

English for Aviation

EXPRESS SERIES 

Teaching Notes

About the notes

The Teaching Notes for English for Aviation are designed to give additional help to teachers in what can be a complicated field. There are notes for each unit of English for Aviation. The notes are divided into three sections:

Background

This section starts with a real life account that illustrates an important point related to the topic of the unit. This is followed by extra information about the more complicated issues in the unit.

Jargon buster

This section gives definitions of aviation-related words that might be difficult to understand for the non-professional.

Activity assistant

Most of the activities in English for Aviation have answers in the back of the book. This section gives possible answers for some of the more open-ended activities so that the teacher can give suggestions if the discussions are not flowing freely. This section also gives ideas on how to organize these activities.

Weblinks

The weblinks in the Teaching Notes take users to a page on the English for Aviation website that has links to external websites. These websites provide useful additional information on a variety of topics related to the units. We aim to keep these links up-to-date, please notify us if you find a link has expired.

1 Introduction to air communications

Background

On March 27, 1977, two Boeing 747s collided on the runway at Tenerife. Among contributing factors to the accident was the use of non-standard phrases in radio communication. This led to confusion about whether or not a clearance for take-off had been granted. In most circumstances, any misunderstanding would be quickly clarified, however on this day, there was dense fog. The tower controller couldn't see either of the two planes, nor could the planes see one another. In addition, simultaneous radio transmissions meant that some messages were not heard. The use of ambiguous words made the already bad situation much worse. Clear communication is extremely important – and can be a matter of life or death – for pilots and air traffic controllers.

Pilots and controllers use standard phraseology to ensure that communication is clear and unambiguous. The sound quality in radiotelephony is variable, which increases the chance of miscommunication. The numbers 'five' and 'nine', for example, might easily be confused, so in standard phraseology, 'nine' becomes 'niner' and 'five' become 'fife'. 'Yes', which might easily be lost in the hiss of radio interference becomes 'affirm', and 'no', which is a tiny word with huge importance becomes 'negative'. There also are strict rules about read-back. To ensure that a message has been correctly transmitted and received, the recipient of the message repeats the information back to the sender. That way, any misunderstanding can be immediately corrected.

A busy international airport will handle an average of 1,500 plane movements per day. With so many pilots and controllers on the radio, messages need to be short and concise. In exercise 3, audio track 4, we hear a standard pilot transmission. Using only twelve words, the pilot says who she's calling, identifies herself, and says her altitude, direction, and estimated time of arrival. This takes about eight seconds. Standard phraseology transmits essential information quickly and clearly. Every pilot and controller understands that a dangerous situation may arise at any point. Keeping the airwaves as open as possible contributes to air safety.

The International Civil Aviation Organization (ICAO), headquartered in Montreal, Canada, was formed in 1944 to ensure the safe and orderly development of international civilian aviation. ICAO sets global standards for pilots, airport authorities, and air traffic controls so that each flight is handled in the same way, using the safest procedures. ICAO's work includes publishing guidelines on licensing, rules of the air, aeronautical charts, aircraft operation, transport of dangerous goods, and so on. It also publishes a Manual of Radiotelephony which details standard phraseology to be used throughout any routine flight.

English is the agreed language of civil aviation throughout the world. Air Traffic Control Officers (ATCOs) and pilots who are involved with international flights learn standard ICAO phraseology in English as part of their professional training. In exercise 6, exchange 3, however, most of the transmissions aren't in English. In many places, for example small, non-international airports, a local language is used on the radio because all of the controllers and pilots in the vicinity speak the language, and it feels more natural – and possibly safer – to use it. However, if pilots who do not speak the local language enter the airspace, then they may request that all of the radio communication be conducted in English so that everyone can understand the positions and movements of all of the aircraft in the area. As you hear in exchange 3, however, this isn't always the case, and it can be very frustrating, and possibly very dangerous, for pilots who don't understand the local language.

Standard phraseology is a highly effective tool in most cases because it has a very specialized and limited use. It is, therefore, fairly easy to master. When the weather is clear, the runways are in good condition, the planes are fully functioning, and the passengers and crew are healthy and well-behaved, standard phraseology works extremely well. But when things go wrong, it's because something unexpected happens. By its nature, standard phraseology doesn't include ways to describe non-routine events. In unit 1, exercise 7, the pilot of Blaze 606 requests a priority landing because of a violent passenger on board the plane. There is no standard phraseology to refer to a violent passenger, so the pilot has to do the best he can to communicate the message using plain English. The result is confusion about the intent of the transmission, which is resolved only when another controller – presumably one who speaks better English – takes over. Similarly, in unit 1, exercise 11, exchange 2, we hear a relatively complex exchange, mostly in plain English, about failed landing gear. Again, there is no standard phraseology for communicating about the details of this non-standard situation and possible resolutions.

ICAO recognizes the importance of plain English in clear communication, especially in circumstances where standard phraseology is inadequate. In the past, it was considered adequate for pilots and controllers to demonstrate mastery of standard phraseology, but ICAO now requires a certain level of general English for all pilots and ATCOs (ICAO Operational Level 4, on page 2 of English for Aviation) to be fully licensed internationally.

English for Aviation is intended to teach plain English in an aviation context. Nonetheless, the book includes many examples of standard phraseology. If you're interested in learning more about standard phraseology, the Manual of Radiotelephony (ICAO doc 9432) can be ordered from ICAO (www.oup.com/elt/express/avi/weblinks). The Civil Aviation Authority (CAA) of the United Kingdom publishes its radiotelephony manual (CA P 413) for free download on its website (www.oup.com/elt/express/avi/weblinks).

Jargon buster

ATC (air traffic control) *n* a service that oversees and guides the movements of aircraft

ATCO (air traffic control officer) *n* a person whose main job is to ensure that airplanes maintain a safe distance from one another in all stages of flight

cabin crew *n* airline staff who work directly with passengers and whose main job is to ensure their safety and well-being, in addition to dealing with seating arrangements and food and drink service

clearance *n* official permission given by a controller for an aircraft to take an action

(air traffic) control (ATC) *n* a service that manages the movements of aircraft; depending on the size and organization of an airport, the job may be divided into ground control for movements on the airport, tower control for movements in and around the airport, approach and departure control; en route controllers handle flights between airports

ETA *n* estimated time of arrival

flight level *n* a measurement, based on atmospheric pressure, of the height of an aircraft, abbreviated FL; FL 250 = 25,000 feet

heading *n* the direction in which a plane is pointing, expressed in degrees from north

heavy *n* a plane with a take-off weight of more than 136,000 kilograms, for example a Boeing 747

- hectopascal** *n* a unit of atmospheric pressure
- hold** *v* to keep an aircraft in a particular position on the ground or in the air while waiting for further clearance from ATC
- identified** *n* (of a plane) visible on a controller's radar screen
- ILS** *n* instrument landing system; a system using radio signals and, in some cases, high-intensity lights that guides aircraft through a safe approach and landing
- knots** *n* a unit of speed (one nautical mile per hour, or approximately 1.85 kilometres per hour)
- landing gear, main** *n* the wheels underneath the aircraft that are the closest to its centre of gravity
- landing gear, nose** *n* the wheel(s) underneath the front of the aircraft
- outer marker** *n* a radio beacon used in ILS systems, usually about 4.5 nautical miles from the end of the runway
- push (back)** *v* the process of moving a plane out of its parked position
- radio check** *n* the process of testing the transmission signal strength of a radio
- squawk** *n* an identification code set on a special device (on a plane) called a transponder that allows air traffic control to identify the plane
- stand** *n* a parking space for an airplane where passengers get on and off the plane
- tower** *n* a tall building with a good view of the airfield
- tower controller** *n* an ATCO who manages aircraft movements from the tower
- vector** *n* a heading given to a pilot to assist in using navigation by radar
- wind shear** *n* a sudden change in wind strength and/or direction that can cause extreme turbulence

Activity assistant

- 14** This exercise emphasizes the importance of plain English ability in addition to mastery of standard phraseology and highlights situations where standard phraseology alone is unlikely to offer a solution.
- 1** Divide the class into groups of 2-4 students. Situations 1 and 3 are from the pilot's perspective, and situations 2 and 4 are from the controller's. If you have both pilots and controllers in your class, you might choose to arrange to have controllers deal with situations 1 and 3, and pilots with situations 2 and 4. This will encourage them to look at the problem from a different perspective than usual.
 - 2** Ask the group to identify the following for each situation:
 - a** any immediate danger
 - b** the nature of the problem, if there is one
 - c** the cause of the problem, if there is one
 - d** possible courses of action

Possible answers

These answers are provided solely for classroom discussion of the hypothetical situations presented in the book.

Situation 1

- a** any immediate danger: If there is wind shear locally, you are in danger of crashing on take off, in the worst case scenario.
- b** the nature of the problem, if there is one: The pilot fears that there is a potential danger that she hasn't been informed about.

- c** the cause of the problem, if there is one: Communication is in a local language even though there is a pilot on the airport who requires English.
- d** possible courses of action: The pilot must ask a direct question regarding wind speeds and the possibility of wind shear before taking off.

Situation 2

- a** any immediate danger: There may be a serious problem with the aircraft requiring emergency services. The list of possible problems is endless. Any immediate danger is unknown at this point.
- b** the nature of the problem, if there is one: ATC knows that the plane is in some kind of difficulty, but doesn't know what it is.
- c** the cause of the problem, if there is one: We don't know for sure. There may be problems with the radio; the pilot's English may be difficult to understand; the controller's English may not be good enough to understand the pilot; there may be an unknown emergency on board; or any combination of the above.
- d** possible courses of action: Get the direct supervisor, who must speak good English if this is an international airport, or possibly another controller to help try to understand. Grant priority landing if this can be done safely. Continue to try to understand the situation. If time permits, ask other pilots on the same frequency if they understand the problem.

Situation 3

- a** any immediate danger: Possible collision between our aircraft and the passing light plane.
- b** the nature of the problem, if there is one: Clearance was initially given, but since that time, no further confirmation of clearance has been received. It now appears as though there is conflicting traffic.
- c** the cause of the problem, if there is one: We don't know for sure. There may be problems with the plane's radio or the controller's radio; the controller may simply not be paying attention.
- d** possible courses of action: The pilot should reconfirm clearance to land. If control continues not to respond, the pilot should take appropriate action to avoid the crossing aircraft. The exact action would depend on the details of the situation beyond those given in the book, but aborting the landing and going around would be one possibility.

Situation 4

- a** any immediate danger: None is obvious from the scenario as given. We don't know what the instructions were, but we can assume that the plane hasn't followed them. It's possible that the plane has a technical problem with the radio and can neither send nor receive communications. It's also possible that control of the plane has been taken by force and that someone other than the captain is flying, or that the captain has been instructed to maintain radio silence.
- b** the nature of the problem, if there is one: There is no communication between an incoming aircraft and the tower and the plane may be ignoring instructions.
- c** the cause of the problem, if there is one: We don't know for sure. Possible scenarios were raised in item a, above.
- d** possible courses of action: The controller should follow standard protocol for establishing contact with the aircraft (possibly using flashing lights). If the situation is judged to be dangerous, emergency protocols should be followed to make other aircraft and the airport as safe as possible until the situation is resolved. The plane should be allowed to land and other traffic should be kept clear.

- 3 Have students compare answers with other groups.
- 4 If class size permits, discuss the answers with the whole class. If the above suggested answers have not been mentioned by students, introduce them into the discussion.

2 Pre-flight

Background

On August 16, 1987, a twin-engine McDonnell Douglas MD-82 crashed on take-off at MBS International Airport in Saginaw, Michigan, USA. Investigators found that the flight crew had probably failed to use the taxi checklist, a set of routine pre-flight checks and actions that should be carried out before take-off. In normal circumstances, a take-off warning system would have alerted the pilots to the problem, however on this day, unknown to them, an electrical problem meant the alarm system wasn't working.

Before every flight, the captain of a plane, often with the help of the first officer, if there is one, does a pre-flight check of the aircraft. This often begins in the cockpit and typically follows a detailed checklist of items to be inspected. All aircraft will be required to carry various documents and certificates, for example a registration, radio licence, certificate of insurance, and so on. These are checked before each flight. Fuel levels, the function of the controls and instruments, and other equipment checks appropriate to the aircraft are carried out. Pre-flight also includes a walk-around, where the outside of the plane is inspected. The pilot looks for any obvious problems that the plane may have. This includes checking for fuel leaks, looking out for damage to the aircraft as a result of contact with a ground service vehicle, checking the condition of the tyres, checking the lights, looking at the propellers or inside the jet engine to make sure the blades aren't damaged, and so on. Commercial planes may carry a list of deferred maintenance items (DMIs) in the cockpit. This list shows any problem or abnormality that has been noticed, checked by an engineer, and determined to require no further immediate action. If any potential problems are discovered on a pre-flight check, maintenance crew are contacted to inspect and repair the plane and determine whether or not it's airworthy. Pre-flight checks continue, following detailed checklists, as the plane is started up, taxied out, and finally cleared for take-off.

During pre-flight, pilots at larger airports monitor automatic terminal information service (ATIS) broadcasts. These give information about weather conditions, which runways are active, and any notices to airmen (NOTAMs) with details of local hazards, closed runways, and so on. Pilots listen to ATIS broadcasts before contacting control. This helps reduce controllers' workload and also keeps radio traffic to a minimum. Unit 2 exercises 14 and 15 contain examples of ATIS broadcasts. Each broadcast has an identifier letter which is given at the end ('Advise the controller on initial contact you have Hotel'). Whenever an updated broadcast is made, a new identifier is assigned in alphabetical order. This allows control to know immediately whether or not a pilot has the very latest information.

Changing weather conditions can turn a routine flight into a potentially difficult or dangerous situation. Pilots carefully monitor weather conditions not only at the airport they're departing from, but also en route and at their destination. Routine aviation weather reports called METARs ('METAR' is probably an abbreviation of the French words MÉTéorologique Aviation Régulière, meaning routine aviation weather) give information about temperature, dew point, wind speed and direction, precipitation, cloud cover and heights, visibility, and barometric pressure, which is crucial for accurately determining altitude. Pilots en route routinely pass on weather observations and reports of turbulence to controllers who in turn alert other pilots in the area to conditions.

Most scheduled airline flights follow instrument flight rules (IFR). IFR procedures and regulations allow licensed pilots to fly using only the aircraft instrument panel.

Even when nothing can be seen through the windows of the cockpit, an IFR rated pilot can complete a flight from start to finish. This means that planes can fly in most weather conditions. However, some weather poses such a threat to the safety of aircraft that pilots will not fly in them. Windshear – a sudden change in wind speed and direction – has contributed to many emergencies and accidents, especially when planes are close to the ground; freezing conditions can cause ice build-up on a plane which can lead to potentially lethal difficulties; very strong winds, especially winds blowing across the runway, can make take-off and landing extremely dangerous, if not impossible; heavy rain can cause water to build up on runways, making them slippery and hazardous.

For more information on the implications of weather on aviation, see the United Kingdom's Met Office aviation home page (www.oup.com/elt/express/avi/weblinks).

Jargon buster

ATIS broadcast *n* automated terminal information service – at busier airports, a continuous recorded broadcast of essential information, updated regularly, about weather, active runways, available approaches, and any other information that pilots need to make a safe landing

dew point *n* the temperature at which air is saturated with water and condensation begins, useful to pilots because it can help them determine the likelihood of carburettor icing and fog, and also help in estimating the height of the cloud base

flight plan *n* a written statement of the intended route and destination of a flight and alternate airports in case of emergency

pitot head *n* a device on the outside of the airplane that is used to measure airspeed

SIGMET *n* significant meteorological information which may affect the safety of a flight, for example severe turbulence

VOLMET *n* meteorological information for aircraft in flight

Activity assistant

Over to you

- 1 Allow students 5–10 minutes to read the article on their own and answer the questions.
- 2 Put them in groups of 2–4 and ask them to compare their answers to the questions.

Possible answers

These answers are provided solely for classroom discussion of the hypothetical situations presented in the book.

Name another safety feature which could prevent a minor incident becoming a disaster.

- Arc-fault circuit breakers and automated wire test equipment in the electrical systems of aircraft can detect damaged wiring before arcing (sparks caused by damaged wires) causes fires.
- Fire extinguishers allow fires to be put out before they spread.
- Lights on the floor of airliners can lead passengers safely to the exit in the event of an evacuation of a smoke-filled cabin.

- Oxygen masks can keep passengers conscious and alert, and therefore safer, in a decompression emergency. More importantly, the separate cockpit oxygen system can save pilots from the disorientation and unconsciousness that can result from hypoxia (oxygen starvation) in the event of a depressurization.
- Old-fashioned mechanical compasses are usually fitted as back-up on jetliners in case of failure of the electro gyro compasses they usually fly with.
- Seat belts can keep both pilots and passengers safe during turbulence.

What is the manufacturer likely to do after this incident?

After initial assessment by the airline's mechanic, the manufacturer will most likely send a representative to check the damage. Depending on the type and the degree of damage, they may take further action, including recommending that all aircraft of that model are inspected. In extreme situations, where there is concern that the fault might affect other planes and might potentially be dangerous, manufacturers may recommend grounding all planes of a certain type until the fault can be corrected.

Have you heard of similar incidents on other aircraft?

Students may have their own stories. You could share this one: On June 9, 2009, American B763, a Boeing 767-300, en route from JFK, New York to Zurich, Switzerland. About 45 minutes into the flight, smoke appeared in the cabin. The plane immediately turned towards Halifax, in Canada, and performed an emergency descent. A flight attendant wearing a personal oxygen mask extinguished the fire, which was reported to have started in a ceiling fan in one of the lavatories. On landing, all of the passengers disembarked safely via stairs.

3 Ground movements

Background

On October 8, 2001, at Linate Airport in Milan, Italy, a McDonnell Douglas MD-87 carrying 110 people collided on take-off with a business jet – a Cessna Citation II. The investigation by Italy's Agenzia Nazionale per la Sicurezza del Volo (ANSV – National Agency for the Safety of Flight) concluded that the accident's immediate cause was the incursion of the Cessna onto the active runway. However, the investigation report didn't place full blame on the Cessna's pilot. The ANSV also identified several deficiencies in the airport's procedures and layout. The worst of these was that though the airport had taken delivery of a ground radar system several years before, it hadn't been fully installed and wasn't operating at the time (ground radar helps controllers track planes' ground movements). Additionally, taxiway signs did not meet regulations. The Cessna pilot mistakenly turned onto the taxiway that led to the active runway, but after the wrong turn, there were no further signs to tell the pilot where he was and alert him to the error; The Cessna pilot eventually correctly reported his location to control when he reached taxiway stop marking S4, but that stop wasn't on airport maps and was unknown to the controller, who disregarded the identification. The crash occurred less than two minutes later.

By definition, every airport has at least one runway, a strip of level ground, usually paved, on which planes land and take off. Smaller airports often have a single runway less than 1,000 metres long. Airports used by commercial airlines usually have runways of about 2,000 metres or longer. The longest non-military runway in the world, at China's Qamdo Bangda Airport, is 5,500 metres long. The airport is at an altitude of 4,334 metres, and at that elevation, the low air density means that planes have to take off and land at higher-than-usual speeds, requiring a longer runway to allow planes to become airborne on take-off and to stop safely on landing.

Runways are connected by taxiways – usually with a tarmac surface – to the apron (ramp in American English). This is the area outside of the terminal building(s) where planes park for loading and unloading, refuelling, service and maintenance, and so on. There are often hangars – covered areas or large buildings used for airplane maintenance and storage – on the apron as well.

The movements of planes at larger airports are handled by ground controllers. As you can hear in unit 3, exercises 2 and 4, ground controllers deal not only with planes, but also with tugs, sweepers, buses, and all of the other service and maintenance vehicles that work at the airport. Ten of the most common vehicles are shown in exercise 1. In addition to these, you may also see 'follow me' trucks which are sometimes used to guide planes on the ground, food service vehicles, special trucks that are equipped to replenish aircraft plumbing systems and haul away waste for proper disposal, trucks with stairs on the back for crew and passenger access, conveyor belt trucks for luggage loading and unloading, and security patrol vehicles.

Airports, especially larger ones, generally have very strict rules and clear surface markings and signs – including edge lighting on runways and taxiways – that govern the movements of all vehicles and planes. Some examples are shown on page 21. Small rural airports used by smaller planes often have no air traffic control service. Traffic at these airports tends to be light, so pilots monitor the radio and keep a sharp eye out for other aircraft in the vicinity in order to make safe take-offs and landings.

Exercises 16 and 17 deal with situations and hazards that can disrupt aircraft ground movements. The possibilities are almost endless, so standard phraseology is rarely adequate to describe what's going on when there's a problem. As we've seen, incorrect or unexpected movements of vehicles at the airport can quickly create lethal situations. Pilots and controllers need to communicate quickly and clearly with one another to keep the flow of traffic moving safely.

For more detailed information about airports, see www.oup.com/elt/express/avi/weblinks.

Jargon buster

de-icer *n* a vehicle that sprays planes – especially wings and tail fins – with anti-freeze chemicals which remove ice and/or stop it forming

flat-bed truck *n* a vehicle with a large flat surface at the back, used for transporting goods and equipment

heavy plant *n* any large vehicle used in construction, for example dumper trucks and diggers

(runway) incursion *n* any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and take-off of aircraft (ICAO's definition)

push-back tug *n* a vehicle used for moving airplanes out of parking positions

snowplough *n* a vehicle designed for removing snow from roads, runways, taxiways, and aprons

sweeper *n* a vehicle with special equipment such as brushes and water nozzles used for cleaning and clearing debris from roads, runways, taxiways, and aprons, all of which are inspected meticulously and regularly to ensure no loose debris which could get sucked into engines, crack windscreens, and so on.

Activity assistant

Over to you

- 1 Allow students 5–10 minutes to read the article on their own and answer the questions.
- 2 Put them in groups of 2–4 and ask them to compare their answers to the questions.

A full report of this incident is available for download on from the website of the Air Accidents Investigation Branch (AAIB) (www.oup.com/elt/express/avi/weblinks).

Possible answers

These answers are provided solely for classroom discussion of the hypothetical situations presented in the book.

Do you think runway 06L should have been used?

Students will have their own opinions about this, and there may be a lively discussion. The report mentioned above has a detailed discussion of the factors that caused the near accident and the findings of the investigation. Rather than close the runway, the report states that the airport should have taken certain measures to make it safer while work was carried out. It also says that the pilots should have known the work was going on given the information that was available to them. A crucial consideration in this discussion is the fact that larger planes generally need longer runways.

Do you have experience of a similar situation?

Student can share their own experiences.

What recommendations could be made based upon this report?

The AAIB report mentioned above makes six safety recommendations, though they are fairly technical in nature. Without having seen the full report, it is unlikely that the students would reach the same conclusions. Reasonable answers might include that the airport should review its procedures when works are being carried out.

4 Departure, climbing, and cruising

Background

On December 17, 1903, Orville Wright flew the Wright Flyer I, a powered aircraft, a distance of 37 metres. The flight, with an average speed of 10.9 kilometres per hour, lasted for 12 seconds. Orville's brother Wilbur then flew the plane a distance of 53 metres. The third flight of the day was 61 metres, and the final flight 260 metres, which took 59 seconds. None of the flights went higher than about 3 metres off the ground. There are stories of earlier powered flights, for example that of New Zealander Richard Pearse, who is said to have made a powered flight on March 31, 1902 of between 45 and 360 metres before crashing into a hedge. But the global aeronautical record-keeping and standard-setting body the Fédération Aéronautique Internationale credits the Wrights with "the first sustained and controlled heavier-than-air powered flight."

A heavier-than-air flight is one made by an object that normally sits on the ground when it isn't in motion. An airplane is heavier than air, but a hot-air balloon is not. The first man-made heavier-than-air instruments of flight are generally agreed to have been kites. Their first recorded use was in China around 200 BC. In the second or third century AD, also in China, pilotless hot-air balloons were developed to aid in military communications. It is generally accepted that the first piloted flight of a hot air balloon was on November 21, 1783, by the Montgolfier brothers, in Paris.

A Boeing 747 has a maximum take-off weight of more than 333,000 kilograms. How can something that heavy, made mostly of metal, fly? There are four essential forces that act when flight occurs. Thrust is the force of the engines that pushes the plane forward. Drag, the opposite of thrust, is the resistance of the air to the plane moving through it. Weight, already mentioned above, is a function of the downward force of gravity. Lift is the force that is generated by an aerofoil (airfoil in American English), which is a wing in the case of an airplane. An aerofoil creates lift because of its shape.

In 1738, Daniel Bernoulli, a Dutch-Swiss mathematician, published a principle – now called Bernoulli's principle – that stated that a slower-moving fluid (in the case of flight, air is considered to be a fluid) creates more pressure than a faster-moving one. An aerofoil slows the flow of air across its top, so the faster-moving air beneath exerts more pressure, which pushes the aerofoil upwards, creating lift. If you can create enough thrust and you have a big enough air foil, you can overcome drag and weight and get your 747 airborne.

The physics of controlling the plane are similar. Control surfaces – moveable aerofoils – on the wings and tailplane allow the pilot to move the aircraft in virtually any direction using the flight controls in the cockpit. As the airfoil moves, the pressure created by the flow of air pushes the plane in the desired direction.

Any unexpected change in the forces that make controlled powered flight possible may lead to an incident – an occurrence that disrupts routine flight procedures. Problems with separation – the distance between aircraft – also can lead to incidents. Often, incidents are 'near-miss' situations. Pilots and controllers fill out detailed reports so that incidents can be investigated; any findings may contribute to identifying dangerous situations or procedures and making flying safer. In exercise 1, exchange 1, an incident occurs where the plane is in danger of not gaining enough speed to produce sufficient lift for the plane to clear some vehicles that were unexpectedly on the runway. Any situation where a plane has a near collision, either with an object on the ground or with another airplane, will be investigated.

During flight, the air through which a plane is flying may be moving in an unsettled way. This is called turbulence, and its effect on planes, though generally just mildly unpleasant, can be severe. In extreme cases, where turbulence is unexpected and passengers and crew are not wearing safety belts, the ride can become so bumpy that people injure themselves because their seats drop out from under them and they hit their heads on the ceiling.

For more information on the physics of flight and the dangers of turbulence, see www.oup.com/elt/express/avi/weblinks.

Jargon buster

CB *n* cumulonimbus; a type of cloud associated with thunderstorms and turbulence

icing *n* the process of a plane, or parts of a plane, becoming covered in ice; icing can disrupt the flow of air across the aerofoils and make a plane difficult or impossible to fly or control

pan *n* a radio call of ‘pan-pan’ indicates that there is an urgent problem on board an airplane, but that there is no immediate danger either to the plane or its occupants

QNH setting *n* the atmospheric pressure at mean sea level used by the airplane’s altimeter to correctly determine the plane’s altitude

turbulence *n* an unsettled movement of air that can cause an airplane to bump and jolt, sometimes severely

Activity assistant

- 13** **1** Make sure that everyone understands all of the symbols and labels on the map.

Answers

TUMBIKI and LAHOA are airports.

GANET, FALCON, PUFIN, and WADER are navigation beacons.

RMV 242, AMX 341, SHD 24, BMM 38, AFL 397, BEE 26, CFP 86, and BAW 63 are airplanes en route.

Numbers with arrows (094, 122, 146, 189 from Tumbiki, for example) are compass headings.

- 2** In pairs, students take turns giving the pilot reports and ATC warnings (as in the answer key in the back of the book).
- 3** Ask pairs to join other pairs and check answers.
- 4** If class size permits, check answers with the whole group.

Over to you

- 1** Give students 5–10 minutes to read the news article and technical report.
- 2** In groups of 2–3, ask students to share their answers to the questions.

Possible answers

What would your reaction be if this was your aircraft?

Students’ answer may vary. The owner of the plane, who will have invested hundreds of hours in building it himself, will of course feel very frustrated and angry. He might also feel suspicious that he was given a faulty part by the manufacturer. He will feel relieved that the incident resulted only in a heavy landing for the plane and cuts and bruises for the pilot and passenger.

What responsibilities do aircraft kit manufacturers have to their customers?

Morally, manufacturers are obligated to make their kit planes as safe and defect-free as possible. However, all buyers of kit planes will sign an agreement that says the manufacturer of the plane will not be considered responsible for any injury, damage, or death that results from the plane being flown. Kit plane manufacturers are likely to take a strong interest any time there is an incident involving one of their products. They will investigate the cause, and if it is found to be a possible problem in other planes they have supplied, then they will issue a service bulletin or similar notification to alert owners to the potential problem.

What light aircraft have you flown in?

Students will share their own experiences and you can share yours.

Would you like to build a light aircraft?

Students will share their own experiences and you can share yours. You might point out that statistically, home-made planes experience a higher accident rate than the overall general aviation average, but that on the other hand, home-made kit planes are becoming more popular in some places because they are an affordable way to own and fly a plane.

5 En route events

Background

On November 2, 2004, Iceland's Grimsvötn Volcano began to erupt. Soon afterwards, Iceland's Civil Aviation Authority (ICAA) and then aviation authorities across Northern Europe began to issue NOTAMs (Notice to Airmen) and ASHTAMs (a notification about volcanic ash or other dust contamination) and updated them as the situation changed and developed. The ICAA published this NOTAM on November 4:

```
(A0210/04 NOTAMR A0208/04
Q) BIRD/QWWXX/IV/NBO/W/000/050/
A) BIRD
B) 0411041247 C) 0411041900 EST
D)
E) THE ERUPTION IN GRIMSVOTN 1703-01 NOMINAL POS. 6425N01719W
HAS REDUCED SIGNIFICANTLY. CONTAMINATED AREA NOW BOUNDED
BY: SFC TO 5.000 FEET AREA 64N018W 64N013W 62N017W 63N020W.
MAINTAIN WATCH FOR NOTAM/SIGMET FOR AREA.
F) G) )
```

For source, see www.oup.com/elt/express/avi/weblinks.

Pilots generally read any NOTAMs that have been issued with regard to their intended route. They are supplied either by the airline or by airport flight briefing facilities. The first line of the NOTAM gives its individual identification number (A0210/04), which includes the year. It also says that it replaces a previous NOTAM (NOTAMR) rather than being new (NOTAMN) or cancelling (NOTAMC) a previous NOTAM. Finally it names the previously issued NOTAM (A0208/04) which it is replacing.

The 'Q' line says who the NOTAM affects using codes with the following meanings:

- BIRD = Iceland flight information region
- QWWXX = the NOTAM code, which in this case indicates a warning (W) of volcanic activity (W) with more explanation to follow (XX)
- IV = IFR and VFR traffic
- NBO = for immediate attention of aircraft operators, for inclusion in pre-flight information bulletins and operationally significant for IFR flights
- W = navigation warning
- 000/050 = lower and upper limits, expressed as flight levels

The 'A' line is the ICAO code of the affected aerodrome or flight information region (FIR), in this case Iceland, for the NOTAM.

The 'B' line gives the start time and date. The 'C' line gives the finish time (in co-ordinated universal time) and date.

When a 'D' line is used, it gives time information if the effect of the NOTAM is less than 24 hours.

The 'E' line give the full details of the NOTAM in heavily abbreviated language.

The 'F' and 'G' lines, if used, give information about any height restrictions associated with the NOTAM.

Volcanic ash can cause severe damage to airplane engines and thus presents a significant danger. Fortunately, all planes that would normally have been in the vicinity heeded the NOTAM and there were no incidents involving the ash plume. Transatlantic flights were diverted south of Iceland. Dutch airline KLM cancelled 59 flights and stranded hundreds of passengers at Amsterdam's Schipol Airport.

Air traffic restrictions for flights are routine. Some are permanently in place, for example where planes aren't allowed into designated military airspace. Others, as in the case of the volcanic eruptions or sand storms, are put in place to keep planes away from natural hazards. Other reasons for flight restrictions are parachute jumps, air shows, temporary obstacles such as cranes near airports, unserviceable lights on tall obstructions, closed runways or taxiways, flights by VIPs, for example heads of state, and military exercises.

The situations described above can all cause flights to divert from their intended route. Unexpected events on board aircraft also can cause diversions. Low fuel, technical problems with aircraft, passengers with air rage, and medical emergencies are relatively common causes of pilots deciding to change route and land at an airport they hadn't originally intended to use. Throughout a flight, pilots continually keep track of the location of possible alternate airports (as they are referred to in aviation) along the route in case difficulty arises.

As soon as a pilot becomes aware of a potential problem, controllers will be alerted. As discussed in the previous unit, a call of pan-pan is used to signify that an urgent situation has arisen, but that there is no immediate danger to life or the aircraft. However, at that time, a decision to use an alternate airport may be made. Planes are never more than two hours from an alternate unless flying mid-ocean.

When a serious medical situation arises on an airplane, the crew will often ask if there is a doctor on board who can assist with the situation. Generally doctors are willing to help, though there have been situations where doctors played a crucial role in dealing with a medical emergency (rather than enjoying a relaxing flight) but felt the airline offered inadequate compensation – usually a thank you letter, sometimes an upgrade on a future flight, occasionally a free ticket.

In recent years, medical facilities available on many airlines have improved. It is not uncommon to find defibrillators aboard airliners and many airlines have access to 'telemedical' facilities on the ground that give expert medical advice and can identify the nearest airports with hospitals close by.

For more information on NOTAMs and for further details on defibrillators in airplanes, see www.oup.com/elt/express/avi/weblinks.

Jargon buster

SIGMET *n* SIGNificant METeorological information notification – similar to a NOTAM but concerned with weather-related issues

UTC *n* co-ordinated universal time, a very precise global time standard based on an atomic clock

Activity assistant

- 1 Allow students 5–10 minutes to read the article on their own and answer the questions.
- 2 Put them in groups of 2–4 and ask them to compare their answers to the questions.

- 16** **1** Ask the class to list safety features and procedures that are in place to protect aircraft from hijacking.
- 2** If they haven't listed sturdy cockpit doors that open only from the inside, try to elicit this by asking, for example, *How is the cockpit kept safe?*
- 3** Ask if there are any potential downsides to sturdy cockpit doors.
- 4** Read the rubric. Ask students to read the sort text in the blue box to themselves. Ask: *Why have cockpit doors that can be opened only from the inside sparked criticism?*

Possible answer

If the flight crew became incapacitated and were in need of assistance, but the cockpit doors couldn't be opened from the outside, then it would be impossible for anyone to get into the cockpit to help the pilots.

- 5** To illustrate a similar scenario, you could tell this story:

In 2006, an Air Canada pilot exited the flight deck to use the lavatory, leaving a flight attendant and the first officer in the cockpit. When the pilot returned, neither he nor the people inside the cockpit were able to open the door, probably due to a malfunction. Eventually, the crew had to take the door apart so the pilot could get in.

The above scenario ended well, but during the incident, the pilot was vulnerable and so was the plane.

- 6** Read the question in the book. Ask students to work in small groups discussing how well they think aircraft safety and crew well-being are balanced on flights.

Possible answer

Though the current set-up with doors may have problems, there doesn't seem to be a perfect solution to the problem of preventing unauthorized access to the flight deck. The current situation can be seen as a suitable compromise.

- 7** Ask groups to share their answers with the class.

Over to you

- 1** Ask students to read the OUTPUT text individually.
- 2** Ask the students to work in small groups to answer the questions.

Possible answers

Can you explain in your own words what happens during an explosive decompression?

Explosive, or uncontrolled, decompression is when the atmospheric pressure inside a contained space, for example the sealed pressurized system of the aircraft cabin, is suddenly reduced – more quickly than air can escape from the lungs. The risk of lung damage is very high. Unsecured objects are thrown about, as in a bomb blast. A heavy fog may immediately fill the aircraft. The immediate risk to crew and passengers is lack of oxygen and the expansion of gases trapped in body cavities following the drop in pressure. Immediate descent is the only solution – to approx 10,000 feet where people can breathe safely without need for additional oxygen.

6 Contact and approach

Background

On September 26, 1997 an Airbus A300 on approach to Medan, Sumatra, Indonesia crashed into woodlands in low visibility that was caused by the smog from forest fires. In the minutes before the accident, air traffic control instructed the pilot to make a right turn. The following exchange occurred:

GIA 152 Turn right heading 040 GIA 152 check established.
ATC Turning right sir.
GIA 152 Roger 152.
ATC 152, confirm you're making turning left now?
GIA 152 We are turning right now.
ATC 152, OK you continue turning left now.
GIA 152 A ... confirm turning left? We are starting turning right now.
ATC OK ... OK. GIA 152 continue turn right heading 015.

A few seconds later, the plane crashed into woodlands. The confusion over whether the turn should have been left or right contributed to the crash. During approach, as a plane gets closer to the ground, the margin for error decreases. En route, confusion over flight level may lead to dangerously narrow separation between planes, but with the help of traffic collision avoidance systems, there's almost always time to correct the mistake before anything bad happens. However, close to the ground, if a pilot thinks the plane is a few hundred metres higher, or further from an obstacle, than it actually is, the error may result in a crash. This appears to have been another contributing factor in the above accident. Clear communication is essential to avoiding a potentially deadly misunderstanding.

If problems occur on approach, it's the captain's job to inform passengers of the situation. In exercise 1, the pilot makes an announcement about a delay and then of a change of airport. In a more serious incident, 747 pilot Eric Moody on approach to Jakarta had to make this announcement: *Ladies and Gentlemen, this is your captain speaking. We have a small problem. All four engines have stopped. We are doing our damndest to get it under control. I trust you are not in too much distress.*

The captain didn't know it at the time, but the plane was flying through a cloud of volcanic ash. Partly because of his cool handling of the announcement, the atmosphere in the plane remained fairly calm despite the fact that many passengers were writing goodbye notes to loved ones. Eventually the plane dropped below the ash plume and the engines were restarted. Eventually a safe – though extremely difficult – landing was completed.

Pilots making instrument landings in conditions of reduced visibility use airport approach plates. The approach plate for Pulkovo Airport, serving St. Petersburg, Russia, appears on page 49. It shows specific waypoints and altitudes that an aircraft must use to safely line up with a designated landing runway. It also includes essential headings and radio frequencies. Approach plates are published with expiration dates and are frequently updated because it is so important that they contain the latest, most accurate information.

In exercises 9 and 14, we listen to an exchange between ATC and a pilot on approach in bad weather conditions. If a pilot making an approach finds that the plane's speed, altitude, or heading means it isn't lining up correctly to make a safe landing, a special procedure called a missed approach will be followed. The approach plate specifies how to handle a missed approach by giving an

initial heading or track and an altitude to climb to, generally followed by holding instructions. This is exactly the procedure the pilot in the exchange follows.

For more information on missed approaches, see www.oup.com/elt/express/avi/weblinks.

Jargon buster

altitude *n* the vertical distance between mean sea level and an aircraft, a point, or a level; in Russia, Mongolia, and the People's Republic of China, this is measured in metres, but in the rest of the world, it is measured in feet.

FIS (flight information services) broadcast *n* an automated radio transmission that notifies pilots about weather, air terminal information, NOTAMS (NOTice to AirMen), and other essential non-control information

read-back *n* the action of repeating a message you have received to confirm that it has been correctly heard

Activity assistant

Starter

- 1 Ask students to read the three flight-deck announcements to themselves and to rank them (1 = the best, 3 = the worst).
- 2 In pairs, have students take turns reading the announcements out loud. Ask them to then work together to agree on which is the best and which is the worst.
- 3 Take a vote in class. Ask students to give specific reasons for their choices.

Possible answers

- 1 (the best) = the middle announcement. The pilot's tone is professional and he gives information that may be interesting or useful to passengers in language that they will be able to understand easily.
 - 2 (the next best) = the first announcement. This announcement is professional in its way, though probably overly technical in its delivery. It gives useful information, but listeners may be confused by terms such as *1742 hours local*.
 - 3 (the worst) = the final announcement. The pilot's delivery is very informal and doesn't give passengers useful information. The comment about food is inappropriate in this context.
- 6** **1** Ask the class to look at page. Ask: *What is this?* (An approach plate.) *What airport is it for?* (Pulkovo Airport in St Petersburg, Russia).
- 2** Ask: *What does this plate show that most plates don't?* (Planes.) The planes are there for exercises 6 and 8 on page 48.
- 3** Ask: *Which plane isn't lined up properly for approach and/or landing?* (Plane a.) Ask students to do exercise 6 and then to check their answers with a partner. The answers are in the back of the book.

Over to you

- 1 Give students 5–10 minutes to read the article.
- 2 Ask students to share their answers to the questions in small groups.
- 3 Ask groups to share their answers with the class.

Possible answers

Are the above recommendations the same as or different from ICAO recommendations?

There are a couple of small differences.

- ICAO recommends *Climb to flight level (230)* rather than *Climb flight level (230)* as the UK CAA recommends.
- ICAO recommends that altitude given in feet be transmitted as, for example *eight hundred (800)*, but that flight levels be transmitted as separate digits *flight level one zero zero (FL 100)*.

Do you know of a serious incident which resulted from bad communication?

Students can give their own answers. You might choose to mention the incident discussed at the beginning of the background notes above.

Why can 'Go ahead' cause confusion?

Go ahead isn't considered standard phraseology because it could be taken to mean *Go ahead (and take a certain action)* or it could simply mean *Go ahead (it's your turn to talk on the radio and my turn to listen)*. If a pilot believes that clearance has been given to perform a certain action but the intended message was *I'm waiting for your next transmission*, the results could be disastrous.

As a controller, do you listen to read-back? As a pilot, do you always give read-back?

Students will give their own answers. Most are unlikely to admit not giving read-back, so you could extend the question by asking: *What problems do you encounter with hearing/giving read-back?* Possible answers: overlapping or truncated transmissions, poor transmission quality.

7 Landing

Background

On January 17, 2008, British Airways flight 38 from Beijing to London was on final approach when first officer John Coward, who was flying the plane, became aware that there was no power. The plane was gliding. A 777 has a cruising speed of nearly 500 knots (just over 900 kilometres per hour) but reduces to an airspeed as low as 130 knots (about 245 kilometres per hour) for landing. In a routine landing, just before touchdown, the pilot performs a flare – pulling the nose of the plane up just slightly – which reduces the rate of descent and softens the landing. As soon as the plane touches down, spoilers – panels on the top of wing – are raised to help reduce lift and air brakes and wheel brakes are applied to slow the plane down. The engines are also reversed, which helps slow the plane quickly and safely. However in the case BA 38, slowing the plane down wasn't the problem. At 200 feet (61 metres), the autopilot reduced the airspeed to 108 knots in an attempt to maintain the instrument landing system (ILS) glide slope. This meant the plane dropped too quickly, which resulted in its landing in the grass 300 metres short of the runway, coming to rest on the runway threshold markings.

As discussed in the background notes for unit 6, as a plane slows down and gets closer to the ground, the margin for error is reduced. If the unexpected occurs, there are often few options available. The activity assistant below gives examples of pilots dealing successfully with emergency landing situations.

All large airports have in place procedures and equipment for dealing with emergencies. This usually includes a fire brigade trained and equipped to remove crew and passengers from damaged aircraft, deal with highly flammable aviation fuel, and cope with bomb threats, hijacking, terrorist activities, and so on. In the past, some airports have been prepared to spread a layer of fire suppression foam (sometimes called fire retardant foam) on a runway in advance of an emergency landing, but this practice is now rarely used. There's a danger that the foam might reduce the effectiveness of an airplane's brakes, and also a concern that the practice might deplete foam supplies which would be better used fighting an actual fire.

Some large airports have fully staffed medical centres and ambulance services in addition to their own team of police officers.

For more information on approach and landing risks, see www.oup.com/elt/express/avi/weblinks.

Jargon buster

nacelle *n* the streamlined housing for an airplane engine

Activity assistant

- 9 1** Give students a few minutes to read the article. Some students may notice that the evacuation took 'less than three minutes'. For an aircraft to be certified, it must pass a test to show that it can be evacuated in 90 seconds with only half of the exits available. By that standard, this evacuation was relatively slow.
- 2** Read question 1. As a class or in small groups elicit stories. You may want to share these stories of successful emergency landings:

On August 21, 1963, a Tupolev 124 on an Aeroflot flight to Moscow had a problem with its nose gear. ATC diverted the flight to Leningrad for an emergency landing. Before landing, the plane circled the city to expend fuel – a safety precaution in case of a rough landing, and also a measure to avoid landing ‘heavy’, which can cause sparks and make the plane harder to stop. While circling, the pilots tried to fix the damaged nose gear. This distracted them from monitoring the fuel and both engines stopped over Leningrad city centre. Barely avoiding two bridges and a tugboat, the pilot managed to ditch the plane. The captain of the tugboat broke the windscreen of the sinking plane, tied a cable to the control wheel, and towed it to shore. For more information, see www.oup.com/elt/express/avi/weblinks .

On 23 July, 1983, Air Canada flight 143, a Boeing 767, was at 41,000 feet when a cockpit alarm indicated a fuel pressure problem. Owing to a misunderstanding involving a conversion from imperial to metric measurements, the initial fuel loading had been miscalculated. After the alarm sounded, the pilots incorrectly assumed that a fuel pump had failed and switched it off. The computer indicated enough fuel for the flight, but its calculations were based on incorrect settings. The real problems began when the fuel ran out completely only seconds later. Fortunately for everyone involved, Captain Robert Pearson was an experienced glider pilot and successfully landed the plane at a former airforce base. For more information, see www.oup.com/elt/express/avi/weblinks .

On January 15, 2009, US Airways flight 1549, an Airbus A320, struck a flock of geese six minutes after taking off from New York’s LaGuardia Airport. This resulted in a nearly complete loss of engine thrust as birds were sucked into the engines. Unable to return to the airport, the pilot safely ditched the plane in the Hudson river. For more information, see www.oup.com/elt/express/avi/weblinks .

You may also want to share the story of flight 38 from the background section above.

3 Read question 2. Ask students to call out possible answers. Write them on the board. If students need help, use the information from the background section above to prompt them.

11 1 Give students a few minutes to read the text. Ask them to do question 1. Check the answer with the key in the back of the book.

2 Ask students to work in pairs to answer question 2. Elicit answers.

Possible answer

At the point where the pilot decided he needed to increase separation from the plane in front, he could have turned left from the downwind leg to the base leg at the usual point (rather than extending the downwind leg), and exited the pattern by continuing to fly straight on the base leg – towards the campsite – rather than turning left onto final approach. He would then need to regain altitude turn left toward where plane 2 is now shown, and joined the yellow circuit line there.

3 Read question 3 and elicit answers.

Possible answers

He could have called a missed approach as he was blinded by the sun on final and gone round.

12 With the class, go through the list of twelve problems and hazards to make sure students understand them.

Answers

- 1 lighting systems failure: At airports, lights marking the beginning, end, and edges of runways and taxiways help planes landing and taxiing at night or in low visibility conditions. They also mark hazards at and near airports. The failure of lighting systems makes landing far more difficult and dangerous.
- 2 speed control problems: As discussed in the background notes above, planes need to land at a relatively slow speed. If a plane is coming in too fast, it is in danger of not being able to stop safely and thus running off the end of the runway.
- 3 medical emergency: It's dangerous for the pilot of a plane personally to experience medical problems at any time, but on landing, because the margin for error is low, it can be extremely dangerous, because it may cause the pilot to lose control of the plane. A medical emergency involving another crewmember or passenger on the airplane can mean that a pilot needs to land the plane as quickly as possible to save someone's life, which may require that the plane is given priority to land while other planes are forced to hold.
- 4 diversion: A diversion – the re-routing of a flight to an airport other than its intended destination – is usually in response to an abnormal situation. Any problem with a person (for example medical or behavioural) on board a plane could lead to a diversion. In addition, planes will be diverted away from any airport experiencing a dangerous situation.
- 5 tail strike: This is when the rear end of an aircraft touches the runway during takeoff or landing. Tail strikes are only rarely dangerous, but after a tail strike, planes have to be inspected and repaired, which can be expensive.
- 6 runway incursions and excursions: A runway incursion is the incorrect presence of an aircraft, vehicle, or person on a runway.
A runway excursion is when an aircraft fails to confine a landing or take off to a designated runway. This can happen when a plane fails to become airborne before reaching the end of the runway, a landing plane is unable to stop before the end of the runway, or a plane goes over the side edge of the runway.
- 7 technical problems (e.g. engine failure): This is any mechanical, electronic, or electrical issue with an airplane.
- 8 braking problems: Problems with, or failure of, brakes can result in planes not stopping within a safe distance. Planes can have difficulty braking because of water, ice, or other contaminants on the runway, or because of mechanical failure of the brakes.
- 9 bad surface conditions: A runway with debris on it, or one that is wet or icy can make planes difficult to control and/or stop.
- 10 bad weather: Wind, wind shear, rain, hail, sleet, snow, blizzard conditions, and fog all make landing more difficult and thus more hazardous.
- 11 delays: A delay is when planes are unable to land and/or depart on their intended schedule. Delays can be caused by bad weather conditions, mechanical problems with aircraft, unexpectedly heavy traffic, and so on.
- 12 flock of birds on the runway: A bird strike is a collision between a bird and a plane, and they have caused planes to crash as they get sucked into the engine, causing it to fail. A flock of birds on the runway presents a real hazard to planes taking off and landing.

8 On the ground

Background

On March 17, 2002, a McDonnell Douglas MD-11 landed at the Ted Stevens Anchorage International Airport, in Alaska, USA. Heavy snow was falling and there was at least 20 centimetres of loose snow on the ground. Ground control instructed the plane to proceed to parking at gate R8. As the MD-11 approached R8 via taxiway Kilo, a McDonnell Douglas MD-82 was being pushed back from gate R7. The ground controller instructed the pilot to remain clear of Taxiway Kilo during pushback and the pilot passed this message along to the tug driver, who acknowledged receipt of the message. However, the driver of the push-back tug was unable to control the direction of the plane because of slippery conditions. The plane was pulled back to the gate and another attempt was made. The crew of the MD-11 saw the MD-82 and tried to determine whether their right wingtip was going to clear the tail of the MD-82, though a heavy accumulation of snow on the window made this difficult. The crew then turned their attention to the ground handling staff. The pilot didn't see a signal to stop, so he assumed that the marshaller had a clear view of the wingtip and that clearance was adequate. At the same time, a ground marshaller signalled the driver of the push-back tug to move the MD-11 off taxiway Kilo. The MD-82 pilot continued to taxi and the right wingtip of the plane hit the tail of the MD-11.

On the apron, there are often several people – pilots, ground controllers, marshalls, and tug drivers – working to get planes safely into and out of gates, so clear communication is essential for effective teamwork. In the above case, it appears that even though everyone was communicating relatively clearly, the situation became dangerous rapidly and there was no time to respond to instructions that had been communicated and prevent the incident.

In exercise 8, we hear ground control communication at a busy airport. In addition to helping arriving and departing airplanes navigate the taxiways safely, this ground controller is also dealing with airport service vehicles. This is a fairly typical example of real communication, but it is not the best example of good practice. Transmissions like *Jetblue, are you with me again?* will be clear to native speakers of English, but a controller using standard phraseology would instead say *Jetblue, Ground* to re-establish communications. Especially on crowded radio frequencies in busy situations with pilots from all over the world, the use of standard phraseology will help everyone understand clearly what's going on, which will contribute the safe movement of traffic.

For more information on ground accident prevention, see www.oup.com/elt/express/avi/weblinks.

Jargon buster

airside *n* the part of an airport where aircraft take off, land, load, and unload

centre line *n* a painted or imaginary line in the centre of a taxiway or runway

interstand clearway *n* the space between stands that is normally beyond the maximum wingspan of a parked aircraft; in the case of the diagram on page 61, the plane's wings are in the clearway, which is potentially dangerous.

jetty/jetway *n* a bridge, usually enclosed, that connects a plane and terminal building for loading and unloading

stand *n* the space where an airplane parks for loading and unloading

taxilane *n* the portion of the parking area that connects taxiways and parking positions

Activity assistant

- 3 1** Give students 5–10 minutes to read the report.
- 2** Ask students to share their answers to the questions in small groups.
- 3** Ask groups to share their answers with the class. Answers for questions 1, 2, and 4 are in the back of the book.

Possible answer (question 3)

The intention of the sign might be clearer if it were placed just beyond taxiway C (when travelling towards A on KC) rather than just before it.

- 6 1** Ask the class to work in small groups to discuss the three questions posed by the rubric. Note that answers will depend on details of the incident that are not explicitly given in the exercises, so the exercise is one of conjecture.
- 2** Ask groups to share their answers with the class.

Possible answers

What do you think will happen next?

First, the pilot will tell Ground that he needs assistance. Then, a truck will come out and help to move the plane. They'll need to be careful not to create a hazard for other taxiing planes. They might have a problem with delays caused by closing the taxiway. After the plane is pulled out, they will need to make sure it can be safely towed to the gate. Finally, they'll need to inspect it carefully to make sure it hasn't been damaged.

How will the passengers get to the gate?

The passengers may remain in the plane as it is towed to the gate. They might be taken off the plane and loaded onto a bus to be driven to the gate.

What problems might they have?

If the plane is badly stuck, it might be difficult to move. If the plane is in a position that makes the taxiways in the vicinity dangerous to use, there may be delays.

- 9 1** Ask students to complete the exercise.
- 2** Have students compare their answers with two or three other students.
- 3** Go through the statements one by one and ask students to show whether they agree or disagree by raising hands. In situations where not everyone agrees or disagrees, ask individual students to share examples of specific situations that support their position.

Notes on statements:

- 1** Slow speech can be helpful to a point, but a more useful recommendation might be not to speak too slowly or too quickly.
- 2** This is a useful skill. If a statement isn't understood, repeating it often won't help. Rephrasing it might.
- 3** Though dictionaries often are available, in the flow of working as a pilot or ATCO on the radio, it's unlikely that a dictionary would be useful because of the time it would take to look up a word.
- 4** This is generally true, though any grammatical error that could lead to a misunderstanding should be avoided. In cases where a speaker makes a confusing grammatical error but doesn't realize it, re-phrasing (item 2) can sometimes clear up confusion before it causes problems.
- 5** This is essential. Pretending you have understood something when you haven't could have terrible consequences.

- 6 ICAO standard phraseology is very limited. When it can be used, it should be used, however it can't be used in non-routine situations.

Over to you

- 1 Ask the class what changes they expect in the aviation industry in the future. If you want to start a lively discussion, you could write some prompts on the board:

Supers

Notes: Airbus A380, Boeing 787. Both planes are designed to make air travel more fuel efficient. The A380 first entered service in 2007. It can carry up to 853 passengers and up to 310,000 litres of fuel, with a range of more than 15,000 kilometres. The 787 can carry up to 330 passengers and up to about 138,000 litres of fuel, with a similar range to that of the A380.

Global warming

Notes: Since the mid 20th century, the average temperature of the Earth's surface (air and oceans) has increased. The political and public debate is ongoing. Most national governments have signed the Kyoto Protocol, which is intended to reduce emissions of so-called greenhouse gases. Aviation is an industry that produces greenhouse gases, so it may be affected by laws and regulations aimed at cutting emissions.

Fuel prices

Notes: Commercial aviation is sensitive to fuel prices. When fuel prices increase, carriers have to absorb the cost or pass it on to customers. If fuel prices increase enough, the cost of flying, both for passengers and freight, may increase to the point where people choose other options.

Space tourism

Notes: Despite concerns about fuel prices and global warming, the dream of tourists travelling in space is still held by some. For \$20–35 million, a company called Space Adventures can arrange for a tourist to visit the International Space Station for up to two weeks. Around the world, projects to construct spaceports are already underway.

- 2 Give students a few minutes to read the opinions and to answer the questions.
- 3 Ask students to share their answers to the questions in small groups.