers

1 06 If you are teaching controllers, ask them if they have any call sign confusion stories to tell. Then get the students to complete the activity.

2 AQ629
3 correct
4 LN588
5 HY5571
6 JM422

06 Listening script

1 FR396
2 AQ629
3 CZ310
4 LN588
5 HY5571
6 JM422

2 This activity provides additional practice with call signs. Students may be keen to practise further with their partner, dictating call signs of their own choosing.

Vocabulary – Verbs describing actions and position

Note that *push back* is the first movement an aircraft usually makes after starting engines. We can say colloquially that the aircraft or pilot pushes back or that the aircraft is pushed back (by a tug or truck). The latter is more technically correct as this is what actually happens (most aircraft cannot reverse under their own power).

Roll for take-off means that the aircraft is accelerating down the runway to generate enough speed to take off safely.

no movement	slow	fast
wait	approach	roll for take-off
queue	turn	touch down
face	push back	
	head	
	taxi	
	exit	

Functional English – Describing actions and position

Before students begin this activity, review the formation and uses of the present continuous tense:

Form: (*am / is / are*) + *-ing* form of the verb

Usage: the principal and most important use in pilot–controller dialogues is to talk about something which is happening at the moment of speaking.

It would also be a good idea to contrast the usage of the present continuous and the present simple tense. Ask students if their language contains a similar contrast in the use of present tenses (many languages don't).

3 's exiting
4 There are, heading
5 is facing, 's waiting
6 is rolling
7 is taxiing
8 there are, waiting
9 are moving
10 are standing
11 is pushing back
12 is approaching

Speaking

1 This activity rounds off the unit and allows students the opportunity to practise what they have learned in this section.

2 For Question 1 students might mention poor ground marking and lighting, obstruction to views, e.g. buildings, and increased traffic.

Section four – Language development

Functional English – Question forms

1
1 When did you start your career in aviation?
2 What aspect of your job do you enjoy most / most enjoy?
3 Which airports have you worked at?
4 How many hours a week do you usually work on average?
5 When did you last experience a communication problem in English?
6 How often do you have to attend training courses?
7 How much language training will you have this year?
8 How long did you train to do your job?

2 Students' own answers.

Describing actions and position

3
1 is taxiing towards
2 is exiting
3 There is, taking off
4 There are, standing
5 is exiting
6 is taxiing into
7 are queuing
8 is approaching
9 is taxiing along

4
1 landed on
2 taxi from
3 taxied along
4 continued straight ahead
5 went across
6 taxiing into
7 carried on towards
8 came nose-to-nose

Vocabulary – Communication

1
1 read back / repeated, misunderstood
2 keep
3 wait
4 misunderstand
5 issued
6 responding, include
7 mispronounces
8 gives, repeat

Parts of an airport

2
1 hotspot
2 taxiway
3 arrow
4 blast fence
5 signage
6 pavement markings
7 intersection
8 terminal

PHOTOCOPIABLE ACTIVITY

This text is a true account of an incident where a baggage handler was trapped in the cargo hold, but was rescued before a transatlantic flight took off. A comprehension activity follows the text and then a discussion activity.

1 One sentence has been removed from each of the four paragraphs. Students have to correctly insert these sentences.

Key

Paragraphs 1, 2, 3: penultimate sentence
Paragraph 4: second sentence

2
1 The last paragraph is deliberately vague. The two baggage handlers who were not rescued in time survived. Allow students to discuss the questions fully before telling them this.
2 It is possible to survive as the cargo hold, which often carries pets, is pressurized.
3 (Suggested answers): shock, exposure to cold
4 Such incidents are rare but they should not happen at all. Let the students explain their ideas to the class for a system that ensures this is the case.

1 Read the text. One sentence is missing in each of the paragraphs. Mark the position where it should be inserted.

Baggage handler saved by his mobile phone

In December 2005, a 55-year-old baggage handler was trapped in the hold of an Airbus A330 at Dublin airport. The aircraft, with 325 passengers on board, had pushed back and begun taxiing towards the runway. The aircraft was bound for Los Angeles. Luckily, the baggage handler was able to use his mobile phone to call his company representative who then alerted the air traffic controllers. The cargo hold door was opened and the baggage handler released.

The incident occurred because the baggage handler, who was the leader of the team loading baggage for that flight, had entered the hold at the last minute to move some baggage. Not realizing that he was still inside, one of his colleagues shut the cargo hold door and gave the 'thumbs up' signal that the flight was ready to depart. The aircraft was cleared to push back and commence taxiing. It was only when the engines powered up that the baggage handler realized he was trapped.

The baggage handler was not injured though he was in a state of shock. It was thanks to the fact that he was carrying his mobile phone that he was able to raise the alarm and save himself from the traumatic ordeal of a transatlantic flight. In it, they recommended that procedures relating to last-minute adjustments or removals of items from the hold be tightened up.

While this incident was unusual, it is not the first time that it has happened. In March 2005, a trapped baggage handler flew for almost two hours from Chicago to Philadelphia in the cargo hold. In 2001, another trapped baggage handler flew all the way from Dallas to Puerto Vallarta, a three-hour flight. In both cases the men tried to escape before take-off by banging on the cargo door. They were not as fortunate as the man involved in the incident at Dublin airport.

Paragraph 1: They immediately informed the pilots who returned to the stand.
Paragraph 2: During push back the lights in the cargo hold remained on.
Paragraph 3: The final report on this incident was issued by investigators in April 2007.
Paragraph 4: In some cases the problem has not been discovered until a plane has landed.

2 Work in pairs. Discuss the following questions.

1 Do you think the two baggage handlers mentioned in the last paragraph survived their flights?
2 Would the Dublin airport baggage handler have been able to survive if the aircraft had taken off?
3 If a baggage handler can survive, what might the person's physical condition be on arrival?
4 How can such incidents be prevented?

SUBJECT BACKGROUND:

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 (for more on this see Unit 10).

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. A good illustration of an air traffic controller aiding such a pilot is to be found in Section 3.

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. This, combined with dead reckoning, is the system Jay Prochnow was using for his flight across the Pacific ocean which appears in the reading in Section 1.

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. Had Jay Prochnow been flying today with such a system available, he would not have come so close to disaster.

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 metres. 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.

for fun

When things go wrong ...

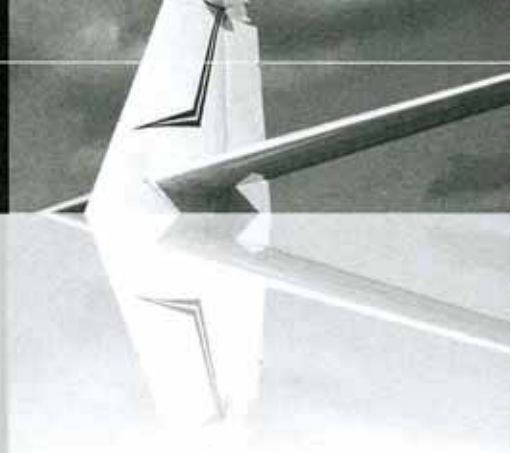
Student pilot: I'm lost; I'm over a lake and heading toward the big E.

Controller: Make several 90° turns so I can identify you on radar ... OK then. That lake is the Atlantic Ocean. Suggest you turn to the big W immediately ...

The pilot is VFR, and the request on the part of the controller that he / she make 90° turns is a commonly used technique in such cases for quick and sure radar identification. 'The big E' and 'the big W' refer to the large letters displayed on the compass – East and West.

UNIT 2

LOST



Section one – Across the Pacific

This section introduces the true story of a pilot, Jay Prochnow, who gets lost while crossing the Pacific Ocean on a solo flight in a single-engine plane. The section teaches the key vocabulary of air navigation and the language function of explaining abbreviations. It also sets the scene for Section 2 in which Jay Prochnow is rescued through the efforts of a commercial airline pilot who picks up his distress call.

1 The picture and the question should arouse students' curiosity. Flying a light aircraft like this with one engine over long stretches of water is not recommended. You might receive some strong reactions, particularly if you are teaching airline pilots (or trainee airline pilots) whose training emphasizes the importance of avoiding any kind of risk. Air traffic controllers (or trainees) are likely to react in a similar way. It is likely that the students will be intrigued by the situation and motivated to talk about the risks involved.

(Suggested answers)

The aircraft can't carry much fuel, which limits how far it can fly at once.

The aircraft doesn't have sophisticated navigational aids.

There are few landmarks for navigation.

The aircraft only has one engine.

There are few places to land in an emergency.

2

a	endurance	e	track
b	chart	f	destination
c	en route	g	fix
d	compass	h	calculate

3 This text should be clear and the aviation vocabulary is straightforward or has been defined in Activity 2. *HF signals* stands for high frequency signals. You might need to respond to vocabulary questions of a general nature.

(from top to bottom)
Oakland
Hawaii
Pago Pago
Onu-I-Lau
Norfolk Island

4

1 Cessna 188
2 22 hours
3 15 hours
4 110 knots
5 0300
6 1,500 nm

5 Students read the text a second time and answer the questions to make sure they have understood. They might wish to discuss the situation or you could prompt a discussion with some supplementary questions, e.g. *What will happen if he runs out of daylight?* (Navigation becomes impossible and he probably has to ditch in the ocean with little chance of survival.) *How serious is the problem?* (Extremely serious as he's running out of daylight.).

1 An aircraft sales company in Oakland
2 Charts, a compass and an ADF
3 To give maximum daylight hours.
4 There were no navigational aids.
5 When he couldn't see Norfolk Island.

6 If you wish to vary the activity, ask students to close their books and work in pairs or small groups to brainstorm the advice they would give to pilots like Prochnow.

(Suggested answers)

Carry a GPS device.

Be patient and wait for the best meteorological conditions (completely clear skies, a following wind).

Contact other pilots who have flown a similar route for advice.

Bring some strong coffee to help keep you awake at all time.

Functional English – Explaining abbreviations

1 Students could complete the activity in groups A and B to ensure they have the correct answers before beginning the information exchange activity.

NDB = Non-Directional Beacon, ADF = Automatic Direction Finder, VFR = Visual Flight Rules

2 Encourage students to help their partner with hints (e.g. giving the first word). To feed back on this activity ask students to explain the abbreviations that you don't know (or are not sure of). This could be an authentic and useful exchange of information.

DTG	distance to go
FAF	final approach fix
FDR	flight data recorder
OAT	outside air temperature
RVR	runway visual range
TAS	true air speed
TBS	to be specified
TOGA	take off, go around
ZFW	zero fuel weight
ILS	instrument landing system

Section two – Finding flight N45AC

This section deals with the rescue of Jay Prochnow. Students listen to the initial contact he made with Auckland air traffic control and the subsequent assistance he received from Captain Vette. The listening activity outlines the considerable aid he received and forms an interesting and challenging listening comprehension activity. Later in the section students practise giving and receiving co-ordinates as well as the pronunciation of regular past tense endings.

1 This is a warm-up activity prior to listening. The aim is for the students to discuss the possible order of events and review some of the key parts of the pilot–controller dialogue.

2 07,08,09 *Mayday. Mayday. Mayday.* is the standard phrase for declaring an emergency. Note that pilots may sometimes contact a controller with a problem but not actually need to or wish to declare an emergency (when in doubt, a controller will ask *Are you declaring an emergency?*). Once an emergency has been declared, all possible assistance will be provided to a pilot, whether from air traffic control services or other pilots who pick up the emergency call.

1 d 2 e 3 a 4 b 5 c

07 Listening script

P = Prochnow, C = controller, V = Vette

P MAYDAY. MAYDAY. MAYDAY. Auckland Control. N45AC. I'm lost. I'm a Cessna 188 AgWagon.

C N45AC. Auckland Centre roger mayday.

(II)

V TE103 contacting N45AC.

P N45AC. Copy.

V N45AC. We are a DC-10 en route from Fiji to New Zealand. We received news of your situation. We are offering assistance. Can you tell me what happened?

P TE103. Thanks. Departed Pago Pago at three this morning with around 22 hours endurance. I wanted to have enough light to see my fixes. But the ADF stopped working correctly and now unable to calculate my position. N45AC.

V N45AC. We are going to try to establish VHF communication with you.

08 Listening script

V Turn towards the sun and report your heading.

P Wilco. (II) My heading is 274°.

V N45AC. We are facing the sun. Our heading is 270. The difference is 4°, so you are south of our position. Now hold out your hand. How many fingers do you have between the horizon and the sun?

P About two and a half fingers.

V N45AC. We have four fingers, so you are south-west of our position. Fly heading 315.

P Heading 315.

V N45AC. Maintain your position, so we can establish your position using the radio signal. We'll maintain our heading until we lose contact. Then we will turn left to re-establish contact, and then try to box you in this way. We'll contact you again very soon. (II) N45AC. It's getting dark. What time is your sunset?

P The sun is setting now, and it is 0752 zulu.

09 Listening script

V N45AC. Sunset on Norfolk Island is 0730 zulu. That means you are 5.6° east and 30° south of Norfolk Island. Maintain your heading.

P TE103. I can see a light. I think it's an oil rig.

V N45AC. Your coordinates are 31° south, 170° 21' east. You are 150 miles from Norfolk Island.

3 07,08,09 Even allowing for the fact that pilots will always help each other out, the assistance provided by Captain Vette was quite remarkable. He agreed straightaway to incur a significant diversion of his passenger flight in order to search for Prochnow. He also had little information to go on, making the search very difficult. The navigational techniques he used to determine Prochnow's approximate position were highly innovative and effective. Note the word *transponder* in Question 4. This is the onboard device which allows aircraft to be identified on a controller's radar. Even if Jay Prochnow's aircraft was equipped with a transponder it would not have been any use in the remote area he was flying in as radar coverage was not provided. Had there been radar coverage in the area, an air traffic controller would have been able to give him his precise position and help him to navigate safely to his destination.

1 b 2 a 3 b 4 a 5 a

Vocabulary – Co-ordinates

1 08,09 Note that according to standard ICAO phraseology, the following numbers have special pronunciations in aviation English: *3 tree 4 fower 5 fife 9 niner*. Numbers are of critical importance and the aim is that there is no ambiguity in this area. *Five* and *nine* could be confused. The *th* sound is difficult for many nationalities to pronounce and hence *tree* instead of *three*. That said, many pilots and controllers (native English speaking or foreign) do not incorporate these variations when they communicate on the frequency.

1 274°
2 5.6° east
3 30° south
4 31° south 170° 21' east
5 150 miles

2 10 Students repeat the directions and co-ordinates.

10 Listening script

north
south
east
west
south-east
north-west
south-west
north-east
274°
56° east 30° south
170° 21' east
14° 32' 40. 25" north

3 Exact positions on the globe are stated longitudinally and laterally with the Earth's surface divided into 360° around each axis. Each degree is divided into 60 minutes and for further precision a number of seconds can also be stated.

In this pair-work information exchange activity, it is important that students communicate numerical data accurately. Monitor students' rhythm and offer them advice on improving it as necessary.

Pronunciation – Regular past tense endings

1 11 Correct pronunciation of the *ed* past tense ending is difficult for many nationalities and it is important in preventing a possibly serious miscomprehension. Make sure all students can hear and reproduce the three basic sounds before moving to the next activity.

11 Listening script

/d/ We received news of your situation.
/t/ The ADF stopped working correctly.
/ɪd/ I wanted to have enough light to see my fixes.

2 You could do this activity with the whole class. Encourage students to say each verb. You could model one or two verbs if they can't agree, but students should be able to complete the table without help.

1 /d/	followed	arrived	tried
2 /t/	established	approached	tasked
3 /ɪd/	contacted	departed	calculated

3 12 After successful choral repetition, you might elicit some other regular verbs and ask students which group they belong to.

12 Listening script

1 /d/	followed	arrived	tried
2 /t/	established	approached	tasked
3 /ɪd/	contacted	departed	calculated

4 In this activity students practise reproducing the correct past tense endings in context.

Section three – Lost

This section deals with a situation where a pilot who is qualified to fly only VFR ends up lost in IMC (Instrument Meteorological Conditions). This is a frequent and dangerous occurrence, especially with inexperienced pilots or student pilots flying solo. Often it is the air traffic controller who rescues the pilot by guiding him / her to safety. As well as providing further relevant listening comprehension practice for the students, the section focuses on the vocabulary needed to describe landmarks and also on the functional language of confirming and disconfirming.

1 Before beginning this activity, review vocabulary for geographical features. Have students keep their books closed and ask them the following question: *What geographical features can help a pilot navigate visually?* Write their suggestions on the board, supplying the vocabulary yourself when necessary.

Then students work in pairs or small groups to complete Activity 1. Be ready to explain any words they are not sure of.

1 built-up area
2 lake
3 high ground
4 mast
5 reservoir
6 valley
7 woods
8 fields
9 highway
10 power lines
11 coast

2 13 To provide students with vocabulary revision before completing the table, ask them to close their books and elicit answers to the following question: *What is the most important information a disorientated pilot needs to give ATC?* (Altitude – the pilot could be dangerously low depending on the terrain – and endurance should be high on their lists. Note that controllers are required to ask how many passengers are on board.)

1 15
2 south-east
3 Beech Baron
4 3,000
5 110
6 780
7 8
8 1, 30 minutes

3 14 For less confident classes, play the recording once and ask the students to just listen. Then play the recording again pausing at regular intervals to give them time to answer.

woods, fields, road, valley, river, reservoir, communications mast, high ground

13 Listening script

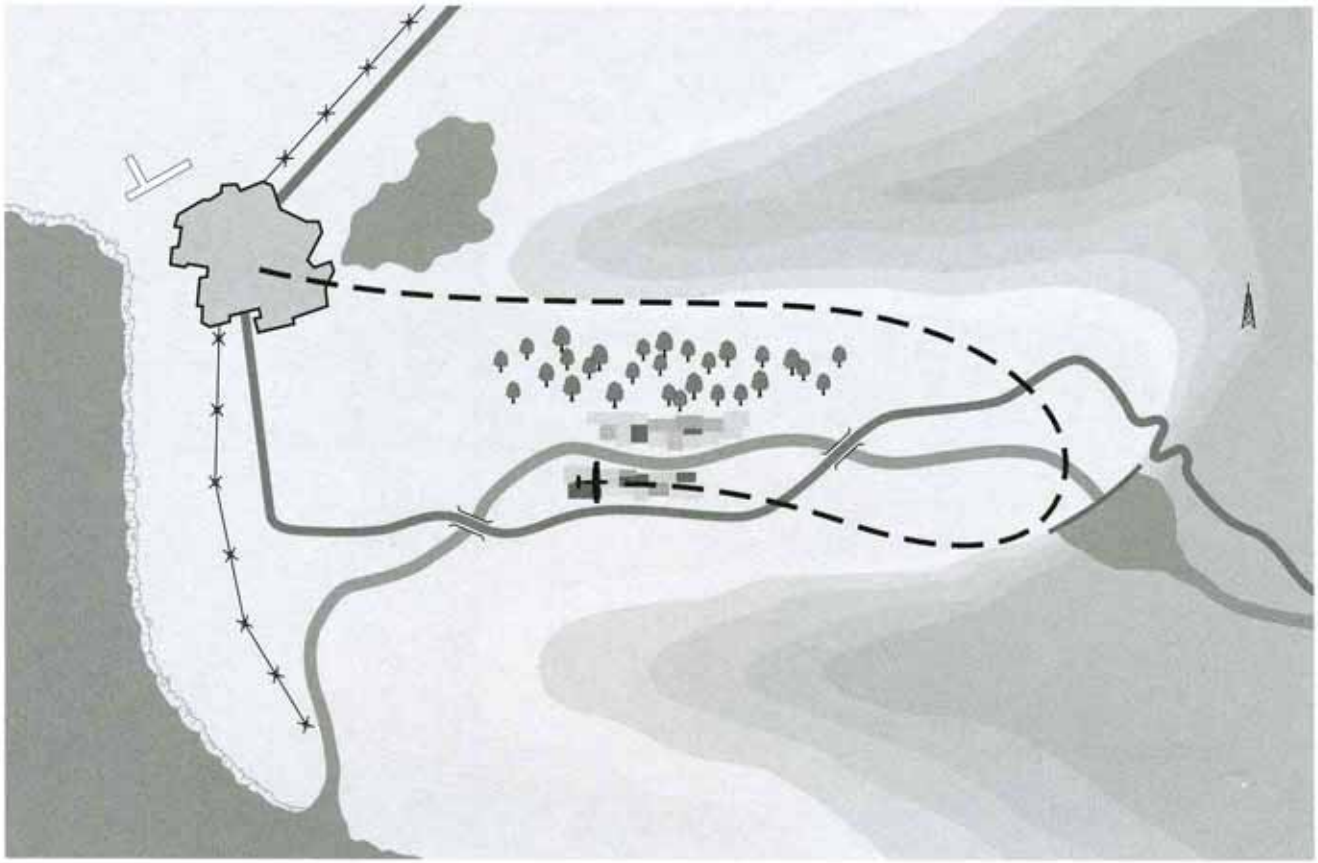
P = pilot, C = controller

P MAYDAY. MAYDAY. MAYDAY. TJB.
C TJB. Pass your message.
P MAYDAY. MAYDAY. MAYDAY. We're lost.
C TJB. Say last known position.
P Last known position was 15 miles south-east of CELRA VOR. TJB.
C TJB. Roger, last known position 15 miles south-east of CELRA VOR. Remain straight and level.
P I'm straight and level right now. We're in total IMC. I can't see the ground.
C TJB. Squawk 7700 on your transponder sir.
P Squawking 7700. TJB.
C TJB. I don't have you on my screen. Can you confirm your aircraft type, altitude and speed?
P We're in a Beech Baron. Altitude 3,000. Speed 110. TJB.
C TJB. Please state fuel on board and persons on board.
P I have 780 lb of fuel, and eight persons on board. Endurance is approximately one hour and 30 minutes … I can see the ground now. I can see trees, and I can make out … high ground on each side of the aircraft …

14 Listening script

C TJB. Can you fly into VFR?
P Affirm … I can see high ground to the north. I'm flying up a valley, with woods to the north, and fields below me. There is a road below me.
C TJB. Confirm that you can see a road.
P Affirm. I can see a road.
C TJB. What side of the valley is the road on?
P The highway is to my right, on the south side of the valley.
C TJB. Can you make out a river?
P Affirm. There is a river.
C TJB. Is the river on the north side of the road?
P Affirm. The river is … no … the road is crossing the river. The river is now on the south side of the road.
C TJB. Can you clarify that the road crossed the river and is now on the south side of the road?
P Negative. The road is now on the north side of the river. The road is now turning south-east. There's a reservoir below me now.
C TJB. Can you see a communications mast at 12 o'clock, at about 4 miles?
P Affirm. There is a communications mast at 12 o'clock.
C TJB. Turn hard left and make a 180° turn, heading 265. Expedite.
P Making a 180° left turn, heading 265. TJB. (II) I'm coming out of the valley and I can see a built-up area ahead and a lake at one o'clock. TJB.
C TJB. There is an airport with a tower 5 miles north-west. Say intentions.
P I'd like to land. Can you give me vectors?

4 14 Get students to listen again and draw the pilot's path on the map. In large classes, students could work in groups, then exchange their maps with other groups to check their answers.



Functional English – Confirming and disconfirming

1 14 You could review the sentences with the students before listening to the dialogue and get them to predict the answers. After completing the activity, you could review question formation with students.

1 Can 2 Confirm 3 Can 4 Is 5 Can you clarify 6 Can you see

2 14

2 ✔ 3 ✔ 4 ✔, then ✘ 5 ✘ 6 ✔

3 14 As well as an effort on the part of the controller to speak more slowly and clearly (as in this example), rephrasing or a reformulation can also help when the pilot is having difficulty understanding (or vice versa). Most controllers and pilots who are speaking English as a foreign language do this automatically. Controllers and pilots who are native English speakers, on the other hand, are sometimes criticized for their lack of sensitivity when checking, confirming and clarifying instructions. You could discuss with your students some of their experiences and difficulties in this area.

(2) is slower and clearer. Requests to confirm information must be spoken slowly and clearly.

Speaking

This is a free practice activity. Explain to students that they will reuse the language they have studied in this section and that they should confirm, check and clarify the information given by Students A and B. When they have done the activity once, you might like to change pairs and change roles and do it again. You can add an extra challenge this time by telling the pilots to deliberately read back wrongly one of the controller's instructions.

Section four – Language development

Functional English – Simple past

1
1 made
2 happened
3 reported
4 departed
5 flew
6 did not reach
7 landed
8 believed
9 was
10 were not

2
1 Why did you make
2 When did you notice
3 Did you decide
4 Why did you land
5 How did the fire start
6 How many passengers did you have

3
1 took place / happened
2 avoided
3 detected
4 steered
5 was
6 was
7 crossed
8 took place / happened
9 issued
10 blamed
11 didn't tell

Confirming and disconfirming

1	Say last	4	what you	7	Negative
2	that correct	5	can see	8	give further
3	Affirmative	6	Confirm that		

Vocabulary

1

1	d	4	i	7	e
2	b	5	h	8	c
3	g	6	a	9	f

2

1	Maintain	4	lose	7	box
2	establish	5	turn	8	contact
3	maintain	6	re-establish	9	getting

3 type of land: high terrain, marshland, desert, plain, farmland, urban area

feature: bridge, footpath, cemetary, harbour, lighthouse, ridge

PHOTOCOPIABLE ACTIVITY

This is a role-play activity where the students work in pairs. First Student A is a TV journalist interviewing Jay Prochnow and Student B is Jay Prochnow. Then Student A is Captain Vette and Student B is a TV journalist.

Before students start, review what happened to Jay Prochnow and how Captain Vette rescued him (Sections 1 and 2). Students will then need ten minutes' preparation time to do the activity and to think of two additional questions. With more confident classes, you can explain that they are not obliged to follow the script.

If you have access to recording equipment, you could video the students' interviews. You should seek your students' agreement if you plan to do this.

Key

Questions for Student A

1 Why were you flying for such a long distance across the ocean?
2 What special preparations did you make for this flight?
3 When did you realize you were lost?

Questions for Student B

1 Why did you ask Jay Prochnow to fly towards the sun?
2 How did you establish his exact position?
3 What advice did you give him?

Role card for Student A

First you will play the role of a journalist. You are going to conduct an interview with Jay Prochnow. Look at the words below and put them in the correct order to make questions. Then write two more questions. After you finish the interview you will play the role of Captain Vette and answer your partner's questions. When you and your partner are both ready, conduct the two interviews. You may choose to ask additional questions depending on the responses you receive.

1 a / across / distance / flying / for / long / ocean / such / the / were / why / you

_____?

2 did / flight / for / make / preparations / special / this / what / you

_____?

3 did / lost / you / realize / were / when / you

_____?

Additional questions:

_____?

_____?

Role card for Student B

First you will play the role of Jay Prochnow and answer your partner's questions. After you finish the interview you are going to play the role of a journalist. You are going to conduct an interview with Captain Vette. Look at the words below and put them in the correct order to make questions. Then try to write two more questions of your own. When you and your partner are both ready, conduct the two interviews. You may choose to ask some additional questions depending on the responses you receive.

1 ask / did / Jay Prochnow / to / fly / sun / the / towards / why / you

_____?

2 did / establish / exact / his / how / position / you

_____?

3 advice / did / give / him / what / you

_____?

Additional questions:

_____?

_____?

SUBJECT BACKGROUND:

AVIATION TECHNOLOGY

Introduction

The speed of technological development during the twentieth century was fully reflected in the aviation world, whether it was in terms 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** (see Unit 5 for a description of these). 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. The advantages and disadvantages of both approaches are discussed fully in the listening activity in Section 2.

An obvious question is what happens when the computer fails (**instrument blackout**) as happens in the incident featured in Section 3. 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. Other advantages and disadvantages in using Datalink systems are outlined in the reading text in Section 1.

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. Though no mention is made of this possibility in the unit, your students may well raise it, particularly during the speaking activity at the end of Section 1.

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. For a full discussion of human factors see Unit 6.

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 cliché 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.

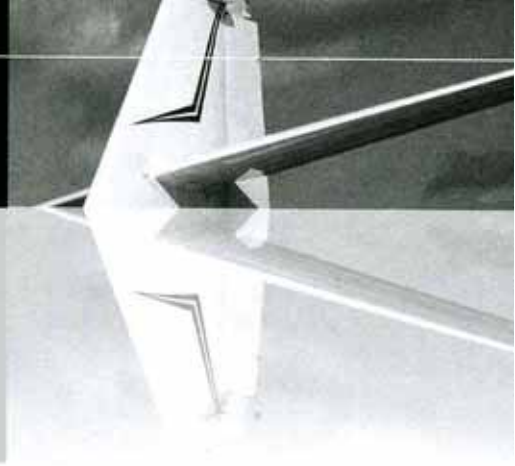
for fun

The aircraft of the future

Future commercial airliners will require just one pilot and a dog. The job of the pilot will be to enter the cockpit and reassure the passengers with his / her presence. The job of the dog will be to keep an eye on the pilot and make sure he / she doesn't try to touch any of the controls.

This is a very old joke but as technology develops further it becomes even more relevant.

TECHNOLOGY



Section one – Datalink

This section introduces a discussion on the subject of Datalink. It summarizes the current debate in the text and also introduces key vocabulary for communications. It also presents the language function of expressing purpose.

1 Some features of Datalink communications (the most routine messages) are already in use in many parts of the world. Even if students work in an environment where they don't use any Datalink messages, it is likely that they will have heard of some applications.

2 Students may mention that full implementation of Datalink is expected to increase capacity through greater efficiency of communications. If you are working with controllers, they may not necessarily see this as an advantage. On the contrary, they may point out that more aircraft in already crowded skies could be a threat to safety. This is a controversial issue which may generate a lively discussion.

(Suggested answers)

Advantages: communication errors are reduced, the ATC can communicate clearly, it reduces airspace congestion

Disadvantages: controllers and pilots sometimes misunderstand free messages, pilots do not have time to write and read free messages in an emergency, messages can get out of sequence, if Datalink and voice are used, the crew's attention is divided

3 Students may react strongly to the point made in the text about pilots and controllers being able to write *free text messages* in non-routine situations. They are unlikely to agree that this is a good idea (whether you are dealing with pilots or controllers). Current practice throughout the world is that emergency situations will always require voice communications. You can point out (or elicit from the students to check their comprehension of the text) that the writer concluded that voice communication is best in an emergency situation.

4 Sentence 1 is partially true in that Datalink does reduce voice communication. The major debate is to what extent it could do so, and no estimate is provided in the text. The text mentions the use of abbreviations (Sentence 4), but these would be expected to appear in free text messages and are not a feature of the routine pre-formatted messages.

1 F 2 T 3 T 4 F 5 T 6 T

5 This question could lead to a lively debate about Datalink. The main reason for introducing Datalink is to improve the efficiency of the air traffic control system. Some people claim that increased efficiency might lead to a reduction in safety standards. People who support the introduction of Datalink reject such claims. It is possible that some of your students might have strong views on the subject.

Vocabulary – Communications

In larger classes, get students to work in pairs and then check their answers in groups. With less confident students, you could do this activity with the whole class.

1 transmissions
2 congestion
3 frequency
4 environment
5 clearance
6 sequence
7 capacity
8 heads-down time

Functional English – Expressing purpose

1 When students have completed the sentences, present the three different structures below, telling students that it is the grammar which differs rather than the meaning:

- *for* + verb (*-ing*)
- (*to / in order to*) + infinitive
- *so that* + subject + verb

To practise these structures in a controlled way, ask students to think about some equipment they use in their job. Then tell them to make three different sentences, similar in meaning, but using each of the three structures above.

1 for
2 to
3 in order to
4 so that

2 1 for
2 to / in order to
3 so that
4 in order to / to
5 for
6 to / in order to
7 so that
8 in order to / to

Speaking – The perfect technology

This activity gives the students the opportunity to be creative. As they work, monitor and help with vocabulary. When reporting back on their ideas they should use the language for expressing purpose in the Functional English section. Some groups may mention either *free flight* or *pilotless aircraft*, thus dealing with the problems of pilot–controller communications by eliminating either controllers or pilots. For more background information on these concepts, see the introductory teacher's notes to this unit. If students do not mention these points, you could introduce them into the discussion.

Section two – Flight control systems

This section deals with a debate on the subject of flight control systems and discusses to what extent they should be automated. Students listen to pilots comparing the flight control systems of two well-known aircraft. The difference in these systems reflects a debate which has taken place between the two major constructors, Airbus and Boeing. The section teaches the language function of rephrasing and vocabulary for safety. Finally students practise the sounds /b/ and /p/.

1 Note that the Airbus A320 is famous as the first fly-by-wire passenger jet to enter into service, in the late 1980s. This new flight control system for civil aviation caused quite a controversy at the time, particularly the override feature (discussed in Activity 3 below).

1 C 2 B 3 A

2 When answering Question 1, the students may interpret *fly-by-wire* differently. Some will think of it as a system where the technology has ultimate control, others will consider that the pilot can always override the commands. This point will be explored fully in the listening activity which follows.

3 Pilots of civilian passenger aircraft are trained to fly safely at all times and to avoid any kind of risk, no matter how minimal. For this reason there are strict limits on the manoeuvres they are permitted to perform. They are obliged to keep within these entirely safe limits, in other words to remain within the *flight envelope*. Their aircraft has the *capability* to fly outside this pre-defined flight envelope, but it is only test pilots, flying the aircraft without any passengers on board, who are authorized to do so. When the flight control system itself prevents a pilot from moving outside the flight envelope, we can say that there are *built-in limits*. A system which allows the pilot to exceed these built-in limits in exceptional circumstances grants the pilot *ultimate control*. To exercise this ultimate control, the pilot needs to be able to take the decision to *override* the flight control system, though this should be an extremely rare decision.

1 ultimate control
2 capability
3 built-in limits
4 override

4 15 An airline usually consults its experienced pilots before any decision to purchase new aircraft. Buying aircraft is the biggest investment that any airline makes and it certainly wishes to have the support of its pilots.

Feedback from pilots is also sought by constructors when they are developing a new type of aircraft. The investment of constructors is even greater, and while the potential customer is the airline, the constructors know that no aircraft can be considered as suitable for purchase without the support of pilots. Note that the Boeing 777 and the Airbus A320 are also very different in terms of their capacity and range. The B777 carries more passengers and is a long haul aircraft while the A320 is for short haul use. If you are teaching pilots, you could ask them to define their dream aircraft and their ideal flight control system.

Whether teaching pilots or controllers, they may be interested in comparing the new Airbus A380 with the new Boeing 787. Both aircraft are for the long haul market but there are major differences in their conception, representing different visions of how civil aviation will develop in future years. This could lead to a very lively debate.

1 Because they are going to upgrade their fleet and Jean wants an experienced pilot's opinion on the two options.
2 Airbus 320 and Boeing 777
3 As examples of the advantages and disadvantages of built-in protection.
4 He thinks they are both extremely safe.

15 Listening script

J = Jean – airline employee, M = Mehmet – pilot

J Mehmet ... can I have a word?

M Sure, Jean. How can I help you?

J Well, you know the airline is upgrading the fleet ... I was wondering, what's your opinion on the two options.

M They're looking at the Boeing 777 and the Airbus A320, aren't they?

J That's right.

M Well both of them are very sophisticated vehicles – they both use fly-by-wire technology.

J Sorry Mehmet – can you just explain what 'fly-by-wire' means?

M In a fly-by-wire aircraft, the pilot manoeuvres the aircraft by operating a computer. But in a conventional aircraft, the pilot uses a control column that is physically linked to the control surfaces.

J So if the A320 and 777 are both fly-by-wire, what's the difference?

M The 777 has an override function.

J I'm not sure what you mean by 'an override function'.

M OK – it's a system that allows the pilot to ignore the built-in limits.

J OK.

M On the other hand, the A320 has built-in protection.

J What do you mean?

M In other words, the Airbus computer doesn't allow pilots to do anything dangerous. There are limits on the Airbus to increase safety.

J So basically, on an Airbus the computer has ultimate control, and on the Boeing 777 the pilot decides.

M That's correct.

J Can you give me an example?

M For example, computers stop the pilot climbing more than 30°, so that the plane doesn't stall. And there are protections to prevent overspeed. That is, it stops the pilot from going faster than is safe.

J So that makes it safer, right?

M Well, in my opinion, when you fully automate and protect the system, you reduce the pilot's capability. To put it another way, sometimes the aircraft should allow manual control. I mean, you shouldn't limit the pull-up capability, for example, to miss another plane or the ground. At the Habsheim airshow for example, built-in protection didn't allow the pilot to pull up, and the plane crashed. But sometimes built-in protection can prevent an accident ... a Boeing 757 hit a mountain in Colombia because the crew didn't retract the speed brakes as they climbed. The speed brakes on an A320 retract automatically.

J It seems that there are good arguments on both sides.

M Well, yes – they're both extremely safe.

5 15

1 fly-by-wire
2 pilot
3 pull up
4 keeping the speed brakes on

Functional English – Saying things another way

1 15 This is of particular importance for pilots and controllers, as they need to rephrase what they say when they are not understood the first time, or simply confirm that they have been understood. After completing the activity you could ask them to describe a situation where they would need or have needed such language.

1 explain what, means
2 sure what you
3 other words
4 basically
5 you give me
6 That is
7 it another way

2 It is likely that your students use the same communication systems. If this is the case, ask one of them to play the role of someone who doesn't understand and to ask a lot of questions for clarification.

Vocabulary – Safety

15 Multiple answers are possible so emphasize to the students that they need to listen carefully for the combinations used in the listening. As a vocabulary extension activity, you could also ask them to explore the alternative combinations that could occur in another context (e.g. *avoid anything dangerous, limit the pilot's capability,* etc).

1 do
2 increase
3 stop
4 prevent
5 make
6 reduce
7 allow
8 limit
9 prevent

Pronunciation – /b/ and /p/

1 16

1 B 2 A 3 A 4 B 5 B 6 B 7 B 8 A

16 Listening script

1 port
2 bat
3 tab
4 pet
5 lap
6 beg
7 staple
8 bit

2 / 3 16 While making the distinction between these sounds is easy for some students, others find it difficult. You could try the following technique to help them understand the difference:

Hold a piece of paper in front of your mouth. When you make the /p/ sound it should move, but when you make the /b/ sound it should stay perfectly still. Try this with the words in the activity.

4 You could ask students to record themselves saying the sentences after they have practised them. When they listen to their recordings, ask them if they are satisfied that they have produced the /p/ and /b/ sounds correctly. If they think they can do better, let them make another recording.

Speaking

For Question 1, students will probably say that both systems are now accepted as being perfectly safe. While small aircraft continue to use mechanical control systems, the extra weight involved would not be appropriate for a modern jet airliner.

For Question 2, students might talk about the possibility that commercial aircraft may be flying without pilots on board in fifty years' time. See the introductory teaching notes to this unit for more discussion of this.

Section three – Instrument blackout

This section features an incident in which an electrical failure occurred with the temporary loss of flight control systems. While it seems to be quite a frightening situation, modern aircraft have multiple back-up systems to cope with such an event. The section teaches the language function of giving instructions and students practise sentence stress.

1 Ask students to work in pairs and discuss the following questions: *What can a pilot do when instruments on board fail? What kind of back-up is available on fly-by-wire aircraft in the case of a system failure?*

Note that it is easier to generate discussion in large classes in response to such open-ended questions, as there is more chance that some students will have interesting knowledge or experience to share with the group. In a small class, there is a possibility that no one has anything to say. It is a good idea in a very small group to have back-up questions available. You will quickly get to know students well in a small class and thus you can prepare questions or activities tailored to their specific needs.

1 D 2 F 3 A 4 G 5 B 6 C 7 E

2 You can feedback on this activity by asking the students to explain the function of each item to you. This is a good way to check if they are capable of explaining these items to a non-specialist, and you may also find that it greatly improves your own knowledge of the cockpit systems. Encourage the students to use the language used to express purpose, studied in Section 1, and the language of rephrasing, studied in Section 2.

upper / lower ECAM displays – a system in Airbus cockpits that allows the crew to monitor aircraft systems and any failures that occur

autopilot – a system that automatically calculates the amount of thrust needed

radio management panel – a set of controls for managing radio communications

primary / secondary flight displays – computer screens that allow the crew to monitor essential flight data such as attitude, air speed, etc.

speed, altitude and attitude display – a computer screen that allows the crew to monitor this data

3 2 h 3 f 4 i 5 c 6 a 7 d 8 g 9 b

4 17 This initial comprehension activity is designed to check that students have understood the main events. Note the phrase to *enter a holding pattern*. This means that the aircraft will not land immediately, but will wait (circling) until the pilots have checked that everything is OK to land.

1 b 2 a 3 c

17 Listening script

PNF = pilot non-flying, C = controller, PF = pilot flying

PNF Brest, M246. Request descent.
C M246. Cleared, descend FL 150.
PF What the ...? The lights have gone. And we've lost the autopilot … and autothrust. I have manual control.
PNF The engines sound OK. The primary flight displays have gone.
PF I can't see the standby horizon. But I can just make out the horizon outside. I've got control of the attitude. Call Centre and tell them what's happening. Declare an emergency and tell them what's happened.
PNF MAYDAY, MAYDAY, MAYDAY. M246. We have a system failure – our lights are not working and our displays are down. I don't think they're receiving us because the radio's lost its power.
PF OK, let's try to get the system going again.
PNF So if I shine my flashlight on the ECAM … that's better.
PF Try rebooting the system.
PNF The instructions are on the lower screen.
PF I've got control and communications. Follow the instructions step by step.
PNF OK, I can only access the instructions one at a time.
PF First, read the instruction. Then follow it. Check it before you delete it.
PNF OK, so … instruction number one says … … Number eight didn't help.
PF What's the next instruction?
PNF So … let's try number nine … Ah! The system's back on line. We've got power.
PF Right. First, try to contact ATC so they know our situation. Ask for a holding pattern. Then we can try to see what went wrong.

5 17 This activity provides practice in understanding the details of what happened. You may wish to get students to work in groups to answer the questions. If necessary, play the recording a third time.

1 Because they are flying at night and the flight deck lights are not working.
2 The autothrust, autopilot, flight deck lighting and primary flight displays
3 Because the aircraft radio has no power.
4 On the lower ECAM screen
5 Nine

6 Equipment used by both pilots and controllers is becoming more and more reliable and it is possible that your students never experience technical problems at work. In this case, students should still be able to answer part 2 of Question 1 in relation to technology at work, because there ought to be procedures in the case of equipment failure (even if it never fails).

Functional English – Giving instructions

18 Note that the language used in the dialogue is very direct. Imperative forms and simple but clear sequencing connectors are used. This is typical of an emergency situation where pilots need to think and react quickly.

When students have finished the activity, review the following grammar points:

- The difference between *try to do* and *try doing* something: the former is used when you make an effort to do something which is difficult, but you might not actually be able to do it. The latter is used when you experiment by doing something in order to see whether or not it will solve your problem.
- The imperative form of the verb (the same as the infinitive form)
- Sequencers: *first* (when you begin) / *next – then – after that* (all similar meanings) / *finally* (when you finish) / *before – after* (opposite meanings)

1 Call; tell
2 Try rebooting
3 First, Then, before
4 next
5 try to

18 Listening script

1 Call Centre and tell them what's happening.
2 Try rebooting the system.
3 First, read the instruction. Then follow it. Check it before you delete it.
4 What's the next instruction?
5 First, try to contact ATC so they know our situation

Pronunciation – Sentence stress 1

18 Some students are not comfortable when they can't hear and understand every word in a sentence, particularly if their first language doesn't have sentence stress. Point out to students that the words they can hear are almost certainly the most important for conveying meaning. Finally, reassure them that they are not expected to reproduce similar stress patterns in their own speech. They will be perfectly comprehensible when speaking with a neutral stress pattern.

2 Try rebooting the system.
3 First, read the instruction. Then follow it. Check it before you delete it.
4 What's the next instruction?
5 First, try to contact ATC so they know our situation.

Speaking

This activity provides free practice of the functional language and vocabulary from this section. You could remind the students of the functional language learnt in Section 2 for rephrasing and encourage them to use it in their dialogues. This activity offers the students the chance to be creative and possibly humorous. You could ask some or all pairs to perform a dialogue for the whole class, or in larger classes, put students in groups and ask pairs to perform their dialogue for their group.

Section four – Language development

Functional English – Expressing purpose

1 2 f 3 j 4 h 5 c 6 b 7 e 8 a 9 g 10 d

Saying things another way

2
1 Do you mean that the radar is out of order?
2 Let me clarify what I'm trying to say.
3 Could you just explain what 'unlawful interference' means?
4 So basically, you need to continue with your current heading.
5 What do you mean?
6 Could you give me an explanation?
7 I'm not sure that I understand.
8 Can you give me an example?
9 In other words, the computer doesn't allow the pilot to fly manually.
10 To put it another way, we have a serious problem.

Giving instructions

3

1	c	6	e
2	g	7	i
3	a	8	f
4	j	9	h
5	d	10	b

Vocabulary – Communications

1
1 speak, message
2 send, routine
3 voice, understand
4 text, words
5 communications, congestion
6 select, pre-formatted
7 deliver
8 responses, sequence
9 give, repetition
10 missed, transmissions

Vocabulary from the unit

2

1	help	5	avoid
2	have	6	afford
3	required	7	allow / permit
4	need / have	8	allow / permit

3

1	features	7	needed
2	Developed	8	simplifies
3	relies on	9	allows
4	display	10	focus
5	utilizes	11	eliminate
6	adjusted	12	employ

PHOTOCOPIABLE ACTIVITY

This text is a report of a computer crash which occurred in 2004, affecting the UK air traffic control system. The computer crash mainly affected the south-east of England, around the London area, which is also the most congested part of the system. Although the computer was out of service for less than an hour, the event caused much disruption. It was also bad publicity for NATS, the UK air traffic control service, which is often criticized. Most of this criticism is due to the fact that it is privatized. Many people, both inside and outside the UK, believe that air traffic control should always be a public service.

The first activity is a general comprehension check. Make sure that all students have the correct answers and have understood the report before moving on to the discussion activity. Answers in the discussion activity may vary greatly and some of the questions might generate a lively debate.

Key

1 was badly hit
2 were also restricted
3 was not seriously affected
4 were advised
5 was operating
6 was an isolated event
7 was not compromised
8 was a similar occurrence

1 Complete the text below with the following phrases and *was* or *were*.

an isolated event	operating
a similar occurrence	advised
badly hit	also restricted
not compromised	not seriously affected

COMPUTER CRASH CAUSES MASSIVE DISRUPTION IN AIR TRAFFIC

A computer crash yesterday morning caused delays for tens of thousands of air passengers. The United Kingdom's air traffic control system (1) _____ by the computer crash, with traffic being worst affected at Heathrow, Gatwick, Manchester and Stansted airports.

Heathrow airport, which usually handles more than a thousand flights per day, reported an average two-hour delay on departing flights. Arrivals at the same airport (2) _____. During the morning, controllers at Gatwick airport were only able to handle around ten outbound flights per hour, whereas normally they deal with 30 to 40. While Manchester airport (3) _____, Stansted airport reported that it was operating at just 60% capacity in the morning. Passengers planning to fly to or from these airports yesterday (4) _____ to contact their airline before leaving home.

The computer system, which crashed just after 6 am, (5) _____ again within an hour. NATS (National Air Traffic Services) declared that there were no further problems once the system returned, and they assured the public that it (6) _____ which would not be repeated. They emphasized that safety (7) _____ at any moment during the breakdown.

Critics of the British air traffic control system blame the privatization of NATS for this latest problem. They point out that this is not the first time that something like this has happened. In the summer of 2000 there (8) _____.

2 Work in pairs. Discuss the following questions.

1 What do you think could have caused this computer crash?
2 What do you think would have happened if the computer failure had lasted longer?
3 Do you agree with the idea that the breakdown might have been a result of the privatization of the UK system?
4 What procedures are there in your workplace in the event of computer failure?
5 What training do you receive in order to deal with computer failure?
6 Do you think there need to be more systems in place to deal with computer failure?

SUBJECT BACKGROUND:

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. The incident in Section 3 illustrates the normal emergency procedure whereby the pilot, having experienced a multiple strike, shuts down the affected engine and plans to return to the airport.

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, and the reading passage in Section 1 gives an overview of hazards caused by other animals.

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 cm long by 3 cm 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. In the incident with the lion having broken out of its cage in Section 2, this was obviously not the case. 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.

for fun

An unusual sighting ...

Controller (to aircraft that just landed): Bear right, next intersection.
Pilot: Roger, we have him in sight.

UNIT 4

ANIMALS

Section one – Wildlife on the ground

This section deals with the problem of wildlife around airports. It teaches the vocabulary necessary to describe the kinds of problems that can occur as well as vocabulary related to the security measures taken to control the problems. The section also teaches the language function of expressing necessity.

1 Before students open their books, ask them to brainstorm with their partner which animals, apart from birds, can cause problems at an airport. Walk around and help them with any vocabulary that they need. Ask them also to make a brief note of the problem each particular animal might cause.

After students have matched the stories and checked their answers, ask them to discuss the following questions in pairs:

In which of the four stories was there a potential danger for aircraft? (A and D)

What specific measures can you think of to tackle these problems where aircraft are at risk? (Suggested answers: poison the rabbits / have a system in place to ensure animals on board are properly secured)

After students have completed this activity, write the following vocabulary on the board: *ground crew, unloading, bulkhead, concourse, smugglers, cargo hold, cargo handlers.* Ask students to find and underline these words in the stories. Then ask them to try and deduce their meanings from the contexts, discussing these deductions in pairs. Be ready to explain any words that they don't know or are unsure of. Note that *bulkhead* is a wall separating the sections inside an aircraft.

1 B 2 D 3 C 4 A

2 When answering these two questions students may talk about birds and the dangers of bird strikes. This area is dealt with in Section 3, so try to elicit examples involving other animals. Point out that the second question asks about problems at *ground level*.

In groups, ask students to think of two problems involving animals based on real events and invent one problem. When feeding back to the class, the other students have to guess which problem was invented.

For each real problem mentioned, ask about any preventative measures that were put into place.

3 Ask students to close their books and discuss the following pre-reading questions:

What kind of wildlife incidents do you think are experienced in US airports and how serious are they?

Can you guess what percentage of wildlife incidents are caused by birds?

Do you think wildlife incidents in the US are increasing in frequency? Why / Why not?

Then let students read the text to see if their predictions were right as well as to find out what the figures given in the activity refer to.

Note the term *go around* in the first paragraph. This is used when a pilot decides it is not safe to land and applies full power to climb again and re-enter the circuit around the airport. Note also that the text confirms that the major threat to safety is caused by birds, as they account for 97% of incidents involving wildlife.

2 the weight of a coyote
3 people injured from 1990 to 2005 by planes hitting wildlife
4 losses caused by this type of incident
5 the percentage of this type of incident involving birds

4 Sentence 3 is false because incidents actually increased fourfold between 1990 and 2005. You could ask students why they think such a major increase occurred and what they think the implications are. In fact this does not necessarily mean risks are increasing. As the text points out, air traffic increased significantly during this period and pilots are more likely now to report incidents involving wildlife, indicating an improvement in safety.

1 F 2 F 3 F 4 T 5 T

Vocabulary – Security measures

1 B 2 C 3 G 4 F 5 D 6 E 7 A

Functional English – Expressing necessity

1 Ask students to close their books and write the two sentences on the board. After they have found the answers, ask them to explain the difference between the two structures. Then let them read the explanation in the book to see if they were right.

Explain that we can also use *need to* with the pronoun *they*, as in *they need to*, when we are not sure who will improve or fix something.

1 needed to go
2 need scaring away

3 1 For information on what the students may say about avoiding bird strikes, you can refer to the introductory teaching notes in this unit. Avoiding birds and animals is an important component of the initial training for both pilots and controllers.

2 When discussing security measures students should make use of the words presented in the vocabulary section. Ask students about the ethical aspects of some of these measures, for example, the use of poison. They may know of some situations where wildlife is protected or where some security measures are not authorized for ethical reasons.

Section two – Animals on the loose

The emphasis in this section shifts towards dangers caused by animals on board. The listening comprehension activity deals with an incident in which a lion breaks loose in the cargo hold. The section teaches the language functions of expressing preferences and explaining unknown words. In the pronunciation activity, the way in which words run together in a sentence is illustrated.

1 When students have completed this matching activity, tell them that these pictures are all connected with the incident they will listen to. Ask them to work in pairs to construct a plausible scenario. Encourage them to be imaginative and give them a chance to share their stories with the class.

1 C 2 D 3 E 4 A 5 F 6 B

2 Answers to these questions may differ depending on what the students know about the transportation of animals. They might mention horses (see introductory notes to this unit). They may wish to discuss the regulations relating to the transportation of animals. Some supplementary questions you could ask are:

What animals may be transported in the passenger cabin?

What are the regulations on the introduction of animals to the cabin?

What animals can be transported in the hold?

What are the rules governing the transportation of animals in the hold?

For suggested answers, see the introductory notes to this unit.

3 19

1 A lion is escaping from a cage in the hold.
2 The lion escapes.

19 Listening script

P1 = pilot 1, P2 = pilot 2, G1 / 2 = ground 1 / 2

P1 OK, that's the pre-flight checklist finished. Is the cargo nearly ready?

P2 Yes, the containers for the next leg are loaded. I think the ground handlers are with the fork-lift truck unloading the animals now. I'll go and check on progress.

P1 OK. We need to push back in twenty minutes really, at five past one. I don't want to miss our slot.

P2 Hey, how's it going down here? Nearly ready?

G1 We've got a problem in the aft hold! A cage door is damaged, and one of the lions is breaking out of its cage!

P2 Is everyone OK?

G1 Yes, everybody's safe – we got out quickly and closed the door behind us. What should we do?

P2 I'd rather know what's going on in there before I make any decisions. This is what I'd like you to do – open the door quickly, assess the situation, and close it again.

G1 Well … OK. There he is. He's halfway out.

G2 Look – the cage lock's broken off. And also the thing that holds the door on to the cage is broken.

G1 The hinge? Yes, that's broken too. So we've got a cargo net for catching him, but someone's got to get in and throw it over him.

P2 Look, I don't want anyone to put themselves in danger. I'd prefer to get some help with this. We need a vet.

G1 I agree. Oh no – he's out. Close the door again, quick!

4 19

1 outbound
2 aft
3 unloading
4 push back, 1305
5 have a look
6 lock, hinge
7 a vet

Functional English – Expressing preferences

1 After students have completed this activity and checked their answers, provide some explanation of this language function as follows:

- *I want to = I'd like to* (this is more polite)
- *I'd rather = I'd prefer to* (comparative sense – both are used when one course of action is chosen in preference to another)
- Negative forms:

  I don't want to

  I wouldn't like to

  I'd rather not (NOT *I wouldn't rather*)

  I'd prefer not to (NOT *I wouldn't prefer to*)

All of these structures, both positive and negative, are followed by a verb in its infinitive form.

Both *I want to* and *I'd like to* often contain a subject before *to*, when you want someone other than yourself to carry out the action, e.g. *I want to cook the dinner now. / I want you to cook the dinner now.*
I'd like to test this engine. / I'd like the maintenance team to test this engine.

1 don't want to
2 'd rather
3 'd like you to
4 don't want anyone to
5 'd prefer to

2 20 Ask students if they can explain what is happening to the word *to* in this structure and why. (It is unstressed. If you didn't know it was there, you probably wouldn't hear it, but the sentences are perfectly comprehensible without *to*.)

20 Listening script

1 I don't want to miss our slot.
2 I'd rather know what's going on in there before I make any decisions.
3 This is what I'd like you to do ...
4 I don't want anyone to put themselves in danger.
5 I'd prefer to get some help with this.

3 1 want to work
2 prefer not to do
3 prefer to be
4 want us to clean
5 like to cut
6 like to give
7 prefer people to speak
8 wants to do
9 like me to repeat
10 'd rather work

4 When students read the sentences they have written to their partner, encourage them to ask each other questions about the reasons behind their statements.

Ask students to change partners several times and repeat the discussions.

Pronunciation – Word endings

21 This activity is known as back chaining. It is a good way to raise awareness of how native speakers of English join words together. Awareness of the way in which words join together should aid the students in their comprehension of natural speech.

21 Listening script

1 This is going to make us late.
2 We've got a problem in the hold.
3 What do you think we should do?

Functional English – Explaining unknown words

1 This is one of the most critical language functions we can teach to pilots and controllers. Communication breakdown can occur if one key word is misunderstood between a pilot and controller. The ability to paraphrase is crucial. Sometimes neither party may be aware of the correct word in English. This is not serious if they can use other words to adequately describe what they want to say.

If necessary, review the structures with the students:

It's made of + material

It's something for + *-ing*

It's used to + verb

The thing that + verb (third person singular)

This is something that + verb (third person singular)

Model the sentences for students by playing a guessing game. Think of an everyday object and give clues using the structures until the students guess the object. Ask students to repeat with other objects.

a container

2 As well as offering useful practice of the functional language, this activity reviews key vocabulary taught in the unit.

Section three – Bird strike

This section deals with an emergency situation after a bird strike and subsequent engine failure. The incident is a typical one in which an aircraft needs to return to the airport it has just taken off from. The section teaches the language function of saying intentions and there is further illustration of stress patterns within a sentence.

1 Birds are a very serious hazard and can damage almost any part of an aircraft. As well as engines, the students may mention the windshield, the wings or the fuselage.

2 22,23,24 Note that Sentence 1 is false because although it was a multiple strike involving four birds, at least one hit the windshield. When this happens, pilots will have difficultly seeing through the windshield afterwards (Sentence 3). This is why the pilots turned the wipers on. When one engine has to be shut down, the thrust on each side of the aircraft will be unbalanced. If pilots have a greater thrust available on the right hand side of the aircraft, they will find it much easier, and safer, to turn left only. This is the case in the incident illustrated, and this is why Sentence 4 is false.

1 F 2 T 3 T 4 F

22 Listening script

PNF = pilot non-flying, C = tower, PF = pilot flying

C S27H. Contact departure 121.75. Good day sir.
PNF Contact departure 121.75 S27H thank you.
PF After take-off checklist.
PNF After take-off checklist, complete.
PF What was that?
PNF What?
PF That noise?
PNF Oh! The windshield!

24 Listening script

C S27H. Say intentions.
PNF What are we going to do? Go around to the left?
PF Yes. I don't intend to land with this much fuel on board. Turn left, dump fuel and get back down.
PNF We're going to make a left orbit of the airfield. S27H.
C S27H. Can you make right turns?
PNF Negative sir. Right turns will be very hard. I'd prefer to turn left.
C S27H. Understand you are unable to make right turns. Turn left at your discretion.
PF OK, we need to dump fuel as soon as possible.
PNF We plan to dump fuel to landing weight. S27H.

23 Listening script

PF That's a multiple strike!
PNF That was four birds! Engine number one is still running.
PF Where's the power? We're rolling left.
PNF There's no data on the screen for engine number one.
PF We need to get wings level. Increase thrust on number one.
PNF Increasing thrust.
PF OK, wings level.
PNF The engine's not running properly.
PF It's hard to remain level. Help me.
PNF Any power on number one?
PF I don't know. I can't see any power at all. The displays read nothing. I think we need to shut it down. I intend to shut down number one.
PNF OK, shut down number one.
PF Shutting down number one.
PNF More power on two and three. Increasing power on two and three.
PF OK. Can you clean the windshield? Get those wipers on.
PNF Wipers on.
C S27H Moi Tower. We see flames and smoke from your left engine. Is everything OK?
PNF No, a bird has gone into the engine. We hit lots of birds at 1,800. We've lost number one engine. S27H.
C S27H. Your number one engine has ingested birds. Are you declaring an emergency?
PNF Declaring an emergency. We're planning on coming back. S27H.
C S27H. State persons on board.
PNF Three crew members.
TWR S27H. State fuel on board.
PNF Er ...194,000 kg.
PF Holding wings level is difficult.

3 The amount of fuel on board (Question 2) is a serious problem. This aircraft has just taken off and is carrying enough fuel for the whole flight. This fuel creates extra weight and so the aircraft is too heavy to land safely. An immediate landing could be dangerous for the passengers and would probably damage the aircraft too. This is why the pilot asks the controller for permission to circle and dump fuel.

1 1,800 ft
2 194,000 kg
3 There is too much fuel on the aircraft.
4 Make a left orbit of the airfield, dump fuel and land.

Pronunciation – Sentence stress 2

1 / 2 / 3 / 4 23 Before completing Activities 1 and 2, ask students the following questions:

Which words generally carry full stress in a sentence? (the important ones)

Can you understand a message if you only hear the stressed syllables? (Yes, you can usually understand the general idea.)

Note that the photocopiable activity on pp 46–47 provides further practice of sentence stress.

1 / 2 1 That's a multiple strike!
2 That was four birds!
3 Engine number one is still running.
4 Where's the power?
5 We're rolling left.
6 There's no data on the screen for engine number one.
7 We need to get wings level.
8 Increase thrust on number one.
9 Increasing thrust.

Functional English – Saying intentions

1 24 This language function needs to be used by pilots and understood by controllers. In a non-routine situation, a controller will ask a pilot, *What are your intentions?* Note that the controller tells the pilot, *Turn left at your discretion*, effectively authorizing the pilot to turn left at will. In routine flight through controlled airspace, no turn can be made unless explicitly authorized. The nature of the emergency situation means that the controller will keep other aircraft away from the area and can thus allow this pilot more freedom of movement. This is a necessary measure because the reduced control capability of the aircraft means that the pilot would find it difficult to follow precise instructions.

After students have completed this activity, write the following structures on the board and ask students what the difference in meaning is: *we're going to / we plan to / we intend to / we'd prefer to / we'd like to.*

(The first three refer to a decision already taken, the other two are more indirect and seek the approval of the controller.)

Ask students what word form follows each of the five structures (a verb in its infinitive form).

1 intentions
2 going
3 intend
4 going to
5 prefer
6 discretion
7 're going to

2 1 are going
2 to ask
3 plan to
4 going to
5 not planning
6 you going

Speaking

This activity provides controlled practice of language learnt in the unit.

Section four – Language development

Functional English – Expressing necessity

1
1 cleaning
2 to get
3 repairing
4 to change
5 refueling
6 to come
7 checking
8 to park
9 replacing
10 to spend

Expressing preferences

2 (Suggested answers)
2 I'd rather travel on a Boeing 787 Dreamliner.
3 I'd prefer to make voice transmissions.
4 I('d) like to work alone.
5 I want to speak my own language at work.
6 I'd rather fly short distances.
7 I('d) prefer to pilot a plane without passengers.
8 I don't want to work shifts.
9 I wouldn't like dealing / to deal with a sick passenger.
10 I'd rather travel first class.

Explaining unknown words

3
1 made of (d)
2 something for (a)
3 used to (b)
4 something that (f)
5 're made (j)
6 used for (h)
7 the thing (i)
8 's used (e)
9 use to (g)
10 are used (c)

Saying intentions and expectations

4
1 Datalink is intended to assist pilots in communication.
2 The controller plans to clear the immediate airspace.
3 We aim to dump some fuel before landing.
4 I estimate our ETA at 1300 hours.
5 We expect to land in about an hour.
6 I'm going to inform passengers of a delay.
7 We're hoping to take off in the next available slot.
8 The airline company has every intention of starting an investigation.
9 Flight 245 is expected to depart at 1800 hours.
10 The flight attendants intend to go on strike tomorrow.

Vocabulary – Security measures

1
1 sniffer dog
2 metal detectors
3 sensor
4 Traps
5 security worker
6 perimeter fence
7 CCTV cameras
8 bird scarer
9 Poison
10 police unit

2
1 strike
2 injured
3 collapse
4 alert
5 hole
6 broken
7 damaged
8 ingestion
9 scratched
10 burst

PHOTOCOPIABLE ACTIVITY

This activity raises students' awareness of how much can be understood from just stressed syllables. Hand out the dialogue in which only the stressed syllables appear and give students a few minutes to read it. Then ask students to work in pairs and practise the dialogue as it appears. Reading it aloud should help them understand it.

Finally, ask them to work with their partner and try to write the dialogue in full. When they finish, give them a copy of the key, which they can then compare with what they have produced.

If the above reconstruction task seems too difficult for your students, or if time is limited, just ask students to work on one segment.

1 Read the following dialogue in which only the stressed syllables appear. Can you understand what is happening?

GCS = ground crew supervisor, ATC = air traffic controller

A

GCS: got / prob__ / flight
ATC: which / one ?
GCS: one / just / pushed / back
ATC: one / go__ / Rome ?
GCS: right / stop / flight ?
ATC: need / know / wrong
GCS: think / man / hold
ATC: what ? tell / pil__ / __turn / stand

B

GCS: real__ / sorr__ / man's / found
ATC: sure ?
GCS: yes / left / team / make / ur__ / call
ATC: pil__ / sure / heard / noi__

C

ATC: pil__ / right / __bout / noise
GCS: yes ?
ATC: dogs / __caped / cages

2 Act out the dialogue by reading the stressed syllables with a partner. Then discuss what you think is happening.

3 Working with your partner, try to write the dialogue in full.

4 Compare your version with the version your teacher gives you.

A Key

GCS: We've got a problem with a flight.
ATC: Which one?
GCS: The one that's just pushed back.
ATC: The one going to Rome?
GCS: That's right. Can you stop the flight?
ATC: I need to know what's wrong.
GCS: We think there's a man in the hold.
ATC: What? I'll tell the pilot to return to the stand.

B Key

GCS: I'm really sorry. Our man's been found.
ATC: Are you sure?
GCS: Yes. He left the team to make an urgent call.
ATC: The pilot is sure he heard a noise.

C Key

ATC: The pilots were right about the noise.
GCS: Oh yes?
ATC: Some dogs escaped from their cages.

SUBJECT BACKGROUND:

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 the incident featured in Section 3, 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. For more on landing gear problems see Unit 9.

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 featured in Section 1 of the unit, the GEN-H4, is a new and highly innovative model. Note that the article featured advises potential customers to 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 (see the introduction to Unit 10 for an explanation as to how this happened). 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.

The air race which took place in Istanbul (see Section 2) would have been a spectacular sight for the city's inhabitants. The pilots involved would consider aerobatics as a sport.

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 from the world champion pilot featured in Section 2. Commercial pilots spend their careers keeping carefully within a predefined, safe **flight envelope**.

for fun

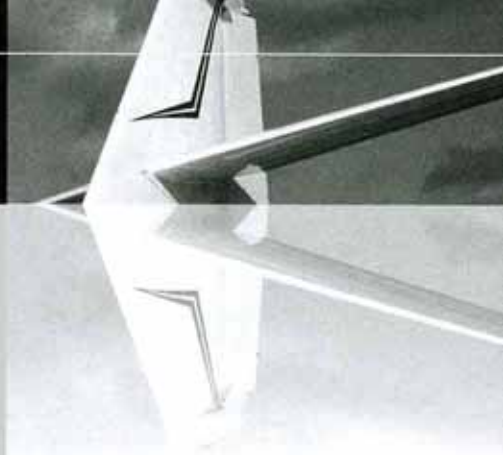
The true nature of the job ...

'You're a pilot, that must be really exciting,' said the little boy on seeing the airline pilot in his uniform.

'Not if I do it right,' replied the pilot.

UNIT 5

GRAVITY



Section one – Ultralight

This section deals with an ultralight aircraft which has a particularly innovative design. It teaches the vocabulary of basic aeronautical movements and the flight controls which make these movements possible. It also presents the language function of explaining how things work.

1 Ask this question before students open their books and see the picture. Students may not necessarily think of ultralight aircraft. There may be gliding enthusiasts in your group, as this is a more common recreational activity. When feeding back on what they discussed with their partners, prompt them in order to introduce the subject of ultralight aircraft.

2 Ask students to cover the text so that they predict rather than look for the answers in the text.

3 Note that the *throttle* switch is twisted to make the propeller rotate faster, in other words to increase its *rpm* (revolutions per minute). This effectively powers the GEN-H4 upwards, by providing *lift*, therefore allowing it to *climb*. When the pilot wants to descend and land it's necessary to *throttle* back gradually, in other words reduce rpm, but not too suddenly, in order to land gently. The terms *pitch*, *roll* and *yaw* are explained in the introductory notes.

Note that there is some ambiguity in Question 6. The text states that you don't need a licence, but then in the final paragraph implies that it may be illegal to fly the GEN-H4 in some countries. Ask students what they think the regulation would be in their country.

1 b (a helicopter – a gyrocopter has a propeller at the back and a non-powered rotor above)
2 four (two sets of two)
3 by miniature 125 cc / 8 hp engines
4 90 kmh / 59 mph
5 by using a handlebar with a throttle, yaw switch and weight shifting
6 no (but could depend on the country)
7 40 hours

Functional English – Explaining how something works

1 After students have completed the activity, check that they have understood the use of these structures by writing on the board the following sentence and asking them to complete it in different ways:

A pilot of a fixed-wing aircraft controls pitch _____ *the elevator.* (by means of / by moving, by raising or by lowering, etc.)

Show the students that the sentence can be expressed without *by*, e.g. *Moving the elevator controls pitch.*

Point out that:

- *by means of* is always followed by a noun
- *(by)* + verb *(-ing)* refers to the action done to get a result
- you *get* a result *by doing* an action
- *doing* an action *gets* a result

1 by means of, pushing
2 Pushing
3 by flicking

2 This activity provides controlled practice of the language in Activity 1.

1 move, by means of
2 Moving, controls
3 by means of
4 adjust, by moving
5 Pushing, turns
6 changes, by raising, lowering

Vocabulary – Manoeuvring an aircraft

1 This is a useful activity for consolidating the vocabulary learned and will appeal to those students who learn best by doing things. You might consider having students make paper airplanes for the activity, or hand out model aircraft if you have them.

An additional activity after they have practised with their partner would be to introduce an element of competition by seeing who has the fastest (and correct) reaction times to the eight instructions (*pitch – roll – yaw – climb – lift – turn – dive – sink – tip over*). This activity will work best if the instructions are read by other students at random.

2 Explain to the students that these questions relate to the GEN-H4.

1 climb
2 by flicking the yaw switch
3 you descend / sink
4 by shifting your weight right
5 you tip over
6 by twisting the throttle
7 hover
8 by throttling back and not shifting your weight

3 This activity could be very interesting depending on the students' experience. You could prompt them to talk about gliders, hang-gliding or other similar activities.

Speaking

This activity gives students the chance to express their opinions about the GEN-H4. If you have a group of controllers, they are likely to be concerned about the safety implications and the possible threat of a collision with low-flying aircraft, so you could expect them to answer *yes* to Question 2. Pilots might take a similar position for the same reasons.

Fixed wing aircraft are usually airplanes (or gliders), *rotary wing* aircraft are generally helicopters. Helicopters can go straight up and down, and also hover. They don't need airports. Airplanes can travel long distances in a short time, but they have to keep moving. Note that the words *airplane* and *aircraft* are generally used interchangeably to mean a fixed wing aircraft. It is only in particular contexts, such as this discussion activity, where it is necessary to differentiate between the two terms.

When discussing the advantages and disadvantages of both, students may try to use the language of comparison and contrast, which is presented in Section 2. It is a good idea to monitor what they are saying because you will be able to see in advance how much (or how little) of this language they can produce correctly.

Section two – Air race

This section deals with detailed descriptions of various aerobatic manoeuvres, described in an interview with a world champion pilot. It teaches units of measurement and numbers and presents the language function of comparing and contrasting.

1 Students may not have heard of the Red Bull air race, but they ought to be interested in finding out more. Further information about this race is available on the web site: www.redbullairrace.com. You may wish to refer to this site yourself, or to suggest to students that they do so.

Racing aircraft and conventional aircraft are very different and this becomes clearer when students listen to the interview and the description of the kind of manoeuvres the racing aircraft are designed to perform.

In response to Question 3 students might mention some air shows they have been to. If this is the case, ask them to exchange information about the different air shows they have attended.

2 25 In this interview, the pilot reuses much of the vocabulary presented in the previous section. The initial aim for students is to identify the movements as he talks about them.

1 c 2 d 3 a 4 b 5 h 6 g 7 f 8 e

3 25 Students match the names to each of the eight manoeuvres. Tell them that two words aren't needed. If you have a group of students who seem to be struggling with the activity, you could tell them that *loop* is used twice and *roll* is used three times.

a half roll
b full roll
c inside loop
d outside loop
e hammerhead
f tail slide
g Cuban eight
h barrel roll

4 25 The students listen a third time to find the answers to more detailed questions. The task for this third listening introduces some numbers, in preparation for the vocabulary activities to follow.

1 the tail slide
2 speed
3 an Extra 300s
4 672 kg
5 25°
6 He almost crashed as a result of hydraulic problems.
7 very good, positive

25 Listening script

I = interviewer, T = Thiago

I Welcome back to Radio Action. I'm here with champion air-race pilot, Thiago Silvo Corbera. Now, Thiago, can you tell us a little about aerobatic manoeuvres?

T The two basic manoeuvres are the loop, which is where you fly a vertical circle. You can fly an inside loop, where you pitch up into a circle, or an outside loop where you pitch down into a circle. And there's the roll, either a half roll – where the wings turn 180° to inverted flight so that you fly upside down, or a full roll, where you rotate 360°.

I And what about the more complex manoeuvres?

T The barrel roll is where you complete one loop and one roll at the same time, making a flight path similar to a horizontal corkscrew, like when you open a bottle of wine. A more complex manoeuvre is the Cuban eight, which again is a combination of loops and rolls. This manoeuvre makes a shape like a number eight. My favourite manoeuvre is the tail slide. That's a straight vertical climb up until you lose momentum. You then fall backwards, tail first, until the nose drops through the horizon to a vertical down position, and then you drop back into level flight. Moves like this are fun, but the most important thing in an air race competition is completing the course as fast as you can.

I What aeroplane are you flying today?

T I'm flying an Extra 300s.

I And how is this different from normal aircraft?

T Well, they are quite different in that they are much lighter than normal aircraft and they have more power for their weight. This aircraft only weighs 672 kg but it has a 300 HP engine. Another key difference is that the control surfaces, the ailerons, rudder and elevators, deflect at least 25°, which is much more deflection than conventional aircraft. This is so you can make the hard manoeuvres at high speed.

I Do you ever get scared?

T The scariest moment I've ever had was doing a manoeuvre called the hammerhead. You start by flying vertically, but then slow down and apply full rudder and full opposite aileron. You then yaw 180° to a nose-down attitude. But this time the aileron didn't release properly, and I almost went into a spin and crashed. Luckily, I got control, and when I landed, I checked the control systems and found a leak in the hydraulic lines.

I And how are you feeling about the air race today?

T I've done a lot of training, and I'm feeling positive.

I Well, good luck, and thanks for talking to us.

T My pleasure. Thank you.

Vocabulary – Units of measurement

1 26 In the aviation world, both non-metric and metric units of measurement continue to be used. What is even more interesting, and perhaps surprising, is that knots and nautical miles are the standard measures of speed and distance respectively. These measurements were adopted from shipping in the early days of controlled flight and have remained as the standard measurements ever since. A nautical mile (nm) is a bit longer than a mile (1.15 miles) and almost two kilometres (1,852 m). A knot (kt), correspondingly, is nearly two kilometres per hour (1kt = 1nm/h = 1.15mph / 1.852km/h).

26 Listening script

feet	*g*s
metres	nautical miles
square feet	square metres
kilometres	pounds
feet per minute	kilos OR kilograms
degrees per second	horsepower
knots	metres per minute

2 27 If you think your students will find this activity difficult, you could get them to listen to the recording twice. The first time they listen, students should just check that they have written the units of measurement in the correct columns. For the second listening, they should write the actual figures.

specifications	Extra 300s	
	non-metric	metric
length	22.6 ft	6.9 m
height	8.5 ft	2.6 m
weight (unladen)	1,480 lb	672 kg
wing area	98 ft^2	9.1 m^2
g-rating	+/-10 *g*s	
engine	300 HP	
max. speed / VNE	220 kt	
stall speed / VS	60 kt	
climb rate	3,200 ft/m	975 ft/m
roll rate	400 °/s	
range	510 nm	944 km

27 Listening script

The Extra 300s has a length of 22.6 ft or 6.9 m, a height of 8.5 ft – or 2.6 m – and an unladen weight of 1,480 lb – or 672 kg. The combined wing area is 98 ft^2 – or 9.1 m^2. The Extra 300s has a *g*-rating of +/-10 gs, and has a Lycoming 6-cylinder power plant which produces 300 HP, giving a VNE speed of 220 kt. Its stall speed is 60 kt. The aircraft can climb at a rate of 3,200 ft – or 975 m – per minute and roll at a rate of 400° per second. Its range is approximately 944 km – or 510 nm.

3 28 When students have completed this activity, write the numbers in full on the board and ask them to mark where the stress lies.

Explain that *and* is never stressed in numbers and is barely audible. On the other hand it is important to stress *point*, or else there might be a serious misunderstanding.

For further practice, provide students with other numbers, focussing on pronouncing them with correct stress patterns.

1 six point five one
2 six hundred and fifty-one
3 six thousand, five hundred and one

28 Listening script

1 six point five one
2 six hundred and fifty-one
3 six thousand, five hundred and one

Speaking

Here students have the opportunity for further practice of both numbers and units of measurement.

Functional English – Comparing and contrasting

1 After they have completed the activity, review the following points:

- the way in which comparatives and superlatives are formed from adjectives
- the usage of the different structures below:
  (comparative) *than*
  not as (adjective) *as*
  as (adjective) *as*
  the (superlative)
  a little / a lot (comparative) *than*

1 than
2 the
3 little / bit / little bit
4 most
5 as

2 Students work in pairs or individually to write sentences comparing the two racing planes, before checking with the class. In larger classes, get students to check their sentences in groups.

3 This activity offers the students the chance to talk about different aircraft, and to compare them. In response to Question 1 they may talk about Concorde, developed by Britain and France in the late 1960s, which was a major innovation technologically, though commercially unsuccessful in the long term. The aircraft which was developed by the Americans shortly afterwards, the Boeing 747, and is still in service today, has been a great commercial success. It was, until recently, the largest passenger jet. The Airbus A380 can carry more passengers, though there is some debate as to whether or not it will be a success. Boeing have responded by developing the Boeing 787, which is a medium-sized long range aircraft that they claim offers greater efficiency. Students may wish to compare and contrast the long term strategies of Boeing and Airbus.

An interesting homework activity is to ask students to gather technical information about two commercial aircraft (e.g. the Airbus A320 and the Boeing 737). They could then conduct mini-presentations in a later lesson where they compare and contrast these aircraft.

Section three – Hydraulic loss

This section deals with an emergency situation in which a pilot loses hydraulic power. It practises the language functions of expressing difficulty (for pilots) and offering assistance (for controllers). The pronunciation activity illustrates the feature of placing extra stress on the most important word in a sentence.

1 The main idea is that hydraulic failure will result in greatly reduced control of the aircraft. Back-up systems are often minimal. Hydraulic failure isn't very common but it does happen. It is a serious problem that usually leads to declaring an emergency.

In answer to Question 4, hydraulic failure is likely to affect the main control surfaces, ailerons, the elevator and the rudder. In the listening which follows the pilot also signals a problem with spoilers, reverse thrust and brakes. He says that the flaps are working, though in another incident this might not be the case. He also says the landing gear is extending correctly. Although normal functioning depends on the hydraulics, there is usually a back-up system available.

2 29 See the introductory notes to this unit for an explanation of *elevator* and *ailerons*.

The pilot mentions elevator and ailerons.

29 Listening script

P = pilot, C = controller

P Approach. Executive 56. We're having trouble controlling the attitude. It's difficult to establish level flight. Declaring an emergency. Executive 56.

C Executive 56, roger your emergency. State intentions.

P We'd … er … like to come back to your airport but we are still trying to fight the pitch and bank. We've got low hydraulic pressure and we've got very little deflection on the elevator or ailerons. Executive 56.

C Executive 56. Just tell me what you need and I'll get it for you.

P It's very difficult to pull or turn on the column … er … we're using asymmetrical thrust … er … we're using the engines to turn. We can only make big turns. Executive 56.

C Executive 56. Roger. Big turns only. Manoeuvre at your discretion.

P We're going to go out west and then make a straight in approach if that's possible. We're fighting to keep it straight and level. We will need very long final. I don't think we have spoilers, reverse thrust or brakes, so we'd like the longest runway possible. Executive 56.

3 If you think your students will find this activity difficult, you could play the recording again. Students may need to listen several times in order to complete this activity.

The *attitude* of the aircraft refers to whether the nose is pointing upwards (nose up) or downwards (nose down). In this particular incident the pilot has lost the use of the elevator, ailerons and rudder (which control pitch, roll and yaw respectively), thus making it difficult to control the aircraft.

With the usual control surfaces (moveable parts of the aircraft) not working, the pilot has to use *asymmetrical thrust* to turn the aircraft. This means that a different level of thrust is applied to each engine. While this will succeed in turning the aircraft, it is a less precise way of doing so.

A *short* and a *long final* both refer to the final approach to an airport before landing. A long final means that the aircraft will line up with the runway earlier and descend more gradually, covering a greater distance than when on a short final. For the pilot who is having difficulty with the flight controls, this is the safest way to land as there will be more time available to correct any error. Likewise a *visual landing* is safer and easier to perform than a precision approach on ILS. See the introductory notes to Unit 9 (Landings) for a full explanation of these terms.

1 low
2 bank
3 big
4 asymmetrical thrust
5 west
6 long

4 30 Ask students to discuss their ideas about what will happen in pairs or small groups before they listen.

The crew will …
adopt landing configuration to control speed and height
make a visual approach (not listed)

The controller will …
give the crew vectors to the runway
offer to activate emergency services (not listed)

30 Listening script

C Executive 56. OK, a visual on runway 07. Would you like emergency assistance at the far end of the runway?

P Affirm, Executive 56.

C Executive 56. The services have been activated. Do you want me to line you up with the end of the runway right now?

P Yes please, but we are really struggling to follow a heading. Please keep giving us vectors to the field. Executive 56.

C Executive 56. Roger. Turn left heading 050°.

P 050. We're adopting landing configuration now to slow us down. Executive 56.

C Roger. Executive 56. (II)

P We have flaps and … er … and landing gear is down and control is easier now. We have the field in sight.

C Executive 56. Roger. You are cleared to land runway 07. Wind 170 with 26 kt.

5 31 Ask students to discuss how the incident might end. After discussion, have the class take a vote on the most plausible scenario before they listen.

This final outcome had the potential to be very serious. Overruning a runway can have fatal consequences, depending on what is at the end of the runway. In this case the aircraft is probably stuck on grass, which explains why a tow truck will be needed.

It landed safely, but overshot the runway and needed a tow truck to get back.

31 Listening script

P Approach, we're down safely, but we overran the runway Executive 56.
C Executive 56. Glad you're all OK. Is there anything else you need?
P We'll need help getting back to the apron. Executive 56.
C Executive 56. Roger. You're off the end of the runway. We'll get a tow truck to take you back.

Functional English – Expressing difficulty and offering help

32 The meanings of the expressions presented are very clear from the context.

You could suggest to students that they memorize the key expressions presented here, selecting the four they would use, depending on whether they are pilots or controllers. They will be invaluable in an emergency situation.

In Sentence 2, *establish level flight* means to stabilize the aircraft. In Sentence 6, *line you up with the end of the runway* means to direct you so that you will be travelling in a straight line towards the runway. In Sentence 7, *follow a heading* means to go in the precise direction required.

1 having trouble
2 difficult to
3 what you need, I'll get it
4 fighting to
5 Would you like
6 Do you want me to
7 struggling to
8 there anything else

32 Listening script

1 We're having trouble controlling the attitude.
2 It's difficult to establish level flight.
3 Just tell me what you need and I'll get it for you.
4 We're fighting to keep it straight and level.
5 Would you like emergency assistance at the far end of the runway?
6 Do you want me to line you up with the end of the runway right now?
7 We're really struggling to follow a heading.
8 Is there anything else you need?

Pronunciation – Tonic stress

1 32 Tonic stress is a feature of speech that is useful for students to reproduce when they want to draw the listener's attention towards a particular word.

2 32
2 It's difficult to establish level flight.
3 Just tell me what you need and I'll get it for you.
4 We're really fighting to keep it straight and level.
5 Would you like emergency assistance at the far end of the runway?
6 Do you want me to line you up with the end of the runway right now?
7 We're really struggling to follow a heading
8 Is there anything else you need?

Speaking – Helping a pilot in difficulty

1 / 2 If you think students will struggle with this activity, divide the class into Groups A and B. Have Groups A be the pilots and Groups B the controllers. Give them five minutes to think of answers, then form AB pairs to role-play the situations.

Section four – Language development

Functional English – Explaining how something works

1
1 by means of
2 with the use of
3 by way of
4 by
5 by
6 With the help of
7 through
8 with the help of
9 using
10 by means of

Comparing and contrasting

2
1 worse
2 quicker
3 faster
4 better
5 busier
6 shorter
7 windier
8 more serious
9 taller
10 more urgent

3
1 much heavier
2 powerful as
3 longer than
4 as good
5 most important
6 as many
7 farther than
8 fewer

4
1 busier
2 bigger
3 more expensive
4 safer
5 more fuel-efficient
6 longer

Expressing difficulty and offering assistance

5
1 I'm having trouble understanding what the pilot is saying.
2 It's difficult to hear you because of the background noise.
3 We're fighting to control the plane.
4 They're struggling to keep up with the increase in air traffic.
5 Would you like emergency assistance?
6 Is there anything else you need?
7 Tell me what you need and I'll get it for you.

Vocabulary – Manoeuvring an aircraft

1
1 d
2 g
3 h
4 i
5 j
6 a
7 e
8 f
9 c
10 b

Vocabulary from the unit

2
1 fixed-wing
2 rotary-wing
3 hang-glider
4 glider
5 tow truck
6 leaking

PHOTOCOPIABLE ACTIVITY

This is a well-known story so it might be possible to elicit some of the facts from the students before they read it. They can then read to confirm what they already know or think they know. If they don't know the story, you might ask them to speculate on the record. You could ask students to discuss one or more of the following questions in pairs or groups:

Who was Steve Fossett and what record(s) did he hold?
Which new record did he set in 2006?
How did he do it? Do you know anything about his aircraft? Who helped him?

OR

What did you think is the record for the longest distance covered by a plane without refuelling?
Do you think this could be done flying solo or would it need more than one pilot?
What kind of preparation would be needed to attempt such a record?

The gap fill activity is a comprehension check and a review of aviation vocabulary.
The discussion activity then allows students to express their opinions.

Key

1 refuelling	3 cockpit	5 tanks	7 emergency	9 windshield	11 solo
2 landing	4 efficiency	6 wingspan	8 tyres	10 pilots	12 aviation

1 Read and complete the news story with the words from the box.

aviation	cockpit	efficiency	emergency	landing	pilots
refuelling	solo	tanks	tyres	windshield	wingspan

February 18, 2006

Fossett sets new long-distance flight record

The 61-year-old American millionaire Steve Fossett has set a new world record for a long-distance flight without (1) _____ after flying more than 26,000 miles. He set off from Florida last Wednesday, and circled the globe flying eastwards, before crossing the Atlantic a second time and (2) _____ on Saturday in Bournemouth, Great Britain. The flight took a total of about 80 hours and perhaps the most astonishing thing was that Fossett was alone in the (3) _____ all that time.

Fossett's plane, designed with maximum fuel (4) _____ in mind, took off with 18,000 pounds of fuel (six times the weight of the aircraft itself) in two huge (5) _____ suspended on each wing. It had a (6) _____ of 35 metres, three times its length. While the flight went well, it was not without problems, particularly at the end. He had originally intended to land in Kent but had to declare an (7) _____ and divert at the last minute due to an electrical failure. He landed on battery power alone and burst two (8) _____ while landing. His (9) _____ was heavily-iced, seriously impairing visibility, and he had only 200 pounds of fuel left when he touched down. His friend and sponsor Richard Branson flew behind him during the final leg. He actually broke the record as he was crossing Ireland, just before his problems began.

The previous record stood at 24,987 miles and had been set by two (10) _____ , Dick Rutan and Jeana Yeager back in 1986. This was also the first time anyone had flown around the world without refuelling. While it was to be expected that this record would be broken one day, nobody thought that it could be done by a pilot flying (11) _____ . Fossett, with his taste for adventure, has once again taken the (12) _____ world by surprise.

2 Look at the following statements and decide if you agree or disagree. Work in pairs. Discuss your opinions.

1 Steve Fossett deserves our admiration for a fantastic achievement.
2 Too much money is spent on trying to set records like this.
3 The risks in a flight like this are too high for the pilot.
4 The pilot proved he has real courage to attempt this record.

SUBJECT BACKGROUND:

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. A general overview of the kind of medical emergencies that may occur is provided in the article in Section 1 and it is worth taking a few minutes to read it now.

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. This is the case in the incident featured in Section 3.

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. This is discussed further in the introduction to Unit 12.

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

Section 2 deals with the general problem of stress in the workplace. 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 (see the introductory notes to Unit 2). 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.

for fun

A reckless pilot ...

Tower: Is this the same aircraft declaring emergency about two hours ago?
Pilot: Negative, sir. It's only the same pilot.

UNIT 6

HEALTH

Section one – Is there a doctor on board?

Although there frequently is a doctor on board a flight, airlines cannot depend upon this and so all cabin crew are trained in first aid procedures. This section deals with some of the most typical medical emergencies that can occur on board an aircraft. It presents the vocabulary needed to talk about medical emergencies. This is supported by teaching the language function of expressing cause and effect.

1 Before students open their books, ask them to discuss in pairs some examples of common medical emergencies that can occur on board an aircraft. While monitoring this activity, supply them with any vocabulary they may require. Discuss students' answers with the class and write some of the emergencies mentioned on the board. Then ask the class which elements of an aircraft first-aid kit might be used to deal with these emergencies. Teach the vocabulary that they need then ask them to open their books and complete the activity.

bandage	A
defibrillator	F
EpiPen	B
inhaler	C
plaster	G
insulin pen	E
splint	D

2 1 B 2 E 3 G 4 D 5 C 6 A 7 F

3 This comprehension activity checks that students understand the main ideas of each section of the article.

A 7
B 3, 4, 6
C 5
D 1
E 2

4 This activity checks students' comprehension of details in the article.

1 heart attack
2 falling items and turbulence
3 People sometimes leave their medicine in the hold.
4 Some airlines have stopped serving peanuts.
5 It is more difficult to eat regularly.

5 It is possible that neither pilots nor controllers have had training in first aid procedures, as it is cabin crew who are responsible for assisting passengers with a medical problem. The pilot's place is in the cockpit and controllers are clearly unable to help directly. Nevertheless, both pilots and controllers will have been trained to recognize situations which require an aircraft to divert. They should also have enough knowledge to know which medical services to request or provide on the ground.

Students may have some interesting experiences to share with the class in answer to Question 2. If they have not actually witnessed any emergencies, you could ask them to mention any emergencies they heard about during their training or from any other source.

Functional English – Expressing cause and effect

This language function is particularly important when talking about symptoms and possible consequences of medical emergencies on board.

When students have completed the activity, write the following two sentences on the board: *There was heavy fog. / There were delays*. Ask the students which is the cause (*fog*) and which is the effect (*delays*). Then ask them to connect these sentences using four of the structures in the book as a further practice activity. (*The delays were caused by heavy fog. / The heavy fog resulted in delays. / The delays resulted from heavy fog. / The heavy fog led to delays.)*. Elicit the fact that each structure works in one direction only, cause-effect or effect-cause. To reinforce this point further, ask the students how the following common link words work:

because (effect-cause)
so (cause-effect)
due to (effect-cause)
therefore (cause-effect)

1 leading cause
2 caused by
3 result in
4 result from
5 lead to

Vocabulary – Medical emergencies

1 airways
2 episode
3 first-aid kit
4 limbs
5 cardiac monitor
6 anaphylactic shock
7 cardiac arrest
8 injection

Speaking – Saving the life of your airline

1 This activity provides an opportunity for students to discuss measures which can be taken to reduce diversions due to medical emergencies to a minimum. It is not an easy question, but you can encourage them to be creative in their proposed solutions. Ideally they should aim to come up with five measures, but you could accept fewer, particularly if they have some innovative solutions.

2 If you have a large class, ask the students to form two groups, each of which votes on their favourite suggestions. You can then set up a debate between the two groups on the final solutions to be adopted.

Section two – Stressed?

This section deals with the problem of stress at work, which is of importance to both pilots and controllers as it can affect their performance and lead to crucial mistakes. The listening activity discusses the problem in general and suggests various solutions. The section teaches the language function of making suggestions and giving advice. Finally, the pronunciation section practises the pronunciation of difficult consonant clusters.

1 Tell students to keep their books closed. Write the word *stress* on the board. Ask the students what they think it means.

Encourage them to give some examples of stress. As they speak, add some of the adjectives from Activity 1 onto the board, as and when they correspond to the feelings students describe.

When all, or nearly all, of the adjectives are on the board they can open their books and do Activity 1.

1 g 2 c 3 e 4 a 5 d 6 h 7 b 8 f

2 Encourage students to give advice and make suggestions to their partners. Walk around and monitor the language they use. This will allow you to see how much of the language function to be taught in Functional English they already know.

3 Students may mention things such as divorce, financial pressures, worries about family or children, job insecurity, medical problems or any other issues which cause stress in the modern world.

4 33 The causes mentioned are lack of sleep, breakdown of a relationship, money problems, too much work.

33 Listening script

P = presenter, A = Antonio, Y = Yacine, G = Greta

P So, what does everyone think about this – is it possible to separate your personal life from your work life? Yes, Antonio ...

A I don't think it is. For example, I heard recently about a senior captain who had just signed on for a three-day pattern of flying after spending three days off duty at home. After take-off he heard 'gear up' called and he retracted the flaps by mistake. Anyway, they found out afterwards that he was worried about money, and that his baby son had kept him awake, and so he was exhausted and unfocused at work.

P Well, that illustrates how personal worries can affect performance. Things like a relationship breakdown or financial difficulties can cause stress which can impact work. So what can people do to help them cope with stress?

A Try and identify the sources of stress. Some experts suggest keeping a diary to record what events affect your energy and time. For some people there might be something specific that triggers anger or anxiety, or they might just feel overworked.

P So how can you avoid getting really run down?

Y You should try to take holidays from work regularly. Organize your schedule around them. And take regular breaks while you're working too.

G When you're starting to feel a bit down, I think it can help to talk to a friend about your problems and feelings.

A But if the cause of stress is outside of your control, you may want to get professional help on how to deal with it. Some companies provide counselling for employees.

Y For me, the best way of dealing with stress is to make sure you exercise, eat and sleep well. And if you can't sleep, well, then I suggest you see your doctor.

G Oh ... Another good idea is to try and make more time for those things you enjoy. Take regular opportunities to relax. I would advise a stressed friend or colleague to try some stress-reducing techniques such as meditation or a massage.

P That's great. I think you've come up with some really good ways of coping with stress. Now ...

5 33 Before listening, ask students to try to remember the advice given in the talk. Make notes on the board, then listen again.

Identify cause of stress (e.g. keep a diary)
Take regular holidays
Take breaks at work regularly
Talk to a friend
Get counselling
Sleep, eat and exercise well
See a doctor if you can't sleep well
Spend time doing things you enjoy
Try meditation and massage

6 This activity gives the students the opportunity to relate the information given in the workshop with their own professional experiences in the world of aviation. What they say may differ greatly, depending on the exact nature of their job and the conditions they work under. Try to create a genuinely supportive environment if you can. It is possible that students may feel free to mention issues in their English classes that they would be embarrassed to talk about at work. If there is a good relationship between the students in your group, they may be quite understanding towards each other, listening to each other's problems and providing constructive suggestions. They may already have started this process in Activity 2 above. On the other hand, students may be embarrassed to talk in front of their peers (or superiors) about such sensitive issues. If you feel this is likely to be the case, keep the discussion impersonal.

Functional English – Making suggestions and giving advice

1 / 2 33 When students have completed these two activities, present the following summary of most of the structures used in this section for giving advice. Note that they range from simple to more complex structures. Students do not need to remember all of them, though encourage them to try and use as many as possible in the speaking activity at the end of this section.

- Verb (imperative)
- *Try and* + infinitive
- *You should / shouldn't* + infinitive
- *I suggest* + verb(*-ing*)
- *I suggest you* + infinitive
- *You may want to* + infinitive
- *It can help to* + infinitive
- *I would advise you to* + infinitive

1

1	Try and	6	best way of
2	suggest	7	I suggest you
3	should	8	Another good idea
4	it can help	9	would advise
5	may want to		

2

1	shouldn't	5	suggest
2	suggest	6	Try and
3	can help	7	advise
4	may want		

Pronunciation – Consonant clusters 1

1 34

34 Listening script

stress
pressure
spending
flaps
flight
breakdown
specific
plans

2 35 For students who find this activity reasonably straightforward, you might like to introduce one of the following activities:

1 Ask each student to give you one word that they use in their professional lives but have difficulty pronouncing. Put these words on the board and discuss with the group the reasons they may be difficult to pronounce. Then practise all the words together.

2 Choose some aeronautical words with consonant clusters that you have regularly heard mispronounced in your classes and follow the same procedure.

1 We're still struggling to get a slot.
2 The brake light is blinking.
3 Is the runway dry enough to drive on?
4 The flaps are frozen and need freeing.
5 I'll wipe the grease off the glass.
6 I've tried to fix the trouble twice.
7 There's a threat of strikes throughout the country.

35 Listening script

1 We're still struggling to get a slot.
2 The brake light is blinking.
3 Is the runway dry enough to drive on?
4 The flaps are frozen and need freeing.
5 I'll wipe the grease off the glass.
6 I've tried to fix the trouble twice.
7 There's a threat of strikes throughout the country.

Speaking – Giving advice

1 / 2 Students have the opportunity to act as experts when talking to new recruits in their profession about what can cause stress and how this stress can be minimized. If your students are undergoing initial training as pilots or controllers, you can ask them to report on training they have undergone in this area, or what advice they have received. Encourage students to ask each other as many questions as possible.

Section three – Medical emergency

This section deals with a medical emergency on board in which the flight crew do not initially understand the nature of the problem and need to contact a medical advisory service. It teaches the use of the present perfect tense for giving updates in a rapidly changing situation and the language function of giving and asking for updates. It also teaches the pattern of rising and falling intonation in lists.

1 36 This first comprehension activity checks that the students have understood the main events in the dialogue.

1 MedLink (medical advisors)
2 They have a sick passenger on board.
3 Scuba diving

2 36 The students listen once more to the dialogue and try to understand various details of the particular situation.

Note the answer to Question 8. The pilots are advised to perform an emergency descent once the medical advisors realize that this is a case of decompression sickness. The passenger's condition has deteriorated under the effect of flying at altitude. This diagnosis clearly illustrates the value of a medical advisory service. It is very unlikely that anyone on board would have realized the exact nature of this problem.

The final advice given by MedLink is also interesting. Not only should the aircraft divert as soon as possible, the pilots need to find an *alternate* (an airport they can divert to) where the passenger will be able to be transferred quickly to a decompression chamber. In any serious medical emergency, the facilities available on the ground to treat the passenger are of crucial importance.

1 Belgian
2 departing from
3 29
4 back
5 holiday, ten
6 France
7 15
8 descend immediately

3 36 Before the students listen for a third time, ask them which symptoms they can remember mentioned in the dialogue. Explain the meaning of any of the eight symptoms given in the activity which they do not understand. Students often have difficulty with the correct pronunciation of the word *blood*, so help them to say it correctly if necessary.

trouble breathing, shaking, in great pain, coughing blood, losing consciousness

36 Listening script

CPT = captain, C = controller, M = medical advisor, F = first officer, FA = flight attendant

CPT Cairo Centre, this is Divestream 290.
C Divestream 290 Cairo Centre. Pass your message.
CPT We have a medical situation on board. We are contacting MedLink now. Divestream 290.
C Roger, you have a medical problem on board. Keep us advised. Cairo Centre. (R)
M MedLink. I'm Dr Slowinski. Which flight are you calling from, please?
F This is Divestream flight 290 and this is Moustaf, the first officer.
M Thanks Moustaf. How can I help you?
F We have a passenger, a young man from Belgium. He's having difficulty breathing, he's shaking badly and his eyes are shut.
M How old is the man?
F He's in his late twenties.
M Is he able to communicate?
F No. I don't think he can hear anyone. He's crying in pain.
M OK, you should move the other passengers away from the patient, if possible.
F Luckily his seat is to the rear of the aircraft, so we've already moved the other passengers away.
M Good. Have you removed his seatbelt?
F Yes, we have. We've laid him down on the floor.
M That's good. Where has he been?
F From his passport, it looks like he has been on holiday in Egypt for ten days.
M Have you found any other information about him?
F No, we haven't found anything else yet. We're looking through his belongings.
M Has he eaten or drunk anything?
F No, the crew haven't begun to serve drinks yet.
M I see you are travelling to Paris CDG. How long have you been airborne?
F We've been in the air for about fifteen minutes.
M So you're still climbing. Are you climbing rapidly?
F Yes, we are. ATC asked for a steep climb out of Cairo due to traffic.
FA Moustaf, he has just started coughing blood, and we think he is losing consciousness.
F Oh dear ...
FA I've just looked in his hand luggage. I found a hotel receipt, a wallet and a scuba-diving log book. It looks like he dived this morning.
M Did I just hear that the patient dived this morning?
F Er ... yes.
M OK, this sounds like it is a case of decompression sickness, which is a critical condition. You should stop climbing and descend right away if you can – every foot you climb could seriously affect the patient's health. You should divert and find an alternate airport that has medical services. Try asking ATC to help you find an alternate that is close to a decompression chamber. There should be a diving decompression chamber somewhere on the Red Sea.
F Roger, levelling off and initiating descent ...

Functional English – Giving and asking for updates

1 37 These extracts from the dialogue illustrate the use of the present perfect tense to check what has and has not happened in a situation which is evolving fast.

Check that the students understand the use and the meaning of *already* and *yet*. These words carry a lot of meaning in emergency situations. Present the word *still* as well, which is often used informally as an alternative to *yet*, though the word order is slightly different:

The bleeding hasn't stopped yet. = The bleeding still hasn't stopped.

1 've already
2 Have you
3 haven't, yet
4 Has he
5 've just

37 Listening script

1 We've already moved the other passengers away.
2 Have you removed his seat belt?
3 We haven't found anything else yet.
4 Has he eaten or drunk anything?
5 I've just looked in his hand luggage.

2 If necessary, review the meaning of the present perfect simple, and elicit examples of sentences using present perfect simple.

1 Present perfect simple
2 *have / has* + past participle

3 This activity practises the language just presented in the context of another medical emergency.

1 has fallen
2 's cut
3 's lost
4 hasn't stopped yet
5 've already done
6 haven't taken it yet
7 just regained

Pronunciation – Intonation of lists

1 38 Copy the sentence *He's having difficulty breathing, he's shaking badly, and his eyes are shut.* on the board. Ask students to close their books and play the recording. Ask them to identify how the voice rises or falls and draw the arrows above the sentence. Get students to open their books and check. Elicit that intonation rises with each item in a list until the final item is given. At this point, intonation falls. This pattern allows the listener to know when a speaker has completed a list.

38 Listening script

He's having difficulty breathing, he's shaking badly, and his eyes are shut.

2 Ask students to mark the intonation on the sentences.

3 39 Once students have completed the activity, you could ask them to write a list of symptoms a passenger is suffering from. In groups, they then practise saying the list, using the correct intonation.

1 rising: Nausea, dizziness, consciousness
falling: sweating
2 rising: trembling, coughing
falling: crying
3 rising: lie, put
falling: call

39 Listening script

1 Nausea, dizziness, losing consciousness and sweating.
2 She's trembling, coughing and crying.
3 Lie the passenger down, put him in recovery position and call Medlink.

Speaking

1 To complete this table, students use the language they learned in the unit as well as what they learned previously in their training. When feeding back, encourage all students to share information so that everyone is then prepared for the role-play in Activity 2.

(Suggested answers)

condition	symptoms	actions
heart attack	chest pains, difficulty breathing, sudden collapse	administer vasodilator spray, use cardiac monitor and contact medical advisor, give CPR
hypoglycaemic episode	sweating, dizziness, disorientation	give glucose injections
fractured arm	jolted during turbulence, loss of movement in arm, severe pain	use splints and bandages to stabilize arm, administer painkillers
severe allergic reaction	breathing problems, turning red, scratching	inject adrenaline, inject antihistamine, use EpiPen (if available)

2 Give students time to prepare and practise their dialogues. Invite pairs to role-play their dialogues for the class.

Section four – Language development

Functional English – Expressing cause and effect

1
1 by
2 of
3 in
4 of
5 to
6 by
7 in
8 of
9 from

Making suggestions and giving advice

2
1 to calm down
2 take
3 to go
4 following
5 to walk
6 taking
7 to go
8 stabilizing
9 to move
10 giving

Giving and asking for updates

3
1 Has he stopped vomiting yet?
2 Have you any idea when the symptoms began?
3 His blood pressure has fallen and he looks very pale.
4 I've already spoken to MedLink.
5 I've just put the passenger into the recovery position.
6 The bleeding hasn't stopped yet.
7 The passenger has cut his head and needs treating immediately.
8 The passenger has just regained consciousness.

Vocabulary – Medical emergencies

1
1 g
2 c
3 e
4 f
5 a
6 b
7 d

2
2 go, labour
3 inject, insulin
4 give CPR
5 restart, heart
6 open up, airways
7 struggling, breathe

3
1 bandage
2 CPR
3 splint
4 plaster
5 inhaler
6 Aspirin
7 Adrenaline, antihistamine, EpiPen
8 defibrillator

PHOTOCOPIABLE ACTIVITY

This discussion activity looks at how best to deal with different situations in which a close colleague exhibits signs of being under serious stress. Hand out a situation card to each student. Ask them to read it and then discuss with a partner what would be the best course of action to take. Students should consider the following two questions:

What would you say to your colleague?

What would you do if your colleague refused to listen to your advice?

Then ask students to change partners and give them another of the situation cards, repeating the procedure. Having the students rotate is a good way to keep the activity interesting, as students will have different ways of approaching these problems. If necessary, review the functional language for making suggestions and giving advice in Section 2 before students start the activity.

A

Last week your colleague, Jeremy, made a major mistake, which fortunately did not have any serious consequences. In fact, nobody else even knows about this mistake except you. Jeremy is normally very good at his job and the mistake was out of character. He has decided not to tell anyone else about what happened and has asked you to keep it a secret.

B

Yesterday your colleague, Andrew, reported for work after having been drinking in a bar. You noticed, but nobody else did. While he seemed to be carrying out his duties as normal, you are very concerned about this situation. You believe that he drinks too much and has a problem, though this is the first time that he has reported for work after drinking.

C

You know that your colleague, Maria, has always enjoyed gambling though you never thought that it was a serious problem. However, she has just told you that she lost so much money in a casino last week that she will have to sell her house. She is the kind of person who keeps her problems to herself and she doesn't want anyone else to know about this problem. You know she is under pressure and you believe it could affect her performance at work.

D

Your colleague, Sarah, is very good at her job, but has recently confessed to you that she is terrified of making a serious mistake. This irrational fear seems to be badly affecting her and so last month you suggested that she see a counsellor. She refused to consider the idea. She looks increasingly worried and upset at work.

E

You and your colleagues have been under increasing pressure at work lately. Despite having to work harder, everyone seems to be coping with the situation. Everyone except for your oldest and closest colleague, John. He has started to get angry and behave aggressively towards your other colleagues. He still seems to be doing his job properly, but you are not sure what might happen next.

SUBJECT BACKGROUND:

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 article in Section 1 of the unit gives some clear examples as to what are considered dangerous goods on board and what can go wrong. The incidents mentioned have actually happened.

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 crash-landed, 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.

In the introductory notes to Unit 3, an incident was mentioned in which a captain chose not to divert but to fly across the Atlantic Ocean on three of the aircraft's four engines. In fact one of his engines had caught fire and he had shut it down before contacting his airline management to ask for further guidance. The position the airline took was that the flight could continue safely. US air traffic controllers, who had witnessed the fire as the aircraft departed, apparently expressed great surprise at this decision. Yet when the incident was investigated the captain was not found to have been at fault in his decision to fly on.

Evacuation procedures

When an aircraft carries out an **emergency landing**, fire-fighting 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 (see the introductory notes to Unit 8 for further details). 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.

Section 2 features an aerial fire-fighting service in Russia. Many other countries have such a service to deal with wildfires. It is worth mentioning that it is an extremely risky occupation for all members of the team, many of whom have lost their lives while on duty.

for fun

One way to reduce the risk of fire ...

In Los Angeles, a single-engine airplane went down short of Burbank airport. Both people on board survived. The pilot was lucid as he was being cut out of the wreckage and told rescuers he was trying to make Burbank airport but had run out of fuel. Commenting on the lack of fire, the fire chief in charge of the rescue said,

'They're just lucky there was no fuel on board.'

UNIT 7

FIRE

Section one – Fire risk

This section deals with the serious risk of fire that can be caused by the carrying of dangerous goods on board. A reading passage based on a report by the Australian Civil Aviation Authority describes some incidents in which there was a clear threat to safety. It teaches the vocabulary related to fire and dangerous goods, and presents the related language functions of obligation, prohibition and permission.

1 There are a number of things students may say in response to Question 1. Electrical problems or the presence of dangerous goods in the cabin or in the hold are likely causes. Students can share their knowledge of different incidents in response to Question 2. It is almost certain that they will have received some training concerning this important threat to safety. They can describe their own training experiences in response to Question 3.

2 The incidents described in the text have actually happened. While some had harmless consequences, the accident described in B was very serious.

1 E 2 C 3 H 4 G 5 A 6 F 7 B 8 D

3 1 T 2 T 3 F 4 F 5 F 6 F 7 T 8 F

Vocabulary – Collocations related to fire

Encourage students to attempt this matching activity without looking back at the text. They may ask other students or you for some help in completing the activity correctly. Be ready to provide clues, but avoid explaining any of the meanings until everyone has the correct answers.

Then ask students to go back to the text, to underline the collocations as they appear, and to spend a few minutes studying the use of these words within the contexts of the reported incidents. If there are any terms whose meaning is not clear, then be ready to explain them to students.

Finally, ask all students to close their books and quiz them on the words they have just studied. Some example prompts:

- *someone who smokes carries this*
- *something which burns very easily*
- *this device alerts the crew if someone lights a cigarette in the toilet*
- *substances causing damage by chemical action*

2 d 3 e 4 g 5 b 6 j 7 c 8 i 9 h 10 a

Functional English – Obligation, prohibition and permission

Before beginning this section you could review the modal structures used to express these functions. The structures you should present are:

- *can / can't*
- *must / mustn't*
- *have to / don't have to*
- *allowed to / not allowed to*

In the context of regulations in the aviation industry, *have to* is normally used instead of *must* as the obligation comes from an external source (a regulatory body). Often students will try to use *don't have to* for prohibition, when they need to use *mustn't*. It is worth teaching the difference between these two structures.

You might like to conclude by teaching the terms *prohibited, illegal* and *breaking the law*. While these three terms are often used interchangeably, *prohibited* can refer to something which isn't allowed by an airline but isn't necessarily illegal. Having said that, breaking the rules set by airlines is a criminal offence in most countries.

1 01 The spokeswoman is quite clear in blaming the irresponsibility of some passengers for incidents which occur. But she also makes the important point that airlines must assume that some passengers will try to bring dangerous goods on board and they need adequate procedures to prevent them from doing so. Her conclusion is that airport staff should be better trained. It would be interesting to ask students if they think that this is the case in their own country as well.

1 Not many
2 hardly any
3 dangerous goods

01 Listening script

Most passengers know what they can and can't bring into an airport. It's obvious that you mustn't bring anything explosive on board. Although some people still try, even when they know it's illegal. The owner of the black powder knew he wasn't allowed to transport it without declaring it as dangerous goods. You have to declare dangerous goods or you are breaking the law. Less than one percent of cargo incidents reported involve dangerous goods which have been correctly declared. It's difficult to understand for example how someone let chemical solutions and corrosive solids on board without question just because they were labelled as 'laundry products'. Maybe better dangerous goods training is required.

2 01 Point out to students the use of the word *let* in Sentence 6, in the expression *let something on board*. Explain that *let* means 'allowing to pass through the check' and is used for goods which are actually permitted. Or it is used for dangerous goods, as in Sentence 6, if security personnel make a mistake.

1 can, can't
2 mustn't
3 illegal
4 allowed to
5 have to, breaking the law
6 let

Speaking

This acivity provides practise of the language presented in Functional English.

Section two – Smoke-jumper

This section describes an aerial fire-fighting service. The students listen to a reporter talking to a team as they go into action. This section teaches the vocabulary relating to firefighting, as well as the language functions of orders and requests.

1 This activity presents the key vocabulary used to describe the different stages involved in dealing with a fire.

When checking the answers, point out that *go out* is intransitive, i.e. it is the fire which goes out. Point out also that *contain a fire* differs from *extinguish* or *put out a fire*. The fire may continue for a long time after it has been brought under control, but it is no longer a serious threat.

(Suggested answers)

start	continue	stop
catch fire	spread	contain a fire
explode	smoulder	extinguish a fire
ignite	burn	put out a fire
		go out
		spray fire-retardant liquid

3 1 They would operate in hot, dry areas with a lot of trees.
2 When they spot a fire or are called to a fire, the air tanker drops water on the fire, and members of the team parachute down to cut down trees, spray liquid, etc. to stop the fire spreading.

4 02 The interviewer is on the ground and then later on board an aircraft with the people who are about to carry out a very dangerous job. This makes for an interesting contrast between the direct operational commands given to the smoke-jumpers and the interviewer's polite requests for information about their work.

Note that the pilot is operating in a very different environment from the pilot of a commercial airliner because the pilot's life is constantly at risk. However, there are some similarities with a commercial airline pilot. The pilot's major concern is for the safety of the passengers, in this case the smoke-jumpers. Also, it is clear that there is a strong team spirit on board. This is also a necessary condition for the safe operation of a commercial flight, especially in an emergency situation.

It is interesting too that the smoke-jumpers appear to enjoy their work. There is a degree of excitement and adventure for all members of the team that civilian pilots and controllers do not experience in their routine work. Your students may find it interesting to compare and contrast their own work with the work of this team.

The three people are a smoke-jumper, an operations manager and an air tanker pilot.

02 Listening script

PA = voice over public address, R = radio presenter, S = smoke-jumper, O = operations manager, P = pilot

PA All jumpers. We have a 1 km² fire 82 km south-west. Get suited. Get your full kit. Line up for inspection. We have a 43 departure.

R It's a hot summer's day in the far east of Russia, and I'm on my way to a wild fire. I'm here with the aerial fire service, who fight the many fires that burn through the forests of northern Asia. Andrei Jachmenkov is a smoke-jumper. Andrei – Could you describe your work to us?

S I jump to the ground to bring the fires under control. It's dangerous work – you have to be fit, both mentally and physically. And you have to keep a cool head and make fast decisions.

R The fire service looks after hundreds of square kilometres from the Arctic to the borders of Mongolia. When the office receives a report of smoke they scramble an airborne fire-fighting team. At least four smoke-jumpers are dropped to cut away the vegetation to contain the fire, and air-tanker pilots tackle the blaze by spraying the area with water or fire-retardant liquid. I have here operations manager, Alex Letov. Alex – Would you tell us how fires are caused?

O Sometimes the fires are started by people. For example, this spring an industrial gas tank exploded, causing a serious wild fire. But our typical fires are ignited by lightning storms, and because the forest gets very dry over the summer, the trees catch fire easily and fires can spread over a large area quickly. But September and October is definitely our busiest time of year, before the winter rain and snow arrives. We have to respond early to the fire, when it's much more manageable … much easier to put out.

R Tatyana Dubrova flies an Antonov 2 for the fire service.

P When that siren goes … that's when the job really begins. I have to try to get a low altitude and air speed for the jumpers and all the time think of the terrain, the trees, the wind. I sometimes have to make two or three traffic circuits to make a safe drop.

R The jumpers are getting ready to drop into the forest. Andrei – Can you talk about your work on the ground?

S We have to make absolutely sure the fire has gone out. Extinguishing it completely can take days. The most difficult part is finding a road so you can get out of the forest again. OK, here we go …

P Jumpers, don't talk. Get ready … drop zone! Jump! Go! One! Two! Jumpers away …

5 02 This activity checks students' comprehension of details in the radio feature. If necessary, play the radio feature several times.

1 Siberia
2 natural phenomena
3 the forest is dry
4 Autumn
5 sometimes has to make two or three circuits
6 finding a way out of the forest

Functional English – Orders and requests

1 03 Introduce this activity by eliciting or presenting to your students some of the differences between orders and requests:

Orders
- direct
- imperative form of verb (the infinitive without *to*)
- *don't* + imperative (for ordering someone not to do something)

Requests
- less direct
- more polite

After students complete the activity, ask them to identify which sentences are orders (Sentences 1, 2, 6) and which are requests (Sentences 3, 4, 5). Then elicit the language features in the sentences that differentiate requests (*Could you / Would you / Can you).*

1 Get
2 Line up
3 Could you describe
4 Would you tell
5 Can you talk
6 don't, Get

03 Listening script

1 Get your full kit.
2 Line up for inspection.
3 Could you describe your work to us?
4 Would you tell us how fires are caused?
5 Can you talk about your work on the ground?
6 Jumpers, don't talk. Get ready ... drop zone!

2 It should be clear from the context that orders are to be preferred to polite requests for operational situations in which time is limited. This would be the same on board a commercial airliner. Simple, clear, direct language is the most efficient way to proceed. Phraseology used in routine situations between pilots and controllers is based on this principle.

However, polite requests will have their place in particular contexts, and it is worth ensuring that students have the ability to use such language. Sometimes, in an non-routine situation where controllers and pilots have some time to discuss the best course of action, the building of confidence between both sides may be facilitated by the use of polite language.

3, 4, 5;
- The speaker uses *Would you / Could you / Can you.*
- The speaker sometimes uses *please.*
- The speaker uses higher intonation.

3 03 After listening and repeating, get students to say other orders and requests to the class, using the correct language structure and intonation.

4 Explain to students that *get* is a very useful word in general English and is frequently used by English speakers.

2 Get some water!
3 Get away from the aircraft!
4 Get out!
5 Get a fire extinguisher!
6 Get your mask on!

5 Give students time to prepare some orders and requests. Then in groups get them to say their orders and requests. The rest of the group carries out a request but not an order.

Speaking

If your students have an aerial fire-fighting service in their country, this could be a very interesting subject to discuss. You may want to set this activity as homework, so that students can do some research into their own country's service, or that of another country. They will have a lot more to say if given the chance to prepare in advance. You could also ask students to research how aerial fire-fighting services recruit people and what qualifications and experience are required.

You could extend the second question further by asking your students to talk about other interesting contexts in which pilots and controllers work (e.g. the military, humanitarian relief operations).

Section three – On-board fire

This section deals with an incident in which a fire occurs on board an aircraft. It presents and practises the difference between the two sounds /l/ and /r/. It also teaches the language functions of identifying and responding to problems. These functions are clearly of importance to pilots and controllers in any emergency situation.

1 If you think your students will find this difficult, get them to work in pairs or groups and then write their suggested answers on the board without correcting them. You can check the answers after doing Activity 3.

1 overheated
2 set off
3 overloaded
4 come loose
5 short-circuit
6 trips, reset

2 The students may offer different suggestions depending on the situations they imagine. A fire on board an aircraft is one of the most dangerous situations a crew can face. While it is true that the pilots should try to land as soon as possible, at the same time the cabin crew ought to do what they can to fight the fire.

Land the plane – the most important factor in loss of life in on-board fires is the delay from when the fire is first discovered to landing.

3 04,05,06 This incident is an illustration of correct procedure for dealing with on-board fires. Once the pilots realize that they have a serious fire on board, they make immediate plans to land as soon as possible. They put on their oxygen masks and, although it is not specifically stated in the dialogue, the cabin door would be firmly closed to ensure that their own ability to control and land the aircraft is not impaired by fumes coming from the cabin. The cabin crew make some initial efforts to tackle the problem. It is interesting that the pilot warns the cabin crew manager not to go too far in these efforts – *don't get yourself incapacitated* is the instruction. It is important that the cabin crew stay away from the danger area so that their ability to look after the passengers is not hindered.

Note that the cabin crew manager is often known as the purser or chief steward.

The crew:
put on their oxygen masks.
investigate the cause of the fire.
try to extinguish the fire.
initiate an emergency descent.

04 Listening script

C = controller, PF = pilot flying, PNF = pilot non-flying, CCM = cabin crew manager

C Siberian 3A, Kunming Centre, maintain FL 380 mach .85.
PNF Maintain FL 380 mach .85. Siberian 3A.

05 Listening script

PF What was that? This isn't right.
PNF What's happened?
PF Three circuit-breakers have tripped. They're showing a problem.
PNF Where's the problem?
PF In one of the washrooms. Maybe the fan overheated.
PNF I'll ask the cabin crew manager to look into it.
PF I'll try and reset the circuit-breakers.
PNF OK?
CCM Yes, hi, I'm getting reports of an unpleasant smell back here, coming from the rear washrooms, like an electrical burning smell. Some of the passengers are getting a little uncomfortable with it.
PNF Could you move the passengers away?
CCM Sure, will do.
PNF Go have a look.
CCM I'll check it out now.
PF Why didn't it set off the smoke detector? I'm not happy with this at all. Something's wrong.
CCM There was smouldering in the washroom. I don't know if any wiring has come loose. I sprayed it with the extinguisher – I think it's gone out.
PNF What do you think caused it?
CCM I don't know. Maybe the vacuum outlet overloaded. I couldn't see where it was coming from. I'll go back now and double check.
PF Yeah, go. We need to know the source of the fire.
CCM I'll take my goggles, just in case.
PF Yeah, we'll put our masks on. Go back, but don't get yourself incapacitated.

06 Listening script

CCM I can't get back there.
PNF Why not?
CCM The smoke's too heavy.
PNF Are the passengers OK?
CCM People are starting to have trouble breathing.
PNF We have to go down.
PF Initiating an emergency descent.

4 04,05,06

1 Three circuit-breakers trip.
2 A fan that has overheated.
3 From one of the washrooms.
4 They move them away from the washroom area.
5 loose wiring or an overloaded outlet
6 goggles

Pronunciation – /l/ and /r/

1 / 2 / 3 07 Differentiating between these two sounds can be difficult for certain nationalities, other students may find the activities quite straightforward.

1 07
1 A 2 B 3 A 4 B 5 B 6 A

07 Listening script

1 right
2 flight
3 frame
4 long
5 load
6 arrive

4 A fun way to end this pronunciation activity is to ask the students to repeat the phrase *red lorry, yellow lorry*, slowly at first. If they master it, you can ask them to try repeating the phrase progressively faster, and then to repeat the phrase several times in succession at high speed.

Functional English – Identifying and responding to problems

After students have done Activities 1 and 2, you could elicit and write on the board the following summary to prepare students for the speaking activity:

Language for asking about a problem:

What was that? / What's happened? / Where's the problem? / Why (not)?

Language for saying what you will do:

I'll ... / We'll ...

I'm going to ... / We're going to ...

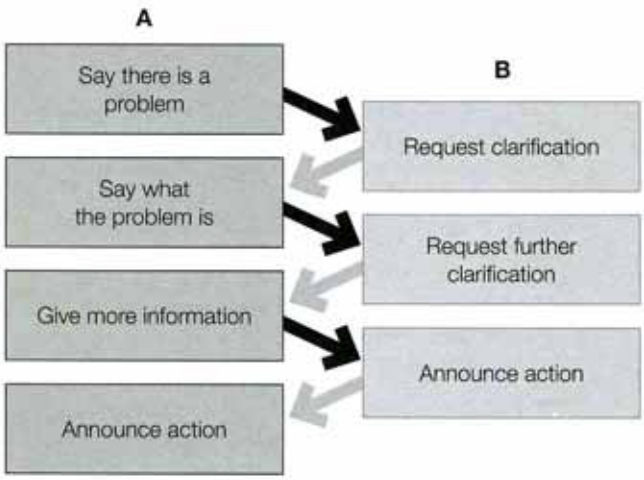
Elicit what the abbreviations *'s, 'll* and *'m* stand for (What's happened? – has; Where's the problem? – is, I'll – will, I'm going to – am).

1 05
1 What
2 happened
3 tripped
4 problem
5 Where's
6 overheated
7 I'll ask
8 I'll try

2 06
1 can't
2 Why
3 smoke's
4 trouble
5 have to
6 Initiating

Speaking

1 / 2 This pattern is simple, but important, with both sides saying what they will do. It is also important that clarification is both sought and provided. Using the prompts in Activity 2, students have the opportunity to create their own emergency situations and practise them using the functional language.



Section four – Language development

Functional English – Obligation, prohibition and permission

1
1 prohibited / breaking the law / illegal
2 permitted
3 not allowed
4 breaking the law / illegal
5 have to
6 required
7 let
8 illegal / breaking the law
9 mustn't
10 can and can't

Functional English – Orders and requests

2
1 Tell the passengers to fasten their seatbelts immediately.
2 It's very hot, so don't touch it.
3 Call MedLink and tell them we have a passenger with severe burns.
4 Contact the emergency services and tell them about the problem.
5 Shut down number two engine
6 Inform the pilot of the nearest aerodrome.
7 Stop the passengers from using the washroom.
8 Get out of the plane as quickly as possible.

3 (Suggested answers)
1 Would you bring me some water, please?
2 Can you find a fire extinguisher?
3 Could you exit the runway, please?
4 Can you fasten your seatbelts, please?
5 Would you put your masks on, please?
6 Can you contact ATC?
7 Could you look for the fire emergencies checklist, please?
8 Can you give me some more detail?
9 Could you try not to disturb the pilot?
10 Can you let me know where the nearest aerodrome is, please?

Identifying and responding to problems

4
2 Show me where the problem is.
3 What shall we do about it?
4 Are the passengers OK?
5 I'll try and reset them
6 I'll ask the cabin crew manager to look into it.
7 I'll contact ATC and declare an emergency.
8 Let's get the passengers' masks on.

Vocabulary – Collocations related to fire

1
1 i
2 f
3 g
4 d
5 h
6 j
7 a
8 b
9 e
10 c

Vocabulary from the unit

2
1 spread
2 set off
3 smoulder
4 ignite
5 short circuit
6 fire extinguisher
7 oxygen mask
8 hose

PHOTOCOPIABLE ACTIVITY

This text deals with a controversial incident which occurred in February 2005. The aim of the activity is to have students debate the issues involved. The first gap-fill activity reviews some general aviation vocabulary. It also acts as a check that the students have understood the text, before they move on to a discussion of the issues involved. There is no correct answer to the main question about the pilots' decision and experts remain divided. The incident was investigated and the airline was not found to be at fault, though the pilots were mildly criticized for mishandling their fuel planning.

Key

1 shut	3 fuel	5 bang	7 failure	9 regulations
2 emergency	4 passengers	6 circled	8 return	10 alerted

1 Read and complete the text with the words in the box.

alerted	bang	circled	emergency	failure	fuel	passengers	regulations	return	shut

Jumbo flies across the Atlantic on just three engines

A Boeing 747 had to (1) _____ down one of its four engines just after taking off from Los Angeles on a flight bound for Heathrow airport. The aircraft subsequently continued its flight to London. It eventually needed to make an (2) _____ landing in Manchester, due to concerns over low (3) _____ levels. Some aviation safety experts have questioned the decision of the pilots to continue with the flight rather than returning to Los Angeles. The airline issued a statement saying that safety was not compromised at any time, and that the aircraft was able to operate on its three remaining engines with no risk to (4) _____.

Air traffic controllers and local residents saw sparks coming from the engine and passengers reported hearing a loud (5) _____ just after take-off. The aircraft climbed to 5,000 ft and (6) _____ for some time while the pilots decided what to do next. They informed passengers of the engine (7) _____ and contacted their company offices to discuss the situation. They then took the decision to continue the flight.

Critics have claimed that the pilots might have been under commercial pressure to take this decision, as a (8) _____ to Los Angeles airport would have left the airline with an expensive bill for compensating the 351 passengers on board. Under new European (9) _____, this bill could have been as high as $200,000. The airline, however, denies that this was a factor in the decision taken to fly on across the Atlantic.

Controllers at Los Angeles airport were apparently surprised at the pilots' decision to carry on. They had (10) _____ fire services in the expectation that the aircraft would return. Comments from safety experts have varied. Some claim that it is not a problem to lose one engine on a four-engine aircraft. They point out that there are lots of twin-engine aircraft crossing the Atlantic. Others are convinced that the new European regulations will inevitably increase the pressure on pilots in such situations. The debate is likely to continue.

2 Work in pairs. Discuss the following questions.

Do you agree that the pilots were under commercial pressure?
Would you have wanted to continue the flight to the UK if you had been a passenger on this flight?
Do you know other airlines' policies about what to do in such situations?
At the moment there is no international regulation on this particular issue, do you think there should be?

3 Discuss the following question as a class.

Do you think that the pilots made the correct decision?

SUBJECT BACKGROUND:

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 (see introductory notes to Unit 2) 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 Toronto (mentioned in the introductory notes in Unit 7). 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 (see introductory notes to Unit 2). 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. A good example of this is illustrated by the incident in Section 3.

Microburst is another danger to aircraft attempting to land. A full description of this phenomenon is detailed in Section 1.

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.

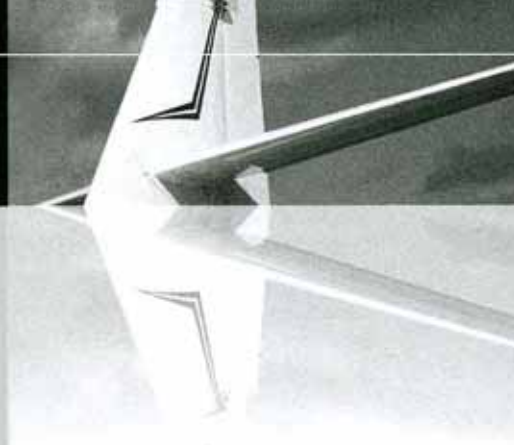
for fun

When airports become too congested and delays build up ...

Pilot: Good morning, Gatwick ground, Sabena 682 request start up and push back, please.
Tower: Sabena 682, weather delays, expect start up in two hours.
Pilot: Please confirm: two hours delay?
Tower: Affirmative.
Pilot: In that case, cancel the good morning!

UNIT 8

METEOROLOGY



Section one – Microburst

This section deals with the meteorological phenomenon known as microburst. The reading text gives a detailed explanation of what a microburst is, how it was discovered and what precautions a landing aircraft can take against this danger. The section also teaches the language function of changing the strength of adjectives.

1 Before students begin this activity, elicit the words *headwind*, *tailwind* and *lift*, in order to check that they are familiar with these terms. Ask students what they think a *downdraft* is (a downward current of air), and be ready to explain this if necessary.

Note that the *glide path* marked on the diagram shows a constant rate of descent. It is the line along which the aircraft should normally approach the runway. The *flight path* marked shows what can happen to an aircraft caught in a microburst.

1 D 2 B 3 A 4 E 5 C

2 Before students read the text, you could ask them to discuss the following questions with a partner:

What happens when an aircraft on final approach flies into a microburst?

What can a pilot do to survive a microburst?

The students will answer similar questions in Activity 3, after reading the text a second time. They then will be able to compare what they thought beforehand with the explanations given.

Note that the third sentence in the second paragraph (*A low-flying airplane …*) is the key to understanding the potentially fatal consequences of a microburst. Lift is created by the strong headwind. When the wind direction suddenly changes and there is a strong downdraught, a low-flying aircraft can plunge to the ground in a matter of seconds.

1 F 2 T 3 F 4 T

3
1 It made the speed increase then decrease dramatically.
2 They pushed the nose down.
3 Students' own answers
4 The aircraft's speed rises and falls.
5 The trees were blown outward from a single point.
6 Go to full power and point the nose upward.

Functional English – Changing the strength of adjectives

Ask students to do both Activities 1 and 2 before presenting the following table:

–	*not at all*	negative sense
+	*quite / fairly*	moderate
++	*very / (really)*	strong
+++	*extremely / (absolutely)*	the strongest

The above adverbs are all used to change the strength of adjectives. Note adverbs in brackets are used with strong adjectives, e.g. *really huge.*

1
6 really / absolutely huge
2 quite / fairly / pretty big
5 huge
3 very / really big
1 not big at all
4 extremely big

2
1 absolutely
2 extremely
3 quite
4 really
5 pretty

Speaking

This activity provides free speaking practice around the subject of difficult meteorological conditions. If there are some trainees in your class, then they may not be able to share first-hand experiences, but they should still be able to talk about a story they have heard of during their training. Some vocabulary that will be dealt with in Section 2 may have to be supplied to the students during this activity.

Section two – Airport disruption

This section deals in depth with the vocabulary of meteorology, through listening activities which describe both general and particular weather conditions at different airports around the world. It also teaches the language functions of discussing results and consequences and asking someone to repeat information.

1 Before students open their books, elicit weather conditions which can cause problems for both pilots and controllers. They may mention most of the weather conditions presented in Activity 1, though they might not know the English words and will have to paraphrase in order that you can supply the correct terms.

Depending on what part of the world your students come from, they may not mention *monsoon*, so you should be ready to explain this.

thunderstorm	C
gale	B
monsoon	A
fog	D
hurricane	E
hailstorm	F

2 This activity provides students with controlled practice of the vocabulary presented in Activity 1. There may be different opinions as to the most appropriate answers. For Question 1 students might mention hot, humid weather with less seasonal changes. For Question 3, explain that students should think of weather patterns in continental land mass with hot summers and very cold winters.

3 If your students are quite strong on meteorological vocabulary, you could have them close their books, read out the definitions and ask them to write the words. If you do this, you might elicit some synonyms instead of the words in the book, e.g. *cloudy* for *overcast*, *humid* for *sticky*, *unpredictable* or *changeable* for *unstable*.

If students do the activity as a direct matching activity, teach these synonyms after they have finished.

1 c 2 a 3 e 4 d 5 b

4 08 If you think students would benefit from further controlled practice of the vocabulary learned so far, ask them to speculate on the weather conditions at the three locations marked.

Bristol 1
Almaty 2
Kerala 3

5 08 Students may need to listen several times to complete all the information in the table. Spend as long as necessary on this activity as the ability to correctly understand meteorological information is a critical skill.

08 Listening script

The weather here is very changeable. Winters can be overcast with drizzle but summers can be clear and warm. As a result of the warm Atlantic winds, the temperature remains quite high – it rarely snows and is never very icy. Aircraft usually depart on the south-west heading due to prevailing south-westerly winds. The airport operator has just resurfaced the runway, and because of this sometimes there can be standing water and it can be slippery. Pilots using the airport at Bristol should be careful of this.

The weather here is quite predictable from season to season as we are in the middle of the continent. In winter there is cold weather and snow and the wind is northerly, from the Arctic. But the problems come in the summer months, when different pressure zones can cause very hot, sticky and humid conditions one moment, and then severe thunderstorms the next. This leads to quite long delays as aircraft have to enter holding patterns and wait to be vectored in to land. Approaches to the airfield can be quite rough, particularly for smaller aircraft.

Winter is quite mild this far south – the problems come for us in early summer. In the summer rainy season, the monsoon results in heavy rain and high humidity at Kerala aerodrome, with strong south-westerly winds. It can therefore be difficult to predict the heavy rains, and flooding can happen at any time. It's quite common for parts of the airfield to flood, and we have to close the airport for days when the rain is heavy. As a consequence, pilots need to be careful just before the monsoon.

	Bristol	**Almaty**	**Kerala**
Winter	overcast drizzle	cold snow	mild
Summer	clear warm	hot sticky humid thunderstorms	heavy rain humidity
Prevailing wind	south-west	northerly	south-west
Warning	standing water slippery	rough approaches	difficult to predict heavy rains flooding

Vocabulary – Weather words

This activity reviews the use of adjectives to describe weather, many of which appeared in the previous listening.

As you check answers, explain that these pairs of words are collocations, e.g. we say *strong wind* and *heavy rain*. Suggest students memorize these collocations.

1 humid / good / stormy / freezing
2 smooth / rough
3 clear / overcast / stormy
3 mild / strong / light
5 heavy / light
6 good / poor

Functional English – Results and consequences

09 After students have listened and checked their answers, you could present the following four general structures. Students will need to understand these different structures when they hear them.

Reassure them that it is not necessary to be able to produce all these different patterns. If they don't seem confident, tell them that *therefore* is possibly the easiest to use correctly.

- *As a result of* + (cause – noun) + (consequence – phrase) OR

  (consequence – phrase) + *as a result of* + (cause – noun)

  Note: *because of* and *due to* behave similarly
- (cause – noun) + *lead(s)* to + (consequence – noun)
- (cause – phrase) + *therefore* + (consequence – phrase)
- *As a consequence* + (consequence – phrase)

  Note: this is used when the cause has just been explained. *Therefore* at the beginning of a sentence behaves similarly.

1 As a result
2 due to
3 because of
4 leads to
5 therefore
6 As a

09 Listening script

1 As a result of the warm Atlantic winds, the temperature remains quite high.
2 Aircraft usually depart on the south-west heading due to prevailing south-westerly winds.
3 The airport operator has just resurfaced the runway, and because of this sometimes there can be standing water.
4 This leads to quite long delays as aircraft have to enter holding patterns.
5 It can therefore be difficult to predict the heavy rains, and flooding can happen at any time.
6 As a consequence, pilots need to be careful just before the monsoon.

Listening – Weather forecast

1 Encourage students to use all the structures presented in Functional English, even if they eventually choose to remember just one or two ways in which to express consequences.

2 10

1 approach
2 night, evening
3 upper airspace
4 eastbound

10 Listening script

ASS = airport controller, ATC 1 / 2 = air traffic controllers 1 / 2

ASS OK everyone. We've got a severe weather front coming at us on tonight's shift. We have a big storm coming in from the north with strong westerly winds and gales, hail and heavy snow. All of the control positions are going to be affected.

ATC 1 Sorry sir, I didn't catch the word before 'control positions' – did you say all of the control positions? Is it that bad?

ASS I'm afraid so – it's going to be a busy evening, especially for those working the approach position. Lots of aircraft will want to land or divert before the snow starts.

ATC 2 Excuse me, I couldn't hear that last bit.

ASS We've got some heavy snow approaching and we'll have to get incoming aircraft down quickly or help them to divert. I hope it's going to get easier as the traffic volume decreases during the night. For tower, the night and morning shifts are going to be easier.

ATC 2 Sorry, sir – What did you say after 'morning shift'?

ASS It's going to be easier, because traffic is not going to move at the airport until tomorrow afternoon. The upper airspace is going to be very quiet over the next 12 hours as many flights are grounded.

ATC 1 I'm sorry sir. What was the first part of the sentence?

ASS To repeat – the upper airspace is going to be quiet during the next 12 hours because many flights will be grounded. For eastbound aircraft, it's not going to be easy flying into Bristol today, so we'll have to work hard to get this traffic coordinated. Now, any more questions? No? Then good luck everyone.

Functional English – Asking someone to repeat information

1 11 Both pilots and controllers use the phrase, *say again* when they need repetition of a routine phrase. The problem is that in a non-routine situation they may have received a message that they only partially understand. In such cases it is important to be able to focus on and ask about part of the message.

1 didn't catch
2 couldn't hear
3 did you say
4 What was

11 Listening script

1 I didn't catch the word before 'control positions'.
2 I couldn't hear that last bit.
3 What did you say after 'morning shift'?
4 What was the first part of the sentence?

2 This activity provides controlled practice of the above expressions.

Speaking

Pilots may have more to say in relation to an airport they visit regularly, rather then the airport they are based at. Allow them the choice of which airport to talk about.

Section three – Stormy approach

This section deals with an incident in which there is a thunderstorm overhead and a warning of microburst activity is issued to an aircraft coming in to land. It teaches the language function of warnings and practises the pronunciation of sounds /ʃ/, /ʒ/, /tʃ/ and /dʒ/ which are often confused.

1 Refer to the introductory teaching notes for this unit where wind shear was discussed in order to be prepared for what your students may say in response to Question 1. In response to Question 2, students will probably tell you that departing aircraft should wait until conditions have improved, and that arriving aircraft should either go around or divert to another airport.

(Suggested answers)

1 Wind shear is a change in wind velocity at right angle to the wind direction. It is difficult to detect because it is very sudden and difficult to see.

2 airports use radar and wind sensor systems, some aircraft have wind shear detection systems, pilots can request PIREPS reports

2 12 Note that the aircraft marked *a*, Company 737, has just landed safely and exited the runway.

1 b 2 c 3 a

12 Listening script

E = ES23, C = controller, PF = pilot flying, PNF = pilot non-flying

E Shenton tower. ES23. We're ready for departure but we can see lightning out to the right. Can we ... er ... wait here until the weather passes? ES23.

C ES23. Affirm. Hold short of runway. Stand by.

E Holding short of runway. ES23.

C Quickair 638. Tower and departing aircraft observe increasing rain and lightning south-west of the field. Amend your altitude ... maintain 2,000.

PNF Maintaining 2,000. Quickair 638.

PF That's the edge of the storm to the left of the airport. Can we get a report on the weather?

PNF I'd appreciate a PIREP from the company traffic in front of us. Quickair 638.

C Quickair 638. Roger. Stand by. (II)
Quickair 638, Company 737 just exited the runway, sir. He said 'smooth ride'.

PF Say again. Quickair 638.

C Quickair 638, Company 737 said 'smooth ride'.

PF Roger, smooth landing conditions. Thank you. Quickair 638.

3 12 A PIREP report means a report from another pilot. Controllers have meteorological information to pass on to pilots, but the final decision to land, as well as the responsibility for this decision, always rests with the pilot. Before taking the decision that a landing can take place safely, a pilot will often wish to solicit the opinion of another pilot who has recently landed.

1 wait 2 to the left of 3 pilot report 4 smooth

4 13,14 This second part of the dialogue is a clear illustration of how conditions can suddenly deteriorate. The pilot report transmitted from Company 737 indicated that conditions were safe enough to land, but in the second part of this dialogue, rapidly increasing wind speed becomes a major concern.

1 F 2 T 3 T 4 F 5 F 6 F

13 Listening script

C Quickair 638. Cleared to land runway 27R. Surface wind 270° at 19 kt. Visibility 700 ft and decreasing.
PNF Roger, cleared runway 27R. Wind 270° at 19 kt. Visibility 700 ft and decreasing. Quickair 638.
C Quickair 638. Wind now 250° at 21 kt.
PNF 250° at 21 kt. Quickair 638.
C Quickair 638. That's wind 250 at 23 kt.
PNF 250° at 23 kt. Quickair 638.

14 Listening script

C Attention all aircraft. Runway 27 arrival. Microburst alert. Be on the alert for wind shear. 35 kt loss one mile final. Quickair 638. Threshold wind now 250° at 24 kt. Watch out for any microburst activity. Be careful on short final.
PF Roger, wind speed now 24 kt. Looking out for microburst activity. Thank you. Quickair 638.
PNF That's -10 kt. Watch out! We're losing speed!
PF OK, we're -20 kt. This wind shear is going to prevent us from landing. Let's take it around to the right.
PNF Wind shear recovery profile. Maximum power. Nose up. Flaps and gear as they are.
PF Maximum power, nose up, positive climb.

Functional English – Warnings

1 14 Students will need to understand all the different expressions for issuing warnings in English, even if they themselves use the same one all the time.

1 Be on the alert for
2 Watch out for
3 Be careful
4 Looking out for

2 This activity provides students with controlled practice of the language of warnings.

Pronunciation – /ʃ/, /ʒ/, /tʃ/, /dʒ/

1 15 Students often confuse these four sounds. This activity helps them to first hear the differences between the sounds and then practise the correct pronunciation of each sound.

15 Listening script

short visual watch roger

2 / 3 16 After students have completed Activities 2 and 3, you could ask them to work in small groups and add several more words to each column in the table. They then pronounce these new words for the rest of the class. Allow the other students to decide if they have been placed in the correct column and pronounced correctly, intervening only when necessary.

/ʃ/	/ʒ/	/tʃ/	/dʒ/
threshold shear	measure usual	approach switch	edge emergency

16 Listening script

approach
edge
measure
switch
threshold
emergency
usual
shear

Speaking

1 / 2 These activities provide students with controlled practice of the vocabulary taught in the unit.

After they have practised the dialogue and changed roles, you could ask each pair to construct another landing scenario like the one at Kerala airport, but at a different airport with a different problem. They then exchange the scenarios they have written with another pair. In this way all students can benefit from further controlled practice.

Section four – Language development

Functional English – Changing the strength of adjectives

1 **small** – minute, slight, tiny
big – enormous, huge, massive
quite – fairly, pretty, relatively
very – exceptionally, extremely, really
completely – absolutely, entirely, totally

Results and consequences

2
1 b
2 f
3 j
4 d
5 i
6 e
7 a
8 h
9 g
10 c

Asking someone to repeat information

3
1 I didn't catch the first part of the sentence.
2 I didn't get that.
3 Can you repeat that last bit?
4 What did you say after 'hailstorm'?
5 What was the word that you said before 'conditions'?
6 I'm sorry, I didn't catch that.

Warnings

4
1 Be on the alert for
2 Watch out for
3 look out for
4 be careful of
5 vigilant
6 be prepared to
7 prepare for
8 listen carefully
9 pay attention to
10 Beware of

Vocabulary – Weather words

1
1 c
2 d
3 h
4 i
5 f
6 g
7 a
8 e
9 b

Vocabulary from the unit

2
1 black ice
2 bumpy
3 dew
4 thunder
5 drizzle
6 frost
7 gale
8 hailstone
9 lightning
10 sleet
11 slippery
12 slush

PHOTOCOPIABLE ACTIVITY

Either hand out the questions separately or ask students to cover the text. As a pre-reading activity ask students to discuss the questions about landing in Antarctica without giving them any hint as to what the text is about. It will be interesting to compare their initial ideas with the text.

The vocabulary activity and the true / false questions are designed to check the students' comprehension of the text.

Students may be interested in discussing whether or not in the future this project will have some tourist potential and whether this is desirable from an environmental point of view.

Key

2
1 crosswinds
2 pull up
3 maintenance
4 temperatures
5 winds
6 environment
7 fuel
8 construction
9 equipment
10 reduced
11 military
12 aviator

3 1 F 2 F 3 T 4 T

1 Work in pairs. Discuss the following questions.

1 Do you think there are any airports or runways in Antarctica?
2 If there were regular air services to Antarctica, who would use them?
3 What kind of runway could be constructed in Antarctica?
4 What kind of aircraft could travel and land there?

2 Read and complete the following text with the words in the box.

aviator	construction	crosswinds	environment	equipment	fuel
maintenance	military	pull up	reduced	temperatures	winds

Commercial aircraft lands in Antarctica

An Airbus A319 landed this week in Antarctica on the newly-constructed Wilkins runway. This four-kilometre long runway is made entirely of ice, which is 500 m thick. On this first flight of just over four hours from Hobart in Tasmania, the pilots were able to see the runway from 10 km out and there were no problematical (1) _____ to deal with. After touching down, they were able to (2) _____ within 1,000 m, despite the lack of friction on the aircraft's wheels.

Construction on this runway started in 2005. Laser levelling technology was used to carve a flat, smooth runway out of the ice. Regular (3) _____ of the runway is also required as it has to be continually cleared of snow. The work took place during the summer months when (4) _____ in Antarctica can rise as high as -25°C. In addition to coping with temperatures such as this, workers had to deal with high (5) _____ of up to 100 kt. The runway has been designed to cause minimal damage to the (6) _____.

The closest wildlife is about 20 km away and no (7) _____ is stored at the runway. Aircraft using the runway need to be able to complete their return journey without refuelling.

The (8) _____ of this runway was an essential part of the Antarctic Airlink Project, to which the Australian government has contributed A$46 million. The regular flights which are expected to begin soon will transport Australian scientists and their (9) _____ to nearby research stations much faster than before. Previously the scientists had to travel by sea. A typical journey time of ten days has now been (10) _____ to a short four-hour flight. There are no plans at the moment to make these flights available to tourists. While other countries have flown to Antarctica before, they have done so over shorter distances in (11) _____ aircraft. The runway has been named after Sir Hubert Wilkins, the explorer and (12) _____, who first flew to Antarctica in 1928.

3 Decide if the following statements are true or false. Write *T* or *F*.

1 Completion of this runway means aircraft can land in Antarctica for the first time. ____
2 The construction of the runway has caused important environmental damage. ____
3 The pilots on the first flight to this runway were able to land in good meteorological conditions. ____
4 Aircraft flying to this runway need to carry sufficient fuel for their return journey. ____

4 Do you think that one day this service will be available to tourists?

SUBJECT BACKGROUND:

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. The reading passage in Section 1 deals with airports that have unusual geographical features which present particular challenges when landing. Pilots need special qualifications before they are authorized to land at such airports.

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 (see the introductory notes to Unit 2 for an explanation). 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 are of concern to environmentalists – see Unit 10) which influence the decision-making process.

Hazardous landings

The difficulties of landing in extreme weather conditions were discussed in the introductory notes for Unit 8. 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. Landing gear problems are quite common and the incidents in Section 3 are clear examples of what can go wrong. If 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).

for fun

An approach not to be recommended ...

Tower: Aircraft on final, go around, there's an aircraft on the runway!
Pilot trainee: Roger ... (pilot continues descent)
Tower: Aircraft, I said GO AROUND!!!
Pilot trainee: Roger!

The trainee lands the aircraft, rolls towards the aircraft on the runway, goes around it and continues to the taxiway.

UNIT 9

LANDINGS

Section one – Touchdown

This section deals with four examples of landings at airports which offer pilots and passengers a unique experience. Through discussion of the particular features which make these landings exceptional, much vocabulary related to landing an aircraft is presented. The section also teaches the language function of describing sensory impressions.

1 Before opening books and beginning the unit, introduce the theme of this section by asking your students:

Have you ever flown into an airport where landing is a particular challenge, either as a pilot or as a passenger?

Can you give examples of such airports?

Have you ever landed at any such airports using a computer program such as Microsoft flight simulator? (You can leave this question out if you don't think it's likely to generate a positive response.)

When answering, students may mention one or more of the four airports featured.

A Courchevel Altiport, France
B Princess Juliana International, St Maarten
C Kai Tak International, Hong Kong
D Tegucigalpa – Toncontin International, Honduras

2 The aim is to elicit some of the vocabulary that appears in the comments on the internet forum in Activity 3. Provide students with the structure *At airport x a pilot could have problems with ...* so that the focus of this activity remains on the vocabulary.

You may also wish to ask students to cover the text so that they are not tempted to look there for the answers.

3 The following terms should be conceptually familiar to the students in their own language, though they may not know them in English:

short final: the last part of the approach to an airport, just before landing.

touchdown zone: this is the section of the runway within which the aircraft is required to touch down.

roll-out: after touchdown an aircraft requires a certain length of the runway to slow down before exiting the runway.

backtrack: certain small airports are configured in such a way that you need to go all the way to the end of the runway, turn around and taxi back in the opposite direction before you can exit the runway (after landing). Departing aircraft might need to complete a similar manoeuvre before take-off.

marker: used to guide a pilot to approach a runway on the optimal flight path.

bank hard: the pilot needs to roll the aircraft (using the ailerons) at a steep angle.

displaced threshold: the threshold of the runway is normally the beginning of the runway, but sometimes the surface here is unsuitable for touching down on, and so the runway is said to have a displaced threshold, some distance further on from the actual beginning.

When the students finish the matching activity they can compare the pilots' reports with what they said in Activity 2. Students might try to produce some expressions to be taught in the Functional English section (e.g. *it looks / it seems*). It's best to let them do so, but don't correct or comment on what they say yet.

4

Which airport	CVF	SXM	HKG	TGU
has no procedure for a missed approach?				
has a problem with bright light?	✔			
has problems with braking?		✔		
Which airports				
have sloping runways?	✔			✔
have high bank angles on approach?			✔	✔
have roads near the runway threshold?		✔		✔
have mountain obstacles on the approach paths?			✔	✔

5
1 the angle of bank needed at HKG
2 the distance of the cliff from the end of the runway at TGU
3 the distance you have for roll-out at SXM
4 the gradient of part of the runway at CVF
5 the turn you have to do on the runway on departure from SXM
6 the distance you have to line up before touchdown at TGU

6 The aerodromes students know well, or work at, are likely to have fairly routine approach patterns. Nevertheless, it is worth asking this question as every approach is different.

Vocabulary – Landing gear and braking

Note that you *extend* the landing gear before landing (it needs to lock into position) and you *retract* it after take-off. Another pair of opposites are *flare*, the pilot lowers the tail just prior to landing and *rotate*, the pilot raises the nose while the main gear wheels are still on the ground, just prior to take-off.

Most of the vocabulary presented here appeared in the internet forum. If the students have problems with some of the vocabulary, you can suggest that they refer to the internet forum and read the word in context.

roll out A
lock G / B
rotate D
seize G / B
overheat G / B
retract D
extend A
collapse G / B
flare A
get stuck G / B
touch down A
line up D

Functional English – Describing sensory impressions

1 After students have completed the activity, present the following points.

- *look(s)* + adjective
- *look(s) like* + noun OR *look(s) like* + subject + verb
- *look(s) as (if / though)* + subject + verb

  Note: these structures have a similar meaning and refer to the visual sense

- *seem(s)* + adjective OR *seem(s)* + subject + verb
- *seem(s) as (if / though)* + subject + verb

  Note: these structures have a similar meaning and may refer to one or more senses (not explicitly stated).

1 looks, looks like
2 seemed
3 felt as if
4 looks as though

2 / 3 These activities allow students to practise the Functional Language in an interesting and structured way. Note that they can use both *look* and *seem*. They will be using their visual sense to do the activity and *seem* is perfectly appropriate for this sense, as well as for other senses.

Speaking

This is a free practice and what students say will depend on what experiences they have to share. If they have not personally experienced such problems, you could encourage them to relate incidents they might have heard of.

Section two – Letting down a VIP

This section deals with the transportation of a VIP by helicopter, which lands on a ship in difficult meteorological conditions. It teaches the language function of describing three-dimensional position and movement. It also teaches verbs of movement and practises the pronunciation of words containing potentially difficult consonant clusters.

1 There are a range of different answers that students might give to this question. It's possible that they have some personal experience of VIP flights to share with the group. If not, you can simply let them talk about what they think the arrangements might be.

2 17 Before students listen, tell them that it was a very well-known British VIP who was being transported. Encourage them to speculate on who (the second question) before listening.

1 from a house to a ship
2 Prince Charles
3 fog

17 Listening script

We were asked to pick up a VIP from a field by a large house, and take him to a Royal Navy ship for the day.

There were clear blue skies when we left, and we landed by the house, shut down and got out, ready to meet Prince Charles. After briefing him on the aircraft and safety, we strapped him in and started up. Once we were airborne, we called up the ship which was only about five miles away. We went over the top of the cliffs ready to let down, and suddenly all we could see was thick white fog. The best way to get onto a ship when the weather is not too good is to get the ships' radar to guide you in. So we went into the fog. It was about 600 ft above sea level. Three-quarters of a mile from the ship, at around 275 ft, the ship suddenly radioed and said 'We've lost you on radar. Continue visually'. Well, it's difficult to continue visually through fog so I decided that, er, we would go around, the ship. While we waited for them to clear us to come back round, I spoke to the Prince, who has flown in the navy, and I explained what the options were. One option was to let down early to get down below the fog to about 100 ft, which is low enough to be a bit risky. I felt a bit worried because the situation was not routine, but anyhow that's the option we took. When we reached about 150 ft, I could just make out the outline of the ship about half a mile away. So I let down a little bit more, came out from under the fog, and I landed safely. The Prince got out, thanked me very much for some very good flying and went off for his day on board the ship.

3 17 If your students found the listening easy, you could have them answer the questions they think they can remember before listening a second time to confirm their answers.

After students have checked their answers, ask them to imagine how Prince Charles would have felt about the flight. They might like to consider the point that he had flying experience in the navy and consider what effect this would have had upon him.

1 by
2 five
3 after
4 ¾
5 couldn't see
6 was an experienced flyer
7 risky
8 150 ft

Functional English – Describing 3-D position and movement

1 Before starting the activity, ask students to work in pairs and to use their hands to demonstrate these prepositions. Explain that many of them are used with the word *fog*. To feedback to the group, draw a ship and some fog on the board. You can then call one or more students to the board and have them demonstrate the prepositions to the group. Be ready to help out and correct as necessary.

1 over
2 onto
3 into
4 through
5 around
6 below
7 out, under

2 17 Ask them to complete the activity and when they finish, play the listening again so that they can check their answers.

3 This activity allows students to practise use of the prepositions in a controlled way. Make sure that they mark the route their partner describes and that they check, confirm and clarify any details of the route they are not sure of. They should take their time and be reasonably confident of the routes they have both drawn before they show each other their pictures.

4 If your students are pilots, then they will have no trouble in describing an interesting flight they made (even if it wasn't necessarily their most recent one).

Those who don't fly can, as explained in the instruction, describe the last flight they took (as a passenger). It's possible they might not have very much to say about this, if so, try one of the following:

Ask them to close their books and describe the flight Prince Charles took in as much detail as they can remember. Ask them to add in one extra detail which is not true. Their partner has to identify this 'mistake'.

Ask them to imagine a flight description, as concise as possible but still plausible, which includes all eight prepositions. You can set this up as a challenge to see who can produce the shortest description which uses all eight prepositions.

Vocabulary – Verbs of movement

17 Unless you have a very strong group, your students might find this activity quite difficult. There are a lot of phrasal verbs which could be confusing for students. You may choose to present some of the phrasal verbs they are less likely to know before they begin the activity. For example:

come back round – to make another approach and an attempt to land

get down – to descend

get out – to disembark

go off – to leave

let down – to descend

pick up – to meet someone and transport someone

Students can check their answers by listening again, but this may not be necessary if they have mostly correct answers. You could let students decide whether or not they need to listen again.

1 pick up, take
2 left
3 landed, got out
4 come back round
5 let down, get down
6 reached
7 got out, went off

Pronunciation – Consonant clusters 2

1 / 2 / 3 18,19 These activities provide useful practice in the pronunciation of consonant clusters, some of which occur when words are run together.

You can play the following game to round off the activity in a fun way. Students have to pronounce all the clusters from Activities 1 and 2 in succession in an 'acceptable' manner (the group will decide what is acceptable). If they pronounce one 'wrongly', they have to go back to the start. The winner is the student who pronounces all fourteen correctly in the shortest time. Choose a confident student to begin the game. If you have a large class, divide the students into two or more groups. If the activity goes well, you may wish to organize a class competition between the winners from each group.

1

18 Listening script

aircraft
asked
safety
options
explained
thick white fog
the ship's radar
some very good flying

3

19 Listening script

reverse thrust
available slots
thick smoke
climb vertically
dump fuel
damaged struts

Speaking

This activity provides free speaking practice and gives students an opportunity to talk about some of the issues relating to flying VIPs. There are likely to be different views on some of these questions in the class, possibly leading to lively discussions.

Section three – Undercarriage

This section deals with landing gear problems and contains a listening comprehension activity in which students listen to three separate pilot–controller dialogues on the subject. The section presents the language function of resolving misunderstanding.

1 The important point in this activity is to give each student sufficient time to study the picture chosen (one minute), to understand the problem and then to practise explaining the problem without looking back at the picture (their books should be closed). Encourage the students who are listening to ask questions if anything in the description is unclear. Students may try to use some of the language you will be teaching in Functional English. Try to monitor any language they use to resolve misunderstanding, but don't correct them yet.

Another way to approach the activity, if you are teaching a strong group, is to do the activity in pairs and allocate two pictures to each student.

As well as offering practice in explaining technical problems, Activity 1 also prepares the students for the main listening comprehension task to follow in Activity 2.

2 20,21,22,23,24

1 B 2 C 3 A

20 Listening script

P = pilot, C = controller

P PAN PAN, PAN PAN, PAN PAN. I'm having problems with my landing gear. Macair 319.

C Macair 319. Roger distress call. What is the problem with your gear?

P I can't see a green light for my nose gear. We felt and heard it extend, but there's no light. Request low pass for visual inspection. Macair 319.

C Macair 319. Cleared low pass runway 09. Surface wind 010 at 10 kt. Not below 500 ft. QFE 1006. Report final.

P Cleared low pass runway 09. Surface wind 190 at 10 kt. Not below 500 ft. QFE 1006. Macair 319. (II)

C Macair 319. The nose gear appears down but ...

21 Listening script

P I'm sorry. The nose wheel is in position? Is that correct? Macair 319.

C Macair 319. Negative, that's incorrect. The nose wheel appears down but it's at a 90° angle.

P I understand the nose gear is down but stuck at 90°. Macair 319.

C Macair 319. Affirm. That's right. On runway heading, climb to altitude 2,000 ft.

P FL 20, runway heading. Can we circle the aerodrome? Macair 319.

C Macair 319. Cleared to circle the aerodrome ...

22 Listening script

P A30. Airborne.

C A30. It appears your main gear hasn't retracted.

P Roger, my main gear has retracted. Thank you sir. A30.

C A30. Negative. You haven't understood. Your main gear is not retracted. It is still visible.

P OK. Our main gear is stuck ... er ... OK A30.

C A30. Say intentions.

P Er ... We're trying to figure out the problem. Stand by sir. A30.

C A30. Standing by.

23 Listening script

C S62. You are seven miles out on long final. How is your landing gear?

P1 We've tried winding down the gear manually but it's stuck about halfway out. S62.

C S62. State intentions.

P1 We don't have much fuel. We're going to land this time. S62.

C S62. Use runway 34R. There is smooth ground on each side of the runway and you have a lot of space. Crash fire and rescue services have been activated.

P1 Runway 34R. I have the field in sight sir. S62.

24 Listening script

P2 Tower, this is Fastair 350 on 3-mile final. The apron is to the right of runway 34R. Do you mean 34L for the belly-landing for traffic behind me?

C Fastair 350. Affirm. Thank you. Break. S62. Use 34L. I say again, runway 34L.

P1 Runway 34L. We've wound the gear back up so we will have a smooth belly-landing. S62.

C S62. Roger. Smooth belly-landing.

3 20,21,22,23,24 If they feel confident enough, students could try to choose the correct answers from what they remember before listening a second time to check.

20,21

1 doesn't have
2 orbit the aerodrome

22

3 departing traffic
4 try and solve the problem

23,24

5 little
6 behind

Functional English – Resolving misunderstanding

1 22,23 Students may feel confident to complete some of the answers before they listen for a third time.

1 Is that correct?
2 That's incorrect.
3 I understand
4 Affirm. That's right.
5 You haven't understood.
6 Do you mean

2 Ask students to close their books and write the following questions on the board:

In communications on the radio ...

how do you ask someone to repeat something?

how do you check if someone has understood correctly?

how do you confirm to someone that they have understood correctly?

how do you tell someone they have not understood correctly?

how do you tell someone what you have understood?

how do you repeat something?

For each question, ask a student to come to the board and note one or more ideas put forward by the class. Students can then open their books and complete the activity. Afterwards, they will be able to check their collaborative efforts against the suggestions in the book. You can help them as necessary.

In some cases, they will have suggested other expressions which are also correct. You will be able to give them feedback on these.

1 c 2 e 3 f 4 d 5 b 6 a 7 f 8 f 9 b 10 b

3 This activity provides controlled practice of the functional language.

If your class doesn't divide neatly into groups of three, you could form groups of four. In this case, ask two different students each time to share one of the roles. They can read half of the report each and the task remains the same.

Speaking

This activity offers students the opportunity to freely discuss the important topic of misunderstanding and how it can be resolved.

Section four – Language development

Functional English – Describing sensory impressions

1
1 c
2 f
3 g
4 i
5 h
6 b
7 j
8 a
9 d
10 e

Describing 3-D position and movement

2
1 sounds
2 as
3 looks
4 seems
5 appears
6 like
7 though
8 impression

3
1 above
2 around
3 below
4 down
5 into
6 under
7 out of
8 over
9 through
10 towards

Resolving misunderstandings

4
1 Do you mean a belly landing?
2 I say again. Request emergency landing.
3 Is it correct that you have little fuel remaining?
4 Please read back in full.
5 Reception is poor. Say again.
6 No, that is incorrect.
7 The reading on the screen is wrong.
8 Please understand that we cannot allow you to land.
9 I'm sorry, but you haven't understood.

Vocabulary – Landing gear and braking

1
1 d
2 f
3 j
4 b
5 c
6 h
7 a
8 e
9 g
10 i

2
1 at, to, in front of
2 On
3 in
4 at
5 to
6 on
7 in, between
8 from

PHOTOCOPIABLE ACTIVITY

This activity contains a text on a technical issue. The students may not be aware of the issue, or they may not know much about it. For the pre-reading Questions 1 and 3, *don't know* is the most likely answer. However, students will probably be able to correctly answer *no* to Question 2.

Have students match the words to form collocations. Then in pairs have them explain the meaning of each collocation as used in the text.

There is one discussion question and students may have quite a lot to say in response. They might mention the future development of aircraft, an increasing reliance on technology and a continuing drive for greater efficiency in the industry.

Key

1 e 2 d 3 f 4 c 5 g 6 b 7 h 8 a

1 Work in pairs. Discuss the following questions. Then read the text to check your answers.

1 What do the abbreviations ETOPS and LROPS stand for? Can you guess?
2 Can a passenger jet with two engines fly on any route in the world?
3 What is the maximum time permitted for a twin-engine to reach a diversionary airport in an emergency?

From ETOPS to LROPS?

A safety regulation governing the operation of twin-engine aircraft was first adopted in 1953 by the FAA (Federal Aviation Agency). This regulation stated that these aircraft should be no more than a maximum of 60 minutes flying time away from an alternate (a diversionary airport). The ruling effectively excluded twin-engine aircraft from certain routes. It was considered dangerous to fly for long distances over sea, a desert or an otherwise inhospitable area in an aircraft with just two engines, in case one of them should fail. As jet engine reliability improved, this maximum diversion time permitted for a twin-engine gradually increased. Outside of the US, the ICAO (International Civil Aviation Authority) regulation, which granted a maximum diversion time of 90 minutes, became the norm.

The term ETOPS (Extended Range Twin-engine Operations) dates from 1985, when the FAA, followed a short time later by the ICAO, extended the diversion time to 120 minutes. The justification for doing so was the continuing development in technology and improvements in engine reliability. This was a significant step because it allowed twin-engines to cross the Atlantic. Just a few years later the time was extended to 180 minutes. This regulation means that twin-engines, which meet the strict certification criteria, can fly across 95% of the world's surface. Such aircraft are known as ETOPS-180 certified.

The new term which is being discussed now is LROPS (Long Range Operations) which would be a certification granted regardless of the number of engines on an aircraft. One of the main reasons for introducing a new certification standard, that would envisage much greater maximum diversionary times (as high as eight hours), would be to allow aircraft to fly more direct routes, sometimes taking them over the north and south poles. Even when a possible diversionary airport exists near the polar regions, the extreme temperatures on the ground make a diversion dangerous. Some experts believe that LROPS could be a suitable standard for the new Airbus A380. Failure of one of its four engines would not cause any serious problem. Most diversions nowadays, however, are for reasons other than engine failure. In any medical emergency the passenger concerned might have to wait a long time to get to hospital. The medical equipment on board, the training of the flight crew to deal with medical emergencies and the availability of a medical advisory service would all be necessary conditions for LROPS certification.

2 Match the following words to make collocations used in the text. Then check your answers.

1 advisory	a regulation
2 certification	b area
3 diversion	c reliability
4 engine	d standard
5 extreme	e service
6 inhospitable	f time
7 medical	g temperatures
8 safety	h emergency

3 Work in pairs. Without looking at the text, explain the meaning of each collocation in Activity 2.

4 Would you board an aircraft knowing that during the flight you might be eight hours away from a safe landing?

SUBJECT BACKGROUND:

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

The article in Section 1 summarizes the main issues and arguments on both sides (the aviation industry and environmental groups). 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.

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 fatal (the incident in Section 3 provides an example where pilots were able to save the situation). 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.

In the introductory notes to Unit 5, the incident involving an A330 which ran out of fuel halfway across the Atlantic was mentioned. 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). There is now even more importance attached to this check in light of the Boeing 707 accident which was discussed in the introductory notes to Unit 9.

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.

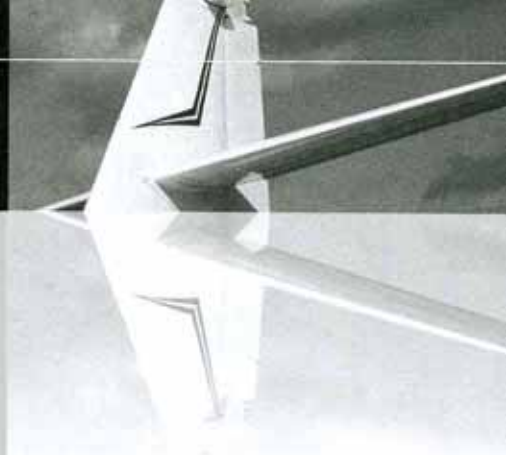
for fun

A false alarm ...

Cessna: Tower Cessna 342, student pilot, I am out of fuel.
Tower: Roger Cessna 342, reduce airspeed to best glide. Do you have the airfield in sight?
Cessna: Er ... Tower ... I am actually on the ramp, I just want to know where the fuel truck is located.

UNIT 10

FUEL



Section one – Aviation and global warming

This section deals with the issue of aviation's contribution to global warming. A reading text presents the arguments both for and against the idea that aviation is a significant contributor to global warming. The section teaches the prefixes to form negative words and the language function of suggesting solutions to problems.

1 If you think that your students will already be familiar with this vocabulary, you could ask them to keep their books closed and write words 1–6 on the board. Students suggest nouns that the words collocate with when talking about environmental issues. They can then open their books and compare their suggestions with the collocations given.

1 f 2 e 3 a 4 c 5 d 6 b

2 Students' opinions may vary. Some students may feel the need to defend the industry that they work in. On the other hand, global warming is a phenomenon that concerns everyone, regardless of the sector they earn their living in.

3 This initial task checks that students understand the main views expressed in the text. The role of IATA, based in Montreal, is to promote civil aviation worldwide.

It is worth drawing students' attention to the useful phrase *restore a balanced view*. Many people working in the aviation industry believe that aviation has been unfairly criticized, and that aviation's negative environmental impact has been grossly exaggerated.

1 yes 2 no 3 yes

4 This task requires students to read the text again in order to identify which organization each statement relates to.

Note the mention of *cirrus clouds* in Statement 5. Jet engines at altitude produce vapour trails, known as *contrails*, which are often visible on a clear day. Sometimes these vapour trails go on to produce cirrus clouds. At present, there is no clear evidence as to the extent to which such artificially-created cirrus clouds harm the environment.

2 IATA
3 T & E
4 IATA
5 T & E
6 EC
7 IATA
8 T & E

Vocabulary – Prefixes

1 If you think your class will find this activity difficult, you could tell them that there are four words for *dis-* and *in-* and five words for *un-*. You could also tell them that in this particular activity, the negatives which are formed with *dis-* are all verbs.

There are no firm rules that can be provided to explain which word will take which prefix. Intuitively, however, students will probably be able to find most of the answers and you can correct the ones that they are unsure of.

dis-	in-	un-
disable	incorrect	uncontrolled
disagree	insufficient	unusual
disprove	invalid	unavailable
disconnect	inadequate	unauthorized
		unable

Functional English – Suggesting solutions to problems

1 Encourage students to brainstorm solutions in note form at this stage. If you think that students will be tempted to look for answers in the text, ask them to close their books.

2 Students can add any additional suggestions they find in the text to their own ideas.

3 After students have underlined the correct answers, present the following patterns:

One / Another + *solution / option / alternative* + *would / could be to* + verb
subject + *could* + verb

Point out that the first pattern is more likely to appear in written English or in formal contexts, whereas the second pattern is easier to use and might be preferred when speaking informally. Students can now go back to the points they listed in Activity 1 and practise making full sentences using both these patterns.

we need to consider, One solution to this could be to, Another option would be to, Alternatively, governments could, An alternative to this would be to

Speaking

1 This activity offers free practice of the functional language presented above. Students talk about several environmental issues concerning civil aviation.

Note that students may require some clarification on the third issue, *water pollution from de-icing*. To de-ice an aircraft, it is sprayed with a liquid which is 45% water and 55% glycol (a toxic liquid). Most airports do not recapture this liquid after use and there is some concern that it may eventually end up in waterways, risking a contamination of the water supply.

2 Some answers students might suggest include:

ATC: allowing more direct routes

pilot: taxiing on one engine instead of all engines

aircraft operators: buying more fuel-efficient aircraft

aircraft designers: designing more fuel-efficient aircraft

Section two – Gimli glider

This section deals with an incident in which an aircraft had to glide to an emergency landing after running out of fuel completely. The section teaches the vocabulary used to talk about fuel and fuel problems. It also presents the pronunciation skill of knowing where to pause in order to be more clearly understood.

1 Ask students to keep their books closed and write the word *fuel* on the board. Ask them to work with a partner and find as many two-word collocations as possible. They should be familiar with most of these collocations in their own language, but may not know the English terms. Encourage students to explain what they want to say by paraphrasing and you can then supply the appropriate vocabulary. Call students to the board to list their collocations, before asking them to open their books and do the activity.

1 g 2 e 3 b 4 i 5 a 6 d 7 c 8 f 9 h

2 For Question 1, your students will probably tell you that this is an extremely serious situation. While it is a rare occurrence, mistakes are sometimes made. Some students may know the story of the Gimli glider, others may know something about the flight which glided to safety in the Azores (see introductory notes to this unit).

When an aircraft does run out of fuel, the only option for pilots is to declare an emergency and attempt to glide to a safe landing. They are trained on simulators to land safely in such circumstances, but most pilots would hope never to have to put this training into effect.

3 25,26 Ask the students to talk about the picture and speculate on the most likely headline before listening to the radio report.

'Silent flight crash-lands at sports event' is the best headline.

25 Listening script

RP = radio presenter, BP = Bob Pearson, JH = John Haskins, HC = Helen Clitheroe

RP If a Boeing 767 runs out of fuel, what do you have? A 132-ton glider. And that's exactly what happened to Air Canada Flight 143, which was en route from Ottawa to Edmonton, cruising at 41,000 ft, when the first warning light came on. Captain Bob Pearson recalls …

BP We thought we had a failed fuel pump in the left wing, and switched it off. Our FMC showed more than enough fuel remaining for the duration of the flight. We had no indication of a fuel shortage.

RP But when a second fuel-pressure warning light came on, Pearson decided to divert to Winnipeg. They began descending, but the fuel flow stopped completely and they lost both engines due to fuel starvation. The $40 million Boeing 767 became a glider, and the pilots were left with only a radio, basic instruments and limited control. The crew soon realized they couldn't make it to Winnipeg. They chose a disused Air Force base at Gimli, not knowing that it was being used for a family car-racing day. John Haskins was on the ground.

JH It just came out of nowhere, almost silently. You could just hear this 'whooosh' sound, and you looked around and there it was. It was coming in at this really strange angle, and we thought, 'it's going to crash'. But then it landed. It was incredible.

RP Helen Clitheroe was one of the event organizers.

HC I only saw it when I heard the bang of the tyres bursting and the nose smashing down on the runway, and all those sparks. When it stopped, we just picked up some extinguishers and tried to fight the fire, and help all the passengers off.

RP The only injuries were to passengers using emergency slides. The question of how a passenger jet with a fuel capacity of over 90,000 litres runs out of fuel remains for investigators.

26 Listening script

RP Initial reports indicate problems with the fuel system. It seems that the cockpit fuel gauges were inoperative. In this situation, after the fuel hoses are removed, the fuel load is checked by hand, like when you check the oil in your car. The fuel measurement was then converted from volume to weight. The problem was that the calculation was done in pounds, but the new Boeing 767 is a metric machine. And so the system thought the data was in kilograms, not in pounds. The aircraft had just half the required fuel for the journey, and the crew had no idea.

4 25,26 Students listen again to identify the reason why this aircraft ran out of fuel. The incident was widely publicized afterwards, which should prevent a recurrence of such an elementary error.

1 Because they lost both engines due to fuel starvation.
2 The cockpit fuel gauges weren't working, and too little fuel had been put in because the amount was mistakenly calculated in pounds rather than kilos.

5 25,26 This is the third time students will listen to the incident. If they seem to have already understood quite a lot about what happened, you could ask them to do Activity 5 based on what they can remember. They can then listen to check their answers.

1 F 2 F 3 T 4 T 5 T 6 F 7 T 8 F 9 F

Pronunciation – Information groups

1 / 2 Answers may vary a little, you should be prepared to accept any alternatives which sound reasonable.

It is possible that your students may not at first understand the usefulness of this activity. You can ask them to keep their books closed and just listen, while you read the report with no pauses, or perhaps read it while pausing in various inappropriate places. They will then see that it is almost impossible to understand the report unless pauses are placed appropriately.

(Suggested answer)

Initial reports indicate problems with the fuel system / it seems that the cockpit fuel gauges were inoperative / in this situation / after the fuel hoses are removed / the fuel load is checked by hand / like when you check the oil in your car / the fuel measurement was then converted from volume to weight / the problem was that the calculation was done in pounds / but the new Boeing 767 is a metric machine / and so the system thought the data was in kilograms / not in pounds / the aircraft had just half the required fuel for the journey / and the crew had no idea

3 26 After they have listened, allow students the opportunity to practise this model answer, while emphasizing that it is not the only way to read the text.

Speaking

1 / 2 Students' answers will almost certainly vary. You should allow students to freely discuss their ideas in small groups, before coming together and trying to reach a class consensus.

(Suggested answers)

A forest, the sea or a river are probably the worst options.

Unless an aircraft is specially equipped, a successful landing on water is very difficult.

Landing in trees could be fatal.

Landing on a frozen lake might initially seem to be equally treacherous if, as seems likely, the ice breaks. But in fact the incident in Section 3 indicates that this is possible, providing that the water is sufficiently frozen over. If landing on ice, a beach or on marshland, a pilot would choose to keep the landing gear retracted and make a belly landing.

There have been numerous cases of light aircraft successfully landing on roads, particularly in rural areas, and large aircraft landing on motorways. But to attempt such a landing would clearly put the lives of those on the road at risk.

Section three – Fuel icing

This section deals with an incident in which fuel icing leads to the loss of both engines on an aircraft which is on final approach. The difference between long and short vowel sounds is presented and practised, and the language function of expressing expectations is also taught.

1 The danger of ice building up on an aircraft's wings, as well as the problems that ice or snow on a runway might cause were discussed in the introductory teaching notes to Unit 8. For aircraft flying in extremely low temperatures, a further danger is that of fuel icing. If fuel can no longer be pumped into the engines, then the situation is as bad as if the aircraft had run out of fuel.

2 27 Note that the extremely low temperatures which caused the problem in the first place allow the aircraft to land safely on a frozen river.

1 It is very cold. The river is frozen.
2 One of the engines stops, followed by a second engine.
3 They land on the ice. Nobody's hurt.

27 Listening script

C = control, PNF = pilot non-flying, PF = pilot flying

C Polar 69. Roger. Report turning final, runway 29. Wind 320 at 10 kt.
PNF Report turning final, runway 29. Wind 320 at 10 kt. Polar 69.
PF Number one doesn't sound good. We're not running short of fuel, are we? We should have plenty of fuel.
PNF We've got fuel … but fuel flow should be much higher.
Torque pressure is meant to be at 100, not 40.
PF That's engine number one gone. Feather the engine.
PNF It's feathered.
PF Tell them we've got one engine shut down.
PNF PAN PAN, PAN PAN, PAN PAN. Bodo Tower, Polar 69. We've lost one engine … er … we're turning final at this time.
PF I smell smoke! We're losing the other one. Contact tower and tell them to get the fire trucks out.
PNF Tower, Polar 69 request fire, crash, rescue services.
C Polar 69. Roger. I'll activate fire, crash, rescue. Say your fuel and persons on board.
PNF Polar 69. Roger. We've got two crew and 120 passengers. I don't know about fuel. We've got a fuel problem.
PF Can we get the other engine going?
We're not going to make it … we'll have to land on the river.
PNF Tower, we've lost both engines. We're on final here to the river. Polar 69.
You want the gear up?
PF Yeah, put it up. We don't want it to catch on the ice.
We've got smoke. Shut down number two.
PNF Pull both extinguishers?
PF Fire bottles. Tower, this is Polar 69. We're down on the ice, nobody's hurt. We had a fuel flow problem and we lost power on the engines and couldn't get to the runway. We're on fire over here though …

3 27 If students seem to have understood well on the first listening, you could have them do this activity based on what they remember. They can then listen a second time to check.

1 lower 2 100 3 fire, crash, rescue services 4 122 5 on a river 6 No

Functional English – Expressing expectation

The three structures given are similar in meaning. You could also review the formation of the negative structures:

should – shouldn't

meant to / supposed to – not meant to / not supposed to

1 (Suggested answers)
2 it should be higher
3 it shouldn't be (on)
4 it isn't supposed to be (down)
5 it is meant to be off
6 it is meant to be at 100
7 they should have (enough)
8 they're supposed to be (on final)
9 they're not meant to be (flashing)

2 This activity provides further practice of the language taught in this language function.

Pronunciation – Long and short vowel sounds

1 / 2 28 Activity 1 checks if students can hear the difference between the long and short vowels. Before students do Activity 2, you could demonstrate the differences between the long and short vowels, perhaps exaggerating these in order to make sure students can hear them. Show how your mouth moves differently to produce the longer sounds, pointing out the following:

- For *short* you purse your lips.
- For *seat* you move your lips sideways as if trying to show all your teeth and smile.
- For *start* you open wide your top and bottom lip.

Students could practise the mechanics of making these different sounds, so that they can understand the difference.

1 A 2 A 3 B 4 A 5 B 6 A 7 A 8 B

28 Listening script

1 shot 2 cot 3 seat 4 hit 5 leave 6 stat 7 chat 8 mark

3 Students might find this activity challenging. To complete the task successfully, both students will need to be able to hear and produce the long and short vowels. You should allow them plenty of time to practise.

As a follow-up activity, ask them to suggest more minimal pairs based on the same sounds. Write them on the board. They can then change partners and practise the same activity once more, using these new words.

Speaking

This activity provides students with controlled practice of the language from Functional English in an interesting context. Encourage students to make use of all three expressions as well as the negative forms while doing the activity. Before they begin, present the following additional language that they will require:

x indicator is showing y.
x switch / valve is set at y.
x is in / out.

Section four – Language development

Functional English – Suggesting solutions to problems

1
1. One solution could be to make more fuel-efficient engines.
2. Another option is to start charging higher fuel taxes.
3. One option would be to create a bio-diesel made of soybeans or corn.
4. An alternative to that would be to make more fuel-efficient aircraft.
5. Or how about having more jumbo jets that can carry hundreds of passengers?
6. Alternatively, we could reduce how often we travel by plane.

Expressing expectation

2

1	should	6	is supposed
2	is supposed	7	should
3	supposed to	8	should
4	not meant to	9	not supposed to
5	meant to	10	shouldn't

Vocabulary – Climate change

1

1	escaping (d)	4	protects (b)
2	atmosphere (f)	5	rise (c)
3	substances (e)	6	breathe (a)

Prefixes

2

1	transatlantic	6	abnormal
2	disused	7	outperform
3	underpowered	8	de-ice
4	unrealistic	9	restart
5	inoperative	10	overcrowded

3
2. misinformed
3. underestimated, refuel
4. overweight
5. reconsider
6. inaccurate
7. inefficient
8. misdiagnosed

Nouns for fuel

4

1	tanks	6	pressure
2	capacity	7	flow
3	pumps	8	consumption
4	hoses	9	shortage
5	gauge	10	starvation

Missing verbs

5

1	running	6	prevent
2	flood	7	turned on
3	Restarting	8	cooking
4	shut off	9	popping
5	shutting down	10	leaking

PHOTOCOPIABLE ACTIVITY

Tell students that they will take part in a debate concerning the construction of a new airport and its impact on the local community. In groups of three, ask students to read the problem. Assign each student in the group a role: 1, 2 or 3. You may either do this at random or choose the most suitable students for particular roles.

Ask students to form a group with the other students who have been assigned the same role. They should spend 5–10 minutes brainstorming the various arguments that they can use to support their viewpoint. Students who have the role of the concerned parent should write some questions to ask the environmentalist and the local businessman. They may decide to support one side or the other depending upon the answers they receive.

Reorganize the students into their original groups. Ask them to debate the proposal and to try and convince the others in the group to change their minds. This activity may last around 10–15 minutes.

The airport debate

Read the problem and take one of the three roles that your teacher assigns you.

The problem

Imagine that you live in a medium-sized city with a population of half a million people. The city is served by an airport which was originally constructed 60 years ago. At that time the airport was in the countryside, but it is now inside the city limits. Both domestic and international flights arrive at the airport. It is not a large airport and the number of flights are limited. However, it can be congested at times, particularly in the summer months. International visitors to your city come for both business and pleasure. Local politicians believe that more tourists and business people would visit the city if improved airport facilities and more flights could be provided.

There is a proposal for the construction of a new international airport in the countryside, 40 km outside the city, which will be connected to the city centre by the construction of a high-speed rail link. Local opinion is divided on this proposal.

Role 1

The environmentalist: You are strongly against this proposal. It will cost a lot of money which is needed elsewhere and it will destroy an area of beautiful countryside. It will also disturb some people who have chosen to live in the countryside. You believe the harmful effects of aviation on the environment are numerous and well-known.

Role 2

The local businessman: You are firmly in favour of the proposal. You believe that the local economy will develop rapidly as soon as the proposal is accepted. Better transport links for your city are essential if the city is to continue to grow and develop. The prestige of your city will rise and your own company is likely to grow and make more money.

Role 3

The concerned parent: You are the parent of three young children. You are not sure what to think about the proposal. You have heard that it will have a positive effect on the local economy and you want your children to have better employment opportunities when they grow up. On the other hand, you are concerned about serious global environmental issues, and you have heard that civil aviation may be responsible for many of the problems.

SUBJECT BACKGROUND:

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-off) 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 (see the incident in Section 3). 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. The story featured in Section 1 was one such famous case in which the pilot was lucky to survive.

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.

An additional factor possibly contributing to this accident is thought to have been the difficulties the two pilots had in communicating in English in a stressful situation (one pilot was German and the other Cypriot). Some safety experts believe that solving complex technical problems in the cockpit requires that pilots share the same first language.

for fun

The search for a pilot ...

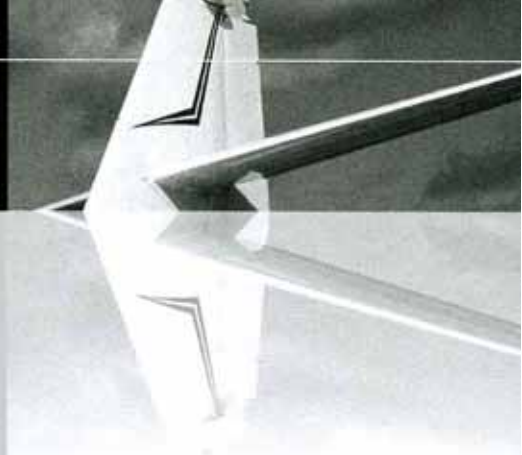
While taxiing to the runway, an aircraft stopped, turned around and returned to the stand. Passengers waited an hour before the airplane finally took off. One of them asked the flight attendant what had caused the problem.

'The pilot didn't like the sound of a noise he heard from the engine,' replied the flight attendant, 'and it took us an hour to find a new pilot.'

A pilot always has the final decision and responsibility for whether an aircraft is ready to take off or not. In reality, no reputable airline would behave like this, but even if they tried to, pilots have a great sense of solidarity and would support their colleague in the decision not to fly that aircraft.

UNIT 11

PRESSURE



Section one – Blast

This section deals with a dramatic incident of sudden decompression in which a captain was sucked out of the cockpit, yet managed to survive. The section teaches the vocabulary of action verbs and the language function of expressing time and duration.

1 A widely publicized case of sudden decompression was the crash near Athens of a charter flight, in which there were no survivors. Students are likely to mention this accident, although they may not know what exactly happened (see the introductory notes for an explanation). Another well-known case which they might mention is the incident featured in this section, though again they may not know many of the details. You can tell them they will be reading a detailed account of the incident.

Other less serious incidents may be mentioned, and students are likely to point out that the deployment of oxygen masks in the cockpit and cabin coupled with a quick descent to around 10,000 feet are required in any such incident.

2 This story is entirely true, even if it seems difficult to believe.

1 F 2 F 3 T 4 T

3 Note that the term *flight attendant* instead of *steward* is often preferred these days. The *chief steward* is more likely nowadays to be called the *purser* or the *cabin crew manager*.

All commercial aircraft fly with at least two pilots. The captain has the final word in the case where they don't agree on a course of action. The co-pilot is usually less experienced but sometimes, as in this incident, has to assume full responsibility.

Name	**position**
Nigel	steward
John	chief steward
Alistair	co-pilot
Tim	pilot

4 Students may need to read the text a second time in order to find the answers to these questions. Note the difficulties that the co-pilot faced (Question 5). While Nigel, the steward, who saved the captain's life was rightly hailed as a hero, the co-pilot and the chief steward were no less heroic.

1 It was disabled by the captain's legs.
2 John, the chief steward
3 He was still strapped in from take-off.
4 To get down to a level where there was more oxygen.
5 He was flying alone, he didn't know the airport and he had no charts.
6 hungry

5 Try to encourage students to do this activity from memory, using logical deductions and only looking back at the text if absolutely necessary.

If you have time, you could ask the following questions:

Who was the hero of the situation?

Was there more than one hero?

How do you think the passengers felt?

What do you think the co-pilot told them?

Why do you think this incident happened?

Do you think that the captain continued his career as a pilot after this incident? What about the steward? (Both continued their careers after this incident.)

1 the time between take-off and the incident
2 the height the plane reached
3 the time it took to descend to 11,000 ft
4 the height they descended to two minutes later
5 the length of the runway
6 the time the captain was outside the plane

Vocabulary – Action verbs

1 The two tenses used are the past simple and the past continuous. You could briefly review these two tenses before students complete the activity.

1	blew	4	jumped	7	hanging
2	drop	5	grabbed	8	banging
3	sucked	6	wrapped	9	rushed

2 Ask students to work in pairs and reconstruct the story together. If they have trouble remembering the events, you could write some key words on the board to help them. You could then check answers by erasing these words and asking one pair to relate the story, while the other students listen and help as necessary.

Functional English – Expressing time and duration

1 Encourage students to complete this activity without looking back at the text. Let them check their answers in pairs. Only then, if there are some answers which they haven't found, allow them to look back at the text. They will learn more by trying to deduce the answers themselves rather than just searching the text for them.

Ask students if they can explain the difference between *on time* (punctual) and *in time* (it wasn't too late).

Often students confuse *during* with *for*. Again, ask if anyone can explain the difference in usage (*for* + quantity of time, e.g. *for 18 minutes*, *during* + noun (not quantified), e.g. *during the flight*).

It is also worth explaining the following points and prompting the students to make some examples of their own:

- *up to* is used when you state the maximum time a procedure might take.
- *within* is used to say that an event occurs before the specified duration has expired.
- *last* and *take* are both used to express duration, the difference is that we use *take* in the construction: *take* + duration + to do something.
- When two events occur at the same time, the following construction is often used: *while* + past continuous, past simple. The past continuous is used for the action which is longer or ongoing, and the past simple for the shorter action.
- *from* + quantity of time *to* + quantity of time, is used to indicate the time limits of a period of time.

1	on	4	While	7	in time
2	Within	5	up to	8	By the time
3	took	6	from, to, lasted	9	During

2 1 lasts 2 During 3 in time 4 within 5 from, to

Speaking

Put the class into groups of three and allocate the three roles (or let students choose for themselves). Then ask all 'journalists' to work in a group in order to discuss together the questions that they might ask. At the same time, the other two students in each group (who will play the roles of Alistair and John) can discuss which questions they expect to be asked and what they would like to say to the journalist.

Encourage students to be as creative as possible. You could feedback on the activity by asking the journalists to make a short one-minute report for TV news. The TV viewers, that is the rest of the class, could then vote on who made the most interesting report.

Section two – Damage

This section deals with structural damage to aircraft. The section teaches the vocabulary to express such damage. Students also listen to a workshop discussion on the subject of decompression and damage which might cause or result from sudden decompression. The section also teaches the language function of summarizing and the pronunciation of dipthongs.

1 Give students time to complete the activity in pairs before checking answers with the class.

(Suggested answers)

1 L
2 F, L
3 W
4 F
5 F
6 W
7 W
8 F
9 L
10 L

2 29,30 This first activity checks that students understand the main ideas from the discussion.

1 In a workshop on depressurization
2 Incidents of sudden / explosive depressurization
3 Damage that caused or was caused by sudden / explosive depressurization

3 29,30 Before students listen again, ask them to read the types of damage listed and check they understand the vocabulary.

Note that *spoilers* are moveable parts of each wing which are raised together in order to increase drag and therefore to lower airspeed. The *leading edge* is the front edge of the wing, the rear edge is termed the *trailing edge*.

The two not mentioned are: cargo door blown off and buckled tailplane.

4 If students are unsure of their answers, play the recording once more for them to check.

1 b 2 a 3 a 4 a 5 b

29 Listening script

T1 = trainer, T2/T3/T4 = trainees

T1 OK everyone, let's begin the workshop by looking at the causes of decompression. Now, have any of you here ever had any decompression-related incidents?

T2 … er … well last year a flight of ours was delayed by four hours due to a cracked windshield. It was a tiny crack, very difficult to see, but the captain refused to fly until maintenance replaced the windshield.

T1 OK, it sounds like you guys did the right thing. Now, let's think about other possible causes of decompression. Any ideas?

T2 Birdstrike.

T1 Yes.

T3 Failing to lock a door.

T1 OK.

T4 Metal fatigue.

T1 Good. Here I've got photographs of some real incidents. Can you pass the photographs around, please? First, here's a DC10 in June 1972, whose rear cargo door blew out due to a faulty lock. Rapid depressurization occurred when the door tore away a spoiler and smashed into the tailplane.

OK, this one shows a famous incident of explosive decompression, this time with a Boeing 737 in April 1988. The aircraft had corrosion, and also serious metal fatigue. Almost 35 m^2 of metal tore away from the upper part of the fuselage, cutting off the electrics, all communication lines and oxygen supply. You can see here that the lower part of the airframe buckled and the nose dropped down by one metre. Unfortunately, one life was lost when a member of the cabin crew was sucked from the aircraft on decompression. Luckily, the nose gear locked down on landing.

30 Listening script

In the picture you see here, a bird strike caused serious damage to a Boeing 767 in 2001 at flight level one-two-zero. A flock of birds dented the aircraft nose, fuselage and wing leading edges, and punctured the aircraft skin eleven times. One of the birds broke through into the cockpit and smashed the captain's instrument panel. Incidents like these can be fatal, but here the captain wasn't injured, and the crew managed to land safely.

Fortunately, explosive decompressions like these examples are very rare, but cabin crew and flight crew must be aware of the dangers. These incidents show that rapid decompression is very different to the controlled environment of a cabin simulator.

Functional English – Summarizing

1 29 If you think your students will find this activity difficult, get them to work in pairs. Ask them to read through the summaries before playing the recording.

The best summary is e.

2 / 3 30 Play the recording for students to make notes of the main points. If necessary, check answers before getting students to write their summaries. After comparing the content of the summaries, you could get students to correct their partner's summary, checking for spelling and grammar.

Pronunciation – Dipthongs

1 Model the pronunciation of the seven dipthongs for your students and allow them to practise making these sounds too.

Ask them to underline all the words which have similar sounds to those practised. It doesn't matter if they don't find all of the examples in the text, as long as they have been able to identify some examples. If you think your students will find this activity challenging, you could complete it with the class, reading each sentence and eliciting the examples.

Good. Now let's take some of these scenarios and look at some real incidents. I have a series of photographs for you to look at here. Here's a DC-10 in June 1972, whose rear cargo door blew out at flight level 120 due to a faulty lock. The door tore away a spoiler and smashed into the tailplane, resulting in hydraulic loss as well as rapid depressurization. The crew managed to land this aircraft safely with only minor injuries.

2 31 Students listen to the single words from the text and write them in the correct columns. If they find this activity difficult, play the recording twice. Then play the recording again while the students practise saying the words.

You could end this activity by asking students to add one or two more words to each column. You could make this more of a challenge by specifying that the words they add must be aeronautical, or that they must have been taught as vocabulary in this book.

/aɪ/	/eɪ/	/ɔɪ/	/ɪə/	/əʊ/	/aʊ/	/eə/
flight	take		real	scenarios	now	aircraft
depressurization	away		series	photographs	out	
minor	tailplane		here	cargo		
	depressurization		rear	only		
	safely			zero		

31 Listening script

now	flight
take	zero
scenarios	away
real	tailplane
series	depressurization
photographs	aircraft
here	safely
rear	only
cargo	minor
out	

Speaking

In answer to Question 1, materials are chosen for lightness and strength, plus flexibility (ability to bend) or rigidity (ability to not bend) depending on the part. Typical materials include aluminium, carbon fibre, fibreglass, steel, titanium.

In answer to Question 2, routine and detailed maintenance checks on the outer structure of aircraft are obligatory, usually after around 100 hours of flight. The precise frequency of these checks depends on the type and the age of the aircraft concerned. In addition to such detailed checks, pilots are required to perform a visual check before every flight (sometimes a ground engineer will do this for them).

Section three – Emergency descent

This section deals with a serious incident of sudden decompression. The section presents the pronunciation skill of contrastive stress and the language function of expressing consequences.

1 Oxygen masks need to be deployed immediately and both crew and passengers must put on their masks without delay. It is essential that passengers travelling with children put on their own masks first, before attending to their children. While this is explained to all passengers during the safety briefing before take-off, they will need to be reminded if such a situation occurs.

Pilots will then make plans for an immediate and fast descent to an altitude of around 10,000 feet, where supplementary oxygen is no longer necessary. The oxygen supply available for each passenger will normally last for ten minutes. ATC need to be informed as they will always give priority to an aircraft which needs to descend in such circumstances.

2 32 Note that this incident occurred because the aircraft was caught in a hailstorm. Pilots will do whatever they can to avoid flying through a hailstorm as there is a high risk of resulting structural damage.

1 He wants to make an emergency landing.
2 a hailstorm
3 three (the captain and two passengers)

32 Listening script

P = pilot, C = controller, FA = flight attendant

P MAYDAY, MAYDAY, MAYDAY. Centre. Kite 63. Making an emergency descent.
C Calling station. Say again. Say again.
P This is Kite 63. I say again, Kite 63 making an emergency descent.
C Kite 63. Cleared to FL 100.
P Centre … 63.
C Kite 63. You're breaking up. Say again.
P We had a rapid decompression. We are just west of the PAYAM VOR, passing FL 240. Kite 63.
C Kite 63. Understand you are depressurized. You are cleared to FL 100. I say again. Descend to FL 100. Report reaching.
P FL 100. Kite 63. (II) Centre this is Kite 63 level at 10,000. Request immediate landing.
C Kite 63. I can't hear you sir. Loud background noise.
P Centre this is Kite 63 level at 10,000. Request immediate landing.
C Kite 63. Read you 5. Squawk 7700.
P 7700.
C Kite 63. I understand you have lost cabin pressure. You are 40 miles from the field at your 11 o'clock, turn left heading 070° altimeter 1002. Say intentions.
P The captain is unconscious. Request immediate landing, and medical services. Kite 63.
C Kite 63. Roger, straight in approach and landing runway 07. Wind 160 at 11 kt.
P Straight in approach and landing runway 07. Wind 160 at 11.
C Kite 63. Do you have any aircraft damage?
P Stand by.
C Kite 63. Standing by.
P You OK?
FA Yes. It's difficult to hear you.
P Have we got any damage back there?
FA I can't see unless I get out of my seat. (II) Er … yes, the leading edges are badly dented, and the engine inlet cowls. I couldn't see any further back. Are we going to be OK?
P Yes, we'll be fine. Is anyone injured?
FA Yes, two were injured when they fell from their seats in the turbulence. What happened?
P Hailstorm.
FA How long is it going to take to land?
P It'll take about 15 minutes.
FA 50 minutes might be too long.
P Not 50 minutes – 15 minutes.
FA Ah, OK. One passenger is bleeding badly. We've got to get help soon, otherwise he might not make it.
P Sorry? Say again.
FA If we don't get to a doctor soon, he may not survive.
P We'll get him to a doctor as soon as we can. We'll have an ambulance waiting for us.
FA OK, thanks.
P Centre, Kite 63. We had a hailstorm that lasted about … er … ten seconds. The left side of the windshield has smashed, the right side is cracked, we have damage to our wings and maybe the tail, but the aircraft feels OK. We've got at least two serious injuries. Kite 63.

3 32

1 controller, pilot
2 40
3 consciousness
4 11
5 leading edges, engine
6 bleeding heavily
7 windshield, tail

Pronunciation – Contrastive stress

1 An understanding of the way in which contrastive stress works will greatly aid pilots and controllers when they need to clarify messages which may initially have been misunderstood.

2 33 When students are practising these examples, encourage them to exaggerate the stress on the two words they wish to contrast. It is better that they do this, in which case they will be clearly understood, rather than run the risk of their message not being sufficiently clear.

1 He's talking about outbound flights, not inbound.
2 Good? It was excellent!
3 You said the flight would leave at half-past seven, not half-past nine.
4 No, my first flight this week is Tuesday evening not Tuesday afternoon.
5 Fly faster. Not slower.

33 Listening script

1 He's talking about outbound flights, not inbound.
2 Good? It was excellent!
3 You said the flight would leave at half-past seven, not half-past nine.
4 No, my first flight this week is Tuesday evening not Tuesday afternoon.
5 Fly faster. Not slower.

3 This activity offers the students the opportunity for controlled practice of the above pronunciation feature. Once again, encourage them to exaggerate the stress patterns involved.

Functional English – Expressing consequences

1 34 Ask the students which words they think will fit in each statement before they listen. After they listen to check their answers, ask them how they would explain the meaning of *unless* and *otherwise*. If necessary explain that *unless* means *if ... not* (a negative condition) and *otherwise* means *or (else)*. Note that *otherwise* is often followed by a statement of the negative consequences that will occur if something doesn't happen.

1 unless
2 otherwise
3 If

34 Listening script

1 I can't see unless I get out of my seat.
2 We've got to get help soon, otherwise he might not make it.
3 If we don't get to a doctor soon, he may not survive.

2 This activity provides further controlled practice of *if*, *otherwise* and *unless*.

1 otherwise
2 unless
3 If
4 otherwise
5 unless
6 unless
7 If

3 This activity provides free practice of *if*, *otherwise* and *unless*. Encourage students to make full use of all three structures when expressing their ideas.

The statements are interesting propositions which may generate a lot of discussion. If the activity works well, you can extend it by asking pairs of students to form groups of four and attempt to reach a consensus on as many of the points as possible. You can then end the activity by seeing if you can obtain a class consensus on some of the issues.

Speaking

Both of the emergency situations allow students to make use of language which has been presented throughout the unit. Encourage students playing the role of pilots to invent some extra details if they feel confident enough to do so. You might also encourage those playing the role of controllers to misunderstand some details, which will give the pilots the opportunity to use contrastive stress for clarification.

If the students have dealt with both situations without difficulty, you could ask them to create their own scenarios and perhaps perform them for the class.

Section four – Language development

Functional English – Expressing time and duration

1

1	on time	6	in time
2	up to	7	within
3	By the time	8	lasted
4	takes	9	While
5	during	10	from, to

2

1	waste	5	make
2	spend	6	managing
3	run out of	7	lose
4	have	8	take

Expressing consequences

3

1	if	5	If
2	Unless	6	unless
3	otherwise	7	otherwise
4	unless	8	if

Articles

1	a	6	the	11	the	16	the
2	the	7	The	12	the	17	The
3	the	8	a	13	The	18	an
4	a	9	the	14	an		
5	the	10	the	15	a		

Vocabulary – Action verbs

1

1	c	3	d	5	a	7	e
2	h	4	g	6	b	8	f

Verbs describing damage

2

1 blew out
2 smashed into
3 corrosion, metal fatigue
4 tore away from, cutting off
5 buckled
6 dented, punctured
7 broke through, smashed

PHOTOCOPIABLE ACTIVITY

This report summarizes the main events which led to the crash of a Boeing 737 flight in August 2005 near Athens. Your students will probably be aware of this accident and its main cause.

The first activity provides a general vocabulary review as well as checking that the students have understood the details of the report.

The second activity offers the possibility of a debate if there are opposing viewpoints within the class. This accident would seem to suggest that a linguistic mix in the cockpit can be dangerous. On the other hand, there is no firm evidence to suggest that this caused the accident and some highly respected airlines already have mixed cockpits.

Finally if you have time, ask students to cover the report and practise retelling the story, focusing on correct use of the past simple and past continuous tenses.

Key

1 pressurize	3 checks	5 masks	7 oxygen	9 military	11 starvation
2 maintenance	4 pressurizing	6 sounding	8 consciousness	10 holding	12 communicating

1 Complete the report below using words from the box.

checks	communicating	consciousness	holding	maintenance	masks
military	oxygen	pressurize	pressurizing	sounding	starvation

Air craft failed to pressurize

In August 2005, a Boeing 737 crashed near Athens. There were no survivors among the 115 passengers and six crew members on board. Investigations soon identified the failure of the plane to (1) _____ after take-off as the main cause of this accident. The pressurization switch should be set to 'Auto' before take-off. It had been left out of position during (2) _____ the night before, and the pilots did not notice this problem while performing their pre-flight (3) _____. Once the aircraft had climbed to 10,000 feet, an alarm went off in the cockpit to warn the pilots that the aircraft was not (4) _____. However, the pilots mistakenly believed that the alarm was the take-off configuration warning, and they switched it off.

After the aircraft had climbed above 14,000 feet, oxygen (5) _____ were automatically deployed in the cabin. There was a warning light in the cockpit to show that this had occurred, but the pilots were distracted by another alarm which was (6) _____ and which they believed signified an equipment cooling system problem. As the aircraft continued to climb on autopilot, both pilots became disoriented and began to suffer from hypoxia, due to their lack of (7) _____. There is no indication in the pilots' communications with air traffic controllers that they had any idea of the danger they faced. If they had realized, they would certainly have put on their oxygen masks in time to begin an emergency descent and then, once at a safe level, they would have tried to determine why the aircraft had not pressurized.

Within a few minutes, both pilots had lost (8) _____. The aircraft continued as far as Athens on autopilot, escorted by (9) _____ jets. When contact was lost with the crew, the authorities feared a terrorist attack. The aircraft entered a (10) _____ pattern and circled until both engines flamed out due to fuel (11) _____. It then crashed into a hillside about 40 km from Athens.

One pilot was German and the other Cypriot. An additional factor contributing to this accident could be the difficulty the two pilots had (12) _____ in English in a stressful situation. The lack of oxygen could only have made things worse.

2 Some safety experts believe that solving complex technical problems in the cockpit requires that pilots share the same first language. Do you agree?

3 Do you believe that there should be an international regulation stating that a flight crew must share the same first language?

SUBJECT BACKGROUND:

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 (see Section 2). 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 (as in the incident in Section 3). 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.

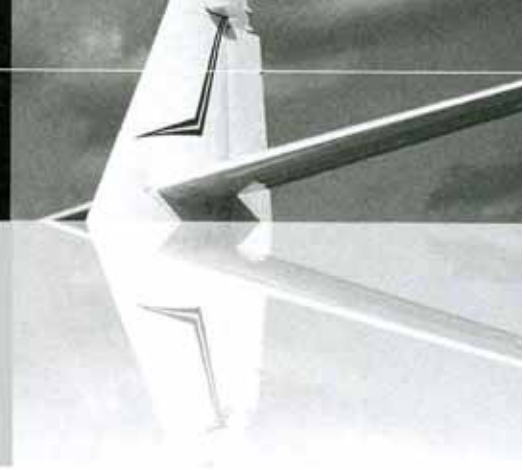
for fun

One way to remain calm ...

A security alert at the airport had meant that passengers had spent several hours queuing at the check-in desk and the flight was way behind schedule. An angry passenger was complaining to the check-in agent about everything. The agent remained cool and polite and continued to smile. Once the difficult passenger had finally been checked in, the following passenger complimented the check-in agent on her polite behaviour. 'No problem' said the agent, 'that guy is going to Frankfurt and his bag is going to Buenos Aires.'

UNIT 12

SECURITY



Section one – Air rage

This section deals with the phenomenon known as air rage. It presents the vocabulary needed to talk about conflict and restraint. It also teaches the language function of focusing on actions by using the passive form of verbs.

1 For some information about what the students might say, refer to *Air rage* in the introductory notes for this unit.

2 The word *inebriated* (meaning drunk) may need to be explained and students might also need to know that *jail* (see Headline 3) can be a verb meaning *go to prison*.

You might also need to explain the following words:
A: *unruly, to handcuff*
B: *to harass, to intervene, to restrain, plasticuffs, disturbance*
C: *to swear*
D: *to abuse, to abandon*

Allow students to read the reports first before you deal with this vocabulary. Some students may already know the meanings of the above words. If so, encourage them to paraphrase the words and explain them to the rest of the class.

For words that nobody knows, encourage students to guess the meanings from the context. Be prepared to explain the meanings yourself if this proves necessary, but the contexts are clear and there is a good chance someone will be able to guess correctly.

While the above techniques take longer than the teacher simply explaining the meanings, students are more likely to remember vocabulary that they have been involved in explaining themselves.

1 D 2 C 3 B 4 A

3 Students may not know the term *offensive language* or the verb *to assault*. If so, you can try one of the above techniques for teaching vocabulary.

1 C 2 D 3 B 4 D 5 C 6 B 7 A 8 A

Vocabulary – Conflict and restraint

This activity provides a useful check that the students have acquired the target vocabulary.

After students have completed the activity, check that they have understood the key vocabulary. Write the following expressions on the board:

become agitated, become violent, behave in a violent way, bite somebody, create a disturbance, kick somebody, put plasticuffs on a passenger, refuse to cooperate, remove a passenger, restrain a passenger

Ask students to sort these expressions into three categories: *Behaviour likely to lead to conflict / Direct physical attack / Measures to restrain a violent passenger*. After checking answers, elicit from your students any other words or expressions which could be added to these categories.

(Answers)

Behaviour likely to lead to conflict: become agitated, become violent, behave in a violent way, create a disturbance, refuse to cooperate

Direct physical attack: bite somebody, kick somebody

Measures to restrain a violent passenger: put plasticuffs on somebody, restrain a passenger, remove a passenger

1 d 2 j 3 f 4 h 5 i 6 c 7 a 8 b 9 e 10 g

Functional English – Focusing on actions

You could supplement the explanation by discussing the formation of different tenses in the passive:

Present simple: *(am / is / are)* + past participle
Present perfect: *(has / have) been* + past participle
Future simple: *will* + passive infinitive

Highlight also the formation and use of the passive infinitive:

Passive infinitive: *(to) be* + past participle

Note: this is used after *will* or *going to*, after all modal structures or after any other structure which takes an infinitive.

2 Plastic restraints are kept on all flights to deal with violence on board.
3 Training is given to cabin crew for dealing with aggressive passengers. / Cabin crew are given training for dealing with aggressive passengers.
4 A belt was used to restrain the passenger.
5 The passengers were not allowed to board the flight because they were drunk.
6 This flight has been diverted and will be landing shortly.
7 The passenger will be arrested as soon as we land.

Speaking

This speaking activity allows students to express their views. It will be interesting if they have some personal experiences to share, or if they have heard of any particular incidents of air rage.

Section two – Suspicious passengers

This section deals with the measures that can be taken on the ground to identify any passengers who might cause trouble on board an aircraft. It teaches vocabulary relating to strange behaviour, as well as the language function of expressing possibility and probability. The section also presents and practises the correct pronunciation of words ending in *-ion*.

1 Your students may not know a lot about either the surveillance techniques involved in identifying suspicious passengers, or the body language which is associated with such passengers. As controllers or pilots they are not involved in this area of work. Nevertheless, it will be interesting to allow them to speculate and they will find out what actually happens in the listening activity which follows.

2 35 While students are listening to this talk for the first time, ask them to note down as many of the features of suspicious body language as they can. They may not know the terms *eyebrows*, *palms* or *the pitch of one's voice*. Allow them to try and guess, but be ready to explain the meanings if necessary. The body language that the expert talks about is rather surprising for those who do not work in this area. Your students may find that he doesn't actually mention any of their ideas.

35 Listening script

P = presenter, KK = Kalle Kaub – security expert

P On the subject of airport security, security expert Kalle Kaub is here to talk us through recent developments in airport security techniques. Kalle. Why a new technique?

KK The strategy for airport security has been almost completely technological. We have technologies such as baggage-screening equipment and explosive detection systems, but technology alone is not enough. We need to look for malicious intentions, and these have to be identified using other techniques.

P What are these techniques?

KK We are using 'behavioural profiling' or 'screening', which basically means that we look at passenger behaviour. When someone is about to commit a crime or a terrorist act, the stress affects their behaviour. And this stress behaviour is extremely difficult to hide or control.

P So what behaviour are you looking for?

KK We're looking for any physical signs that could show that someone is nervous or angry – signs that they might be planning a criminal act. These include avoiding eye contact and small movements of the lips, eyebrows and nose. Common body signs that indicate aggressive behaviour include the head moving forward, stepping forward on the left leg, and a hand position with the palms down. Rises in the volume and pitch of the voice may also show that someone is agitated. If people show just one sign of stress, they are probably not a threat. But if you observe multiple signs, then you can assume that they must have something to hide.

P And how do you use these techniques?

KK We have a team of officers monitoring the airport terminal area. If they detect behaviour that indicates a person may be a threat to security or the safety of a flight, they attempt to engage in casual conversation with that person. They try to make friendly eye-contact and ask simple questions to see if they react normally.

P Surely friendly conversations can't be enough to indicate if a passenger is a criminal?

KK Of course these questions can't determine if a passenger has criminal intentions, but they might indicate suspicious behaviour. The important thing is that if an officer feels unhappy they can send the passenger to secondary screening, including a body search, a physical inspection of carry-on baggage, or even police questioning.

P Do these techniques work?

KK Using behaviour detection we have arrested people on charges of drug possession and immigration violations and we've also seen a reduction in alcohol-related incidents in airport terminals and at the gates. The good thing is that training is simple, the technique requires no additional specialized equipment, and it presents yet one more layer in the security system.

3 35 If your students didn't find the first listening difficult, ask them to try these questions before listening again to check. If they found it difficult, play the recording once more and ask the students to listen for the answers.

1 It's not enough on its own.
2 Because they are under stress.
3 lips, eyebrows, nose
4 They make friendly eye contact or start a casual conversation with the passenger.
5 body search, inspection of carry-on baggage, police questioning
6 immigration violations, drug possession

Vocabulary – Strange behaviour

The vocabulary in the box should now be familiar to the students, so you can ask them to do this activity without any introductory explanation. When they finish, point out the following expressions which they may wish to memorize:

make (friendly) eye contact with

react normally

a (common) sign of (aggressive behaviour / stress)

undergo a body search

1 eye
2 body
3 leg
4 head
5 lips
6 hand, palms
7 voice

Functional English – Expressing possibility and probability

1 / 2 35 To check that students have understood the concepts correctly, you could ask them how they would express the words listed in percentage terms:

- *might / may / could* – less than 50%
  Note: Adding stress to these words implies a more remote possibility.
- *probably* – around 70–90%
- *must* – 100%, sometimes just a little lower
- *can't* – 0%

1 could, might
2 are probably not
3 must
4 may
5 can't
6 can't, might

3 This activity allows students not only to practise the above language function in a controlled way, but also to be creative in their use of the structures. The context reviews the main subject of the unit, a discussion of passengers whose behaviour may be considered suspicious.

Pronunciation – *-tion, -sion, -cion* endings

1 36 After students have completed the activity, point out that there are not many concrete rules for knowing which syllable of a word should be stressed in English. This, however, is one example of an area where a clear rule exists. All words ending in *-ion* have the main word stress on the penultimate syllable.

1 /ʃn/
2 the second

36 Listening script

detection possession suspicion

2 37 You may wish to teach your students about secondary stress at this point. Words with four or more syllables in English usually have both a primary and a secondary stress. All the words in the recording have their primary stress on the penultimate syllable, but *aviation, conversation, immigration* and *violations* also carry a secondary stress on their first syllables.

aviation
reaction
conversation
immigration
inspection
intentions
reduction
violations

37 Listening script

aviation	immigration	reduction
reaction	inspection	violations
conversation	intentions	

Speaking

1 Allow students to look through the list of possibilities and encourage them to ask you about any expressions they don't understand.

Students may point out that certain security measures, such as baggage inspections, are obligatory at all airports. Accept such suggestions and tell students that this means that they will have less points to spend on the optional choices.

2 In a large class you may need to form two or three groups. Emphasize that students are part of a team and that they must reach a consensus, even if this means that some students will have to compromise. You could also ask each group to present their solutions and have the class vote on which one they think is best.

Section three – Unlawful interference

This section deals with an incident in which a passenger becomes violent on board and the flight crew decide that they need to divert. The section reviews appropriate pausing and stress patterns in continuous speech. It also teaches the language function of reported speech.

1 As the picture suggests, cockpit doors have now been reinforced. This was a clear recommendation which followed the events of September 11, 2001. The cockpit door is locked during flight and no unauthorized personnel are allowed to enter for any reason.

2 38 Note that the flight crew believe that this is a problem of mental health. This seems a reasonable assumption. The other possibility, also suggested in the recording, is that the passenger is drunk.

1 violent
2 Korean
3 divert and land

3 38 If students found the listening activity easy, you could get them to answer these questions before listening for a second time to check.

When they finish this activity, ask them if they believe that the flight crew were right in their decision to divert. They will probably agree on the grounds that safety always comes first. The passenger was restrained though, so it may have been possible to continue to their destination.

1 He hits a flight attendant.
2 Flight attendants force him to the floor and handcuff him.
3 They think he has a mental health problem.
4 Secure him away from other passengers.
5 medical and security
6 178
7 at 47

38 Listening script

PNF = pilot non-flying, PF = pilot flying, FA = flight attendant, T = Tokyo Area Control Centre, I = Inchon Area Control Centre

PNF What's going on?
PF It sounds like someone trying to get in. Can you look on the video?
PNF OK … I can see him. The flight attendants are struggling to restrain a passenger. Oh … he's hit one of the attendants.
PF OK, notify Centre.
PNF Centre. We might have a problem here. Stand by. Interflight 547.
T Interflight 547. Standing by.
PNF It looks like they've forced him to the ground and got the cuffs on him.
FA We've a problem back here with a violent passenger. We've restrained him, but he's still struggling.
PNF Is he drunk?
FA I don't think so, but he's very agitated and abusive. He said we were in danger and he had to fly the plane. It must be a mental health problem.
PNF Is anyone hurt?
FA No, we're OK. What do you want us to do with him?
PNF Secure him, away from the other passengers if you can. Get someone to stay with him until we land.
PF Right, contact ATC and tell them that we've got an unruly passenger. Request a diversion to nearest suitable airfield. Have medical and security there to meet us.
PNF Centre. Interflight 547. A passenger has attempted to enter the flight deck. He's also attacked the cabin crew. There are injuries. We have restrained him but we need to get him off the plane as soon as possible.
T Interflight 547. Understand you have an unlawful interference. Please say fuel and persons on board.
PNF Er … 178 persons and four hours of fuel remaining. Can we descend to the nearest available aerodrome? We'll need medical and security services ready. Interflight 547.
T Interflight 547. You are approaching Korean airspace. Contact Inchon Control on 123.6. I'll advise them of your situation and pass on your request. (H)
Hello, this is Tokyo Area Control Centre here. We have a problem B 757-200, Interflight 547, G585 westbound towards SAPRA at FL 340, squawking 1243. We expect it in your airspace at approximately 47.
I OK, a 757 squawking 1243. What's the problem?
T We had a report from the flight crew. They said a passenger had attempted to enter the flight deck. The first officer said that crew had restrained him, but believed he was still a threat.
I Roger, are there any injured persons?
T The crew told me there were injuries, but they didn't give details.
I Did they state intentions?
T They asked if they could descend to the nearest aerodrome, and they said they'd need medical and security services ready.
I Thank you. Leave it with us.

Pronunciation – Information groups and stress

1 / 2 / 3 38 The students have already worked on information groups in Unit 10 and they have worked on stress patterns throughout the course. This activity is therefore a review and a useful check on what improvements students have made in their pronunciation during the course. Assuming that they have made some improvement, try to give your students some positive feedback on this point. Students often lack confidence in the area of pronunciation.

Note that the pauses as well as the stressed syllables that students have marked may be different from the suggested answer. Be prepared to accept alternative answers if they seem to be reasonable suggestions.

(Suggested answers)

PNF centre / Interflight 547 / a passenger has attempted to enter the flight deck / he's also attacked the cabin crew / there are injuries / we have restrained him but we need to get him off the plane as soon as possible /

ACC Interflight 547 / understand you have an unlawful interference / please say fuel and persons on board /

PNF er ... 178 persons and four hours of fuel remaining / can we descend to the nearest available aerodrome? We'll need medical and security services ready / Interflight 547 /

ACC Interflight 547 / you are approaching Korean airspace / contact Inchon control on 123.6 / I'll advise them of your situation and pass on your request

Functional English – Reporting

1 / 2 38

1 has attempted
2 are
3 Can we
4 We'll need
5 said, had attempted
6 told, were
7 if they could
8 they'd need

3 After students have attempted this activity, conduct a general review of reported speech by eliciting or presenting the following rules:

- Tenses 'go back' in reported speech:
  present simple ⟶ past simple
  present perfect ⟶ past perfect
  past simple ⟶ past perfect
  present continuous ⟶ past continuous
  will ⟶ *would*
  can ⟶ *could*
  shall ⟶ *should*
  (when the original phrase was *Shall I / we ... ?*)
- It is possible not to change the tense of the verb, particularly when speech is reported a short time afterwards and the situation referred to is still true.
- *Yes / No* questions are reported using *if* but other questions retain the question words. Subject and verb are not inverted when questions are reported. Verb forms also change in questions as outlined above.
- Commands or instructions can be reported using the following structure:

  subject + *told* + object + *to* + infinitive

  This structure is particularly useful for pilots and controllers who will often be reporting instructions.

1 The tense of the verb moves back in time.
2 *Can* changes to *could* and *will* changes to *would*. *Shall* changes to *should*.

4 1 the man (that) he had to leave the plane / the man to leave the plane
2 if he / she should contact MediLink
3 (that) one of their flight attendants had been injured
4 the pilot to contact Inchon Control
5 (that) they had an emergency in the cabin
6 (that) there were three serious injuries on board
7 they'd like to divert to another airfield

Speaking

1 At first students work in groups of three to form ten questions for the journalist to ask.

2 Students now adopt their different roles and perform the interview, with one of them taking sufficient notes for Activity 3.

3 Students now have the opportunity to fully practise the language of reported speech. They should report the questions as well as the answers.

Section four – Language development

Functional English – Passive

1
2 were thrown off
3 was assaulted
4 was forced
5 was punched
6 were informed
7 was told
8 was not allowed
9 was checked
10 was refuelled

Expressing possibility and probability

2
1 c
2 h
3 f
4 a
5 g
6 e
7 d
8 b

Reported speech

3
1 told us
2 refused to
3 we
4 to count
5 ask for
6 to
7 to state
8 request
9 us
10 ask, for clearance

4
2 The pilot told the flight attendant to place the passenger at the rear of the plane.
3 The passenger asked the air steward for a glass of water.
4 The controller asked the pilot to confirm his position.
5 He mentioned that he was a qualified pilot.
6 The pilot requested to make an emergency landing.
7 The pilot advised the controller that they had a problem.
8 The controller asked for / asked him to give more details.

Vocabulary – Physical conflict and restraint

1
1 malicious
2 nervous
3 angry
4 aggressive
5 agitated
6 uncooperative
7 abusive
8 suspicious
9 drunk
10 unruly

2
1 kicking
2 abuse / harass
3 threatened, hit
4 calm down, restrain
5 punched
6 handcuff, bit
7 abusing
8 removed

PHOTOCOPIABLE ACTIVITY

Organize students into small groups and give each group one copy of the questions. They should combine their knowledge to try and find the answers. If they have no idea at all, you could allow them to do the following for one question only:

1 Telephone a friend.
2 Ask you to remove one of the wrong answers so they have a 50 / 50 chance.

When they have done the best they can, collect their answers and give each group its score. You can then move on to the second part of the quiz, where each group writes three questions to ask the class. You could set this for homework in order to give the students the opportunity to research their questions.

Key

1 C
2 B – Aviation developed faster in Europe in the early years.
3 A – Louis Blériot is famous for being the first to fly the English channel, and Charles Lindenburg made the first solo flight across the Atlantic.
4 B – Heathrow airport was officially opened just after the end of the Second World War.
5 B
6 A – It finally entered into service seven years later, in 1976.
7 C
8 C – It made its first test flight in 2005.

1 Work in groups. Answer the questions.

AVIATION HISTORY QUIZ

1 **When did the Wright brothers make the first powered human flight?**
A 1899 **B** 1901 **C** 1903

2 **The world's first commercial passenger flights connected which two cities?**
A New York and Chicago **B** London and Paris **C** Berlin and Munich

3 **Who made the first non-stop flight across the Atlantic?**
A Alcock and Brown **B** Louis Blériot **C** Charles Lindenburg

4 **Which of the following airports is the oldest?**
A Munich – Franz Josef Strauss **B** London – Heathrow **C** Paris – Charles de Gaulle

5 **In which decade did pressurized passenger aircraft first begin flying?**
A in the 1930's **B** in the 1940s **C** in the 1950s

6 **When did Concorde make its first test flight?**
A 1969 **B** 1972 **C** 1976

7 **Which was the first fully fly-by-wire passenger aircraft?**
A the Boeing 737 **B** the Boeing 777 **C** the Airbus A320

8 **When did the Airbus A380 make its first commercial flight?**
A 2005 **B** 2006 **C** 2007

2 Write three questions of your own to ask the other groups.

1 _____?
A _____ B _____ C _____

2 _____?
A _____ B _____ C _____

3 _____?
A _____ B _____ C _____

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John Kennedy

Originally from Ireland, John worked for twelve years in Turkey teaching both general and business English before joining the École Nationale d l'Aviation Civile (ENAC) in Toulouse, France. He is responsible for the English language training programme for pilots and teaches air traffic controllers, pilots and engineers as well as co-ordinating the ENAC English language testing programme.

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