This course is for aviation professionals – particularly pilots and air-traffic controllers – who wish to reach and maintain level 4 (operational) as measured by the ICAO Language Profile descriptors (see pages vi and vii). The course aims to increase confidence in communication and develops the very specific skills described in the ICAO level 4 language profile. These are the skills needed to succeed in any Level 4 assessment and also to function effectively and safely in an aviation environment.

This course does not aim to teach the phraseology that aviation professionals need but it is included to provide a context for the plain English needed for communication between pilots and air-traffic controllers, and between pilots and pilots. The main focus is on the language needed to communicate in non-routine and/or emergency situations during flight operations.

The Student's Book contains the material for the course in the form of reading and listening texts. The main purpose of this is to present new vocabulary and to provide a context for the exercises and language functions. There are lots of pair-work and group-work activities for speaking practice for the benefit of students using the course in a classroom situation.

The course is intended both for independent study and for classroom use. The CD-ROM supports the student's book with interactive language and pronunciation exercises, simulations in which the student can participate, and all the audio files from the Student's Book. The Teacher's Book contains extra support and ideas that can be used to supplement the material contained in this Student's Book.
STUDENT'S BOOK

Each of the 12 units in the Student's Book is divided into four two-page sections.

Section 1
is based on a reading text and provides an introduction to the main theme of the unit.

Section 2
is based on a listening text or texts and provides sustained listening and pronunciation practice work.

Section 3
is based on an emergency or non-routine flight operation scenario. It always contains a listening text or texts involving a radio telephony exchange with a mixture of phraseology and plain English.

Section 4
is an extension section which includes further practice, consolidation and extension of language taught within the unit.

CD-ROM

The interactive CD-ROM complements the material in the Student's Book by providing interactive simulations, detailed pronunciation and extra listening. The CD-ROM material is split into 12 units which match those of the Student's Book. It has two sections.

Section 1
contains further practice on pronunciation and listening,

Section 2
contains animated interactive sequences in which students are encouraged to use the language taught in the corresponding unit of the book. Students can compare their own speech with model responses and take the role of characters in the animation.

We hope that you enjoy using Aviation English.

Henry Emery
Andy Roberts
<table>
<thead>
<tr>
<th>Topic</th>
<th>Skills</th>
<th>Pronunciation</th>
<th>Functions</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIT 1 RUNWAY INCURSION</td>
<td>1 Avoiding miscommunication</td>
<td>Reading and vocabulary</td>
<td>Asking for information</td>
<td>Communication</td>
</tr>
<tr>
<td></td>
<td>2 Airport layout</td>
<td>Listening and speaking</td>
<td>ICAO alphabet</td>
<td>Prepositions</td>
</tr>
<tr>
<td></td>
<td>3 Ground operations</td>
<td>Listening and speaking</td>
<td>Numbers</td>
<td>Verbs describing actions and position</td>
</tr>
<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNIT 2 LOST</td>
<td>1 Across the Pacific</td>
<td>Reading and vocabulary</td>
<td>Explaining abbreviations</td>
<td>Navigation</td>
</tr>
<tr>
<td></td>
<td>2 Finding flight N45AC</td>
<td>Listening and speaking</td>
<td>Past tense endings</td>
<td>Co-ordinates</td>
</tr>
<tr>
<td></td>
<td>3 Lost</td>
<td>Listening and speaking</td>
<td>Confirming and disconfirming</td>
<td>Topographical features</td>
</tr>
<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNIT 3 TECHNOLOGY</td>
<td>1 Datalink</td>
<td>Reading and vocabulary</td>
<td>Expressing purpose</td>
<td>Communications</td>
</tr>
<tr>
<td></td>
<td>2 Flight control systems</td>
<td>Listening and speaking</td>
<td>/i/ and /i/</td>
<td>Safety</td>
</tr>
<tr>
<td></td>
<td>3 Instrument blackout</td>
<td>Listening and speaking</td>
<td>Sentence stress 1</td>
<td>The instrument panel</td>
</tr>
<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNIT 4 ANIMALS</td>
<td>1 Wildlife on the ground</td>
<td>Reading and vocabulary</td>
<td>Expressing necessity</td>
<td>Security measures</td>
</tr>
<tr>
<td></td>
<td>2 Animals on the loose</td>
<td>Listening and speaking</td>
<td>Word endings</td>
<td>Cargo</td>
</tr>
<tr>
<td></td>
<td>3 Bird strike</td>
<td>Listening and speaking</td>
<td>Sentence stress 2</td>
<td>Saying intentions</td>
</tr>
<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNIT 5 GRAVITY</td>
<td>1 Ultralight</td>
<td>Reading and vocabulary</td>
<td>Explaining how something works</td>
<td>Manoeuvring an aircraft</td>
</tr>
<tr>
<td></td>
<td>2 Air race</td>
<td>Listening and speaking</td>
<td>Comparing and contrasting</td>
<td>Aerobatics; Units of measurement</td>
</tr>
<tr>
<td></td>
<td>3 Hydraulic loss</td>
<td>Listening and speaking</td>
<td>Tonic stress</td>
<td>Expressing difficulty and offering help</td>
</tr>
<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNIT 6 HEALTH</td>
<td>1 Is there a doctor on board?</td>
<td>Reading and vocabulary</td>
<td>Expressing cause and effect</td>
<td>Medical emergencies</td>
</tr>
<tr>
<td></td>
<td>2 Stressed?</td>
<td>Listening and speaking</td>
<td>Consonant clusters 1</td>
<td>Symptoms of stress</td>
</tr>
<tr>
<td></td>
<td>3 Medical emergency</td>
<td>Listening and speaking</td>
<td>Intonation of lists</td>
<td>Giving and asking for updates</td>
</tr>
<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pairwork, pages 104–112  Recordings, pages 113–128
<table>
<thead>
<tr>
<th>UNIT 7</th>
<th>Topic</th>
<th>Skills</th>
<th>Pronunciation</th>
<th>Functions</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>1 Fire risk</td>
<td>Reading and vocabulary</td>
<td></td>
<td>Obligation, prohibition and permission</td>
<td>Collocations related to fire</td>
</tr>
<tr>
<td></td>
<td>2 Smoke-jumper</td>
<td>Listening and speaking</td>
<td></td>
<td>Orders and requests</td>
<td>Verbs for describing fires</td>
</tr>
<tr>
<td></td>
<td>3 On-board fire</td>
<td>Listening and speaking</td>
<td>/l/ and /r/</td>
<td>Identifying and responding to problems</td>
<td>Electrical problems</td>
</tr>
<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT 8</th>
<th>Topic</th>
<th>Skills</th>
<th>Pronunciation</th>
<th>Functions</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>METEOROLOGY</td>
<td>1 Microburst</td>
<td>Reading and vocabulary</td>
<td></td>
<td>Changing the strength of adjectives</td>
<td></td>
</tr>
<tr>
<td>Page 64</td>
<td>2 Airport disruption</td>
<td>Listening and speaking</td>
<td></td>
<td>Results and consequences; Repeating information</td>
<td>Weather words</td>
</tr>
<tr>
<td></td>
<td>3 Stormy approach</td>
<td>Listening and speaking</td>
<td>/ʃ/, /ʃ/, /ʌʃ/, /ʌs/</td>
<td>Warnings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT 9</th>
<th>Topic</th>
<th>Skills</th>
<th>Pronunciation</th>
<th>Functions</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>LANDINGS</td>
<td>1 Touchdown</td>
<td>Reading and speaking</td>
<td></td>
<td>Describing sensory impressions</td>
<td>Landing gear and braking</td>
</tr>
<tr>
<td>Page 72</td>
<td>2 Letting down a VIP</td>
<td>Listening and speaking</td>
<td>Consonant clusters 2</td>
<td>Describing 3-D position and movement</td>
<td>Verbs of movement</td>
</tr>
<tr>
<td></td>
<td>3 Undercarriage</td>
<td>Listening and speaking</td>
<td></td>
<td>Resolving misunderstanding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT 10</th>
<th>Topic</th>
<th>Skills</th>
<th>Pronunciation</th>
<th>Functions</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUEL</td>
<td>1 Aviation and global warning</td>
<td>Reading and speaking</td>
<td></td>
<td>Suggesting solutions to problems</td>
<td>Prefixes</td>
</tr>
<tr>
<td>Page 80</td>
<td>2 Gimli glider</td>
<td>Listening and speaking</td>
<td>Information groups</td>
<td></td>
<td>Fuel collocations</td>
</tr>
<tr>
<td></td>
<td>3 Fuel icing</td>
<td>Listening and speaking</td>
<td>Long and short vowel sounds</td>
<td>Expressing expectation</td>
<td></td>
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<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT 11</th>
<th>Topic</th>
<th>Skills</th>
<th>Pronunciation</th>
<th>Functions</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE</td>
<td>1 Blast</td>
<td>Reading and speaking</td>
<td></td>
<td>Expressing time and duration</td>
<td>Action verbs</td>
</tr>
<tr>
<td>Page 88</td>
<td>2 Damage</td>
<td>Listening and speaking</td>
<td>Diphthongs</td>
<td>Summarizing</td>
<td>Types of damage</td>
</tr>
<tr>
<td></td>
<td>3 Emergency descent</td>
<td>Listening and speaking</td>
<td>Contrastive stress</td>
<td>Expressing consequences</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT 12</th>
<th>Topic</th>
<th>Skills</th>
<th>Pronunciation</th>
<th>Functions</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECURITY</td>
<td>1 Air rage</td>
<td>Reading and speaking</td>
<td></td>
<td>Focusing on actions</td>
<td>Conflict and restraint</td>
</tr>
<tr>
<td>Page 96</td>
<td>2 Suspicious passengers</td>
<td>Listening and speaking</td>
<td>-tion, -sion, -tion endings</td>
<td>Expressing possibility and probability</td>
<td>Strange behaviour</td>
</tr>
<tr>
<td></td>
<td>3 Unlawful interference</td>
<td>Listening and speaking</td>
<td>Information groups and stress</td>
<td>Reporting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Language development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pairwork, pages 104–112  Recordings, pages 113–128
<table>
<thead>
<tr>
<th>Level</th>
<th>Pronunciation</th>
<th>Structure</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert 6</td>
<td>Pronunciation, stress, rhythm, and intonation, though possibly influenced by</td>
<td>Both basic and complex grammatical structures and sentence patterns are</td>
<td>Vocabulary range and accuracy are sufficient to communicate effectively on a wide variety of</td>
</tr>
<tr>
<td></td>
<td>the first language or regional variation, almost never interfere with ease of</td>
<td>consistently well controlled.</td>
<td>familiar and unfamiliar topics. Vocabulary is idiomatic, nuanced, and sensitive to register.</td>
</tr>
<tr>
<td></td>
<td>understanding.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended 5</td>
<td>Pronunciation, stress, rhythm, and intonation, though influenced by the first</td>
<td>Basic grammatical structures and sentence patterns are consistently well</td>
<td>Vocabulary range and accuracy are sufficient to communicate effectively on common, concrete, and</td>
</tr>
<tr>
<td></td>
<td>language or regional variation, rarely interfere with ease of understanding.</td>
<td>controlled.</td>
<td>work-related topics. Paraphrases consistently and successfully. Vocabulary is sometimes idiomatic.</td>
</tr>
<tr>
<td>Operational 4</td>
<td>Pronunciation, stress, rhythm, and intonation are influenced by the first</td>
<td>Basic grammatical structures and sentence patterns are used creatively and</td>
<td>Vocabulary range and accuracy are usually sufficient to communicate effectively on common,</td>
</tr>
<tr>
<td></td>
<td>language or regional variation but only sometimes interfere with ease of</td>
<td>are usually well controlled. Errors may occur, particularly in unusual or</td>
<td>concrete, and work-related topics. Can often paraphrase successfully when lacking vocabulary in</td>
</tr>
<tr>
<td></td>
<td>understanding.</td>
<td>unexpected circumstances, but rarely interfere with meaning.</td>
<td>unusual or unexpected circumstances.</td>
</tr>
<tr>
<td>Pre-Operational 3</td>
<td>Pronunciation, stress, rhythm, and intonation are influenced by the first</td>
<td>Basic grammatical structures and sentence patterns associated with</td>
<td>Vocabulary range and accuracy are often sufficient to communicate on common, concrete, or work-</td>
</tr>
<tr>
<td></td>
<td>language or regional variation and frequently interfere with ease of</td>
<td>predictable situations are not always well controlled. Errors frequently</td>
<td>related topics but range is limited and the word choice is often inappropriate. Is often unable</td>
</tr>
<tr>
<td></td>
<td>understanding.</td>
<td>interfere with meaning.</td>
<td>to paraphrase successfully when lacking vocabulary.</td>
</tr>
<tr>
<td>Elementary 2</td>
<td>Pronunciation, stress, rhythm, and intonation are heavily influenced by the</td>
<td>Shows only limited control of a few simple memorized grammatical</td>
<td>Limited vocabulary range consisting only of isolated words and memorized phrases.</td>
</tr>
<tr>
<td></td>
<td>first language or regional variation and usually interfere with ease of</td>
<td>structures and sentence patterns.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>understanding.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Elementary 1</td>
<td>Performs at a level below the Elementary level.</td>
<td>Performs at a level below the Elementary level.</td>
<td>Performs at a level below the Elementary level.</td>
</tr>
<tr>
<td>Fluency</td>
<td>Comprehension</td>
<td>Interactions</td>
<td></td>
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<td>------------------------------------------------------------------------</td>
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<td>-------------------------------------------------------------------------------</td>
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<tr>
<td>Able to speak at length with a natural, effortless flow. Varies speech flow for stylistic effect, e.g. to emphasize a point. Uses appropriate discourse markers and connectors spontaneously.</td>
<td>Comprehension is consistently accurate in nearly all contexts and includes comprehension of linguistic and cultural subtleties.</td>
<td>Interacts with ease in nearly all situations. Is sensitive to verbal and non-verbal cues, and responds to them appropriately.</td>
<td></td>
</tr>
<tr>
<td>Able to speak at length with relative ease on familiar topics, but may not vary speech flow as a stylistic device. Can make use of appropriate discourse markers or connectors.</td>
<td>Comprehension is accurate on common, concrete, and work-related topics and mostly accurate when the speaker is confronted with a linguistic or situational complication or an unexpected turn of events. Is able to comprehend a range of speech varieties (dialect and / or accent) or registers.</td>
<td>Responses are immediate, appropriate, and informative. Manages the speaker / listener relationship effectively.</td>
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</tr>
<tr>
<td>Produces stretches of language at an appropriate tempo. There may be occasional loss of fluency on transition from rehearsed or formulaic speech to spontaneous interaction, but this does not prevent effective communication. Can make limited use of discourse markers or connectors. Fillers are not distracting.</td>
<td>Comprehension is mostly accurate on common, concrete, and work-related topics when the accent or variety used is sufficiently intelligible for an international community of users. When the speaker is confronted with a linguistic or situational complication or an unexpected turn of events, comprehension may be slower or require clarification strategies.</td>
<td>Responses are usually immediate, appropriate, and informative. Initiates and maintains exchanges even when dealing with an unexpected turn of events. Deals adequately with apparent misunderstandings by checking, confirming, or clarifying.</td>
<td></td>
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<tr>
<td>Produces stretches of language, but phrasing and pausing are often inappropriate. Hesitations or slowness in language processing may prevent effective communication. Fillers are sometimes distracting.</td>
<td>Comprehension is often accurate on common, concrete, and work related topics when the accent or variety used is sufficiently intelligible for an international community of users. May fail to understand a linguistic or situational turn of events.</td>
<td>Responses are sometimes immediate, appropriate, and informative. Can initiate and maintain exchanges with reasonable ease on familiar topics and in predictable situations. Generally inadequate when dealing with an unexpected turn of events.</td>
<td></td>
</tr>
<tr>
<td>Can produce very short, isolated, memorized utterances with frequent pausing and a distracting use of fillers to search for expressions and to articulate less familiar words.</td>
<td>Comprehension is limited to isolated, memorized phrases when they are carefully and slowly articulated.</td>
<td>Response time is slow, and often inappropriate. Interaction is limited to simple routine exchanges.</td>
<td></td>
</tr>
<tr>
<td>Performs at a level below the Elementary level.</td>
<td>Performs at a level below the Elementary level.</td>
<td>Performs at a level below the Elementary level.</td>
<td></td>
</tr>
</tbody>
</table>
Section one - Avoiding miscommunication

1. Work in pairs. Discuss the questions below. Ask each other questions to get more details.
   1. Have you ever worked with someone whose English you didn’t understand?
   2. What are some of the causes of miscommunication between controllers and pilots? Note down your ideas.

2. Read the article about a report from a National Aviation Safety Investigation on tower-pilot communications. Check which of your ideas from activity 1 are included.

A recent report showed that miscommunication is a factor in over 70% of operational errors. The report examined four areas of miscommunication:

1. Requests from the pilot that the controller repeat the instructions
2. Misunderstandings by the pilot that result in incorrect readbacks
3. Failure of the controller to recognize incorrect readbacks
4. Either the controller or the pilot confusing the call sign

Several factors increased the possibility of communication breakdown. The most important was the complexity of the instructions. The following instruction, for example, when analysed, contains eight separate pieces of information, or eight opportunities for miscommunication:

3890, Ground, give way to the second Dornier inbound, then taxi runway 32 left, intersection departure at Gulf, via outer, Charlie, Gulf.

A lack of fluency in English can cause confusion both because of mispronunciation and misunderstanding. But too much fluency in English can also be a dangerous thing! Any idiomatic language or inappropriate plain English can cause misunderstandings. Also, instructions spoken too quickly can be very difficult to understand.

The report made the following recommendations for further improvements in ATC communications:

- Keep instructions short
- Listen to what a pilot reads back
- Speak slowly
- When talking to pilots / controllers who don’t speak native English, break up the message into its individual words by using short pauses
- Ask when not sure about a piece of information
- Include the full call sign when giving an instruction or reading back
- Wait for complete aircraft identification following instructions
3 Underline the correct information.
   1 In the first incident, the maintenance truck driver misheard / misunderstood the controller.
   2 In the second incident, the captain misheard / misunderstood the controller.
   3 In the third incident, the pilot / the controller / both the pilot and the controller misunderstood the other person.
   4 30% of operational errors involve / do not involve miscommunication.
   5 The main cause of misunderstanding is instructions that are unclear / very complicated.
   6 The safest way to communicate is using simple English / natural, fluent English.

4 Work in pairs. Discuss the questions.
   1 What additional recommendation would you add to the reports?
   2 How could each of the three incidents described at the start of the article be avoided?
   3 Do you know of any incidents where miscommunication has caused a runway incursion?

Vocabulary – Communication
Try to remember what verbs are used before the following nouns in the article. Then look back at the text to check.
   1 m_______ a request
   2 r_______ clearance
   3 g_______ a response
   4 r_______ a message
   5 r_______ a mistake
   6 r_______ an instruction
   7 c_______ a call sign
   8 g_______ an instruction

Functional English – Asking for information
1 Use the verbs in the box to complete the questions from an Aviation Authority survey.
   does have must do will did are

Survey
   1 When ______ you start to learn English?
   2 How long ______ you been studying English?
   3 How ______ you try to improve your English outside class?
   4 What language training ______ you had already?
   5 What ______ you find most difficult about English?
   6 How often ______ you use English in your work?
   7 How much support ______ your employer give you?
   8 Why ______ you studying English?
   9 What level of English ______ you be happy with?
   10 What level of English ______ you have for your job?

2 Work in pairs. Interview each other using the questionnaire.

Speaking – English in aviation
3 Work in small groups. How far do you agree or disagree with the statements below? Why / Why not?
   1 A French ATC speaking to a French pilot at a French airport doesn’t need to know English.
   2 It’s impossible to understand Americans – they don’t speak plain English.
   3 Pilots have been flying safely for years – they don’t need to learn English.
   4 R / T phraseology is enough to communicate with.
   5 All pilots and ATCs working with international traffic should have ICAO level 5.
Section two — Airport Layout

1 Work in pairs. You are going to complete a map of JFK Airport. Student A look at the map on this page. Student B look at the map on p 107. Don't look at each other's maps.

Student A
Find out from Student B where the following buildings and features are. Mark them on your map.
- the airport administration offices
- customs offices
- the national weather service
- the postal service offices
- a helipad

Describe the position of the buildings and features that Student B asks for. The prepositions in the box will be useful.

in the centre of in front of next to behind opposite to the north of parallel to on the opposite side of

2 01,02,03 Listen to an ATC describing three 'hotspots' at JFK. Which three areas (A–E) on the diagram in 1 does she mention?

1 ____
2 ____
3 ____

3 01,02,03 Listen again and match each problem with one of the areas in activity 2.

1 Outbound aircraft can easily cross a runway if they miss the taxiway.
2 You can't see the runway you are taxiing to.
3 Inbound traffic must turn right to avoid conflict.
4 You can have a long taxi if you turn left too soon.
5 You can easily follow the wrong line.

4 Describe an airport you know, including the taxi circuits for arriving and departing traffic. Are there any hotspots?

Pronunciation — The ICAO alphabet

1 04 Listen and write the letters in the correct column in the table according to their stress pattern. The first one has been done for you.

<table>
<thead>
<tr>
<th>Q</th>
<th>R</th>
<th>Z</th>
<th>N</th>
<th>H</th>
<th>J</th>
<th>S</th>
<th>A</th>
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<tr>
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<td>Oo</td>
<td>Ooo</td>
<td>oOo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 04 Listen again and repeat.

3 Work in pairs. Add the missing letters of the ICAO alphabet to the table.

4 Spell the following items for your partner to write down.
- the town where you were born
- your full name
- your address
Vocabulary – Prepositions

Below is a controller’s report of an incident in area C of the aerodrome.
Complete the report with the missing prepositions.

to  at  ahead  on  towards  into  onto  across  from  via  along

Controller’s report

QE433 landed (1) _______ runway 22R in marginal weather conditions. The crew were issued instructions to taxi (2) _______ the runway (3) _______ the apron on K and B (4) _______ KA. They taxied (5) _______ K, but missed the sign and the runway holding position markings for 13R, and went (6) _______ the active runway and (7) _______ KA on the opposite side. At the same time, a 747 was taxiing (8) _______ position on runway 13R. (9) _______ the intersection with B, the crew missed the arrow pointing right. It continued straight (10) _______ and taxied (11) _______ the terminal on A. QE433 finally came nose-to-nose with the outbound 747.

Speaking – Sketching out an airport

1 Work in pairs. Look at the aerodrome information. Design an aerodrome layout including runway and taxiway configuration and the taxi circuit. Mark these positions on your diagram:
   - Where ATC issue runway-in-use information and taxi clearances
   - The holding position(s) in case of traffic conflict
   - Where ATC issue take-off clearance
   - Where ATC issue clearance to taxi to apron
   - Where ATC issue parking information

2 Compare your ideas with another pair.

Aerodrome data

Prevailing wind: 230°
Type of traffic: IFR/VFR, private, scheduled, domestic and international
Average daily traffic movements: 1,100
Section three - Ground operations

1 Work in pairs. Discuss the questions.
   1 What is a runway incursion?
   2 What can cause a runway incursion?
   3 What can the aviation industry do to reduce the number of runway incursions?

2 🎧 05 Listen to a dialogue between a tower controller and a pilot. Underline the correct word to complete the summary of the incident.

In marginal / good weather conditions, an inbound / outbound aircraft takes the incorrect taxiway and moves onto an active / inactive runway. Another aircraft lands / takes off in front of the aircraft. The tower controller tells the crew to turn left / stop. In the end the plane follows / clears the runway.

3 🎧 05 Listen again and mark on the diagram:
   1 The route the tower controller expects the plane to take.
   2 The route the plane actually takes.
   3 The position where the plane stops to wait for further instructions.
   4 The position where the tower thinks the plane has stopped to wait for further instructions.

Pronunciation – Numbers

1 🎧 06 Listen to the call signs. Correct any mistakes.
   1 FR969 396
   2 AQ692
   3 CZ310
   4 LN488
   5 HY557
   6 JM402

2 Work in pairs. Practise saying call signs. Student A, go to p 104. Student B, go to p 107.

Vocabulary – Verbs describing actions and position

Put these ground manoeuvres in the correct column according to their speed in routine operations.

stand move around approach turn push back
head wait roll for take-off taxi queue
touch down exit face

<table>
<thead>
<tr>
<th>no movement</th>
<th>slow</th>
<th>fast</th>
</tr>
</thead>
<tbody>
<tr>
<td>stand</td>
<td>move around</td>
<td></td>
</tr>
</tbody>
</table>
Functional English – Describing actions and position

Look at these extracts from the dialogue.

*I'm facing* Kilo.

*We are approaching* Charlie on Kilo.

*There's somebody taking off!*

*There are signs showing* the runways.

Complete the description of the picture with the verbs from the Vocabulary section in the correct form.

1. *There's a 767-300 touching down* on runway 27R.
2. An A330 *is turning* left.
3. It ________ the far end of the same runway.
4. ________ two aircraft ________ towards the apron.
5. A Saab 340 ________ south. It ________ to cross runway 27L.
6. On runway 27L a B777-300 ________ for take-off.
7. An Embraer ERJ-145 ________ into position.
8. After the Embraer, ________ three more aircraft ________ to depart on runway 27L.
9. A few service vehicles ________ around on the apron.
10. Seven aircraft ________ at the gates.
11. A truck ________ a 747-400.
12. An IL-96 ________ its gate.

Speaking

1. Work in pairs to complete your pictures of an airfield. Student A look at this page. Student B go to p 107.

2. Work in pairs. Discuss the questions.

   1. What factors increase the possibility of hotspots?
   2. What can be done to reduce hotspots?
   3. Are hotspots becoming more or less of a problem?
   4. Which airports have the most / fewest hotspots?
Section four - Language development

Functional English – Question forms

1 Rearrange the words to make questions.
   1 you / aviation / start / career / your / when / did / in?
   
2 of / aspect / your / do / most / you / job / enjoy / what?
   
3 have / which / worked / you / at / airports?
   
4 hours / week / average / how / on / work / many / a / you / usually / do?
   
5 you / did / problem / in / experience / when / last / English / communication / a?
   
6 how / to / do / training / often / have / you / attend / courses?
   
7 language / much / will / training / have / you / year / this / how?
   
8 long / did / how / to / your / do / job / train / you?

2 Answer the questions using full sentences.
   Example
   I started my career in aviation five years ago.

Describing actions and position

3 Look at the diagram and complete the description of what the planes mentioned are doing.

1 RJ112 ______________ its gate.
2 CA193 ______________ the apron.
3 ______________ an aircraft ______________ on runway 27R.
4 ______________ two aircraft ______________ at the gates.
5 EL467 ______________ runway 27L.
6 The A330 ______________ position.
7 Three aircraft ______________ for take-off on runway 27R.
8 QE433 ______________ an intersection.
9 An aircraft ______________ A.
4 Read this report of the incident shown in 3. Complete it with the words from the box.

came nose-to-nose  continued straight ahead  taxied along  landed on  taxi from
carried on towards  taxiing into  went across

Incident report
QE433 (1) _______________ runway 27L in fog. The tower issued instructions to (2) _______________
the runway to the apron on C and A via H. It (3) _______________ C, but at the intersection with H, the
crew missed the arrow pointing left, and (4) _______________. They then missed the sign for runway 09L,
and (5) _______________ the active runway and onto B on the opposite side. At the same time, an A330
was (6) _______________ position on runway 27R. QE433 (7) _______________ the terminal and
(8) _______________ with an outbound 747 on B.

Vocabulary – Communication
1 Complete each sentence with a verb related to communication in the
   correct form.
   1 When the pilot r________ the instruction, I realized that he had
      m________ me.
   2 Controllers should k________ their instructions short and simple.
   3 Hold short of the runway and w________ for further instructions.
   4 Pilots can m________ complex instructions, so it’s best to break
      them up.
   5 The truck driver thought the tower had i________ clearance to
      cross the runway.
   6 When r________ to an ATC traffic call-out, the pilot should
      i________ his call sign.
   7 If a controller m________ a word, the pilot may not understand.
   8 If a pilot g________ an incorrect readback, r________ the
      instruction.

Parts of an airport
2 Rearrange these letters to make features of an airport.
   1 toopsh  a point in an airport where there is danger of runway incursions
   2 awaxity  a road that planes take to get to and from the runway
   3 worar  a symbol that shows you which way to go
   4 stabl cenef  a barrier that protects an area from the force of jet engines
   5 naggise  letters, numbers and symbols that are positioned around an airport
to show pilots where they are and which way to go
   6 menavept krimsang  lines and letters painted on the ground
   7 nittercoseni  a place where two runways, roads, etc. cross
   8 altremin  the main building at an airport
1. Work in pairs. Look at the map and photograph. What particular problems could a pilot of this type of aircraft have on a long flight across an ocean?

2. Match the words below with the definitions a–f.

<table>
<thead>
<tr>
<th>calculate</th>
<th>track</th>
<th>fix</th>
<th>endurance</th>
<th>chart</th>
<th>compass</th>
<th>destination</th>
<th>en route</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
<td>f</td>
<td>g</td>
<td>h</td>
</tr>
<tr>
<td>the longest time an aircraft is able to fly without stopping</td>
<td>a map used for planning and marking a route</td>
<td>on the way; on the line that your journey follows</td>
<td>a piece of equipment that shows your direction</td>
<td>the line on a map that an aircraft follows</td>
<td>the place you are travelling to</td>
<td>a position in space, usually on a flight plan</td>
<td>to use mathematics to find out something</td>
</tr>
</tbody>
</table>

3. Read the text about the flight on the opposite page. Label the pilot's route on the map.
4. Complete the pilot's flight plan.

5. Read the text again and answer the questions.
   1. Who did the pilot work for?
   2. What navigational equipment did he have on board?
   3. Why did he leave Pago Pago at 0300?
   4. Why did he fly on his compass from Ono-I-Lau to Norfolk Island?
   5. When did the pilot realize there was a problem?

---

**Solo flight to Norfolk Island**

In 1978, pilot Jay E. Prochnow was working for an aircraft sales company in Oakland, California. An experienced civil and military pilot, Prochnow was given the task of delivering a Cessna 188 single-handed from Oakland, to Australia. Because the flight covered thousands of miles over open ocean, the aircraft was fitted with extra fuel tanks for the journey. Apart from charts and a compass, the only navigation equipment he had was an ADF for picking up the HF signals of NDBs scattered across the tiny islands of the Pacific Ocean. At the time, this crossing was a long trip even for big jets. For a single-engine aircraft with one crew, this was a long and dangerous mission.

After a stopover in Hawaii, he completed the second leg of the journey on schedule, and arrived on the Samoan island of Pago Pago without incident. The pilot rested for one day before he began the third leg of the trip, and he spent his time on the island preparing for the long and tiring flight ahead. The charts showed a distance of almost 1,500 nm to Norfolk Island. Prochnow calculated a flying time of 15 hours minimum, cruising at 110 kt in good VFR conditions with a light wind. He decided to carry maximum fuel and he filled the tanks to give a total endurance of 22 hours.

He planned his flight well. He departed Pago Pago at 0300, and with 15 hours of daylight in front of him, he could make visual contact with the fixes and his destination below him.

Using the NDBs, Prochnow navigated successfully to the fix of the island of Ono-I-Lau, almost directly en route. Now his task was to fly the remaining 850 nm of empty ocean to Norfolk Island with no navigation aids at all. Now he flew by compass alone. A few hours later he came into range of the Norfolk NDB, and he followed the heading indicated by the ADF. As he approached the ETA he looked carefully for the island, but it wasn’t in sight.

---

6. Work in pairs. What tips can you think of for pilots planning to fly long-distance in a light aircraft? Make a list. Then compare with the other pairs.

**Functional English – Explaining abbreviations**

1. Here are some common expressions for asking or saying what abbreviations mean. Do you know what these abbreviations stand for?

   - What does NDB **stand for**?
   - What does ADF **mean**?
   - What is VFR **short for**?

   **It stands for** ____________________________.
   **It means** ____________________________.
   **It's short for** ____________________________.

2. Work in pairs. You are going to practise saying and explaining abbreviations.
   Student A go to p 104. Student B go to p 107.
Section two - Finding Flight N45AC

1 Look at the pictures of what happened next in the Prochnow story. Put them in the correct order.

1 2 3 4 5

2 07,08,09 Listen and check your answers.

3 07,08,09 Listen again and circle the correct answer.

1 Prochnow contacted
   a other aircraft in the area
   b Auckland ATC for help.

2 A commercial jet made
   a radio contact
   b visual contact.

3 Both aircraft flew towards the sun to establish their
   a heading
   b position.

4 Captain Vette tried to establish Prochnow's exact
   a radio signal
   b transponder.

5 They established the co-ordinates for
   a Prochnow
   b Norfolk Island.

Vocabulary – Co-ordinates

1 Listen again and complete the co-ordinates.

08 Vette Turn towards the sun and report your
   heading.

Prochnow Wilco. My heading is (1)__________.

09 Vette N45AC. Sunset on Norfolk Island is 0730
   zulu. That means you are (2)__________
   and (3)__________ of Norfolk Island.

Vette Your co-ordinates are (4)__________.
   You are (5)__________ from Norfolk Island.

2 10 Listen and repeat these directions and
   co-ordinates.

   north south east west south-east
   north-west south-west north-east

   274° 56°E 30°S 170° 21°E 14°32'40.25"N

3 Work in pairs. Student A look at the next page,
   Student B look at p 108.
RUNWAY INCURSION

A recent report by the National Aviation Safety Investigation on tower-pilot communications contains eight recommendations for further improvements in ATC communications:

1. Keep instructions short
2. Listen to what a pilot reads back
3. Speak slowly
4. When talking to pilots/controllers who don't speak native English, break up the message into its individual words by using short pauses
5. Ask when not sure about a piece of information
6. Include the full call sign when giving an instruction or reading back
7. Wait for complete aircraft identification following instructions

A pilot reports:

Holding short of the runway, the tower asks: 'Go ahead' says the controller, waiting for the driver to make his request. The truck driver, thinking he has received clearance, drives on the runway.

- hold short - concurpence
- OW incursion

What is the business, you have a sudden attack.

What are the possible reasons of OW incursions?

- OW - Amaguro
- RW incursion (nieursno)

The report made the following recommendations for further improvements in ATC communications:

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6. Include the full call sign when giving an instruction or reading back
7. Wait for complete aircraft identification following instructions
Section two - Flight control systems

1 Match the aircraft with the flight control systems.
   1 fly-by-wire ______
   2 mechanical ______
   3 hydromechanical ______

2 Work in pairs. Discuss the questions.
   1 What are the main differences between the systems above?
   2 Which of the systems do you have experience of?
   3 Why have new systems developed?

3 Complete the sentences with the words below.
   override ultimate control capability built-in limits

   1 If a pilot has ______, then he takes the final decision on controlling the aircraft.
   2 When the flight control system is completely automatic, the pilot's ______ is reduced.
   3 The points that a pilot cannot go past which are part of the flight control system are called ______.
   4 To cancel or change an automatic action, we use the ______ function.

4 15 Listen to a discussion between an airline employee and pilot, and answer the questions.
   1 Why does Jean want Mehmet's opinion about two planes?
   2 What two aircraft are they talking about?
   3 Why does Mehmet mention Habsheim and Colombia?
   4 Which plane does Mehmet think is safer?
5 15 Listen again and underline the correct information.
1 Both aircraft use mechanical / fly-by-wire / intelligent flight control systems.
2 The Airbus gives final control to the flight control system / pilot / first officer.
3 At the Habshheim airshow, the computer didn't allow the pilot to pull up / land correctly / retract the air brakes.
4 In Columbia, a computer could have stopped the pilot flying too quickly / keeping the speed brakes on / climbing.

Functional English – Saying things another way
1 15 Listen again and complete these sentences from the conversation.
1 Sorry Mehmet – can you just _______________ fly-by-wire _______________?
2 I'm not _______________ mean by 'an override function'.
3 In _______________, the Airbus computer doesn't allow pilots to do anything dangerous.
4 So _______________, on an Airbus the computer has ultimate control ...
5 Can _______________ an example?
6 And there are protections to prevent overspeed. _______________, it stops the pilot from going faster than is safe.
7 To put _______________, sometimes the aircraft should allow manual control.

2 Work in pairs. Take turns to explain how to use a communication system or gadget that you use regularly. When your partner is speaking, ask for explanations as often as possible. Try to use language from 1.

Vocabulary – Safety
15 Complete the expressions with the verbs from the box, then listen again and check.

reduce stop do allow prevent increase limit make

1 __________ anything dangerous
2 __________ safety
3 __________ the pilot climbing
4 __________ overspeed
5 __________ it safer

6 __________ the pilot's capability
7 __________ manual control
8 __________ the pull-up capability
9 __________ an accident

Pronunciation – /b/ and /p/
1 16 Listen to eight words. Write A or B, according to the word you hear.

A B
1 bought port ___
2 bat pat ___
3 tab tap ___
4 bet pet ___
5 lab lap ___
6 peg beg ___
7 stable staple ___
8 bit pit ___

2 16 Listen again and repeat the words.

3 Take turns to read one word from each line. The person listening must say if they hear A or B.

4 Now practise these sentences.
1 Boeing and Airbus should use the best of both systems.
2 There are protections to stop overspeed.

Speaking
Work in groups. Discuss the questions.
1 In your opinion, is fly-by-wire safer than a conventional mechanical control system?
2 In fifty years' time, how do you think flight control systems will be different?
Section three – Instrument blackout

1 Match the words to the picture. Write a–h.
1 upper ECAM (electronic centralized aircraft monitor) display
2 lower ECAM display
3 autopilot
4 radio management panel (RMP)
5 primary flight display (PFD)
6 secondary flight display
7 speed, altitude and attitude display

2 Work in groups. Explain the function of each item.

3 Match the two halves of the sentences.
1 Let’s reboot a are down.
2 We’ve lost b power back.
3 OK, let’s get the system c back online.
4 We have a system d this out.
5 The system is e the system.
6 All the flight displays f going again.
7 Let’s check g is out.
8 The upper ECAM display h the autopilot.
9 We’ve got i failure.

4 [17] Listen to a conversation from the flight deck of an Airbus A319. Choose a, b or c to complete the sentences.
1 There is a problem with the:
a fuel system
b electrical system
c pressurization system.

2 The pilots solve the problem by:
a reading instructions on the ECAM screen
b reading instructions in the manual
c getting help from maintenance on the ground.

3 The pilots decide to:
a continue their original flight plan
b land immediately
c enter a holding pattern.
Functional English – Giving instructions

18 Complete the sentences from the dialogue. Listen and check.

1 Centre and _______ them what’s happening.
2 _______, read the instruction. _______ follow it.
3 Check it _______ you delete it.
4 What’s the _______ instruction?
5 First, _______ contact ATC so they know our situation.

Pronunciation – Sentence stress 1

18 Listen to the first sentence again. Notice how the words that carry the main meaning of the sentence have the most stress.

Call Centre and tell them what’s happening.

Circle the stressed part of the words you think carry the main meaning in the sentences 2–5 in the Functional English section, then listen again and check.

Speaking

Work in pairs. One of you has a technical problem. A colleague looks at a troubleshooting guide on the Internet, and gives you instructions over the phone. Use expressions from the unit, and add as many details as you can.

Situation 1

A

blank laptop screen
battery fine (add detail)
fine (add detail)
yes (add detail)
agree

B

battery?
cables?
switched on?
report to manufacturer

Situation 2

A

other person can’t hear you over radio

B

fine (add detail)

fine (add detail)

fine (add detail)

agree
Section four - Language development

Functional English – Expressing purpose

1. Match the beginnings and endings of the sentences.
   1. Repeat the message slowly so that
   2. We had to dump some of our fuel in order to
   3. Controllers and pilots use Datalink to
   4. Investigations are carried out for the purpose of
   5. Research is being done with the aim of
   6. A Datalink trial was done with a view to
   7. The training school is raising money with the objective of
   8. They’re working on the old plane with the intention of
   9. They switched off the fuel pumps so that
   10. We went to the conference for the purpose of

   a. restoring it to flying condition.
   b. having all aircraft use this technology in the near future.
   c. discovering ways to reduce aircraft noise.
   d. learning about the latest technologies.
   e. expanding its student capacity.
   f. land safely.
   g. the engine didn’t catch fire.
   h. avoiding similar incidents in the future.
   i. I can understand.
   j. communicate with each other.

Saying things another way

2. Rearrange the words to make sentences.
   1. is / do / mean / of / order / out / radar / that / the / you?

   2. clarify / I’m / me / let / say / to / trying / what

   3. ‘unlawful interference’ / could / explain / just / means / what / you?

   4. basically / continue / need / so / heading / to / with / you / your / current

   5. do / mean / what / you?

   6. an / could / me / explanation / give / you?

   7. sure / I / that / not / I’m / understand

   8. an / give / can / example / me / you?

   9. allow / computer / doesn’t / fly / in / manually / other / pilot / the / the / to / words

   10. another / have / it / problem / put / serious / to / way / we / a

Giving instructions

3. Match the verbs 1–10 with the words or phrases a–j.
   1. access
   2. contact
   3. declare
   4. do
   5. follow
   6. keep
   7. lock
   8. request
   9. shut down
   10. try

   a. an emergency
   b. again
   c. the ECAM
   d. the instructions
   e. going
   f. descent
   g. ATC
   h. engine 1
   i. the cabin door
   j. a complete check
Vocabulary – Communications

1 Complete the sentences with the words in the box.

- communicate
- sequence
- voice
- understand
- text
- words
- send
- routine
- transmissions
- congestion
- repetition
- missed
- deliver

1. It is easier to ________ directly to a pilot rather than write a ________.
2. Datalink allows pilots and ATCs to ________ text messages for ________ communications.
3. The problem with ________ transmissions is that the speaker may be difficult to ________.
4. Datalink allows users to create ________ messages using their own ________.
5. Datalink has the potential to make ________ safe and fast and to reduce ________ on the frequency.
6. Datalink users just need to ________ from a list of ________ text messages.
7. Datalink systems ________ messages between pilots and controllers.
8. It can take time to match messages to ________ when messages get out of ________.
9. If controllers ________ clear traffic instructions, it reduces the need for ________.
10. Using a Datalink system could help with the problem of ________ voice ________.

Vocabulary from the unit

2 Complete the sentences with the verbs from the unit.

- afford
- allow
- avoid
- have
- help
- need
- permit
- required

1. Datalink exists to ________ to make communications more efficient.
2. Maintenance staff will ________ to conform to the new safety requirements whether they like it or not.
3. Air traffic controllers and pilots are ________ to undergo a medical check-up every two years.
4. The officials told the airline that they ________ to improve their current safety record immediately.
5. Commercial pilots are told to ________ flying through military-controlled airspace.
6. The airports agency simply can’t ________ to buy a second police service unit.
7. The on-board CCTV cameras ________ the pilots to see if there is a problem in the cabin without leaving the cockpit.
8. The recent regulations ________ all passengers to carry two items of hand luggage.

3 Complete the text with the verbs in the box. Use your dictionary to help you.

- adjusted
- features
- focus
- allows
- developed
- display
- eliminates
- employ
- utilizes

A glass cockpit is an aircraft cockpit that
(1) ________ electronic instrument displays.
(2) ________ relatively recently, glass cockpits are highly sought-after upgrades from traditional cockpits. Where a traditional cockpit (3) ________ numerous mechanical gauges to (4) ________ information, a glass cockpit (5) ________ several computer displays that can be (6) ________ to display flight information as (7) ________.
This (8) ________ aircraft operation and navigation and (9) ________ pilots to (10) ________ only on the most pertinent information. They are also highly popular with airline companies as they usually (11) ________ the need to (12) ________ a flight engineer.
Section one - Wildlife on the ground

1 Match the stories A-D with the subjects.
   Which one is about an animal?
   1 being transported illegally? —
   2 damaging an aircraft? —
   3 escaping inside a terminal? —
   4 damaging an airfield? —

2 Work in groups. Discuss the questions below.
   1 Do you know of any other incidents involving
      wildlife loose in airports? Tell the group.
   2 What is the most common problem involving
      wildlife at ground level at an airport you know?

3 Scan the report below to find what the following figures refer to.
   1 1/4 mile
   2 50 lb
   3 172
   4 $233,000,000
   5 97%

   the aircraft’s distance from O’Hare

Animals in the flight path

The Federal Aviation Administration (FAA) reported that two planes preparing to land at O’Hare International Airport aborted their landings after a pilot spotted coyotes near the runway. The flights, operated by United and American airlines, needed to go around, but landed safely on their second attempts. The pilots were about a quarter-mile from O’Hare with their landing gear down when they were warned. The pilot of a flight landing ahead of them saw the coyotes on the grass margins and alerted controllers.

It is not unusual for coyotes to end up on runways – they’re seen at O’Hare once or twice a week. Coyotes, which can weigh as much as 50 lb, can cause significant damage to aircraft. In October 2005, a 19-passenger Beechcraft 1900 turboprop hit a coyote on take-off at the Ogdenburg airport. The nose gear collapsed, and the plane skidded to a stop. It was declared a total loss, according to FAA records. The FAA said reports of planes hitting wildlife went up four times from 1,744 in 1990 to 7,136 in 2005 because there are more flights, more wildlife near airports and more reports from pilots. In the same period, 172 people were injured and nine died in such incidents, which resulted in $233 million in losses.

Coyotes know how live in the urban environment, and while fewer coyotes are trapped, more are coming closer to cities to hunt rabbits and birds. The coyotes can be detected by sensors and CCTV and then often need scaring away by airport security workers in cars. But the best way to keep coyotes away is to make sure that the airport’s perimeter fences are secure so they can’t dig under them.

Airplanes struck wildlife 66,392 times in the USA from 1990 to 2005. More than 97% of those incidents involved birds. Strikes involving other animals were: deer – 652; coyotes – 198; alligators – 14; house cats – 11.
4 Read the text again and decide if the sentences are true or false. Write T or F.

1 Pilots were warned about the animals 15 minutes before landing at O’Hare. ___
2 A Beechcraft 1900 arriving at Ogdensburg airport collided with a coyote. ___
3 Wildlife strikes went up 80% between 1990 and 2005. ___
4 Airport workers drive at coyotes to scare them away. ___
5 Wildlife strikes in the USA included some pets. ___

Vocabulary – Security measures

Match the words with the features a–h.

1 perimeter fence
2 CCTV camera
3 grass margin
4 bird scarer
5 security worker
6 bird of prey
7 poison

Functional English – Expressing necessity

1 Look back at the text and complete these sentences.

1 The flights _________ around.
2 The coyotes ... often _________ away by airport workers in cars.

We use need + to verb to say when it is necessary to do something. We can use need + verb -ing
to talk about how to improve or fix something without saying who will do it.

2 Work in pairs. Look at the vocabulary in the pictures and explain why each thing is necessary.
Use the language from 1.

3 Work in groups. Discuss the questions.

1 What do pilots and ATCs need to do to prevent bird or animal strikes?
2 How could the airport you know best improve its prevention of wildlife strikes?
Section two - Animals on the loose

1. Match the words with the pictures.
   1. containers
   2. pallets
   3. fork-lift truck
   4. cage
   5. hinge
   6. cargo net

2. Work in pairs. Discuss the questions.
   1. What animals are most often transported by air?
   2. What problems can animals cause on cargo aircraft?

3. 19 Listen to the conversation between pilot and ground crew, and answer the questions.
   1. What's the problem?
   2. What happens in the end?

4. 19 Listen again and underline the correct information.
   1. The flight is inbound / outbound.
   2. The cages are in the fore / aft hold.
   3. The ground crew are unloading / loading on the animals.
   4. The plane is due to take off / push back at 1255 / 1305.
   5. The pilot wants the ground crew to have a lock / go back in the hold.
   6. The bars / lock and hinge / floor of the cage broke.
   7. The pilot wants to call security / a vet.
Functional English – Expressing preferences

1 Work in pairs. Try to complete these sentences from the dialogue.

1. __________ miss our slot.
2. __________ know what’s going on in there before I make any decisions.
3. __________ this is what I __________ do.
4. __________ put themselves in danger.
5. __________ get some help with this.

2 Listen again and check, then listen again and repeat the sentences. Notice how to is pronounced.

3 Complete the sentences with the words in the box.

like to repeat prefer not to do like to cut
prefer people to speak like to give want to work
'd rather work want us to clean prefer to be
wants to do

1. __________ for our national airline someday.
2. I'd __________ long-haul flights, if possible.
3. I'd __________ based abroad.
4. Do you __________ the windshield?
5. I'd __________ down the number of hours I work.
6. We wouldn't __________ advice until we know your position.
7. I __________ slowly and clearly.
8. Nobody else __________ night flights, but I enjoy them.
9. Would you __________ that information?
10. I work for a large airline, but I __________ for a smaller one.

4 Use these expressions to make true sentences about your current job. Then work in pairs to talk about what you have written.

I don't want to __________
I wouldn't like to __________
I'd rather __________
I want someone to __________
I'd prefer to __________
I'd like to __________
I'd like my employers to __________

Pronunciation – Word endings

21 Listen and repeat the sentences, starting with the last word. Notice how the end of one word seems to join the beginning of the next.

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 Here are examples from the dialogues when people explain what words mean.

The thing that holds the door onto the cage is broken. We've got a cargo net for catching him.

Here are some more ways to describe an object. What thing are they describing?

It's made of steel.
It's something for moving large quantities of goods.
It's used to transport goods overseas.
This is something that helps companies operate worldwide.

2 Work in pairs. You are going to practise describing words. Student A, go to p 104, Student B, go to p 109.
Section three
-Bird strike

1 Work in pairs. Discuss what kinds of damage a bird strike can cause.

2 22,23,24 Listen to the recording and decide if the sentences are true or false. Write T or F.
   1 The plane is hit by four birds. ___
   2 The crew increases power on engines two and three. ___
   3 They can't see through the windshield clearly after the strike. ___
   4 The pilot has difficulty turning left. ___

3 Listen again and answer the questions.
   1 At what height does the plane strike the birds?
   2 How much fuel is on board?
   3 Why doesn't the pilot want to land immediately?
   4 What actions does the pilot intend to take next?

Pronunciation - Sentence stress 2

1 23 Listen to a section of the dialogue again, and complete the sentences.
   1 __________________________ strike! 6 ___________________ one.
   2 __________________________ birds! 7 ___________________ level.
   3 __________________________ running. 8 ___________________ one.
   4 __________________________ power? 9 ___________________ thrust.
   5 __________________________ left.

2 23 Listen again and underline the stressed syllables.

3 23 Listen again and repeat the sentences.

4 Work in pairs. Practise the section of dialogue, until you can do it without looking at your book.
Functional English – Saying intentions

1 24 Listen to a section of the recording again and complete the dialogue.

C S27H. Say (1) ________.
PNF What are we (2) ________ to do? Go around to the left?
PF Yes. I don’t (3) ________ to land with this much fuel on board. Turn left, dump fuel and get back down.
PNF We’re (4) ________ 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 (5) ________ to turn left.
T S27H. Understand you are unable to make right turns. Turn left at your (6) ________.
PNF Turning left, heading 340. S27H.
PF OK, we need to dump fuel as soon as possible.
PNF We (7) ________ to dump fuel to landing weight. S27H.

2 Complete the sentences with the words in the box.

going to are going not planning plan to you going to ask

1 We ________ to maintain 5,000 ft.
2 I intend ________ control to chase the geese off the runway.
3 I ________ have maintenance check the wings.
4 We aren’t ________ dump fuel until we’re nearer the airport.
5 I’m ________ to inform the passengers yet.
6 Are ________ to activate emergency services?

Speaking

Work in pairs. Student A, you are the pilot of WindAir 87. Student B, you are the ATC. Spend a few minutes thinking about what you are going to say, then act out the dialogue. Then change roles.
Section four - Language development

Functional English – Expressing necessity

1 Underline the correct form of the verb.
1 The cabin needs to clean / cleaning.
2 The controller needs to get / getting in contact with someone in the next sector.
3 The undercarriage of the Boeing 747 needs to repair / repairing.
4 We need to change / changing the current radio frequency.
5 The aircraft will need to refuel / refuelling on arrival at JFK.
6 Our technician needs to come / coming and fix the radar.
7 The landing gear needs to check / checking for any damage.
8 The emergency services need to park / parking near the end of the runway.
9 The windshield needs to replace / replacing as it has a big crack in it.
10 The trainee needs to spend / spending some time working in a different sector this week.

Expressing preferences

2 Express your preferences about the following things using the word in brackets.
1 work nights or days? (prefer)
2 travel on an Airbus A380 or on a Boeing 787 Dreamliner? (rather)
3 make voice transmissions or send text messages? (prefer)
4 work in a team or alone? (like)
5 speak English or your own language at work? (want)
6 fly long distances or short distances? (rather)
7 pilot a plane with or without passengers? (prefer)
8 regular hours or shifts? (not want)
9 deal with an unruly passenger or a sick passenger? (not like)
10 travel first class or economy class? (rather)

I'd prefer to work days because ...

Expressing unknown words

3 Complete descriptions 1–10 with words from the box, and match each one to an object a–j.

<table>
<thead>
<tr>
<th>'re made for</th>
<th>'s used to</th>
<th>made of</th>
<th>used to</th>
<th>something for</th>
<th>used to</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 It's ______ a strong synthetic fibre and foam.</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>2 It's ______ steering the plane.</td>
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<tr>
<td>3 It's ______ record flight data.</td>
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<tr>
<td>4 It's ______ helps controllers detect and track objects.</td>
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<tr>
<td>5 They ______ of glass.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 It's ______ detecting a possible fire.</td>
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<tr>
<td>7 It's ______ that cabin crew use to serve food and drinks.</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>8 It ______ to store luggage.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 It's what we ______ communicate with air traffic controllers.</td>
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<td></td>
</tr>
<tr>
<td>10 They ______ to help pilots and controllers to hear and speak easily.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a control column
b flight strip
c headsets
d lifejacket
e overhead locker
f radio
g smoke alarm
h trolley
i windshield
Saying intentions and expectations

4 Rearrange the words to create sentences expressing intentions or expectations.

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

Vocabulary – Security measures

1 Complete the sentences with the words from the box.

bird scarer CCTV cameras metal detectors perimeter fence poison
police unit security worker sensor sniff dog traps

1 A ________ is used in airports to detect illegal items in people’s luggage.
2 Every person boarding a flight must walk through ________.
3 A ________ is a piece of equipment that reacts to physical changes such as heat, light or movement.
4 ________ are sometimes used for catching animals near a runway.
5 A ________’s job is to protect a building and / or its surroundings.
6 A ________ is a structure made of wire that surrounds an airport for security.
7 ________ are placed around an airport to monitor what is happening.
8 A ________’s role is to frighten birds from the aerodrome airspace.
9 ________ is often used to kill animals or birds found near a runway.
10 Some airports have their own ________ to deal with any crimes on location.

Vocabulary from the unit

2 Rearrange the letters to find the synonyms of words from the unit.

1 eiksrt to hit
2 deijnru hurt
3 acellops to fall
4 raelt to warn
5 ehio crack
6 beknor out of order
7 aaddegm broken
8 egiinnost intake
9 accdehrst scraped
10 rtbsu punctured
Section one – Ultralight

1 Discuss in pairs. What’s the smallest aircraft you have:
   - flown?
   - flown in?
   - seen?

2 Work in pairs. Look at the picture of the GEN-H4 and guess the answers to the questions.
   1 What is it?
      a a gyrocopter
      b a helicopter
      c a hang-glider
   2 How many blades does it have?
   3 How is it powered?
   4 How fast can it fly?
   5 How is it controlled?
   6 Do you need to be a licensed pilot to fly it?
   7 How long does it take to assemble it?

3 Read the article from *Kitplane Monthly* magazine and compare your answers with the text.

The GEN- H4 is the smallest co-axial one-man helicopter in the world. It is equipped with miniature engines of 125 cc (8 HP) and two rotors, each with two blades. It can fly up to a maximum altitude of 1,000 m at a top speed of 90 kmh (59 mph) for up to 30 minutes. The rotors have a length of only 4 m (118 inches), so no parking problems.

The pilot controls the pitch, roll and yaw of the craft by means of a handlebar, using weight-shift to change direction. Pushing the throttle controls climb. As you add rpm, the fixed-pitch blades provide more lift. To move forward, you pull the handlebar toward you. You turn left or right by flicking a yaw switch with your left thumb, which changes the rotation of the two upper blades.

I first saw the GEN-H4 flying at the Newham Air Show, and it was impressive in action. The pilot climbed to about 100 ft, rolled to the right and performed a wide turn. He then straightened up and alternated pitching up and down. Sensibly there were no steep dives, but a controlled descent to just above the ground. After a further series of flight manoeuvres, he hovered above the runway before throttling back and sinking gently to the ground.

Because it falls into the ultralight category, you don’t need to be a licensed pilot to fly this machine. Training is not a lengthy process, but you will need several sets of spare rotor blades. One pilot said that when he was teaching himself to fly he went through four sets of blades before he learned to control the helicopter without tipping over.

There are no worldwide standard definitions for ultralight aircraft. So make sure you check the regulations in your own country before you buy. The GEN-H4 comes in kit form and can be assembled in 40 hours.
Functional English – Explaining how something works

Try to remember the missing words in these sentences from the article, then look back and check.

1 The pilot controls the pitch, roll and yaw of the craft ________
   a handlebar, ________ weight-shift to change direction.
2 ________ the throttle controls climb.
3 You turn left or right ________ a yaw switch with your left thumb.

2 Complete these sentences about basic control of a fixed-wing aircraft using the words in the box.

<table>
<thead>
<tr>
<th>adjust changes</th>
<th>by means of controls</th>
<th>by means of lowering movement</th>
<th>by moving</th>
<th>by raising</th>
<th>pushing turns</th>
</tr>
</thead>
</table>

1. Cockpit controls ________ the control surfaces ________ rods, cables and pulleys.
2. ________ the control yoke left or right ________ roll.
3. You control the rudder ________ pedals.
4. You ________ the pitch ________ the control column backwards or forwards.
5. ________ the left-hand pedal ________ the aircraft to the right.
6. The pilot ________ the pitch of the aircraft ________ or ________ the elevators.

Vocabulary – Manoeuvring an aircraft

1. Work in pairs. Look at each of the bold words in the text (pitch, roll, etc.) and use your hands to demonstrate them.

2. Take turns to answer the questions about the GEN-H4. Listen to your partner's answers and say if you agree.

   1. What do you do by increasing the revs?
   2. How do you turn left?
   3. What happens when you throttle back?
   4. How do you roll right?
   5. What happens if you shift your weight too quickly when taking off?
   6. How do you adjust the pitch of the aircraft?
   7. What do you do by keeping the throttle open and not shifting your weight?
   8. How do you land?

3. Tell your partner about the most unusual aircraft you've ever flown, or the most unusual vehicle you've ever driven or ridden in. How were its controls unusual?

Speaking

Work in small groups. Discuss the questions.

1. What are the regulations for ultralights in your country? Is it legal to fly a GEN-H4?
2. Should pilots have to be qualified before they are allowed to use ultralights?
3. What are the advantages and disadvantages of fixed wing aircraft compared to rotary wing aircraft?
4. Would you like to fly a GEN H4? Why / Why not?
Section two - Air race

1 Work in small groups. Discuss the questions.
   1 What do you know about the Red Bull air race?
   2 How are the racing aircraft different from conventional aircraft?
   3 Describe the most amazing aerobatic manoeuvres you have seen (not necessarily in an air race).

2 Listen to a radio interview with Brazilian world champion pilot Thiago Silvio Corbera. Number the manoeuvres 1-8 in the order he describes them.

3 Listen again and write the names of the manoeuvres he describes next to the pictures. The words you need are in the box (two words are not needed).

inside half barrel full outside death tail Cuban hammerhead slide loop spin roll eight

4 Listen again and answer the questions.
   1 Which is Thiago's favourite manoeuvre?
   2 Which is more important in an air race - speed or manoeuvres?
   3 What plane is Thiago flying?
   4 How much does Thiago's plane weigh?
   5 How many degrees do the control surfaces deflect as a minimum?
   6 What happened to Thiago in the 2007 race?
   7 How is Thiago feeling about today's race?
Vocabulary – Units of measurement

1 26 Work in pairs. Discuss how you say these units of measurement. Then listen and repeat.

<table>
<thead>
<tr>
<th>ft</th>
<th>m</th>
<th>ft²</th>
<th>km</th>
<th>f/m</th>
<th>°/s</th>
<th>kt</th>
</tr>
</thead>
<tbody>
<tr>
<td>gs</td>
<td>nm</td>
<td>m²</td>
<td>lb</td>
<td>kg</td>
<td>HP</td>
<td>m/m</td>
</tr>
</tbody>
</table>

2 27 Listen and complete the table with the specifications of Thiago’s aircraft.

<table>
<thead>
<tr>
<th>specifications</th>
<th>Extra 300s</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>non-metric</td>
</tr>
<tr>
<td>length</td>
<td>ft</td>
</tr>
<tr>
<td>height</td>
<td></td>
</tr>
<tr>
<td>weight (unladen)</td>
<td></td>
</tr>
<tr>
<td>wing area</td>
<td></td>
</tr>
<tr>
<td>g-rating</td>
<td>+/-</td>
</tr>
<tr>
<td>engine</td>
<td></td>
</tr>
<tr>
<td>max. speed / VNE</td>
<td></td>
</tr>
<tr>
<td>stall speed / VS</td>
<td></td>
</tr>
<tr>
<td>climb rate</td>
<td></td>
</tr>
<tr>
<td>roll rate</td>
<td></td>
</tr>
<tr>
<td>range</td>
<td></td>
</tr>
</tbody>
</table>

3 28 Discuss with your partner how to say these numbers in plain English. Then listen and repeat.

1 6.51
2 651
3 6,501

Speaking

You are going to exchange information about two more racing planes. Student A go to p 105. Student B go to p 109.

Functional English – Comparing and contrasting

1 Work in pairs. Discuss what the missing word is in each sentence.

1 The CAP 232 is longer ______ the MX2.
2 The Extra 300s is ______ longest.
3 The CAP 232 is a ______ heavier than the MX2.
4 The MX2 is the ______ powerful.
5 The Extra 300s’s range isn’t as great ______ the MX2’s.

2 Write two sentences comparing the racing planes using each of the adjectives in the box.

heavy powerful tall fast

3 Work in pairs. Discuss the questions. Try to use expressions from 1.

1 In your opinion, what plane has revolutionized air travel? How is / was it different from other planes?
2 What is your favourite type of plane? Why?
3 What is your favourite airport? Why?
Section three - Hydraulic Loss

1 Work in small groups. Discuss the questions.
   1 What problems can hydraulic failure cause for:
      a airborne aircraft?
      b air traffic control?
   2 Is hydraulic failure common? Why / Why not?
   3 Do you know of any incidents or accidents related to hydraulic problems?
   4 Make a list of the parts of an aircraft that can be affected by hydraulic failure.

2 29 Listen to the first part of a conversation between a pilot and an approach controller.
   Does the pilot mention any of the parts you listed?

3 Underline the correct words to complete the controller's summary of the situation.

   Executive 56 has (1) no / low pressure in their hydraulic system. It is difficult for the crew to control
   the (2) yaw / bank and the pitch of the aircraft. They can only make (3) small / big turns and they
   are using (4) asymmetrical thrust / the control surfaces to turn. They would like to try and fly
   (5) west / east of the airport for a (6) short / long final.

4 30 Tick (✓) the things you think will happen. Add two more. Then listen and check your answers.

   The crew will ...
   ■ execute a missed approach
   ■ be forced to ditch the aircraft in a field
   ■ adopt landing configuration to control speed and height
   ■

   The controller will ...
   ■ give the crew vectors to the runway
   ■ ask the pilot to switch frequency to the tower controller
   ■

5 31 Listen to the final exchange between the pilot and the controller.
   What happened to Executive 56 in the end?
Functional English – Expressing difficulty and offering help

32 Work in pairs. Try to remember some of the words and expressions that complete the sentences from the conversation. Then listen and complete the sentences.

1 We’re _________________ controlling the attitude.
2 It’s _________________ establish level flight.
3 Just tell me _________________ and _________________ for you.
4 We’re _________________ keep it straight and level.
5 _________________ emergency assistance at the far end of the runway?
6 _________________ line you up with the end of the runway right now?
7 We’re really _________________ follow a heading.
8 Is _________________ you need?

Pronunciation – Tonic stress

1 32 In Unit 3 we looked at how the words that carry most meaning in a sentence are stressed. In addition, the word that the speaker thinks is the most important carries even stronger emphasis than the others. Listen to how the intonation rises on the word attitude in the sentence.

*We’re having trouble controlling the attitude.*

2 32 Work in pairs. In sentences 2–8 of *Functional English*, discuss which word or part of a word you think should carry the most stress, and circle it. Then listen to the sentences again.

3 32 Listen and repeat the sentences. Then, with a partner, practise saying the sentences, concentrating on making your intonation rise on the most important word. Listen carefully and give feedback on your partner’s pronunciation.

Speaking – Helping a pilot in difficulty

1 Work in pairs. For each situation, decide what things the pilot is having difficulty with, and what help the air traffic controller could offer. Then roleplay the situations, using expressions from the unit.

<table>
<thead>
<tr>
<th>pilot having difficulty with</th>
<th>help offered by ATC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A light aircraft has landed in marginal weather and skidded off the runway onto the field.</td>
<td></td>
</tr>
<tr>
<td>2 A helicopter has total hydraulic failure.</td>
<td></td>
</tr>
</tbody>
</table>

2 Change partners and roleplay the situations again.
Section four - Language development

Functional English – Explaining how something works

1 Underline the correct option.
   1 A pilot is able to steer a plane by means of / by flight controls.
   2 Controllers are able to observe the progress of a flight through / with the use of radar.
   3 The second level in the Airbus A380 is accessed by the way of / by way of a curving set of stairs.
   4 Pilots keep unwanted passengers out of the cockpit by / with the use of locking the door.
   5 The Boeing 747 is powered by way of / by four engines.
   6 With the help of / By an escape chute, passengers and crew are able to evacuate the aircraft quickly.
   7 Flight safety is maintained through / using regular maintenance checks.
   8 Aerodrome controllers are able to see aircraft clearly by way of / with the help of binoculars.
   9 You climb and descend using / through the throttle controls.
   10 The presence of ice on aircraft wings is reduced through / by means of de-icing chemicals.

Comparing and contrasting

small → smaller   easy → easier   important → more important   far → farther / further

2 Change adjectives 1–10 to comparatives.
   1 bad → _________   6 short → _________
   2 quick → _________   7 windy → _________
   3 fast → _________   8 serious → _________
   4 good → _________   9 tall → _________
   5 busy → _________   10 urgent → _________

3 Complete the sentences using the words in the box. Not all the words are needed.

a bit   a lot more   as good as   as many as   farther than   fewer
longer than   more   most important   much heavier   powerful as

   1 Steel is ____________ than aluminium.
   2 The Airbus A320 is as ____________ the Boeing 747.
   3 An Airbus A380 is ____________ Concorde.
   4 French ATCs are ____________ as controllers in Germany.
   5 The ____________ function of an air traffic controller is to ensure the safe separation of air traffic.
   6 The Airbus A320 can carry ____________ passengers as the Boeing 747.
   7 A jumbo jet is able to fly ____________ a light aircraft.
   8 Captain Emery flew ____________ miles than Captain Roberts last year.

4 Complete the sentences by putting the adjective in the comparative form.
   1 Heathrow is much ____________ (busy) than London's other airports.
   2 They are making the airport ____________ (big) to accommodate increased traffic.
   3 Air travel was a lot ____________ (expensive) a few years ago.
   4 Air traffic control systems are getting ____________ (safe) all the time.
   5 Modern planes are ____________ (fuel-efficient) than planes thirty years ago.
   6 The flight was ____________ (long) than usual because there was a strong headwind.
Section four - Language development

Functional English – Explaining how something works

1. **Underline** the correct option.
   1. A pilot is able to steer a plane by means of / by flight controls.
   2. Controllers are able to observe the progress of a flight through / with the use of radar.
   3. The second level in the Airbus A380 is accessed by the way of / by way of a curving set of stairs.
   4. Pilots keep unwanted passengers out of the cockpit by / with the use of locking the door.
   5. The Boeing 747 is powered by way of / by four engines.
   6. With the help of / By an escape chute, passengers and crew are able to evacuate the aircraft quickly.
   7. Flight safety is maintained through / using regular maintenance checks.
   8. Aerodrome controllers are able to see aircraft clearly by way of / with the help of binoculars.
   9. You climb and descend using / through the throttle controls.
   10. The presence of ice on aircraft wings is reduced through / by means of de-icing chemicals.

Comparing and contrasting

<table>
<thead>
<tr>
<th>small</th>
<th>smaller</th>
<th>easy</th>
<th>easier</th>
<th>important</th>
<th>more important</th>
<th>far</th>
<th>farther / further</th>
</tr>
</thead>
</table>

2. **Change adjectives** 1–10 to comparatives.

   1. bad → ________
   2. quick → ________
   3. fast → ________
   4. good → ________
   5. busy → ________
   6. short → ________
   7. windy → ________
   8. serious → ________
   9. tall → ________
   10. urgent → ________

3. **Complete the sentences** using the words in the box. Not all the words are needed.

<table>
<thead>
<tr>
<th>a bit</th>
<th>a lot more</th>
<th>as good</th>
<th>as many</th>
<th>farther than</th>
<th>fewer</th>
<th>longer than</th>
<th>more</th>
<th>most important</th>
<th>much heavier</th>
<th>powerful as</th>
</tr>
</thead>
</table>

   1. Steel is __________ than aluminium.
   2. The Airbus A320 is as __________ the Boeing 747.
   3. An Airbus A380 is __________ Concorde.
   4. French ATCs are __________ as controllers in Germany.
   5. The __________ function of an air traffic controller is to ensure the safe separation of air traffic.
   6. The Airbus A320 can carry __________ passengers as the Boeing 747.
   7. A jumbo jet is able to fly __________ a light aircraft.
   8. Captain Emery flew __________ miles than Captain Roberts last year.

4. **Complete the sentences** by putting the adjective in the comparative form.

   1. Heathrow is much __________ (busy) than London’s other airports.
   2. They are making the airport __________ (big) to accommodate increased traffic.
   3. Air travel was a lot __________ (expensive) a few years ago.
   4. Air traffic control systems are getting __________ (safe) all the time.
   5. Modern planes are __________ (fuel-efficient) than planes thirty years ago.
   6. The flight was __________ (long) than usual because there was a strong headwind.
Expressing difficulty and offering assistance

5 Rearrange the words to make complete sentences.

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

Vocabulary – Manoeuvring an aircraft

1. Match the beginnings with the endings to make sentences.

   1. The pilot flew inside a loop and ...
   2. He did a full roll ...
   3. And then they yaw ...
   4. They lost control and started to ...
   5. Aerobatic manoeuvres involve ...
   6. You start a dive by pushing ...
   7. They increased power and climbed ...
   8. He eventually learnt to control the helicopter without ...
   9. In a GEN-H4 you twist ...
   10. The helicopter hovered above ...

   a. forward on the stick
   b. the helipad before landing.
   c. the throttle controls to climb.
   d. pitched up into a circle.
   e. several hundred feet.
   f. tipping over.
   g. by rotating 360°.
   h. 180° to a nose-down.
   i. lose altitude.
   j. a lot of training and skill.

Vocabulary from the unit

2. Rearrange the letters in the words from the unit to complete the definitions.

   1. An aeroplane is a **defix-ginw** aircraft.
   2. A helicopter is an example of **aortty-lgwn** aircraft.
   3. A **gahn-edgil** is a simple aircraft with no engine that you lie underneath and control by shifting your weight.
   4. A **lergid** is a light plane with no engine.
   5. A **wto ckrtu** or tug is a vehicle used to taxi aircraft.
   6. If something is **aegikin**, liquid or gas is coming out of it through a hole.
Section one - Is there a doctor on board?

1. Label the first-aid kit with the words from the box.
   - bandage
   - defibrillator
   - EpiPen
   - insulin pen
   - inhaler
   - plaster
   - splint

2. Match each of the events or injuries with the item of medical equipment that treats it.
   1. a severe allergic reaction
   2. a diabetic episode
   3. a cut
   4. a limb fracture
   5. a severe asthma attack
   6. a serious head injury
   7. a heart attack

3. Read the article. Match the sections A-E to events 1-7. Some sections may match more than one event.
   - A
   - B
   - C
   - D
   - E
   - G

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Is there a doctor on board?

A. You're midway through a routine flight, when suddenly a passenger collapses clutching his chest and struggling to breathe. This is one of the situations that cabin crew are trained to deal with, and aircraft are equipped for. So what are some of the most common medical emergencies?

This event - a heart attack - is the leading cause of in-flight death, and the leading medical cause of diversions. Medical kits include aspirin and a vasodilator spray to keep the blood flowing when there is chest pain. In case of cardiac arrest, cabin crew are trained to give CPR, while many airlines now also carry defibrillators to restart the heart. Cardiac monitors are used increasingly, so that data can be transmitted to medical advisors on the ground.

B. A large number of diversions are caused by injuries to passengers. Items falling from the overhead storage bins are a common cause of head injury, while unexpected turbulence can easily result in broken bones. First-aid kits are equipped with splints and bandages to stabilize limbs, as well as plasters for minor cuts.

C. Asthma is a common condition that can be life-threatening, especially when the sufferer's inhaler is in the baggage hold. In addition to oxygen, bronchodilators and adrenaline are kept in order to open up the airways.

D. Dangerous breathing problems can also result from severe allergic reaction, which worries airlines so much that some no longer serve peanuts. Most carry EpiPens, as well as antihistamine and adrenaline to prevent anaphylactic shock.

E. Most medical kits contain glucose and glucagon injections to treat passengers who suffer hypoglycaemic episodes. The disruption of regular eating habits can lead to a dangerous drop in blood sugar levels.
4 Read the article again and answer the questions.
   1. What event causes most deaths on board planes?
   2. What are the two main causes of injury?
   3. When can asthma be especially dangerous on flights?
   4. What have some airlines done to prevent dangerous allergic reactions?
   5. Why do diabetics sometimes have problems when flying?

5 Work in pairs. Discuss the questions.
   1. Have you received training to deal with medical emergencies?
      What were the most important things you learned?
   2. Have you ever witnessed a medical emergency in your job? What happened?

Functional English – Expressing cause and effect

Try to remember the words and expressions from the article, then look back to check.

1. This is the _______ of in-flight death.
2. A large number of diversions are _______ injuries to passengers.
3. Unexpected turbulence can easily _______ broken bones.
4. Dangerous breathing problems can also _______ severe allergic reaction.
5. The disruption of regular eating habits can _______ a dangerous drop in blood sugar levels.

Vocabulary – Medical emergencies

Match the words in **bold** in the text with a definition below.

1. the tubes in the body that we breathe through
2. a sudden attack of an illness
3. a box containing emergency medical supplies
4. the arms and legs
5. a machine for checking how well the heart is working
6. a sudden and extremely dangerous allergic reaction
7. the sudden stopping of the heart
8. a small measure of medicine for putting into the body through a needle

Speaking – Saving the life of your airline

1. Read the situation.

   You work for a small airline which has had to make a record number of diversions due to medical emergencies in the past year. As a result, it is in serious financial trouble, and it must avoid any more diversions. It has offered a prize for the best suggestions to help it achieve this.

   Work in pairs. Think of five inexpensive measures it can take to achieve this. Write down your ideas as five action points. Be creative!

2. Share your ideas with the group. Vote on the five most original.
Section two - Stressed?

1 Match the adjectives with their definitions.

1 run down
2 stressed
3 overworked
4 exhausted
5 worried
6 irritable
7 down
8 unfocused

a extremely tired
b a bit depressed
c feeling under pressure
d anxious about something
e having to work more than you are able to
f unable to concentrate
g unhealthy because of too little sleep and too much work
h easily annoyed

2 Choose three of the adjectives. Tell your partner about the last time your work made you feel like that.

3 Make a list of things that can cause someone stress in their life.

4 🌀 33 Listen to part of a workshop on "Dealing with stress", and tick (✔) the reasons you listed that are mentioned.

5 🌀 33 Listen again and note down the ways for dealing with stress that people suggest.

6 Work in pairs. Discuss the questions.

1 Does stress often affect people in your job? Why / Why not?
2 What tells you that a colleague is becoming stressed?
3 What can an employer do to reduce stress in its employees?

Functional English – Making suggestions and giving advice

1 🌀 33 Work in pairs. Try and remember the words and expressions from the workshop.
Then listen again and check.

1 _______ identify the sources of stress.
2 Some experts _______ keeping a diary ...
3 You _______ try and take holidays from work regularly ...
4 I think _______ to talk to a friend about your problems and feelings.
5 ... you _______ get professional help on how to deal with it.
6 For me, the _______ dealing with stress is to make sure you exercise, eat and sleep well.
7 And if you can't sleep at all, well, then _______ see your doctor.
8 _______ is to try and make more time for those things you enjoy.
9 I _______ a stressed friend or colleague to try some stress-reducing techniques ...

2 Complete these sentences giving advice about minimizing the effects of jet lag using the words in the box.

advise can help may want shouldn't suggest suggest try and

1 You _______ take a nap when you arrive.
2 I _______ you drink plenty of water before, during and after the flight.
3 It _______ to take a melatonin supplement when you arrive.
4 You _______ to keep to your home schedule on a short trip.
5 I _______ scheduling important meetings to times that correspond to waking times at home.
6 _______ avoid light at times when it would be dark at home.
7 I would _______ you to avoid heavy meals at a time when you would have a light meal at home.
Pronunciation – Consonant clusters 1

1 34 Words beginning with more than one consonant can cause misunderstandings. Listen and repeat these words from the workshop.

stress pressure spending flaps flight breakdown specific plans

2 35 Rearrange the words to form sentences. Then listen and check your answers. Practise saying the sentences with the recording.

1 still / we're / to / get / slot / a / struggling

2 light / brake / the / blinking / is

3 enough / drive / on / to / is / runway / the / dry ?

4 need / are / frozen / and / flaps / freeing / the

5 the / wipe / grease / the / I'll / glass / off

6 tried / to / I've / the / fixed / twice / trouble

7 threat / country / throughout / of / there's / strikes / a / the

Speaking – Giving advice

1 Work with a partner who does the same job as you. As an experienced worker, you have been asked to prepare a short talk on ‘Minimizing stress’ for people just starting their career. Identify the times when they can expect to feel stressed, and prepare a number of tips to help them deal with this.

2 Form small groups. Give your talk to the group.
Section three — Medical emergency

1. Listen to the dialogue and answer the questions.
   1. Who do the flight crew contact and speak to?
   2. Why do they speak to these people?
   3. What activity caused the passenger's illness?

2. Listen again and underline the correct information.
   1. The sick passenger is Belgian / Egyptian.
   2. The flight is on its way to / departing from Egypt.
   3. The sick passenger is about 19 / 29 years old.
   4. The sick passenger is sitting at the front / back of the plane.
   5. He has been on holiday / a business trip for five / ten days.
   6. The flight's planned destination is France / somewhere on the Red Sea.
   7. The flight has been airborne for 50 / 15 minutes.
   8. The medical advisor tells the captain to return to the airport / descend immediately.

3. What are the passenger's symptoms? Listen again and tick (✓) the symptoms you hear.
   - trouble breathing  - shaking  - very pale  - in great pain
   - coughing blood  - sweating  - vomiting  - losing consciousness

Functional English — Giving and asking for updates

1. The crew update the medical advisor with the latest news of the situation.
   Work in pairs. Try to remember the missing words, then listen and check.
   1. We __________ moved the other passengers away.
   2. __________ removed his seat belt?
   3. We __________ found anything else __________.
   4. __________ eaten or drunk anything?
   5. I ________________ looked in his hand luggage.

2. Discuss the questions.
   1. What tense is used in these sentences.
   2. How is it formed?

3. Complete the dialogue using the expressions in the box.

<table>
<thead>
<tr>
<th>'ve already done</th>
<th>has fallen</th>
<th>'s cut</th>
<th>haven't taken it yet</th>
<th>'s lost</th>
<th>hasn't stopped yet</th>
<th>'s just regained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captain</td>
<td>A laptop (1) ____________ on an elderly female passenger. She (2) ____________ her head very badly. She (3) ____________ consciousness.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical advisor</td>
<td>Has the bleeding stopped?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Captain</td>
<td>No, it (4) ______________.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical advisor</td>
<td>You need to put a bandage on it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Captain</td>
<td>We (5) ______________ that. It's still bleeding though.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical advisor</td>
<td>How's her pulse?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Captain</td>
<td>We (6) ______________. Ah – she (7) ____________ consciousness.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical advisor</td>
<td>That's good. You can give her oxygen if necessary.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pronunciation – Intonation of lists

1. Listen to the sentence from the dialogue and notice the intonation.
   
   *He's having difficulty breathing, he's shaking badly and his eyes are shut.*

2. Draw an arrow or to show where the intonation rises and falls in the following lists.

   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.

3. Listen and check your answers, then listen and repeat.

Speaking

1. Work in pairs. For each of the medical problems below, share your knowledge to write a list of three symptoms you would expect someone to have. Then, write a list of actions that should be taken to help the person.

<table>
<thead>
<tr>
<th>condition</th>
<th>symptoms</th>
<th>actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>heart attack</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hypoglycaemic episode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fractured arm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>severe allergic reaction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Change partners. Roleplay the situations, inventing details where necessary. Take turns to be the captain and the medical advisor.
Section four - Language development

Functional English – Expressing cause and effect

1. Complete sentences 1–10 with the prepositions from the box.
   from in by of to
   1. An epileptic fit is caused ______ a sudden burst of excess electrical activity in the brain.
   2. Excessive alcohol consumption is the leading cause ______ air rage.
   3. Poor judgement by the pilot almost resulted ______ a fatal incident.
   4. Several flights have been diverted as a result ______ storms.
   5. For controllers and pilots, lack of sleep can lead ______ errors.
   6. Aviation accidents are often caused ______ human error.
   7. Better training for flight crew resulted ______ fewer passenger fatalities.
   8. The leading cause ______ flight delays is poor air traffic management.
   9. Better flight safety has resulted ______ improvements in technology.

Making suggestions and giving advice

2. Underline the correct option.
   1. You won’t be able to board the plane, sir. Please try to calm down / calming down.
   2. You should take / taking a thick coat and a hat, because Moscow is cold.
   3. She was advised to go / going to passport control immediately.
   4. Due to the reported severe turbulence, they suggested to follow / following a revised flight path.
   5. To avoid deep vein thrombosis, it can help to walk / walking around the cabin during the flight.
   6. The passenger had a very bad headache, so the flight attendant suggested take / taking an aspirin.
   7. It’s a good idea to go / going through the passenger’s belongings to see if they are taking any medication.
   8. A good way of stabilize / stabilizing a broken limb is to use a splint.
   9. You may want to move / moving the patient to the rear of the plane, away from the other passengers.
   10. Try giving / to give the passenger an aspirin – that may relieve his chest pain.

Giving and asking for updates

3. Rearrange the words to make complete sentences.
   1. stopped / he / yet / has / vomiting ?
   2. any / began / have / idea / symptoms / the / when / you ?
   3. and / blood / fallen / has / pressure / he / his / looks / pale / very
   4. already / to / I’ve / MedLink / spoken
   5. into / I’ve / just / recovery / passenger / position / put / the / the
   6. yet / bleeding / the / stopped / hasn’t
   7. and / cut / has / head / his / immediately / needs / passenger / the / treating
   8. has / consciousness / the / regained / just / passenger
Vocabulary – Medical emergencies

1 Match the emergencies 1–7 with their synonyms a–g.

1 an allergic reaction a broken bone
2 a diabetic episode b early labour
3 air rage c hypoglycaemic episode
d cardiac arrest
e an agitated or violent passenger
5 a fracture f breathing problems
g anaphylactic shock
6 premature childbirth
7 a heart attack

2 Complete the sentences with an item from each box.

give open up stabilize inject struggling go restart
airways labour limb CPR breathe insulin heart

1. In the case of a broken leg, the first thing to do is **stabilize** the **limb**.
2. Women in late pregnancy are discouraged from flying in case they **go** into **labour**.
3. Diabetics have to **inject** themselves with **insulin** to control their blood sugar levels.
4. Cabin crew are trained to **provide** CPR in case of a heart attack.
5. A defibrillator can be used to **restart** the **heart** if it stops beating.
6. Asthma sufferers can carry an inhaler to **open up** the **airways** if they have an attack.
7. An oxygen mask will help a passenger who is **struggling** to **breathe**.

3 Complete the sentences 1–10 with the words from the box.
adrenaline antihistamine aspirin bandage CPR defibrillator EpiPen inhaler plaster splint

1. A(n) **plaster** is a long thin piece of cloth that you wrap around an injured part of your body.
2. Cabin crew are trained to give **CPR** in case of cardiac arrest.
3. A(n) **splint** is a piece of metal, plastic, or wood that is put next to a broken bone in order to hold it in place.
4. A thin piece of cloth or plastic that sticks to your skin to cover a cut is called a(n) **bandage**.
5. A(n) **aspirin** is often used by asthma sufferers.
6. **Antihistamine** is a drug that cures minor pain or that is used to improve the blood flow when a patient complains of chest pain.
7. **Adrenaline** and **aspirin** are administered using an **EpiPen** can be used to prevent anaphylactic shock.
8. A(n) **defibrillator** is a machine that gives an electric shock to a patient to restore normal heart rhythm.
Section one - Fire risk

1. Work in pairs. Discuss the questions.
   1. What do you think is the most common cause of fires on board planes?
   2. What incidents caused by fire have you heard about?
   3. What training have you received for dealing with fires?

2. You are going to read dangerous goods incident reports from the Australian Civil Aviation Authority. Read the stories, and match each incident with a story. Write A–H.

In which incident:
1. was fire started by metal touching metal?
2. did someone try to illegally ship explosive powder?
3. did the movement of the aircraft cause a fire?
4. did leakage cause a dangerous chemical reaction?
5. was a fire discovered after landing?
6. did heat from a chemical reaction start a fire?
7. did an explosion in the hold cause a plane to crash?
8. did a passenger accidentally bring a dangerous item on board?

DANGEROUS GOODS INCIDENTS REPORT

A. On arriving at the destination, one passenger’s bag had smoke coming out of it. A check by the airline revealed that a cigarette lighter had ignited and burned some of the clothing.

B. An aircraft crashed due to a flammable liquid - possibly perfume - leaking in a passenger’s stowed baggage. An ignition source set light to the liquid, causing an explosion.

C. A courier driver arrived at a freight-forwarder’s premises and asked to pick up a large crate which contained an explosive material in the form of a black powder. The owner knew it was prohibited, and was already in trouble with the police for collecting a briefcase full of fireworks from the airport two days earlier.

D. Federal police were called to a baggage carousel at an international airport to check an unclaimed bag. An inspection of the contents revealed a fire extinguisher and a packet of sandwiches. It was finally discovered that a passenger had accidentally taken a taxi driver’s bag from the car and didn’t notice that he checked in an additional bag.

E. A shipper consigned a wet-cell battery, undeclared as dangerous goods. Before consignment he emptied the acid out of the battery. But he also placed a brake cable in the same package. On arrival of the aircraft, smoke from the package set off a smoke detector because the brake cable had caused a short circuit of the terminals.

F. In a cargo hangar, a container ignited. One item of cargo in the container was an oxygen generator, undeclared as dangerous goods. These devices produce oxygen by chemical reaction, which creates significant heat.

G. Undeclared dangerous goods tested as 'laundry products' contained a mixture of a chemical solution and corrosive solids. It was loaded on its side in the cargo compartment and the liquid leaked on to the solids, causing a very hot fire.

H. While unloading baggage, ground staff noticed smoke rising from a suitcase. Investigation revealed the quantity of matches that had ignited due to vibration in the hold.
3 Decide if the sentences are true or false. Write T or F. Then read the text again to check.

1 In incident A, the cigarette lighter caught fire first.
2 In incident B, a spark may have set the perfume alight.
3 In incident C, the courier driver had fireworks in his truck.
4 In incident D, the passenger was a taxi driver.
5 In incident E, the shipper hadn’t taken any precautions.
6 In incident F, heat from the aircraft ignited oxygen.
7 In incident G, the goods were incorrectly loaded in the hold.
8 In incident H, ground staff immediately knew the cause of the fire.

Vocabulary – collocations related to fire

Match a word on the left with a word on the right to make collocations from the incident reports.

1 cigarette  a circuit
2 fire  b reaction
3 corrosive  c liquid
4 ignition  d extinguisher
5 chemical  e solids
6 smoke  f lighter
7 flammable  g source
8 dangerous  h material
9 explosive  i goods
10 short  j detector

Functional English – Obligation, prohibition and permission

1 01 Listen to a spokeswoman from the Australian CAA commenting on the dangerous goods reports. Underline the correct information.
   Many / Not many passengers fly with dangerous goods by mistake.
   Correctly-declared goods cause hardly any / most fires.
   Airport staff should possibly be better trained in dealing with fires / dangerous goods.

2 01 Listen again and complete the sentences.
   1 Most passengers know what they _________ and _________ bring into an airport.
   2 It’s obvious that you _________ bring anything explosive on board.
   3 Although some people still try, even when they know it’s _________.
   4 The owner of the black powder knew he wasn’t _________ transport it without declaring it as dangerous goods.
   5 You _________ declare dangerous goods or you are _________.
   6 It’s difficult to understand, for example, how someone _________ chemical solutions and corrosive solids on board.

Speaking

Section two - Smoke-jumper

1. Below are some words and phrases for describing fires. Put each one into the correct column.

| spread go out | contain a fire burn | extinguish a fire spray fire retardant liquid | set something on fire smoulder catch fire ignite | put out a fire explode |

<table>
<thead>
<tr>
<th>start</th>
<th>continue</th>
<th>stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>set something on fire</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Work in pairs. Look at the pictures. Tell the story. Use the words in exercise 1.

3. Work in pairs. Look at the photographs of the aerial fire service in action at the top of the page. Discuss the questions.

   1. In what type of environment would they be needed?
   2. How do they tackle fires from the air and on the ground?

4. 02 Listen to a radio feature about an aerial fire service.
   What are the jobs of the three people who talk to the radio presenter?
5 02. Listen again and underline the correct information.
1  This aerial fire service operates in Mongolia / Siberia.
2  Wild fires are usually caused by natural phenomena / human activity.
3  Wild fires start because the forest is dry / people are careless.
4  Summer / Autumn is the busiest time of year.
5  In order to make a safe drop, the pilot sometimes has to make two or three circuits / must keep upwind of the fire.
6  For the smoke-jumper, extinguishing the fire / finding a way out of the forest is the most difficult thing.

Functional English – Orders and requests
1 03. Complete the sentences from the radio feature, then listen and check.
1  ________, your full kit.
2  ________ for inspection.
3  ________, your work to us?
4  ________ us how fires are caused?
5  ________ about your work on the ground?
6  Jumpers, ________ talk! ________ ready ... drop zone!

2  Work in pairs. Discuss the questions.
1  Which sentences sound polite? Why?
2  Would you use similar expressions and intonation in your language to make a polite request?

3 03. Listen again and repeat the sentences.

4  We often use get in place of verbs of movement in orders. Make the following polite requests into orders with get.
1  Could you exit the runway, please?
2  Would you bring me some water, please?
3  Could you move away from the aircraft, please?
4  Could you leave the aircraft as quickly as possible?
5  Can you find a fire extinguisher, please?
6  Would you put on your mask, please?

5  Work in groups. One student make a series of orders and polite requests in the same way.
Other students obey polite requests, but not orders.

Speaking

Work in pairs. Discuss the questions.
1  Do you have an aerial firefighting service in your country? Why / Why not?
2  Would you like to work in aerial firefighting operations? Why / Why not?
Section three - On-board fire

1. Compete the sentences with the verbs below.

<table>
<thead>
<tr>
<th>verb</th>
<th>come loose</th>
<th>set off</th>
<th>reset</th>
<th>overheated</th>
<th>trips</th>
<th>short-circuit</th>
<th>overloaded</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The fan has ________ - there's smoke coming from it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>If anyone smokes in the toilet, it will ________ the smoke detector.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>This outlet is ________, so we need to unplug a couple of things.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Some wiring has ________ and needs securing in place.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Water has got into the wires and caused the system to ________.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>If the circuit-breaker ________, you need to ________ it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Work in small groups. When a fire is discovered during a flight, is it more important to fight the fire or land the plane? Why?

3. 04,05,06 Listen to intra-cockpit and radio-telephony communications from a B747 in the cruise phase of flight. Tick (✓) the things that the crew do.

- put on their oxygen masks
- inform air traffic control about the problem
- investigate the cause of the fire
- try to extinguish the fire
- make an announcement to passengers
- initiate an emergency descent

4. 04,05,06 Listen again and answer the questions.

1. How do the crew first realize there is a problem?
2. What does the pilot think the cause could be?
3. Where is the smell coming from?
4. How do they deal with the passengers who feel uncomfortable?
5. What two possible causes does the cabin crew manager mention?
6. What equipment does the cabin crew manager put on before investigating again?

Pronunciation – /l/ and /r/

1. 07 Listen to six words. Write A or B, according to the word you hear.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>right</td>
<td>light</td>
</tr>
<tr>
<td>fright</td>
<td>flight</td>
</tr>
<tr>
<td>frame</td>
<td>flame</td>
</tr>
<tr>
<td>wrong</td>
<td>long</td>
</tr>
<tr>
<td>road</td>
<td>load</td>
</tr>
<tr>
<td>arrive</td>
<td>alive</td>
</tr>
</tbody>
</table>

2. 07 Listen again and repeat the words.

3. Work in pairs. Take turns to read one word from each line. The person listening must say if they hear A or B.

4. Now practise these sentences.

1. The right light is broken.
2. We had a fright when the flight landed heavily.
3. The flame came from the air frame.
4. The pilot flying took a wrong turn.
5. They'll transport the load by road.
6. All systems must be upgraded or replaced.
7. I was glad to arrive alive.
8. File the report on the fire.
Functional English – Identifying and responding to problems

Complete the extracts from the dialogue with the words below. Then listen and check.

1 05

<table>
<thead>
<tr>
<th>happened</th>
<th>I’ll try</th>
<th>what</th>
<th>overheated</th>
<th>I’ll ask</th>
<th>problem</th>
<th>where’s</th>
<th>tripped</th>
</tr>
</thead>
<tbody>
<tr>
<td>PF</td>
<td>(1) __________ was that? This isn’t right.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNF</td>
<td>What’s (2) __________?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PF</td>
<td>Three circuit-breakers have (3) __________. They’re showing a (4) __________.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNF</td>
<td>(5) __________ the problem?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PF</td>
<td>In one of the washrooms. Maybe the fan (6) __________.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>PNF</td>
<td>(7) __________ the cabin crew manager to look into it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PF</td>
<td>(8) __________ and reset the circuit-breakers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 06

<table>
<thead>
<tr>
<th>trouble</th>
<th>why</th>
<th>smoke’s</th>
<th>have to</th>
<th>can’t</th>
<th>initiating</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>(1) __________ get back there.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNF</td>
<td>(2) __________ not?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>The (3) __________ too heavy.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNF</td>
<td>Are the passengers OK?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>People are starting to have (4) __________ breathing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNF</td>
<td>We (5) __________ go down.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PF</td>
<td>(6) __________ an emergency descent.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Speaking

1 The flow chart shows the pattern of communication in the two dialogues in the Functional English section. Complete the boxes with the appropriate statement. The first one has been done for you.

Say what the problem is
Announce action (x2)
Request clarification
Say there is a problem
Request further clarification
Give more information

2 Work in pairs. Use the prompts to make dialogues based on the flow chart pattern. Invent your own details.

1 There is a smell of burning plastic in the galley
2 The floor in business class feels hot.
3 There are sparks under the instrument panel.
4 There is smoke coming from a bag in an overhead locker.
Section four – Language development

Functional English – Obligation, prohibition and permission

1 Complete the sentences with the words and phrases in the box. In some cases, more than one answer is possible.

- breaking the law
- can and can't
- have to
- illegal
- let
- mustn't
- not allowed
- permitted
- prohibited
- required

1. It is __________ to smoke in the washroom.
2. Passengers are not __________ to enter the cockpit at any time.
3. You are __________ to leave your seat during take-off and landing.
4. Carrying anything explosive onto a plane is __________.
5. The cabin crew __________ inform passengers of safety procedures in the event of an accident at the beginning of every flight.
6. All passengers flying to and from the US are __________ to carry a machine-readable passport.
7. The man was not __________ on board because he appeared to be carrying suspicious goods in his hand luggage.
8. It is __________ to fly a plane without a license.
9. Hand luggage to be taken into the cabin __________ contain any dangerous or flammable items.
10. Flight regulations clearly state what passengers __________ bring onto a plane.

Functional English – Orders and requests

2 Rearrange the words to make orders.

1. immediately / fasten / passengers / seatbelts / tell / the / their / to

2. don't / hot / it / it's / so / touch / very

3. tell / severe / we / passenger / MedLink / have / and / burns / call / them / a / with

4. about / and / contact / emergency / problem / services / tell / the / the / them

5. engine / down / two / number / shut

6. aerodrome / inform / nearest / of / pilot / the / the

7. from / passengers / stop / the / the / using / washroom

8. as / as / get / of / out / plane / possible / quickly / the

3 Make the following orders into polite requests. Use the verbs in brackets.

1. Get me some water! (bring)
2. Quick! Get a fire extinguisher! (find)
3. Get off the runway! (exit)
4. Get your seatbelts on! (fasten)
5. Get on your masks! (put on)
6. Get ATC on the radio! (contact)
7. Find the checklist for fire! (look for)
8. Tell me more! (give)
9. Don't bother the pilot! (disturb)
10. Tell me where the nearest aerodrome is. (let know)
Identifying and responding to problems

4 Find and correct the mistake in each sentence.

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

Vocabulary – collocations related to fire

1 Match the beginnings with endings to make sentences.

1 The controllers alerted the ...
2 One of the tyres caught ...
3 It took eleven firefighters to contain ...
4 The flight attendant tried his best to extinguish ...
5 The pilots could see ...
6 The emergency fire service sprayed the empanelage of the plane with ...
7 Two fire services were involved in attempting to tackle the ...
8 A passenger thought he could smell burning ...
9 There should be several fire ...
10 The flames completely ...

a blaze at San Francisco airport.
b plastic near his seat.
c engulfed the plane just seconds after everyone had been evacuated.
d the small fire in the washroom.
e extinguishers on every plane.
f fire on landing.
g the fire on the runway.
h smoke coming from under the cockpit door.
i emergency services as soon as they realized there was a problem.
j foam.

Vocabulary from the unit

2 Rearrange the letters in the words from the unit to match the definitions.

1 adeprs (of fire) to gradually affect a larger area
2 est tof to cause something to operate or to explode
3 delmorsu to burn slowly, producing smoke but no flames
4 egliit to start to burn, or to make something start to burn
5 horst cciirtu a bad electrical connection that prevents a piece of equipment from working
6 efir gruinehtesix a foam-filled container that is used to put out a fire
7 xegnoy akms an object that fits over your face and is used for helping you to breathe normally
8 oehs a very long tube that water can flow through
Section one - Microburst

1 Match the descriptions below with letters A-E in the diagram.

1 Tailwind increases
2 The aircraft has increased lift
3 Headwind increases
4 The aircraft suddenly loses lift and air speed
5 A downdraft of cold air

2 Read the text and decide if the sentences are true or false. Write T or F.

1 Flight 191 landed on a short runway.
2 The problem was caused by fast-moving cold air.
3 Ted Fujida piloted a plane through a microburst.
4 American pilots found a method for surviving a microburst.
Microbursts – a battle against nature

As Delta Airlines Flight 191 approached Dallas-Fort Worth airport on a hot summer’s day in 1985, it flew into a thunderstorm. The storm quickly got worse, and the crew noticed that something extremely strange was beginning to happen. At 800 ft, they suddenly began to lose control of the plane’s speed, which increased to 175 kt without any throttle. Just as suddenly, the speed dropped to 119 kt, even though the pilot was applying full power. To prevent a stall, the pilot pushed the nose down. The plane could not gain height, and came down far short of the runway. The freak weather that brought down Flight 191 was a microburst. Millions of dollars have been spent on pilot training and detection systems to ensure that planes can now survive this dangerous phenomenon.

A microburst is essentially a shaft of fast-moving cold air that hits the earth from high up in the atmosphere, then explodes upwards and outwards. A low-flying plane encountering this would fly first into a strong headwind, then a downdraught, then a fierce tailwind, which forces it to lose height rapidly. A microburst is caused when a thunderstorm carries massive amounts of warm air high into the atmosphere on its strong updraughts. This air then cools and becomes heavier, causing it to plunge to earth.

The first person to suspect the existence of this phenomenon was a researcher called Ted Fujida, who was flying over a Siberian forest in 1972 when he observed how tens of thousands of trees had been blown down in a pattern radiating outwards from a single point. He knew that the cause could not be a massive tornado, as the crew said, because a tornado follows a path. Research into the phenomenon began, but progress was quite slow until the 80s, when research by NASA gave us an understanding of how microbursts are caused, and it was recognized that even a large aircraft could not survive them.

The survival technique that pilots are taught today was developed by two American pilots in the 1980s. The required action goes against natural instincts – apply full power and pull the nose up at least 15° until the stall warning is triggered, and then hold on through the turbulence. Without doubt, the insight and determination of the people who first recognized and studied microbursts thirty years ago has saved the lives of thousands of passengers.

3 Read the text again and answer the questions.
1. What effect did the microburst have on the speed of flight 191?
2. How did the crew try to avoid stalling the aircraft?
3. In your own words, how is a microburst formed?
4. What effects does a microburst have on a low-flying aircraft?
5. How did Ted Fujida know a tornado did not damage the forest?
6. How do pilots today deal with microbursts?

2 Underline the best adjective to complete the sentences.
1. It’s very / absolutely freezing in winter in Siberia, and you need a fur hat.
2. Libya is extremely / not at all hot for most of the year, which can cause overheating problems.
3. It gets quite / extremely cold at night, but the temperature never falls below freezing.
4. You get some really / very incredible storms in the mountains.
5. The runway can be absolutely / pretty slippery, even after the snow is cleared.

Functional English – Changing the strength of adjectives

We can use adverbs to make an adjective weaker or stronger.
... something extremely strange was beginning to happen.
... progress was quite slow ...

Or we can use an extreme adjective.

a massive tornado

1 Number these words or expressions from 1 (weakest) to 6 (strongest).

really / absolutely huge

not big at all

quite / fairly / pretty big

does not apply

very / really big

hug

extremely big

Work in groups. Talk about the most extreme weather conditions you have experienced. Talk about:
• when and where they happened
• how bad the weather was
• what happened
• what happened at the end of the story
• any developments / results of this.
Section two - Airport disruption

1 Match the words below with the pictures of weather conditions.
   thunderstorm —
   gale —
   monsoon —
   fog —
   hurricane —
   hailstorm —

2 Work in pairs. Discuss which weather type(s) you could find in:
   1 a tropical area
   2 a northern coastal area
   3 an inland area.

3 Match the words with the definitions.
   1 visibility
   2 slippery
   3 overcast
   4 sticky
   5 unstable
   a (of a surface) difficult to move on because it is wet or smooth
   b used to describe weather that keeps changing
   c how far you can see, depending on weather conditions
   d used to describe weather that makes you feel hot and uncomfortable
   e completely cloudy, so that you cannot see the sun

4 Listen to four weather descriptions. Number the places on the map in the order you hear them.

5 Listen again and make notes to complete the chart.

<table>
<thead>
<tr>
<th></th>
<th>Bristol</th>
<th>Almaty</th>
<th>Kerala</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td>overcast</td>
<td>drizzle</td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevailing wind</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warning</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Vocabulary – Weather words

Match the adjectives with the nouns that they describe.

<table>
<thead>
<tr>
<th>good (x2)</th>
<th>humid</th>
<th>mild</th>
<th>stormy (x2)</th>
<th>rough</th>
<th>smooth</th>
<th>overcast</th>
<th>clear</th>
<th>strong</th>
<th>light (x2)</th>
<th>heavy</th>
<th>poor</th>
<th>freezing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 weather conditions                       humid / _______ / _______ / _______</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>2 an approach                               _______ / _______ / _______</td>
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<tr>
<td>3 the sky                                   _______ / _______ / _______</td>
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<tr>
<td>4 wind                                      _______ / _______ / _______</td>
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</tr>
<tr>
<td>5 rain                                       _______ / _______ / _______</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>6 visibility                                _______ / _______ / _______</td>
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</tr>
</tbody>
</table>

Functional English – Results and consequences

09 Listen and complete the sentences from the listening.

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

Listening – Weather forecast

1. Look at the weather forecast for Bristol. Discuss what effect the weather will have on flights into and out of Bristol over the next 12 hours. Try to use expressions from the exercise above.

2. 10 Listen to a briefing from the ATC shift supervisor and underline the correct information.

1. Controllers working the approach / departure areas are going to be busy.
2. The evening / night shift is going to be quieter than the evening / night shift.
3. The upper airspace / apron is going to be very quiet over the next 12 hours.
4. It's going to be difficult for westbound / eastbound aircraft to fly into Bristol today.

Functional English – Asking someone to repeat information

1. 11 Listen and complete the sentences.

1. I ___________ the word before 'control positions'.
2. I ___________ that last bit.
3. What ___________ after 'morning shift'?
4. ___________ the first part of the sentence?

2. Work in pairs. Take turns to read parts of the listening script 08 on page 121, but occasionally whisper an important word so that your partner can't hear it. When you don't hear a word, use the expressions above to ask for repetition.

Speaking

Work in groups. Talk about the weather conditions at your airport and how your airport deals with extreme weather.
Section three - Stormy approach

1 Work in groups. Discuss the questions.
   1 What is wind shear and why is it so dangerous for aircraft?
   2 How can arriving and departing traffic avoid wind shear?
   3 What experience of wind shear have you had?

2 12 Listen to the first part of the dialogue and match the call signs to aircraft A-C in the picture.
   1 ES23 __  2 QA638 __  3 Company 737 __

3 12 Listen again and underline the correct information.
   1 The pilot of ES23 decides to cancel the flight / take off / wait.
   2 QA638 sees the storm is in front of / to the left of / behind the airport.
   3 The crew of QA638 requests a pilot report / weather report / new flight path from the tower.
   4 The crew of Company 737 describes the landing conditions as rough / smooth / bumpy in places.

4 13,14 Listen to the second part of the dialogue and decide if the statements are true or false. Write T or F.
   1 The threshold wind speed is decreasing. __
   2 Wind direction varies between 270° and 250°. __
   3 Visibility is getting worse. __
   4 The tower controller issues a microburst alert with a speed loss of 30 kt. __
   5 QA638 loses 20 kt on short final. __
   6 The pilot decides to fly through the turbulence and land. __
Functional English – Warnings

1. Listen again to a short section of the dialogue. Complete the expressions.
   1. ________ wind shear. 3. ________ on short final.
   2. ________ microburst activity. 4. ________ microburst activity.

We use be on the alert / watch out / look out (for something) and be careful (of something) to warn someone about possible danger.

2. Work in pairs. Write a short dialogue between pilot and ATC, or pilot and co-pilot, including the four expressions above. Then perform it to the group.

Pronunciation – /ʃ/, /ʒ/, /tʃ/, /dʒ/

1. Listen to how we say these sounds. Listen and repeat the words.

2. Put the words into the correct column in the table according to the underlined sounds.

<table>
<thead>
<tr>
<th>/ʃ/</th>
<th>/ʒ/</th>
<th>/tʃ/</th>
<th>/dʒ/</th>
</tr>
</thead>
<tbody>
<tr>
<td>short</td>
<td>visual</td>
<td>watch</td>
<td>roger</td>
</tr>
</tbody>
</table>

3. Listen and check your answers. Then listen again and repeat the words.

Speaking

1. Work in pairs. Student A is the pilot of HotAir 220 coming to land at Kerala airport, India. Student B is the approach ATC. Read the conversation outline and decide what to say.

   **Pilot**
   - Announce approach to Kerala airport
   - Acknowledge and warn of bad weather conditions
   - Inform pilot of possibility of monsoon rains
   - Confirm and warn of approaching storm clouds
   - Confirm understanding

   **ATC**
   - Acknowledge and warn of bad weather conditions
   - Inform pilot of possibility of monsoon rains
   - Inform pilot monsoon rain has occurred and runway has flooded. Tell pilot to divert

2. Roleplay the dialogue, then change roles and do it again.
Section four - Language development

Functional English – Changing the strength of adjectives

1 Complete the table with the correct synonyms from the box.

<table>
<thead>
<tr>
<th>absolutely</th>
<th>enormous</th>
<th>entirely</th>
<th>exceptionally</th>
<th>extremely</th>
<th>fairly</th>
<th>huge</th>
<th>massive</th>
<th>minute</th>
<th>pretty</th>
<th>really</th>
<th>relatively</th>
<th>slight</th>
<th>tiny</th>
<th>totally</th>
</tr>
</thead>
<tbody>
<tr>
<td>small</td>
<td>big</td>
<td>quite</td>
<td>very</td>
<td>completely</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Results and consequences

2 Match the beginnings with the endings to make sentences.

1. There was a thunderstorm overhead, so ...
2. Because of the strong turbulence, ...
3. And it is for this reason ...
4. The runway is particularly slippery. You should therefore ...
5. As a result of strong gales, ...
6. Wing stall is a common consequence ...
7. The sky was dull and overcast. The pilot consequently ...
8. The wind shear during the thunderstorm resulted in ...
9. The foggy conditions led to ...
10. One of the wings of the plane had not been de-iced and the pilot subsequently ...

   a. cancelled her VFR flight.
   b. flights were diverted to an alternative airport.
   c. lost control of the plane.
   d. expect longer stopping distances.
   e. of ice accretion from freezing drizzle.
   f. passengers were told to fasten their safety belt.
   g. reduced visibility near the airport runway.
   h. some very severe turbulence.
   i. several hangars had to be repaired.
   j. that we have decided to suspend two members ground control.

Asking someone to repeat information

3 Rearrange the words to make sentences.

1. catch / didn’t / first / I / of / part / the / the / sentence

2. that / get / I / didn’t

3. bit / can / last / repeat / that / you ?

4. after / did / ’hailstorm’ / say / what / you ?

5. that / was / said / word / what / before / the / you / ’conditions’?

6. catch / didn’t / I / I’m / that / sorry
Warnings

4. Underline the correct option.

1. Be prepared to / Be on the alert for wind shear when approaching the edge of the city.
2. Watch out for / Pay attention microburst activity near runway 27L.
3. We were told to look out for / listen carefully any light aircraft caught in the storm.
4. Please be careful of / be ready the slippery runway on landing.
5. You will need to be particularly beware of / vigilant when flying near the mountains.
6. Please be prepared to / be on alert for review your current flight plan because of the hurricane.
7. And on landing you will need to be ready to / prepare for a longer stopping distance due to the surface rain.
8. I want you to beware of / listen carefully as I read through the emergency procedure.
9. He didn’t pay attention to / on alert for the warning about severe thunder and lightning.
10. Watch out / Beware of the strong winds at the end of the runway.

Vocabulary – Weather words

1. Match the adjectives 1–9 with their opposites a–i.

   1. wet  
   2. warm  
   3. overcast  
   4. bright  
   5. heavy  
   6. freezing  
   7. rough  
   8. tailwind  
   9. sunlight  
   a. smooth  
   b. darkness  
   c. dry  
   d. cool  
   e. headwind  
   f. light  
   g. scorching  
   h. clear  
   i. dull

Vocabulary from the unit

2. Rearrange the letters to match the definitions.

   1. abckl iec  an invisible slippery surface than can form on the runway in cold weather
   2. bpuym  (used about a flight) uncomfortable because of bad weather
   3. wde  small drops of water that form on the ground at night
   4. dehntrt  the loud noise that you sometimes hear in the sky during a storm
   5. zdeirtz  very light rain
   6. oஸrт看着 a thin white layer of powdery ice that forms on things outside when the weather is very cold
   7. aegl  a very strong wind
   8. aehilnost  a small ball of ice that falls as rain
   9. gghiiłmnt  the bright flashes of light that you see in the sky during a storm
   10. tesel  a mixture of snow and rain
   11. yeǐlprps  a surface that is difficult to move on because it is smooth or wet
   12. hlissu  snow that is starting to melt on the ground
Section one - Touchdown

1. Work in groups. Look at the pictures. Where do you think the pictures were taken?

2. Make a list of the problems fixed-wing aircraft could have on approach and landing. Think about:
   - terrain
   - obstacles
   - manoeuvres
   - runway length
   - weather

3. Read the exchanges about difficult landings from a pilot's Internet forum and match the airports with the pictures. Do they mention any problems from your list in 1?

---

**SUPERMAN**

CVF is the only place I know where you can fly a bad weather low-level circuit BELOW the control tower! In an afternoon landing in winter, the sun is so low that from turning finals at two miles to go before touchdown, it's absolutely impossible to see in front of you. You can't go around because there is a mountain in the way. On short final, the runway looks too short and it looks like you're going to hit the mountain, but because part of the runway is at a +18.5% gradient, you have to ADD power to roll out. If the aeroplane stops, you won't get to the apron without someone getting out and pushing.

---

**JETHEAD747**

The 05 instrument approach at SXM is a VOR / DME but it's usually a visual. You can't touch down earlier than the touchdown zone because you only have a short 7,054 ft for roll-out. Slowing down and cooling is an operational issue. We had to go around once because an aircraft's brakes overheated and seized and it got stuck on the runway. On departure you backtrack onto the runway, do a 180° Right behind the aircraft there is a fence and a beach. There are always people standing near the fence and several have been blown back into the sea by jet blast.

---

**BULLDOG**

The famous HKG runway one-three procedure was incredible. The fun started once eastbound on approach. First you got the view of the city and the skyscrapers. Then the giant red and white squares on the mountainside. You extended the gear as you closed with this marker. Just as it seemed like you were going to fly into the marker, you turned hard right, banking a full 47.5°. You turned so close to the buildings that you could see the people inside. It looked as if you could reach in and change the TV channel. 30 seconds later it was rudders neutral, you flared, and the undercarriage touched down, kissing solid ground. Unforgettable!

---

**LORD LUCAN**

TGU is situated in a basin between mountains, and if you land on runway 01, you circle inside the basin, below the mountaintops. You have to bank hard, and you can look the opposite way and still see trees and mountains. On final you only have 100-200 ft to line up before touchdown. 01 has a displaced threshold, leaving a limited 5,436 ft of useable pavement. There's also a 1.06° downhill slope and a cliff, which is only 100 ft from the end of the runway. It always looks as though you're going to fall off the end of the runway! It used to be even more exciting before they removed a small mountain on the approach path and added traffic lights on Boulevard Hacia Loarque to stop traffic for each arrival or departure.
4 Read the text again. Answer the questions. Put a tick (√) in the table.

<table>
<thead>
<tr>
<th>Which airport</th>
<th>CVF</th>
<th>SXM</th>
<th>HKG</th>
<th>TGU</th>
</tr>
</thead>
<tbody>
<tr>
<td>has no procedure for a missed approach?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>has a problem with bright light?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>has problems with braking?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Which airports</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>have sloping runways?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>have high bank angles on approach?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>have roads near the runway threshold?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>have mountain obstacles on the approach paths?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5 Can you remember what these numbers refer to?
1 47.5°  2 100 ft  3 7,054 ft  4 +18.5%  5 180°  6 100–200 ft

6 Work in pairs. Describe the approach and landing at an aerodrome you know well. What are the interesting features?

Vocabulary – Landing gear and braking

Decide if the words are related to arrival, departure or gear / brake problems. Write A, D or G/B next to each one.
roll out ___ rotate ___  overheated ___  extend ___  flare ___  touch down ___
lock ___ seize ___  retract ___  collapse ___  get stuck ___  line up ___

Functional English – Describing sensory impressions

1 Look back at the pilot's Internet forum and complete the sentences.
1 On short final, the runway ______ too short and it ______ you're going to hit the mountain.
2 Just as it ______ you were going to fly into the marker, you turned hard right.
3 It ______ you could reach in and change the TV channel.
4 It always ______ you're going to fall off the end of the runway!

2 Work in pairs. Student A, describe what you think is happening in the four pictures below. Try to use the expressions from 1. Student B, look at the complete pictures on p 109. Listen to Student A's ideas first, then tell them if they were correct.

Student A

3 Change roles. Student B look at the pictures below. Student A look at the complete pictures on p 105.

Student B

Speaking

Work in small groups. Discuss what experience you have had of landing gear or braking problems.
Section two – Letting down a VIP

1 What special arrangements have to be made when transporting the following VIPs in your country?

- government representatives
- members of the royal family
- celebrities

Think about:

- security
- personal/private aircraft
- media
- diplomatic clearance.

2 17 Listen to a helicopter pilot talking about the time he carried a VIP, and answer the questions.

1 From where to where did the pilot have to carry the VIP?
2 Who was the VIP?
3 What caused problems with the journey?

3 17 Listen again and underline the correct information.

1 The helicopter landed by/behind the house.
2 The journey was about five/ten miles.
3 The pilot called the ship after/before they were airborne.
4 The ship lost the helicopter on the radar ¼/¾ of a mile out.
5 The pilot went around because he lost communication with the ship/couldn’t see.
6 The VIP knew nothing about flying/was an experienced flyer.
7 Flying at 100 ft above the water is risky/not risky.
8 The outline of the ship was visible at 150/100 ft.

Functional English – Describing 3-D position and movement

1 Complete the sentences from the description of the VIP’s journey using the prepositions in the box.

<table>
<thead>
<tr>
<th>around</th>
<th>below</th>
<th>over</th>
<th>into</th>
<th>out</th>
<th>onto</th>
<th>under</th>
<th>through</th>
</tr>
</thead>
</table>

1 We went ________ the top of the cliffs ready to let down.
2 The best way to get ________ ship ...
3 We went ________ the fog.
4 It’s difficult to continue visually ________ fog.
5 I decided that we would go ________ the ship.
6 One of the options was to let down a little bit early to get down ________ the fog.
7 So I let down a little bit more, and came ________ from ________ the fog.

2 17 Listen again and check.

3 Work in pairs to describe your helicopter route to your partner. Student A go to page 106. Student B go to page 110.

4 Work in pairs. Describe the last flight you made or took using as many of the words from the box in 1 as you can.
Vocabulary – Verbs of movement

17 Work in pairs. Try to complete the sentences from the description of the VIP’s journey with a suitable verb, then listen again and check.

1 We were asked to p________ a VIP … and t________ him to a Royal Navy ship for the day.
2 There were clear blue skies when we l________
3 We l________ by the house, shut down and g________
4 While we waited for them to c________, I spoke to the prince.
5 One option was to l________ early to g________ below the fog.
6 When we r________ about 150 ft ...
7 The Prince g________, thanked me very much for some very good flying and w________ for his day on board the ship.

Pronunciation – Consonant clusters 2

1 In unit 6 we looked at consonant clusters at the beginning of words. These can also occur in the middle or at the end of words. Listen and repeat these words from the description of the VIP’s journey.

- aircraft
- asked
- safety
- options
- explained
- thick white fog
- the ship’s radar
- some very good flying

2 Work in pairs. Take turns to pronounce the following words clearly. Listen to your partner’s pronunciation and tell them if it is not clear.

- reverse thrust
- available slots
- thick smoke
- climb vertically
- dump fuel
- damaged struts

3 Listen and repeat the words.

Speaking

Work in small groups. Discuss the statements below. Do you agree or disagree with the statements? Why / Why not?

1 You should be more careful when you carry VIP passengers.
2 Airline companies should offer VIPs a special service.
3 VIPs and ordinary passengers should not mix on planes.
4 ATC should provide extra separation for aircraft carrying VIPs.
5 Members of the government or royalty should only travel on military aircraft.
6 VIPs create too much work for pilots and ATCs.
Section three – Undercarriage

1 Work in small groups. Each member of the group choose a different picture and study it for one minute. Close your books and then try to describe your picture. Time each person's description. Who produced the longest stretch of language at an appropriate tempo?

2 Listen to three dialogues between pilots and tower controllers. Choose the best picture (a–d) for each dialogue.

   20,21 1  
   22 2  
   23,24 3  

3 Listen to the three dialogues again and underline the correct information.

   20,21
   1 Macair 319 has / doesn't have a green light for the nose gear.
   2 After making a low pass, Macair 319 wants to fly east / orbit the aerodrome.

   22
   3 A30 is arriving / departing traffic.
   4 A30 is going to return immediately / try and solve the problem.

   23,24
   5 S62 has little / a lot of fuel remaining.
   6 S62 is behind / in front of Fastair 350.

Functional English – Resolving misunderstanding

1 Listen again and complete the dialogues.

   21
   Pilot I'm sorry. The nose wheel is in position? (1) ? Macair 319.
   Controller Macair 319. Negative, (2) . The nose wheel appears down but it's at a 90° angle.
   Pilot (3) the nose gear is down but stuck at 90°. Macair 319.
   Controller Macair 319. (4) 

   22
   Controller A30. It appears your main gear hasn't retracted.
   Pilot Roger, my main gear has retracted. Thank you sir. A30.
   Controller A30. (5) Negative. Your main gear is not retracted. It is still visible.
   Pilot OK. Our main gear is stuck ... er... OK A30.

   24
   Pilot Tower, this is Fastair 350 on three-mile final. The apron is to the right of runway 34R.
   Controller Fastair 350. Affirm. Thank you.
The phrases are:
1. That's right.
2. Say again.
3. That's incorrect.
4. Understand that ...
5. Is that correct?
6. I say again ...
7. That's wrong.
8. You haven't understood ...
9. Do you mean ... ?
10. Please read back in full.

Some of the functions can be used more than once.

a. repeating
b. checking understanding / querying
c. confirming correct understanding
d. stating understanding
e. asking for repetition
f. saying someone hasn't understood correctly

Work in groups of three. You have reports of three incidents with arriving and departing aircraft. Some of your information in each report is incorrect. If two people have the same information, it is correct. Use the phrases from 2 to resolve any misunderstandings.

Student A read out report A below. Student B go to p 110 and read out report B. Student C go to p 112 and read out report C.

**Student A**

A Flight SQ286 taxied to runway 05L at Sydney's International Airport and was cleared for take-off. When the captain rotated the B747-412 for lift-off, the tail struck the runway and scraped for 490 m until the aeroplane became airborne. The tail strike occurred because the rotation speed was 35 kt less than the 163 kt required for the aeroplane weight.

B The controller cleared Flight 504 for a visual approach to runway 15. At 09:54 the crew reported on finals and were cleared to land. The Cessna Citation touched down 45 m short of runway 15 and struck the edge of the runway threshold. It continued for 112 m before coming off the runway. It ran another 263 m before it skidded into the wall of a building.

C Flight 1455, a B737-300, was vectored for a visual approach to runway B. The flight's descent angle was more than 6°. Touchdown speed was 182 kt. The crew couldn't stop the aircraft on the runway and it overran. It crashed through the perimeter fence at a speed of 32 kt and stopped in a lake. The forward service-door escape slide inflated inside the plane and the nose gear collapsed.

**Speaking**

Discuss the questions in pairs.

1. When was the last time you had to resolve a misunderstanding at work? What exactly happened?

2. Have you ever been in a situation where either:
   a. it was impossible to understand someone else?
   b. someone found it impossible to understand you?

3. Discuss whether you agree or disagree with the statements below. Give your reasons.
   1. Most misunderstandings happen because pilots and ATCs do not use the radio or mic correctly.
   2. The only communication strategy needed to resolve misunderstanding is the phrase ‘say again’.
Section four – Language development

Functional English – Describing sensory impressions

1 Match the beginnings and endings of the sentences.
1 The plane looks ... a she has a lot of traffic to deal with at the moment.
2 This is your captain speaking. I’m afraid it looks like ... b be lifting.
3 Dumping the fuel seemed like ... c damaged.
4 It felt as if ... d he is going to pass out.
5 It doesn’t look as though the passenger ... e relaxed and in control.
6 The fog appears to ... f we may have to divert to another airport.
7 The flight attendant gave the impression that ... g a good idea at the time.
8 The controller sounds like ... h is going to calm down.
9 The passenger looks as if ... i the right wing was heavier than the left.
10 The pilot sounds ... j there might be a problem with one of the passengers.

Describing 3-D position and movement

2 Complete the sentences with words from the box.

<table>
<thead>
<tr>
<th>like</th>
<th>as</th>
<th>looks</th>
<th>seems</th>
<th>though</th>
<th>appears</th>
<th>impression</th>
<th>sounds</th>
</tr>
</thead>
</table>
1. One of the engines ________ strange, so we’ll get it checked.
2. It feels ________ if the cabin temperature has dropped.
3. The runway ________ wet.
4. It ________ like it always rains when I come to London.
5. That Cessna ________ to be preparing to take off.
6. It looks ________ the windshield is icing up.
7. It looks as ________ we’re going to be delayed.
8. The sunshine gives the ________ that the air temperature is warm, but in fact it’s well below freezing.

3 Underline the correct alternative.

1. The helicopter hovered just above / into the helipad before landing.
2. He looked under / around and all he could see was thick fog.
3. Please stow your bags below / down the seat in front of you.
4. The pilot looked down / out of and saw the burning aircraft on the runway.
5. The jumbo jet was towed over / into the hangar.
6. Lifejackets are found over / under your seats.
7. We eventually managed to climb down / out of the fog.
8. She suggested flying over / through the city to get a good view.
9. He changed his heading to avoid going under / through the hailstorm.
10. They decided to divert and fly towards / down Seattle instead.

Resolving misunderstanding

4 Rearrange the words to make sentences.

1. a / belly / do / landing / mean / you ?
2. again / emergency / l / landing / request / say
3. correct / it / fuel / have / is / little / remaining / that / you ?
4. back / full / in / please / read
5. again / is / poor / reception / say
6. is / no / incorrect / that
7. is / on / reading / screen / the / the / wrong
8. allow / cannot / land / please / that / to / understand / we / you
9. but / haven’t / I’m / you / sorry / understood
The phrases on the left can be used to check understanding. Match them to the functions on the right. Some of the functions can be used more than once.

1. That's right.
2. Say again.
3. That's incorrect.
4. Understand that ...
5. Is that correct?
6. I say again ...
7. That's wrong.
8. You haven't understood ...
9. Do you mean ...
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**Speaking**

Discuss the questions in pairs.

1. When was the last time you had to resolve a misunderstanding at work? What exactly happened?
2. Have you ever been in a situation where either:
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   b. someone found it impossible to understand you?
3. Discuss whether you agree or disagree with the statements below. Give your reasons.
   1. Most misunderstandings happen because pilots and ATCs do not use the radio or mic correctly.
   2. The only communication strategy needed to resolve misunderstanding is the phrase 'say again'.
Vocabulary – Landing gear and braking

1 Match the verbs 1–10 with the definitions a–j.

1 collapse  a to become too hot
2 extend  b to become caught or held in a position so that you cannot move
3 seize  c to form a row with other people
4 get stuck  d to fall down suddenly
5 line up  e to draw something in, eg the landing gear after take-off
6 flare  f to make something go to its full length, eg the landing gear after take-off
7 overheat  g to land
8 retract  h to land on the rear landing gear to absorb the force of the landing
9 touch down  i to raise the nose of an aircraft during take-off
10 rotate  j to suddenly stop moving or working properly

Other uses of prepositions

2 Complete the sentences with a suitable preposition.

1 The sun is so low that from turning finals ________ two miles ________ just before touchdown, you can’t see ________ you.
2 ________ short final, the runway looks too short.
3 You can’t go around because there is a mountain ________ the way.
4 The runway is ________ a +18.5% gradient.
5 The 05 instrument approach ________ SXM is a VOR / DME.
6 The fun started once eastbound ________ approach.
7 TGU is situated ________ a basin ________ mountains.
8 They removed a small mountain ________ the approach path.
Section one - Aviation and global warming

1 Match a word on the left with a word on the right to make collocations relating to global warming.
1 air  a change
2 carbon  b layer
3 climate  c emissions
4 CO₂  d gases
5 greenhouse  e dioxide
6 the ozone  f pollution

2 Work in pairs. Do you think that the effect of aviation on global warming in the media is accurate or exaggerated?

3 Read the text and decide if the following organizations believe that air traffic is having an impact on global warming. (Circle yes or no.

1 the European Commission  yes / no
2 the International Air Transport Association (IATA)  yes / no
3 the European Federation for Transport and Environment (T & E)  yes / no

Myth or reality?
Aviation and global warming

With air traffic and greenhouse gas emissions growing steadily, the European Commission has suggested limiting CO₂ emissions for all planes departing from EU airports. It stated that uncontrolled aviation growth cannot be allowed to continue.

Although research into more fuel-efficient aircraft continues, the idea that this will reduce pollution is unrealistic as the growth in the number of aircraft flying is greater than the savings in fuel-efficiency. The Commission is worried that aviation emissions are growing faster than in any other sector.

The International Air Transport Association (IATA) wants to restore a balanced view on aviation and global warming. It issued a five-point brief aimed at killing allegations that air transport is a major source of greenhouse gas emissions. Here are some of the figures that the IATA puts forward to disprove the myths:

1 Air transport contributes only 2% of global CO₂ emissions.
2 Over the last 40 years, emissions per passenger kilometre have decreased by 70%.
3 Airline fuel-efficiency has improved by 20% in the last decade.
4 80% of aviation emissions are related to flights over 1,500 km for which there is no alternative mode of transport.

However, the European Federation for Transport and Environment (T & E) disagree with IATA’s conclusions. T & E don’t think they need to reconsider their view, and describe IATA’s information as inaccurate. T & E argues that:

1 The 2% figure refers only to CO₂ emissions, not other climate impacts such as aviation-induced cirrus clouds.
2 The 2% figure is from 1992, which fails to include the explosion in growth of global aviation in the last 15 years.
3 The true global contribution to climate change of aviation is between 4 and 9%, depending on the impact of aviation-induced cirrus clouds.
4 Aircraft fuel efficiency has not improved at all. Typical passenger aircraft of the 1950s were as fuel-efficient as typical modern jets.
4 Read the text again and decide which organization each statement relates to. Write EC, IATA, or T & E.

1 We must limit the growth of aviation. EC
2 Most CO₂ emissions are caused by long flights. EC
3 Air transport is responsible for up to 9% of the human effect on climate. EC
4 Air traffic is responsible for under 5% of CO₂ emissions. EC
5 We need to consider the effect of cirrus clouds caused by emissions. EC
6 Fuel-efficiency is not improving fast enough to reduce pollution. T & E
7 CO₂ emissions are 70% lower than 40 years ago. EC
8 Planes are no more fuel-efficient than they were 50 years ago. EC

Vocabulary – Prefixes

Change the words below to create negatives and put them in the correct column of the table.

<table>
<thead>
<tr>
<th>able (x2)</th>
<th>adequate</th>
<th>agree</th>
<th>authorized</th>
<th>available</th>
<th>valid</th>
</tr>
</thead>
<tbody>
<tr>
<td>prove</td>
<td>connect</td>
<td>controlled</td>
<td>correct</td>
<td>sufficient</td>
<td>usual</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>dis-</th>
<th>in-</th>
<th>un-</th>
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<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

Functional English – Suggesting solutions to problems

1 Work in pairs. What can we do to reduce air pollution from aviation? List your points.
2 Read the text. Does it mention any of the same points that you listed?
3 Read the text again and underline the expressions for suggesting solutions.

The growth of air travel in the years to come will have a big impact on the environment, and we need to consider how we will be able to deal with these issues. Let’s look in more detail at air pollution. Aircraft emit nitrogen oxides, carbon monoxide and hydrocarbons that can be harmful to the environment. One solution to this could be to improve engines and make them more fuel-efficient. Another option would be to increase fuel-efficiency by improving the aerodynamics of aircraft and building them with more lightweight materials. Alternatively, governments could impose very heavy taxes on long-haul flights. The tax money could then be invested into forestation and other environmental projects. An alternative to this would be to reduce the number of domestic flights altogether and transfer passengers from planes to trains.

Speaking

1 Work in small groups. Try to use the language you underlined above. What can we do about the following problems:
   • noise pollution from airports
   • dealing with airport waste
   • water pollution from de-icing
   • destruction of landscape and wildlife habitats by new airport building?

2 Work in small groups. How can the following people or organizations maximize fuel efficiency in aviation?
   • ATC
   • pilots
   • aircraft operators
   • aircraft designers
Section two - Gimli glider

1. Match the nouns 1–9 with the definitions a–i.

1. fuel capacity
2. fuel flow
3. fuel gauge
4. fuel hose
5. fuel load
6. fuel pressure
7. fuel pump
8. fuel shortage
9. fuel starvation

a. the amount of fuel that an aircraft is carrying
b. a piece of equipment that measures the amount of fuel
c. a piece of equipment for sending fuel into or out of something
d. the force that fuel produces in an area or a container
e. the continuous movement of fuel
f. a lack of fuel
g. fuel that an aircraft or vehicle is able to carry
h. failure of fuel to reach the engine
i. a tube that fuel flows through

2. Work in pairs. Discuss the following questions.

1. Have you ever run out of fuel while driving? What happened?
2. Have you ever heard of an incident where a plane has almost run out of fuel during flight?
3. Why might a flight suddenly run out of fuel?
4. What procedures do pilots and controllers follow in case of such an event?

3. 25,26 Listen to a radio report of an incident in Canada, and choose the best headline.

Boeing 767 makes emergency landing after hole in fuel tank
Canadian flight diverted for refuelling
Silent flight crash-lands at sports event
Canadian Air Force tests Boeing 767's gliding potential
Busy runway used for go-carting

4. 25,26 Listen again and answer the questions.

1. Why did the pilot of the Boeing 767 have to divert?
2. What were the two main causes of this incident?
5 25,26 Decide if the sentences are true or false. Write T or F. Then listen again and check.

1 The plane was on its way to Ottawa when the problem occurred. ___
2 The pilots switched off one of the engines to save fuel. ___
3 Two warning lights indicated a fuel problem. ___
4 The pilots diverted to a disused airfield in Winnipeg. ___
5 John Haskins said that the plane suddenly appeared with little noise. ___
6 Helen Clitheroe said that all they could do was stand and watch. ___
7 Passengers received minor injuries on leaving the plane. ___
8 Reports say that there was no problem with the fuel gauges. ___
9 The problem occurred because someone failed to verify the fuel load by hand. ___

Pronunciation – Information groups

1 Read this extract from the radio report, which the punctuation has been removed from. Put a forward slash (/) where you think there should be a pause between information groups.

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 and 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.

2 Read the text out loud, pausing at the end of each information group.

3 ⌁ 26 Listen and compare.

Speaking

1 In groups, rank the places for an emergency landing of a commercial plane (1 = the most ideal, 10 = the least ideal).

beach
football pitch
forest
frozen lake
golf course
marshland
highway
river
rough farmland
sea

2 Explain and discuss your reasons for your choice with the rest of the class.
Section three - Fuel icing

1 What are the main problems for aircraft flying in extremely low temperatures?

2 (27) Listen to the incident and answer the questions.
   1 What can you say about the weather conditions?
   2 What happens to the flight as it enters the control tower's airspace?
   3 What happens in the end?

3 (27) Listen again and underline the correct information.
   1 Fuel flow is lower/higher than it should be.
   2 The reading of torque pressure should be 40/100.
   3 The pilots request fire, crash, rescue services/vectors from the control tower.
   4 There are 22/122 people on board.
   5 The pilots land on a river/in a field.
   6 Nine/No people are injured after the landing of the plane.

Functional English – Expressing expectation

We often use should, be supposed to and be meant to to express how the situation is expected to be, especially when there is a problem.

Fuel flow is very low. It should be much higher.
You're supposed to be on final now. Are you OK?
Torque pressure is meant to be at one hundred, not forty.

1 Complete the sentences using should, be supposed to, be meant to in the correct form.

   1 The temperature is high but it should be much lower (should).
   2 The fuel flow is low but (should).
   3 The light is on but (should not).
   4 The landing gear is down but (not supposed).
   5 The supply is still on but (meant).
   6 The torque pressure is at 40 but (meant).
   7 They don't have enough fuel but (should).
   8 They're not on final but (supposed).
   9 The warning lights are flashing but (not meant).

2 Work in pairs. Make a list of rules or procedures that are not always followed correctly. Try to use the language from 1. Then compare your list with the rest of the group.

Pronunciation – Long and short vowel sounds

1 (28) Listen to eight words. Write A or B, according to the word you hear.

   A       B
   1 shot    short
   2 cot     caught
   3 sit     seat
   4 hit     heat
   5 live    leave
   6 stat    start
   7 chat    chart
   8 Mach    mark

2 (28) Listen again and repeat the words.

3 Work in pairs. Take turns to read one word from each line. The person listening must say if they hear A or B.
Speaking

Work in pairs. You are going to help each other deal with fuel problems while flying.
Student A look at this page. Student B look at page 110.

**Student A**

1. You are a flight instructor on the ground. Your partner is a student pilot on a solo flight in a Cessna 172SP. He/She has fuel problems and engine power loss. He/She can't remember all of the power loss checklist and is busy trying to fly the aircraft. You have radio communications. The checklist on the right shows the correct control settings for the situation. Find out what mistakes the pilot has made and correct them. Use language from the Functional English section.

2. Change roles. Your partner is the flight instructor on the ground. You are a student pilot on a solo flight in a Cessna 172SP. You have fuel problems and are going to make a power-off landing. You can't remember all of the manual's checklist for this situation. You have radio communications. Listen to your instructor and use the picture to check your control settings. Find out what mistakes you have made and correct them.

**ENGINE POWER LOSS DURING FLIGHT**

- **Air speed** = 68 KIAS
- **Fuel shut-off valve** = ON (= fully in)
- **Fuel selector valve** = BOTH
- **Auxiliary fuel pump switch** = ON
- **Mixture** = RICH (= fully in)
- **Ignition switch** = BOTH
Section four – Language development

Functional English – Suggesting solutions to problems

1 Rearrange the words to make sentences.

1 engines / be / make / solution / one / more / to / fuel-efficient / would

2 another / charging / fuel / higher / is / option / start / to / taxes

3 a / be / bio-diesel / corn / create / made / of / one / or / option / soybeans / to / would

4 aircraft / alternative / an / be / fuel-efficient / make / more / that / are / to / would

5 about / can / carry / having / how / hundreds / jets / jumbo / more / of / or / passengers / that ?

6 alternatively / by / could / how / often / plane / reduce / travel / we / we

Expressing expectation

2 Underline the best alternative in sentences 1–10.

1 The fuel tankers should / supposed to / meant to have arrived by now.

2 The landing gear meant to / is supposed / shouldn’t to be down for landing.

3 The flight was shouldn’t / not meant to / supposed to depart at 1600 hours but was delayed because of fog.

4 You’re shouldn’t / not supposed / not meant to move from the taxiway until you are given direct instructions.

5 We were should have / meant to / supposed land an hour ago.

6 TCAS should / is supposed / meant to assist both pilots and controllers in taking appropriate action in order to avoid a possible collision.

7 The fuel hoses should / supposed to / meant to be working properly.

8 The oxygen masks meant to / are supposed / should be used in case of depressurization.

9 I was shouldn’t / meant to / not supposed to be this close to the coast. I think I have made a mistake with my heading.

10 The warning light not meant to / shouldn’t / not supposed to be flashing.

Vocabulary – Climate change

1 Complete the definitions 1–6 using words from the box, and match each one with a noun a–f.

substances breathe escaping rise atmosphere protects

1 gases that stop heat from _________ from the atmosphere and therefore cause temperatures to rise on Earth

2 carbon dioxide that vehicles and factories produce and send into the _________

3 chemicals and other _________ that have a harmful effect on air

4 a layer in the Earth’s atmosphere that _________ the Earth from the harmful effects of the Sun

5 the _________ in the temperature of the Earth that is caused partly by increasing amounts of carbon dioxide in the atmosphere

6 the gas that is produced when you _________ out

a carbon dioxide

b ozone layer

c global warming
d greenhouse gases
e air pollution
f CO₂ emissions
Prefixes

2 Make words that match the definitions by adding the prefixes in one box to the verbs and adjectives in the other box.

<table>
<thead>
<tr>
<th>ab-</th>
<th>de-</th>
<th>dis-</th>
<th>in-</th>
<th>out-</th>
<th>over-</th>
<th>re-</th>
<th>trans-</th>
<th>under-</th>
<th>un-</th>
</tr>
</thead>
<tbody>
<tr>
<td>perform</td>
<td>crowded</td>
<td>operative</td>
<td>powered</td>
<td>ice</td>
<td>start</td>
<td>realistic</td>
<td>used</td>
<td>normal</td>
<td>atlantic</td>
</tr>
</tbody>
</table>

1 across the ocean
2 no longer used
3 not having enough power
4 not probable
5 not working
6 not usual
7 to perform better than something else
8 to remove ice
9 to start again
10 containing too many people

Nouns for fuel

4 Rearrange the letters to form the missing words.
Most recently-built planes have two fuel
(1) nstka ___________ or cells which are located
in the wings. The fuel (2) tacpalyc ___________ for
each aircraft is determined by its wing geometry.
In a lot of aircraft, (3) smpu ___________ are required
to feed the fuel through (4) soshe ___________ from
the cells to the engine. For every fuel cell there is
a fuel (5) eaug ___________ that the pilot can read
from the cockpit in order to keep an eye on the fuel
(6) espruse ___________. The continuous movement
of fuel is called fuel (7) ofwl ___________ and the
fuel (8) scnoupimton ___________ is a measure
of the fuel used up by the engine. If the movement
of the fuel is somehow slowed down, or if there is
a (9) ethasgor ___________ of fuel, this can cause fuel
(10) vistanrato ___________, which in turn can cause
loss of power in the engine.

Missing verbs

5 Complete this letter and reply from an Internet pilots’
forum with the verbs in the box.

<table>
<thead>
<tr>
<th>cooking</th>
<th>flood</th>
<th>leaking</th>
<th>popping</th>
<th>prevent</th>
<th>shut off</th>
</tr>
</thead>
<tbody>
<tr>
<td>restarting</td>
<td>running</td>
<td>shutting down</td>
<td>turned on</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Pete

I have an airplane with an IO360 engine.
After landing you can hear fuel still (1)________ to the engine which causes it to (2)________.
(3)________ the engine after that can be a nightmare. Seems there needs to be a valve to
(4)________ the fuel flow from the splitter after
(5)________ the engine. Do you know of
anything on the market that can stop the flow
of fuel after stopping to (6)________ flooding?

Chris

Hi Chris

There is no real flow of fuel in an injected
engine if the engine is not running and the
boost pump is not (7)________. It sounds to
me that what you are hearing is the fuel
(8)________ in the warm injection lines. Is it
kind of a (9)________ sound? If there is some
hesitation when shutting down, the centre body
seal of the injector could be (10)________.

Pete
Section one – Blast

1. Work in groups. Talk about any incidents of rapid decompression you have heard about.

2. Read the story and decide if the sentences are true or false. Write T or F.
   1. The co-pilot saved the captain from being sucked out of the plane.
   2. The co-pilot tried to stop the plane dropping.
   3. They didn’t have time to dump fuel.
   4. The pilot was unconscious during the incident.

Hanging on to life

Explosive decompression at 17,000 ft

We could see Tim’s face outside the window, covered in blood. While I was holding Tim, another steward strapped himself into the third pilot’s seat and gave me a hand.

Alistair had managed by now to reconnect the autopilot, and was being talked down to Southampton Airport. For a co-pilot, Alistair was in a very challenging situation, flying alone and without charts into an airport he didn’t know. The plane was fully loaded with fuel, but it could take up to five minutes to dump fuel, and with the captain hanging out of the aircraft, he had no choice but to land.

Alistair did a brilliant landing, stopping the heavy aircraft three-quarters of the way down the 1,800 m runway. The whole incident from explosion to landing lasted 18 minutes, but it seemed like hours. We hoped we’d got down in time to save Tim.

By the time we landed, Tim had spent 18 minutes outside the cockpit. During this time he’d been unconscious. When he regained consciousness on the stretcher, his first words were ‘I want to eat.’ Typical pilot!
Complete the table.

<table>
<thead>
<tr>
<th>Name</th>
<th>position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigel</td>
<td>steward</td>
</tr>
<tr>
<td></td>
<td>chief steward</td>
</tr>
<tr>
<td>Alistair</td>
<td></td>
</tr>
<tr>
<td>Tim</td>
<td></td>
</tr>
</tbody>
</table>

Work in pairs. Answer the questions.

1. Why did they lose the autopilot?
2. Who first stopped Nigel, the steward, from being sucked out?
3. Why wasn’t Alistair sucked out?
4. Why did Alistair increase the rate of descent?
5. For what reasons was it a very difficult situation for Alistair?
6. How did the captain feel when he regained consciousness?

Work in pairs. Try to remember what these numbers refer to. Check the text if necessary.

1. 13 minutes
2. 17,000 ft
3. 2 minutes
4. 11,000 ft
5. 1,800 m
6. 18 minutes

Vocabulary – Action verbs

1. Complete the sentences with the words in the box in an appropriate form.

   suck  drop  blow  hang  jump  grab
   wrap  bang  rush

   1. The left-hand windscreen ________ away.
   2. The aircraft began to ________ towards the ground.
   3. The captain was being ________ out of the aircraft.
   4. The steward ________ over the flight controls.
   5. Nigel ________ Tim around the waist.
   6. The steward ________ the shoulder strap around Nigel.
   7. The captain was ________ out of the aircraft.
   8. Tim’s face was ________ against the window.
   9. Cold air ________ into the cabin.

2. Underline the correct time expression to complete the facts about depressurization.

   1. Oxygen helps avert the effects of depressurization at altitude. The oxygen from these masks usually lasts / takes for about 10 minutes.
   2. While / During flight an airplane pressurizes and depressurizes, causing some passengers discomfort.
   3. After depressurization, the pilot has just seconds to get oxygen. If he is unable to do this in time / on time / by the time, he will rapidly lose consciousness.
   4. A hole a metre and a half across will depressurize a jetliner up to / within seconds.
   5. Airliners have had pressurized cabins to / from the late 1940s to / from the present day.

Speaking

Work in groups of three. Student A is a journalist, Student B is Alistair, the co-pilot, and Student C is John, the chief steward. Roleplay an interview about the incident. Before you begin, prepare what you are going to say.
Section two - Damage

1 Work in pairs. Decide which of the types of damage below could happen to:
   • a windshield (W)
   • fuselage skin (F)
   • landing gear (L)
   Write W, F or L next to each word.
1 buckled ___
2 corroded ___
3 cracked ___
4 dented ___
5 punctured ___
6 shattered ___
7 smashed ___
8 torn ___
9 torn off ___
10 twisted ___

2 29,30 Listen to the conversation and answer the questions.
1 Where are the speakers?
2 What are they talking about?
3 What are the photographs of?

3 29,30 Listen again. Tick (✔) the types of damage that are mentioned.
   ✔ cracked windshield
   ✔ spoiler torn away
   ✔ torn fuselage
   ✔ cargo door blown out
   ✔ corrosion
   ✔ metal fatigue
   ✔ buckled tailplane
   ✔ dented leading edges
   ✔ smashed instrument panel

4 Circle the correct answer.
1 What does the trainer think about the tiny crack incident?
   a They could have continued their flight.
   b The best thing to do was to wait for the windshield to be replaced.

2 Why did the rear cargo door blow off the DC-10?
   a The lock on the door was not working properly.
   b The door hadn't been closed properly.

3 What happened to the Boeing 737 on landing?
   a The nose gear worked correctly.
   b The nose gear buckled and caused more damage.

4 What happened when the Boeing 767 was damaged by a flock of birds?
   a The crew landed the plane.
   b The captain was injured.

5 What does the trainer say about the efficiency of cabin simulators?
   a A cabin simulator is ideal for practising emergency situations.
   b A cabin simulator is not really the same as a real emergency situation.
Functional English – Summarizing

1 29 Listen to the first part of the workshop and choose the best summary of the Boeing 737 incident.
   a There was a sudden depressurization problem and a member of the cabin crew was killed.
   b Metal fatigue can cause severe damage, causing danger of explosive decompression.
   c A section of fuselage was torn from a Boeing 737 due to corrosion and metal fatigue, causing rapid decompression. One person died in the incident but the crew landed safely.
   d When a large section of fuselage is lost, the cabin depressurizes immediately, and passengers and crew may be sucked from the aircraft.
   e A Boeing 737 lost 35 m² of fuselage. It lost all electrics, communication lines and power supply. The airframe buckled and the nose dropped down. Fortunately, the landing gear worked correctly.
   f In April 1998, a large section of upper fuselage tore away from a Boeing 737. One member of the cabin crew was sucked from the aircraft and died.
   g A section of fuselage was torn away, but the plane landed safely.

2 30 Now listen again to the rest of the extract. Make notes on the other incident described.

3 Write a summary of the incident, then compare your summary with another student’s.

Pronunciation – Diphthongs

1 The phonetic symbols below represent double sounds, or diphthongs.

<table>
<thead>
<tr>
<th>/au/</th>
<th>/ɔː/</th>
<th>/ɔɪ/</th>
<th>/əʊ/</th>
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<th>/æʊ/</th>
<th>/əʊ/</th>
</tr>
</thead>
<tbody>
<tr>
<td>pilot</td>
<td>plane</td>
<td>oil</td>
<td>steer</td>
<td>load</td>
<td>around</td>
<td>air</td>
<td></td>
</tr>
</tbody>
</table>

Underline all the words in the text below that contain a diphthong.

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 Listen to the words containing diphthongs, and write them in the columns below, then listen again and repeat.

<table>
<thead>
<tr>
<th>/au/</th>
<th>/ɔː/</th>
<th>/ɔɪ/</th>
<th>/əʊ/</th>
<th>/œʊ/</th>
<th>/əʊ/</th>
<th>/æʊ/</th>
<th>/əʊ/</th>
</tr>
</thead>
</table>

Speaking

Work in pairs. Discuss the questions.

1 What materials are typically used to make the main parts of an aircraft, eg fuselage, engines, tyres, windshield? What qualities do these materials need to have?

2 How often are the airframes of aircraft checked? What checks are performed? Do different types of aircraft require different checks?
Section three – Emergency descent

1 Work in groups. Discuss what action the crew should take in an incident of sudden decompression.

2 🎧 32 Listen to the dialogue and answer the questions.
   1 What does the pilot want to do?
   2 What caused the problem?
   3 How many people are injured?

3 🎧 32 Listen again and underline the correct information.
   1 The pilot / controller can’t hear the pilot / controller well at first.
   2 The pilot is approximately 14 / 40 miles from the airfield.
   3 The captain has lost a lot of blood / consciousness.
   4 Windspeed on the runway is 11 / 21 kt.
   5 The flight attendant sees damage to the fuselage / leading edges and engine / tail.
   6 One injured passenger is having breathing problems / bleeding heavily.
   7 The pilot reports damage to the nose / windshield and landing gear / tail.

Pronunciation – Contrastive stress

1 We use stress to correct someone who has misunderstood information.

   Not fifty minutes – fifteen minutes.

   Underline the sections of words that should be stressed.
   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.

2 🎧 33 Listen to the recording to check your answers. Then listen again and repeat.

3 Work in pairs. You are going to practise correcting each other. Student A turn to page 106.
   Student B turn to page 111.
Functional English – Expressing consequences

1. 34 Complete the sentences from the dialogue.
   1. I can’t see _______ I get out of my seat.
   2. We’ve got to get help soon, _______ he might not make it.
   3. _______ we don’t get to a doctor soon, he may not survive.

2. Complete the sentences using if, otherwise or unless.
   1. We will have to change our heading, _______ we will hit the hailstorm.
   2. The aircraft will be too heavy to land on the runway _______ it dumps the remaining fuel.
   3. _______ the radar isn’t showing the aircraft we will need to contact the pilot for their precise position.
   4. There must be a problem, _______ the pilot would have answered.
   5. For military flights there’s no contact with Air Traffic Control _______ they detect a possible collision.
   6. You cannot work as an air traffic controller _______ you provide an official medical certificate.
   7. _______ you don’t do more training in the control room, you won’t qualify as a controller this year.

3. Decide whether you agree or disagree with the statements below. Write A or D. Then, in pairs, discuss your answers using if, otherwise and unless.

   Example
   Yes, they must all undergo stress management training, otherwise mistakes will happen.

   1. Both pilots and air traffic controllers should undergo stress management training. —
   2. All ATC should be automated. —
   3. Pilots should be free to plan their own routing. —
   4. At least one flight attendant should know how to fly a plane in case of an emergency. —
   5. Radar should be used in all controlled airspace. —
   6. All aircraft control should be computerized. —

Speaking

Work in pairs. You are going to roleplay an emergency situation. Student A is the pilot. Student B is the ATC.

Use the chart and the information below to help you. When you have finished situation 1, swap roles.

**Situation 1 – Student A**

- **Call sign:** TW430
- **Incident:** bird strike → smashed windshield → sudden decompression.
- **Damage:** to control panel and leading edges
- **Injuries:** co-pilot badly cut and one passenger with serious head injury

**Situation 2 – Student B**

- **Call sign:** BX711
- **Incident:** hole in fuselage caused by unknown object → sudden decompression.
- **Damage:** to left-hand horizontal stabilizer
- **Injuries:** several passengers unconscious, one not breathing

**Pilot**

- **Contact ATC and declare emergency**
- **Respond. Ask for permission to descend. Mention consequences**
- **Give details. Mention consequences. Say you need to land**

**ATC**

- **Respond and ask for details**
- **Give permission. Ask for details of damage**
- **Give permission to land. Ask for information about injuries**
- **Confirm emergency services on standby. Offer more help if needed**
Section four - Language development

Functional English – Expressing time and duration

1. Complete the sentences using the words or phrases in the correct form from the box.

by the time  during  from  in time  last  on time  take  to  up to  while  within

1. The delays are now over, and most flights are taking off ________.
2. In some countries it can take ________ three years to become a qualified controller.
3. ________ the flight reaches French air space, it will have flown through six different countries.
4. It ________ about two years to become a commercial pilot.
5. The captain has visited six different cities ________ the last two months in her job.
6. We need to complete the roster ________ for tomorrow morning’s team meeting.
7. Search and rescue operations were launched ________ minutes of the loss of radio contact.
8. The maiden flight of the Airbus A380 ________ 3 hours 50 minutes.
9. ________ one controller was speaking to the pilot, another was contact MedLink.
10. The trainee pilot felt stressed ________ take-off ________ landing.

2. Complete the sentences with the verbs in their correct form from the box.

have  lose  make  manage  run out of  spend  take  waste

1. Don’t ________ your time. I’ve already called him five times and he isn’t answering.
2. Pilots ________ time going around the aircraft making sure everything is in order.
3. We’d better get something to eat now or we’ll ________ time.
4. I have a million things to do. I don’t ________ time to read the report.
5. If you don’t ________ time for physical exercise, your health will suffer.
6. She’s very good at ________ time. She’s great at organizing flight plans and schedules.
7. We have no time to ________. Let’s land as soon as possible!
8. You’ll have to be patient, sir. These things ________ time.

Expressing consequences

3. Complete the sentences using if, otherwise or unless.

1. The cabin needs to be pressurized ________ you fly at over 10,000 ft.
2. ________ regular inspections are made, airworthiness can become a problem.
3. We need to have the landing gear checked, ________ the problem could happen again.
4. We won’t arrive on time ________ we take off in the next slot.
5. ________ air pressure falls too low, you can suffer from headaches and nausea.
6. We’re going to need clearance ________ we descend.
7. Divers should wait at least a day before flying, ________ they risk getting ill.
8. You can get altitude sickness ________ you fly into an airport that is way above sea level.
4 Complete the gaps in this article with a(n) or the.

On April 28, 1988, (1) the 737 took off from Hilo International Airport bound for Honolulu with 90 passengers and five crew members on board. Nothing unusual occurred during (2) the take-off and climb.

As (3) the aircraft reached its normal flight altitude of 24,000 feet, (4) a small section on (5) the left side of (6) the roof ruptured. (7) The resulting explosive decompression tore off (8) a large section of the roof, consisting of (9) the entire top half of (10) the aircraft skin extending from just behind (11) the cockpit to (12) the fore-wing area.

(13) The first officer immediately contacted Kahului Airport on Maui to declare (14) the emergency. Sadly, (15) a flight attendant was ejected through (16) a hole. (17) The crew performed (18) the emergency landing at Kahului Airport.

Vocabulary – Action verbs

1 Match a verb on the left with a definition on the right.

1 bang a to be fixed so that the top part is held in position but the bottom part is loose and can move easily
2 blow b to move somewhere quickly and suddenly
3 drop c to knock against something when you are moving
4 grab d to fall
5 hang e to pull something using the force of air
6 jump f to hold or keep something in position by fastening a narrow piece of material around it
7 suck g to take hold of something in a rough way
8 strap h when air or wind moves

Verbs describing damage

2 Complete the sentences using words from the box.

blew out  broke through  corrosion  cutting off  dented  metal fatigue
punctured  smashed  smashed into  buckled  tore away from

1 The rear cargo door ________________.
2 The door tore away a spoiler and ________________ the tailplane.
3 The aircraft had ________________ due to operating in a salty environment, and it was a very old aircraft with serious ________________.
4 Almost 35 m² of metal ________________ the upper part of the fuselage, ________________ the electrics.
5 The lower part of the airframe ________________
6 A flock of birds ________________ the aircraft nose, fuselage and wing leading edges, and ________________ the aircraft skin eleven times.
7 One of the birds ________________ into the cockpit and ________________ the captain’s instrument panel.
Section one - Air rage

1. Work in pairs. Discuss the question.

Sometimes a person who is normally polite and law-abiding goes 'crazy' during a flight and causes a security incident. What factors cause this change in behaviour?

2. Read about four incidents of air rage and match the headlines 1-4 with the stories A-D.

1. Pilot leaves inebriated passengers on small island
2. Flight redirected after passenger's unusual behaviour
3. Frightened passenger jailed
4. Need to smoke causes passenger to attack pilot

A

A Honolulu-bound Delta Airlines jet was diverted to San Francisco on Tuesday when a female passenger became unruly after trying to smoke in the lavatory. The pilot came back to deal with the disturbance. He threatened to handcuff her if she didn’t calm down, but she became hysterical and hit him in the chest. The woman was sedated and taken to hospital by ambulance after the plane landed.

B

72-year-old Franco Massa, who was extremely nervous of flying, became drunk and aggressive during a Munich to Toronto flight. He began to harass an elderly woman beside him and, when a steward tried to intervene, Massa punched the steward. He had to be restrained with plastic cuffs by fellow passengers. The pilot felt the disturbance was so severe he diverted to Heathrow. The diversion cost £30,000, and Massa was jailed for twelve months.

C

A transatlantic flight was diverted to Boston after top model Tatiana Vukovsky started to behave very strangely. Flight attendants were alerted about 90 minutes into the flight when she started jumping on her seat and waving a wine bottle. She appeared very agitated and was swearing loudly at the other passengers. Two members of the crew were bitten as they restrained her.

D

Drunken holiday-makers who abused cabin crew on a flight to Tenerife spent 36 hours on a tiny island in the Atlantic after the airline abandoned them, 300 miles from their destination. The men became abusive and aggressive towards staff shortly after their flight took off from Manchester. When they refused to calm down, the pilot took the decision to divert the plane and make an unscheduled stop-off at an airstrip on the tiny Portuguese island of Porto Santo, and the men were removed.

3. Read the texts again. In which story:

1. did a passenger use offensive language?
2. were passengers removed from the flight?
3. did a passenger go to jail?
4. did passengers become aggressive shortly after take-off?
5. did someone get bitten?
6. did a passenger annoy an old lady?
7. did a passenger have to be taken to hospital?
8. was the pilot assaulted?
Vocabulary – Conflict and restraint

Match the beginnings with the endings to make sentences.

1. Despite several warnings, the passenger refused
2. Two of the passengers were behaving in
3. The captain threatened to
4. The passenger continued to drink more wine until he became
5. Three people helped the flight attendant to restrain
6. She kicked the pilot
7. The cabin crew got hold of the passenger but he bit
8. The crowd of football supporters created
9. The traveller was
10. The cabin crew eventually managed to put

   a. one of them in the arm.
b. a disturbance on the flight.
c. in the knee after he asked her to calm down.
d. to cooperate with requests.
e. agitated because she was unable to smoke on the plane.
f. remove the drunken passenger if he didn’t return to his seat.
g. plasticuffs on him.
h. very drunk.
i. the passenger and sit her down at the rear of the plane.
j. a noisy and violent way.

Functional English – Focusing on actions

Look at these sentences from the texts, which all focus on the action rather than on the person, thing, etc. that is doing the action.

The woman was taken to hospital by ambulance after the plane landed.
He had to be restrained with plasticuffs by fellow passengers.
Massa was jailed for twelve months.
Two members of the crew were bitten as they restrained her.
The men were removed.

Change the sentences below so that they focus on the actions in the same way as the examples above.

1. People injure dozens of flight attendants each year in air rage incidents.
   Dozens of flight attendants are injured each year in air rage incidents.

2. They keep plastic restraints on all flights to deal with violence on board.

3. They give cabin crew training for dealing with aggressive passengers.

4. They used a belt to restrain the passenger.

5. They didn’t allow the passengers to board the flight because they were drunk.

6. We have diverted this flight and will be landing shortly.

7. Police will arrest this passenger as soon as we land.

Speaking

Work in small groups. Discuss the questions.

1. How could airlines prevent air-rage incidents?
2. How should cabin crew be trained to deal with these incidents?
3. How should violent passengers be restrained?
4. How should passengers be punished for such incidents?
5. Do you know any stories of air rage incidents?
Section two - Suspicious passengers

1. Work in pairs. Discuss the questions.
   1. What methods currently exist to identify a suspicious passenger at the airport?
   2. What body language do you associate with a suspicious passenger? Make a list.

2. 35 Listen to security expert Kalle Kaub talking about a new technique for screening potentially dangerous passengers. Does he mention any of the same body language you listed?

3. 35 Listen again and answer the questions.
   1. What does Kalle think of technology in airport security?
   2. Why do criminals behave differently to other passengers?
   3. What parts of the face make small movements when someone is nervous?
   4. What do Kalle’s officers do if they are suspicious of a passenger?
   5. What three things can happen in a “secondary screening”?
   6. What types of crime have already been stopped using this technique?

Vocabulary – Strange behaviour

Complete the sentences with the words from the box.

<table>
<thead>
<tr>
<th>body</th>
<th>eye</th>
<th>hand</th>
<th>head</th>
<th>leg</th>
<th>lips</th>
<th>palms</th>
<th>voice</th>
</tr>
</thead>
</table>

1. Officers try to make friendly _______ contact to see if a suspicious person reacts normally.
2. Passengers undergo a _______ search to check that they are not carrying any weapons.
3. One sign of a passenger acting suspiciously is stepping forward on the left _______.
4. Moving the _______ forward is a common sign of aggressive behaviour.
5. Officers should look for small movements of the _______.
6. A _______ position with the _______ down can indicate suspicious behaviour.
7. A rise in the volume and pitch of the _______ is a sign of stress.
Functional English – Expressing possibility and probability

*might / may / could* = it's possible
*probably* = you're not sure, but you think it's likely
*must* = you're sure – there is no other possibility
*can't* = it's impossible

1. Underline the correct alternative in sentences 1–7.
   1. We're looking for any physical signs that *could / must* show that someone is nervous or angry – signs that they *can't / might* be planning a criminal act.
   2. If people show just one sign of stress, they *can't be / are probably not* a threat.
   3. But if you observe multiple signs, then you can assume that they *must / can't* have something to hide.
   4. If they detect behaviour that indicates a person *may / must* be a threat to security or the safety of a flight, they attempt to engage in casual conversation with that person.
   5. Surely friendly conversations *might / can't* be enough to indicate if a passenger is a criminal?
   6. Of course these questions *can't / probably* determine if a passenger has criminal intentions, but they *might / must* indicate suspicious behaviour.

2. 35 Listen to the extract again and check your answers.

3. Work in pairs. You are going to explain strange passenger behaviour. Student A go to p 106 and work with another Student A. Student B go to p 112 and work with another Student B.

Pronunciation – *-tion, -sion, -cion* endings

1. 36 Work in pairs. Look at the words below. Answer the questions and then listen to check your answers.

<table>
<thead>
<tr>
<th>Detection</th>
<th>Possession</th>
<th>Suspicion</th>
</tr>
</thead>
</table>
   1. How do you pronounce the ending?
   2. Which syllable is stressed – the first, the second, or the last?

2. 37 Underline the stressed syllable in the following words, then listen and repeat.

   aviation reaction conversation immigration
   inspection intentions reduction violations

Speaking

1. A small international airport is being built, and airport management have to decide how to spend their limited security budget of 1,000 points. Work in pairs. Discuss how you would spend the 1,000 points and why you have chosen the security measures that you have.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 perimeter fence patrolling</td>
<td>100</td>
</tr>
<tr>
<td>2 CCTV (external and internal)</td>
<td>250</td>
</tr>
<tr>
<td>3 an armed police service</td>
<td>450</td>
</tr>
<tr>
<td>4 behavioural screening training</td>
<td>100</td>
</tr>
<tr>
<td>5 explosive detection swabbing</td>
<td>100</td>
</tr>
<tr>
<td>6 explosive detection machines</td>
<td>200</td>
</tr>
<tr>
<td>7 fingerprint / face biometric profiling devices</td>
<td>150</td>
</tr>
<tr>
<td>8 luggage scanning (for organic and inorganic materials)</td>
<td>300</td>
</tr>
<tr>
<td>9 baggage inspection / personal search officers</td>
<td>250</td>
</tr>
<tr>
<td>10 sniffer dogs</td>
<td>200</td>
</tr>
<tr>
<td>11 a bomb disposal unit</td>
<td>400</td>
</tr>
<tr>
<td>12 airport personnel swipe-card / fingerprint system on doors on secure areas</td>
<td>250</td>
</tr>
</tbody>
</table>

2. Form one group. Each pair should present their ideas. The group must reach a decision on how to spend the points.
Section three - Unlawful interference

1 Work in pairs. Discuss the questions.
   1 What measures do airlines take to prevent passengers getting into the cockpit?
   2 Do you know of any incidents where a passenger has tried unsuccessfully to enter the cockpit?
      What happened?

2 🎧 38,39 Listen to this incident aboard a passenger jet, and underline the correct information.
   1 There is a very violent / drunk passenger on board.
   2 The plane is entering Japanese / Korean airspace.
   3 They decide to divert and land / return to their departure airport.

3 🎧 38,39 Listen again and answer the questions.
   1 Who does the man hit?
   2 How do they restrain the man?
   3 Why is the man violent?
   4 What does the pilot tell the attendant to do with the man?
   5 What services do they request at the airport?
   6 How many passengers are on board?
   7 When will they enter Korean airspace?

Pronunciation — Information groups and stress

1 Read the extract from the listening and put a forward slash (/) where you think the pauses should go.

   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

2 Now underline the parts of words that are stressed, and double underline the part of each information
group that carries the main stress.

3 🎧 39 Listen and check your answers.
Functional English – Reporting

1 Work in pairs. Look at the pilot’s original sentence to the Tokyo ATC, and how the ATC reported the same information. Try to complete the sentences with the missing verbs.

<table>
<thead>
<tr>
<th>Pilot</th>
<th>ATC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A passenger _______ to enter the flight deck.</td>
<td>5 They _______ a passenger to enter the flight deck.</td>
</tr>
<tr>
<td>2 There _______ injuries.</td>
<td>6 The crew _______ me there</td>
</tr>
<tr>
<td>3 _______ to the nearest available aerodrome?</td>
<td>7 They asked _______ to descend to the nearest aerodrome.</td>
</tr>
<tr>
<td>4 medical and security services ready.</td>
<td>8 They said _______ medical and security services ready.</td>
</tr>
</tbody>
</table>

2 Listen again and check your answers.

3 Work in pairs. Discuss the questions.

1 What usually happens to the tense of verbs in reported speech?
2 What happens to can and will in reported speech? What do you think happens to shall?

4 Read the direct quote and then change the sentence using the reporting verb given.

1 ‘Sir, you have to leave the plane now.’
   The security guard told

2 ‘Shall I contact MediLink?’
   The captain asked

3 ‘One of our flight attendants has been injured.’
   The pilot said

4 ‘Contact Inchon Control.’
   The air traffic controller told the pilot

5 ‘We have an emergency in the cabin.’
   The flight attendant said

6 ‘There are three serious injuries on board.’
   The co-pilot told the ATC

7 ‘We would like to divert to another airfield.’
   The pilot said

Speaking

1 Work in groups of three. First, write down ten questions that a journalist could ask the head of airport security about his / her reaction to the incident, the measures in place, etc.

2 Student A, you are the head of airport security. Answer the reporter’s questions about the incident.

Student B, you are a reporter for a national newspaper. Ask the questions you prepared, and any others that you think of during the interview.

Student C, listen and note down the questions and answers (you don’t need to write every word – just enough to help you remember afterwards).

3 Work together to write a report of the interview, and then read it to another group.
Section four – Language development

Functional English – Passive

1. Complete the sentences using the passive form of the verb in brackets.
   1. Because of severe fog in the area, the flight was diverted. (divert)
   2. Two football supporters throw off the flight. (throw off)
   3. A flight attendant assaulted by the unruly passenger. (assault)
   4. The aggressive traveller forced to the ground by a flight attendant and two passengers. (force)
   5. The captain punched in the stomach by the drunken passenger. (punch)
   6. Passengers informed that the plane was experiencing technical problems. (inform)
   7. The controller told to take a leave of absence following the incident. (tell)
   8. The commercial flight not allowed to fly through the military airspace. (not allow)
   9. The Airbus A320 checked for any damage after the emergency landing. (check)
  10. The jumbo jet refuelled on arrival at Turin airport. (refuel)

Expressing possibility and probability

2. Match the beginnings with the endings to make sentences.
   1. Oxygen deprivation ...
   2. We are diverting as we ...
   3. They will ...
   4. One thing we ...
   5. If we don’t descend immediately, the man ...
   6. Her behaviour is extremely strange which means she ...
   7. There is a suspicious package near one of the gates so we ...
   8. We must hurry, otherwise we ...

   a. ... could do is ask MedLink for some advice.
   b. ... might miss our flight.
   c. ... might be a cause of air rage.
   d. ... can’t board the plane just yet.
   e. ... must have something to hide.
   f. ... probably arrive ahead of schedule because of a tail wind.
   g. ... may die.
   h. ... can’t land on the runway because of excess surface water.

Reported speech

3. Underline the correct form.
   1. The controller told / told us to go around.
   2. Some passengers refused / refused to cooperate with the crew’s requests.
   3. The tower said that us / we would have to wait for the next slot.
   4. Can you ask the flight attendants counting / to count the passengers again?
   5. We’d better ask / ask for confirmation of the runway.
   6. Tell the cabin crew that / to take their seats for take-off.
   7. Ask the pilot state / to state his intentions.
   8. I’ll request for / request information about the landing conditions.
   9. Can you tell us / to us what you are planning to do?
   10. I’m going to ask to / ask the tower clearance / for clearance to land.
4 Change the following sentences from direct speech to reported speech using the verbs in brackets.

Pilot
I think it's a good idea if we delay take-off.

1 The pilot said he thought it was a good idea if we delayed take-off. (say)

Pilot
Place the passenger at the rear of the plane.

2 _______________ (tell)

Passenger
I would like a glass of water, please.

3 _______________ (ask)

Controller
Confirm your position please.

4 _______________ (ask)

Man
I'm a qualified pilot.

5 _______________ (mention)

Pilot
We need to make an emergency landing.

6 _______________ (request)

Pilot
We have a problem.

Controller
Please give more information.

7 _______________ (advise)

8 _______________ (ask)

Vocabulary – Physical conflict and restraint

1 Rearrange the letters to show the correct word for the definitions 1–10.

1 acomilus intended to hurt or upset someone __________
2 revosun feeling excited or worried, or slightly afraid __________
3 gyarn very annoyed __________
4 sagivrezeg behaving in an angry way that shows you want to fight, attack, or argue with someone __________
5 taidateq worried or upset __________
6 vronopceautie not willing to do what someone asks you to do __________
7 vesabui offensive or insulting __________
8 issupicuso that might be bad or dangerous __________
9 rkudn unable to control your actions or behaviour because you have had too much alcohol __________
10 ryuunl very difficult to control __________

2 Complete the sentences with the words in the box in the correct form. More than one answer may be possible.

abuse bite calm down handcuff harass hit kick punch remove restrain threaten

1 A child was __________ the back of my seat with their feet.

2 The man started to __________ a steward by repeatedly demanding whiskey.

3 The passenger __________ to __________ one of the flight attendants with his shoe.

4 The pilot told him to __________ otherwise they would have to __________ him.

5 The drunk lady __________ another passenger in the stomach.

6 As they tried to __________ the passenger she __________ one of the flight attendants’ hands.

7 The group were __________ the other passengers, shouting and swearing at them.

8 The group were told that if they didn't control their behaviour that they would be __________ from the plane.
Unit 1 - Section 3

Pronunciation (p 12)

1 Read the call signs to your partner.
   1 TG104  2 NH3993  3 KX565  4 ON778  5 QV260

2 Listen to your partner and write the call signs, then check what you have both written.

Unit 2 - Section 1

Functional English (p 17)

Work with another student A. Use the words in the box to write the complete forms of the abbreviations below. Then form a pair with a Student B to find out what their abbreviations stand for.

above  air  approach  data  distance
final  fix  flight  go  ground  level
outside  range  recorder  runway
temperature  to  visual

AGL  above  ground  level
DTG  
FAF  
FDR  
OAT  
RVR  

Student B's abbreviations
FIR  
TAS  
TBS  
TOGA  
ZFW  
ILS  

Unit 4 - Section 2

Functional English (p 35)

Explain the words in your crossword to Student B. Explain what things are used for, but don't say the words. Ask Student B to explain their words for you.

---

104 | PAIRWORK
Unit 5 - Section 2

Speaking (p 43)

Ask Student B to give you information about the CAP 232.

How long is the CAP 232? What’s its height?

Use units of measurement when you say the specifications of the MX2.

It’s 21.5 ft, or 6.55 m.

<table>
<thead>
<tr>
<th>specifications</th>
<th>MX2</th>
<th>CAP 232</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>non-metric</td>
<td>metric</td>
</tr>
<tr>
<td></td>
<td>non-metric</td>
<td>metric</td>
</tr>
<tr>
<td>length</td>
<td>21.5</td>
<td>6.55</td>
</tr>
<tr>
<td>height</td>
<td>6.0</td>
<td>1.83</td>
</tr>
<tr>
<td>weight (unladen)</td>
<td>1,287</td>
<td>584</td>
</tr>
<tr>
<td>wing area</td>
<td>102</td>
<td>9.5</td>
</tr>
<tr>
<td>g-rating</td>
<td>+/-14</td>
<td></td>
</tr>
<tr>
<td>engine</td>
<td>320</td>
<td></td>
</tr>
<tr>
<td>max speed / VNE</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>stall speed / VS</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>climb rate</td>
<td>3,500</td>
<td>1,066</td>
</tr>
<tr>
<td>roll rate</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>range</td>
<td>1,669</td>
<td>901</td>
</tr>
</tbody>
</table>

Unit 7 - Section 1

Speaking (p 57)

You are a customs official.

As a new security measure the following rules have been introduced.

Forbiden

- Any machine with petrol
- Lighters
- Matches
- Fireworks

Allowed

- Perfume (if bought in the duty free)
- Wet cell batteries if they are for a wheelchair and the terminals have been disconnected
- Life jacket (one only) with carbon dioxide cylinder

You have to explain to a passenger what is and isn’t allowed and why. Use language from the Functional English section if you can.

Unit 9 - Section 1

Functional English (p 73)

Listen to Student B’s ideas about what could be happening in the pictures.

Then, without showing the pictures, describe what is actually happening.

[Images of airplanes and a passenger jet]
Unit 9 - Section 2

Functional English (p 74)

1. Describe your helicopter route to Student B. Do not show them your picture.

2. Listen to Student B’s description of the route of their helicopter and draw it on your picture.

Unit 11 - Section 3

Pronunciation (p 92)

1. You are at a meeting reviewing emergency procedures. Listen to Student B talking from notes about an incident. You have the correct information in the report below. Correct Student B politely but clearly.

<table>
<thead>
<tr>
<th>Crew</th>
<th>Pilot, co-pilot, 3 flight attendants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passengers</td>
<td>121</td>
</tr>
<tr>
<td>Departure city</td>
<td>Liverpool, UK</td>
</tr>
<tr>
<td>Destination city</td>
<td>San Francisco, California</td>
</tr>
<tr>
<td>Flight level</td>
<td>FL 240</td>
</tr>
<tr>
<td>Problem</td>
<td>faulty air conditioning</td>
</tr>
<tr>
<td>Action taken</td>
<td>emergency landing at Manchester Airport</td>
</tr>
<tr>
<td>Outcome</td>
<td>decompression caused by one of the cabin doors not being closed correctly</td>
</tr>
</tbody>
</table>

2. Later in the same meeting, you need to talk about another incident, but you only have notes you made at the time. Talk about the incident, making full sentences from your notes. Student B has the official report of the incident, and will correct any information that is wrong.

3 crew + 150 passengers
Chester, UK → Sacramento, California
Flight level 250
Cabin decompression caused return to airport
Problem due to hole in left-hand cargo door, caused by sharp object

Unit 12 - Section 2

Functional English (p 99)

1. Complete the table with another Student A. Use the language from the Functional English section.

<table>
<thead>
<tr>
<th>passenger's behaviour</th>
<th>‘suspicious’ interpretation</th>
<th>likely interpretation</th>
<th>imaginative interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A young man repeatedly touches one of his feet.</td>
<td>He must have a bomb in his shoe.</td>
<td>He’s probably hurt his foot.</td>
<td>He could be superstitious about flying, and that’s his ‘lucky’ shoe.</td>
</tr>
<tr>
<td>It is summer, but a middle-aged woman in departures is wearing heavy winter clothes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>An elderly man doesn’t respond to greetings.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two young women are travelling together, but not talking to each other.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Each student form a pair with a Student B. Tell them only your interpretations. They must guess what the passenger's strange behaviour is.
Unit 1 - Section 2
(p 10)
Find out from Student A where the following buildings and features are. Mark them on your map.
- the general aviation terminal
- the airport police station
- the aircraft rescue and fire-fighting station
- the international arrivals terminal
- the control tower
- a helipad
Describe the position of the buildings and features that Student A asks for. The prepositions in the box will be useful.
in the centre of in front of next to behind opposite to the north of parallel to on the opposite side of

Unit 2 - Section 1
Functional English (p 17)
Work with another student B. Use the words in the box to write the complete forms of the abbreviations below. Then form a pair with a Student A to find out what their abbreviations stand for.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>air</td>
<td>around</td>
</tr>
<tr>
<td>be</td>
<td>flight</td>
</tr>
<tr>
<td>fuel</td>
<td>go</td>
</tr>
<tr>
<td>instrument</td>
<td>information</td>
</tr>
<tr>
<td>landing</td>
<td>off</td>
</tr>
<tr>
<td>region</td>
<td>specified</td>
</tr>
<tr>
<td>speed</td>
<td>system</td>
</tr>
<tr>
<td>take</td>
<td>to</td>
</tr>
<tr>
<td>true</td>
<td>weight</td>
</tr>
<tr>
<td>zero</td>
<td></td>
</tr>
</tbody>
</table>

FIR  flight information region
TAS  
TBS  
TOGA 
ZFW  
ILS  

Student A's abbreviations
AGL  
DTG  
FAF  
FDR  
OAT  
RVR  

Unit 1 - Section 3
Pronunciation (p 12)
1 Listen to your partner and write the call signs.
2 Read the call signs to your partner then check what you have both written.

1 AB793  4 EK265
2 PH4870  5 ZB256
3 FI190
Unit 2 - Section 2

Vocabulary (p 18–19)

Ask student A what places are at the following co-ordinates. Write the names of the places in the approximate position on your map.

example

What do you have at 29°02'49.78"S, 167°57'42.98"E

1 29°02'49.78"S  167°57'42.98"E
2 17°45'35.72"S  177°26'39.93"E
3 22°20'52.78"S  171°20'43.88"E
4 33°51'29.41"S  151°12'37.52"E

Unit 2 - Section 3

Speaking (p 21)

Ask Student A to describe their position using visual fixes. Direct them to the airstrip, getting them to confirm or disconfirm what they can see along the way.
Unit 4 - Section 2

Functional English (p 35)

Explain the words in your crossword to Student A.
Explain what things are used for, but don't say the words.
Ask Student A to explain their words for you.

LOCK
PERIMETER/FENCE
BIRDS/SCARER
GRASS/MARGIN
CCTV/CAMERA

Unit 7 - Section 1

Speaking (p 57)

You are a passenger and want to take the following items on board. Try to get the customs officer to let you take the items on board your flight. Use language from the Functional English section if you can.

- 200 cigarettes
- a box of fireworks
- a packet of ten lighters
- perfume (bought in duty-free)
- ten packets of tea.
- two life-jackets with carbon dioxide cylinders
- two new car batteries. (You have emptied the battery acid and disconnected the terminals. The passenger in front of you has an electric wheel chair which contains a disconnected battery. He is allowed to take it with him.)

Unit 9 - Section 1

Functional English (p 73)

1 Listen to Student A's ideas about what could be happening in the pictures. Then, without showing the pictures, describe what is actually happening.

<table>
<thead>
<tr>
<th>Specification</th>
<th>MX2</th>
<th>CAP 232</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>non-</td>
<td>metric</td>
</tr>
<tr>
<td></td>
<td>metric</td>
<td>non-</td>
</tr>
<tr>
<td>length</td>
<td>22.2</td>
<td>6.76</td>
</tr>
<tr>
<td>height</td>
<td>5.8</td>
<td>1.79</td>
</tr>
<tr>
<td>weight (unladen)</td>
<td>1,290</td>
<td>586</td>
</tr>
<tr>
<td>wing area</td>
<td>109.2</td>
<td>10.1</td>
</tr>
<tr>
<td>g-rating</td>
<td>+/-10</td>
<td></td>
</tr>
<tr>
<td>engine</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>max speed</td>
<td>219</td>
<td></td>
</tr>
<tr>
<td>stall speed</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>climb rate</td>
<td>3,290</td>
<td>1,002</td>
</tr>
<tr>
<td>roll rate</td>
<td>420</td>
<td></td>
</tr>
<tr>
<td>range</td>
<td>1,200</td>
<td>648</td>
</tr>
</tbody>
</table>

2 Change roles. Look at the Student B pictures on p 73.
Unit 9 - Section 2

Functional English (page 74)

1. Listen to Student A's description of the route of their helicopter and draw it on your picture.

2. Describe your helicopter route to Student A. Do not show them your picture.

Unit 9 - Section 3

Functional English (p 77)

1. Flight SQ286 taxied to runway 05R at Auckland’s International Airport and was cleared for take-off. When the captain rotated the B747-412 for lift-off, the tail struck the runway and scraped for 490 m until the aeroplane became airborne. The tail strike occurred because the rotation speed was 33 kt less than the 163 kt required for the aeroplane's weight.

2. The controller cleared Flight 504 for a visual approach to runway 15. At 19:54 the crew reported on finals and were cleared to land. The F-28 touched down 4.5 m short of runway 15 and struck the edge of the runway threshold. It continued for 112 m before coming off the runway. It ran another 263 m before it skidded into another aircraft and stopped.

3. Flight 1655, a B737-300, was vectored for a visual approach to runway 8. The flight's descent angle was more than 6°. Touchdown speed was 182 kt. The crew couldn't stop the aircraft on the runway and it overran. It crashed through the perimeter fence at a speed of 42 kt and stopped on a highway. The forward service door-escape slide inflated inside the plane and the nose gear collapsed.

Unit 10 - Section 3

Speaking (p 85)

1. You are a student pilot on a solo flight in a Cessna 172SP. Your partner is the flight instructor on the ground. You have fuel problems and engine power loss. You can't remember all of the manual's checklist for this situation. You have radio communications. Your instructor will tell you the correct readings and control settings for power loss. Check them against your control settings in the picture, and find out what mistakes you have made. Use language from the Functional English section.

2. Change roles. You are a flight instructor on the ground. Your partner is a student pilot on a solo flight in a Cessna 172SP. He/She has fuel problems and is going to make a power-off landing. He/She can't remember all of the checklist and is busy trying to fly the aircraft. You have radio communications. Go through the checklist below. Find out what mistakes he/she has made and correct them.

### Power Off Landing

- Air speed = 68 KIAS
- Transponder code = 7700
- Mixture = IDLE CUT-OFF (= fully out)
- Fuel shut-off valve = OFF (= fully out)
- Ignition switch = OFF
- Flaps = 30 or FULL
Unit 11 - Section 3

Pronunciation (p 92)

1 At a meeting reviewing emergency procedures, you need to talk about an incident that happened, but you only have notes you made at the time. Talk about the incident, making full sentences from your notes. Student A has the official report of the incident, and will correct any information that is wrong.

2 Later in the same meeting, you listen to Student A talking from notes about an incident. You have the correct inform in the report below. Correct Student A politely but clearly.

Incident report

<table>
<thead>
<tr>
<th>Crew</th>
<th>Pilot, co-pilot, 2 flight attendants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passengers</td>
<td>115</td>
</tr>
<tr>
<td>Departure city</td>
<td>Manchester, UK</td>
</tr>
<tr>
<td>Destination city</td>
<td>Oakland, California</td>
</tr>
<tr>
<td>Flight level</td>
<td>FL 260</td>
</tr>
<tr>
<td>Problem</td>
<td>cabin decompression</td>
</tr>
<tr>
<td>Action taken</td>
<td>returned to Manchester Airport</td>
</tr>
<tr>
<td>Outcome</td>
<td>Decompression was caused by a small hole in the right-hand cargo door. The hole was probably created by a ramp vehicle at Manchester Airport.</td>
</tr>
</tbody>
</table>
Unit 12 - Section 2

Functional English (p 99)

1 Complete the table with another Student B. Use the language from the Functional English section.

<table>
<thead>
<tr>
<th>passenger's behaviour</th>
<th>'suspicious' interpretation</th>
<th>likely interpretation</th>
<th>imaginative interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>An elderly woman is holding her handbag very close to her body.</td>
<td>She might be hiding a weapon.</td>
<td>She is probably afraid of losing her medication.</td>
<td>She may have an old photo of her dead husband and doesn’t want to lose it</td>
</tr>
<tr>
<td>A teenage boy cannot walk straight.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A middle-aged businessman refuses to part with his umbrella.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A young man is wearing a rucksack with wires coming from it.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 Each student form a pair with a Student A. Tell them only your interpretations. They must guess what the passenger’s strange behaviour is.

Unit 9 - Section 3

Functional English (p 77)

1 Flight SQ286 taxied to runway 05L at Auckland’s International Airport and was cleared for take-off. When the captain rotated the B747-412 for lift-off, the tail struck the runway and scraped for 490 ft until the aeroplane became airborne. The tail strike occurred because the rotation speed was 33 kt less than the 163 kt required for the aeroplane’s weight.

2 The controller cleared Flight 504 for a visual approach to runway 15. At 09:54 the crew reported on finals and were cleared to land. The F-28 touched down 4.5 m short of runway 15 and struck the edge of the runway threshold. It continued for 212 m before coming off the runway. It ran another 263 m before it skidded into the wall of a building and stopped.

3 Flight 1455, a B737-300, was vectored for a visual approach to runway 18. The flight’s descent angle was more than 6°. Touchdown speed was 182 kt. The crew couldn’t stop the aircraft on the runway and it overran. It crashed through the perimeter fence at a speed of 32 kt and stopped on a highway. The forward service-door escape slide inflated outside the plane and the nose gear collapsed.
**Unit 1**

01

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

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

A third area of concern is using Juliet to transition from A to B south east bound. 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.

04

Quebec
Romeo
Zulu
November
Hotel
Juliet
Sierra
Alpha

05

\[ C = \text{controller}, \ P = \text{pilot} \]

\[ C \] 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. 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 now 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.

06

1 FR396
2 AQ629
3 CZ310
4 LNS88
5 HY571
6 JM422

**Unit 2**

07

\[ P = \text{Prochnow}, \ C = \text{controller}, \ V = \text{Vette} \]

\[ P \] MAYDAY. MAYDAY. MAYDAY. Auckland Control. N45AC. I’m lost. I’m a Cessna 188 AgWagon.

\[ C \] N45AC. Auckland Centre roger mayday.

\[ V \] TE103 contacting N45AC.

\[ P \] N45AC. Copy.
Unit 1

01
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
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
A third area of concern is using Juliet to transition from A to B south-east bound. 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.

04
Quebec
Romeo
Zulu
November
Hotel
Juliet
Sierra
Alpha

05
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. MC798 is on N by the runways here ... er ... we

Unit 2

07

P  MAYDAY. MAYDAY. MAYDAY. Auckland Control. N45AC. I'm lost. I'm a Cessna 188 AgWagon.
C  N45AC. Auckland Centre roger mayday.
V  TE103 contacting N45AC.
P  N45AC. Copy.
LISTENING SCRIPT

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?

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.

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

08

Turn towards the sun and report your heading.

Wilco. My heading is 274°.

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?

About two and a half fingers.

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

Heading 315.

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. N45AC. It's getting dark. What time is your sunset?

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

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

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

N45AC. Your co-ordinates are 31° south, 170° 21' east. You are 150 miles from Norfolk Island.

09

north south east west south-east north-west south-west north-east
274° 56° east 32° south 170°21'
east 14°32'40.25° north

10

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

12

followed arrived tried
established approached tasked
contacted departed calculated

13

Pilot, 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 Baron. Altitude 3,000. Speed 110. TJB.
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

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 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 road. 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 180° left turn, heading 265. TJB.
C I'm coming out of the valley and I can see a built-up area ahead and a lake at one o'clock. TJB.
P There is an airport with a tower 5 miles north-west. Say intentions.
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?
Unit 3

15

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.

16

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

17

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.
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.

Unit 4

19

P1 = pilot 1, P2 = pilot 2, G1 / G2 = ground 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 onto 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!

20

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.

21

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?

22

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!

23

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.

PF 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.

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.

C S27H. State fuel on board.

PNF Er ... 194,000 kg.

PF Holding wings level is difficult.

24

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.
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.

PNF  OK, we need to dump fuel as soon as possible.

S27H. We plan to dump fuel to landing weight. S27H.

Unit 5

25

I = interviewer, T = Thiago

I   Welcome back to Radio Action. I'm here with champion air-race pilot, Thiago Silva Corbeira. 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°. 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 is 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. Well, good luck, and thanks for talking to us.

My pleasure. Thank you.

26

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

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 ft² – or 9.1 m². 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.

28

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

29

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.
Unit 6

33

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

**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 but 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...

34

**stress**

**pressure**

**spending**

**flaps**

**flight**

**breakdown**

**specific**

**plans**
35
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.

36
CPT = captain, C = controller, M = medical advisor, F = first officer

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.

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 seat belt?

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 CGD. How long have you been airborne?

F
We've been in the air for about 15 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 ...

37
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.

38
He's having difficulty breathing, he's shaking badly, and his eyes are shut.

39
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.

Unit 7

01
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.
02

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 southwest. 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 kilometers 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 ... Jump! Go! One! Two! Jumpers away ...

03

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!

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

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

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.
08

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 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.

10

ASS = ATC shift supervisor, 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 co-ordinated. Now, any more questions? No? Then good luck everyone.

09

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.
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. 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.

13

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


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.

15

short visual watch roger

16

approach edge measure switch threshold emergency usual shear

17

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 ... oh ... 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.

18

aircraft asked safety options explained thick white fog the ship's radar some very good flying

19

reverse thrust available slots thick smoke climb vertically dump fuel damaged struts
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. The nose gear appears down but...

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...

P = pilot, C = controller

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.

C = controller, P1/2 = pilot 1/2

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.

Unit 10

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 'whoosh' 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.
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.

Pilot non-flying, C = control, PF = pilot flying, FA = flight attendant


PF  Number one doesn’t sound good. We’re not running short of fuel, are we? We should have plenty of fuel.

PFN  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.

PFN  It’s feathered.

PF  Tell them we’ve got one engine shut down.

PFN  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.

PFN  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.

PFN  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.

PFN  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.

PFN  We’ve got smoke. Shut down number two.

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 …

Unit 11

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  Bird strike.

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 m² 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.
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.

now take scenarios real series photographs here rear cargo out flight zero away tailplane depressurization aircraft safely only minor

Pilot, Controller, 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. 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. Er ... yes, the leading edges are badly dented, and the engine inlet cowl. 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.
33
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.

34
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.

Unit 12

35
P =Presenter, KK = 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.

36
detection
possession
suspicion

37
aviation
reaction
conversation
immigration
inspections
intentions
reduction
violations

38
PNF = pilot non-flying, PF = pilot flying, 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.

39

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 Incheon Control on 123.6. I’ll advise them of your situation and pass on your request.
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.
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