

A graphic representing the ECCAIRS 4 Reporting System. It features a light blue header bar at the top. Below it is a large white rectangular area containing the text 'ECCAIRS' in a large, bold, black sans-serif font, followed by a large, stylized orange '4' with a black outline and a slight 3D effect. Underneath 'ECCAIRS' is the text 'Reporting System' in a smaller, black sans-serif font. The background of the white area shows a faint, abstract image of a modern building with glass windows. At the bottom of the graphic is a solid light orange horizontal bar.

ECCAIRS⁴

Reporting System

ECCAIRS 4 in Practice

—

**ECCAIRS 4 Applications
ADREP 2000 Taxonomy**

—

For End-Users

SOLUTIONS BOOK

Introduction

Exercises within the accompanying Exercise Book are based on reports and relevant material available from public sources. Various partners of the ECCAIRS community, among which the *International Civil Aviation Organisation* (ICAO), the French *Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile* (BEA), the German *Deutsche Flugsicherung* (DFS) and the *European Aviation Safety Agency* (EASA) have collaborated in providing the necessary amendments and suggestions to the initial draft in order to provide a wide spectrum of occurrences that address the many issues in the reporting in civil aviation.

The exercises describe fictitious scenarios of aviation accidents and/or incidents with the sole purpose of providing guidance and training material for the coding of events of such occurrences in the ECCAIRS system. Some scenarios were downloaded from publicly available web sites.

The book has been organised in different sections related to occurrence data entry:

- General Exercises
- Occurrence Category Exercises
- Events/Factors Exercises
- Separation Exercises
- Air Traffic Management Exercises

For some of the sections, solutions are provided printed in a separate volume or electronically in a file. These solutions represent an interpretation of the narrative or of the facts by the authors. In the event, the reader might gather a different opinion about the facts exposed which is, in itself, positive and rather stimulated by the same authors. An introductory and guided exercise may be present in each section for acquiring some extra skills and usage tips about the tool.

Two additional sections have been added that address the following tools:

- Query Builder
- Grapher

Purpose and Objectives

The objectives of encoding aviation accidents and incidents are various: memory of accidents, dissemination of safety data, elaboration of safety indicators and safety studies. Another key issue is to identify recurrent factors or patterns in accidents to prevent future occurrences.

The use of a common taxonomy (ADREP 2000) and common software (ECCAIRS release 4) are necessary but not sufficient. The method described through examples is supposed to provide a consistent approach for the encoding of incidents and accidents.

The results of the investigation are discussed in the analysis of the report that very often follows the chronological sequence of events (causation chain). The analysis of the report can also support the safety recommendation found in section 4 of ICAO standard reports.

Non-contributory factors can also appear throughout an investigation and it is important to keep track of them and therefore record the factors that led or can lead to recommendations. It could be helpful for future safety studies.

The user may find case studies all along this document provided for giving an in-depth look into occurrence reporting and coding performed by an investigation body using the convened coding techniques. Although in practice it is not mandatory to provide such level of detail in every incident, it is based on the assumption that 'you code what you know' and whatever is not coded is inevitably lost.

Comments and Suggestions

The beneficiaries of this book are the users of the ECCAIRS system. Comments and suggestions that would allow the authors to enrich this publication are therefore welcome at any time. Contact the authors at the e-mail address 'eccairs.documentation@jrc.it' or 'eccairs.training@jrc.it' citing the title of this book in the message's subject.



General Exercises

The General Exercises are based on coding an occurrence into the ECCAIRS system, starting from an existing occurrence report. Since the information provided refers to many different topics and attributes available in the taxonomy used, it is not possible to provide complete yet simple images (i.e. screen shots) of the ECCAIRS 4 Browser, as further in this book.

The solutions are therefore provided as occurrence records using the electronic ECCAIRS 4 Data File format (.E4F). The occurrences can be opened and modified without limitations in the ECCAIRS 4 Browser application and represent a level of detail that is compatible with the principles of good coding.

For some of the solutions, it is especially the Event Tree that may fail to provide the entire detail of the events. The challenge is up to the user in trying to fill in the missing tiles.

Occurrence Category Exercises

The solutions are provided in the form of a grid, since multiple selections are allowed. For the full explanation of the categories consult the Dictionary Browser.

Ex.	ADRM	AMAN	ARC	ATM	CABIN	CFIT	EVAC	F-NI	F-POST	FUEL	GCOL	ICE	LALT	LOC-G	LOC-I	MAC	RAMP	RE	RI-A	RI-VAP	SCF-NP	SCF-PP	SEC	TURB	USOS	WSTRW	OTHR	UNK
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Events & Factors Exercises

Exercise 46

- Events
- Unknown , during Initial climb. {Aircraft - C-ABCD}
 - An aircraft collision with the terrain , during Take-off. {Aircraft - C-ABCD}
 - Damage caused when aircraft sank in water , during Post-impact. {Aircraft - C-ABCD}

Exercise 47

- Events
- Aircraft's propellers related eventl , during Final approach. {Aircraft - C-ABCD}
 - Deviation from intended pitch attitude , during Final approach. {Aircraft - C-ABCD}
 - Deviation from intended flight path - heading , during Final approach. {Aircraft - C-ABCD}
 - Aircraft fire , during Post-impact. {Aircraft - C-ABCD}

Exercise 48

- Events
- Deviation from minimum safe altitude en-route , during En-route. {Aircraft - C-ABCD}
 - Aircraft collision with high terrain, a hill or a mountain , during Normal descent. {Aircraft - C-ABCD}

Exercise 49

- Events
- Aircraft collision with power line conductor, cable or wire , during Approach. {Aircraft - JA9910}
 - Aircraft collision with level terrain/water , during Post-impact. {Aircraft - JA9910}
 - Aircraft fire , during Post-impact. {Aircraft - JA9910}

Exercise 50

- Events
- Missing aircraft , during Unknown. {Aircraft - C-ABCD}

Exercise 51

- Events
- Deviation from intended flight path - heading , during Landing roll. {Aircraft - C-ABCD}
 - Runway excursion to the side , during Landing roll. {Aircraft - C-ABCD}

Exercise 52

- Events
- Deviation from intended pitch attitude , during Take-off run. {Aircraft - C-ABCD}
 - The aircraft ran off the end of the runway , during Aborted take-off. {Aircraft - C-ABCD}
 - Nose gear collapsed/retracted , during Aborted take-off. {Aircraft - C-ABCD}

Exercise 53

- Events
- Deviation from intended flight path - heading , during Take-off run. {Aircraft - N387UA}
 - rejected take-off , during Take-off run. {Aircraft - N387UA}

Exercise 54

- Events
- Deviation from intended roll attitude , during Cruise. {Aircraft - C-ABCD}

Exercise 55

Events

- Wheels down landing on water , during Level off-touchdown. {Aircraft - C-ABCD}
- Nosed down/overtaken , during Landing. {Aircraft - C-ABCD}

Exercise 56

Events

- Hydraulic system related event , during Cruise. {Aircraft - C-ABCD}
- Diversion due to technical reasons , during Cruise. {Aircraft - C-ABCD}

Exercise 57

Events

- Clearance deviation - en-route , during Cruise. {Aircraft - C-ABCD}
- Aircraft altitude related event , during Cruise. {Aircraft - C-ABCD}

Exercise 58

Events

- Electrical power system related event , during Take-off run. {Aircraft - C-ABCD}
- Smoke or fumes in the aircraft , during Take-off run. {Aircraft - C-ABCD}
- rejected take-off , during Take-off run. {Aircraft - C-ABCD}

Exercise 59

Events

- Aircraft encountered crosswind , during Landing roll. {Aircraft - C-ABCD}
- Deviation from intended roll attitude , during Landing roll. {Aircraft - C-ABCD}
- Nosed down/overtaken , during Landing roll. {Aircraft - C-ABCD}

Exercise 60

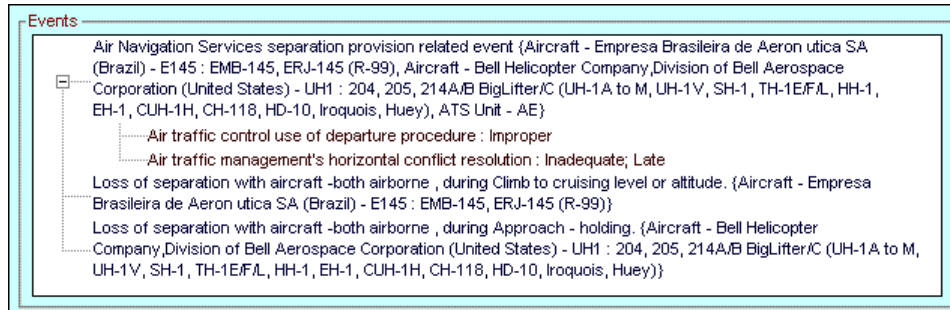
Events

- Landing gear related event , during Initial climb. {Aircraft - C-ABCD}
- declared emergency , during Initial climb. {Aircraft - C-ABCD}

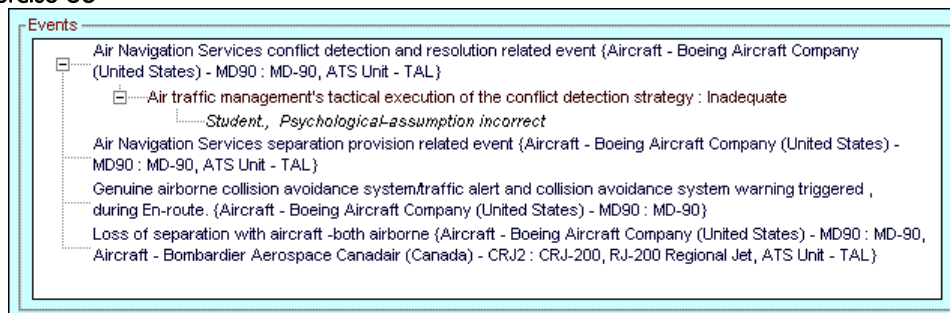
Air Traffic Management Exercises

The solutions provided are based on the events tree of an «ATM» type of view. When using an «ADREP» type of view, the names of the aircraft will be different, since that view uses 'ICAO Make/model' indication instead of the 'ATM Type designator' indication.

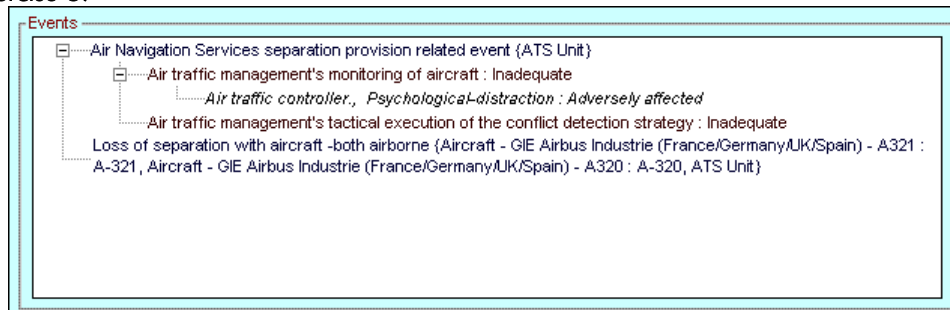
Exercise 85



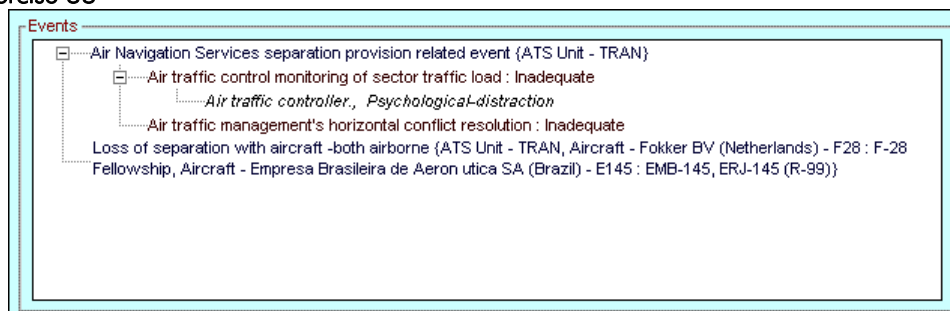
Exercise 86



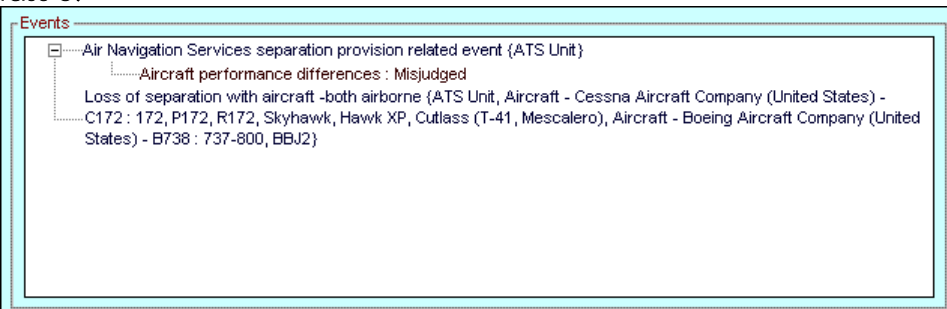
Exercise 87



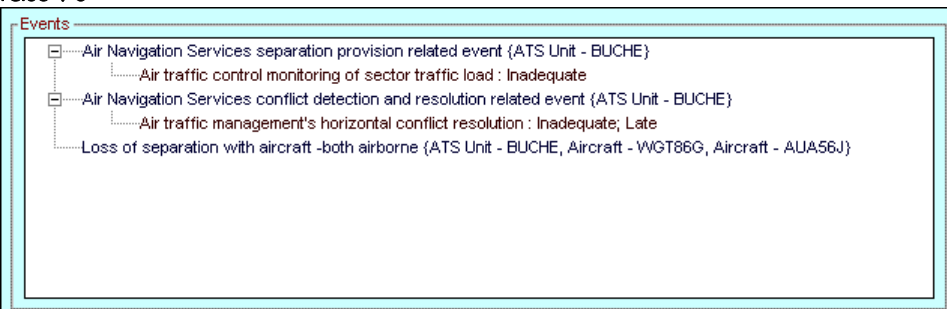
Exercise 88



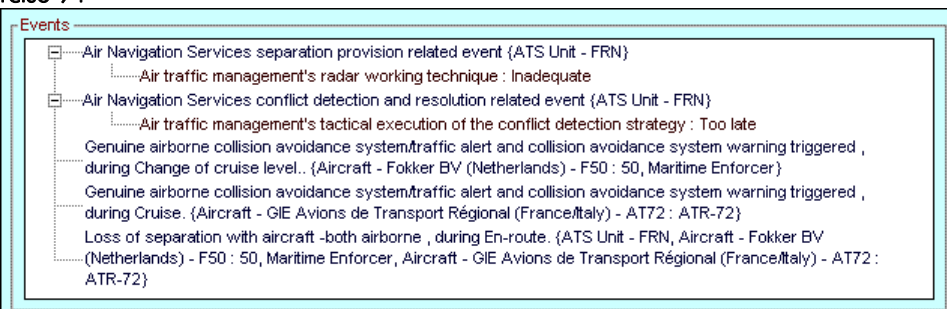
Exercise 89



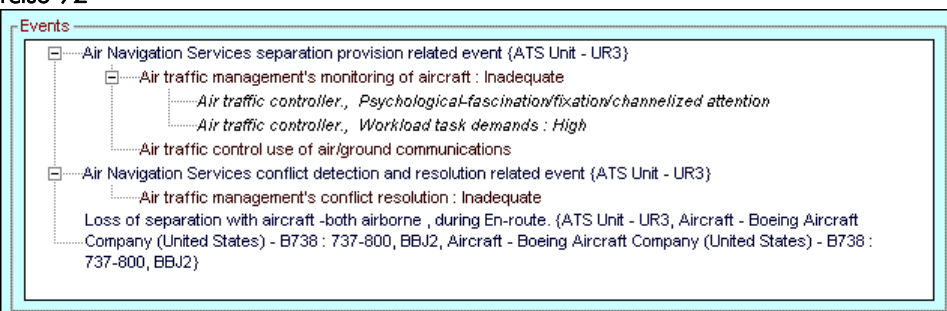
Exercise 90



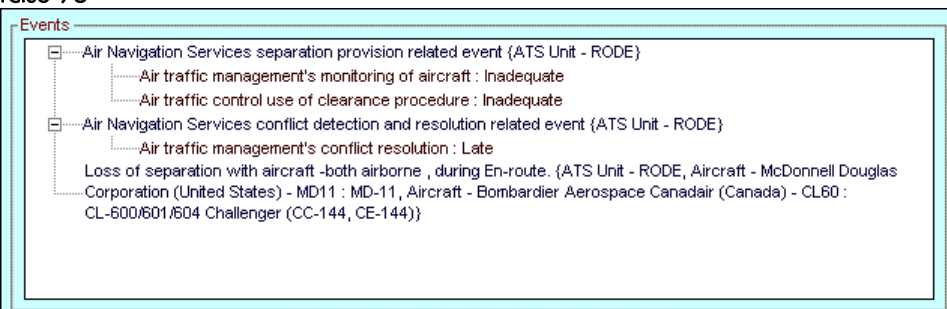
Exercise 91



Exercise 92



Exercise 93



Exercise 94

Events

- ☐ Air Navigation Services separation provision related event {ATS Unit}
 -Air traffic management's radar working technique : Inadequate
 -Air traffic management's monitoring of aircraft : Inadequate
 -Air traffic management's internal coordination : Inadequate
-Loss of separation with aircraft -both airborne , during En-route. {ATS Unit - ATS, Aircraft - Piper Aircraft Corporation (United States) - PA30 : PA-30/39 Twin Comanche, Twin Comanche CR, Turbo Twin Comanche, Aircraft - HLD3195}

Query Exercises

The solutions are written in the form displayed by the query explanation box in the bottom part of the Query Builder. The query built may not represent the one and only possible implementation, sometimes another combination of fields may yield the same or even better results. The query may also return more occurrences from the database than actually expected.

Practice shows that it is always better to go for a less stringent query returning a larger set of records instead of trying to create the state-of-the-art query that may, in the event, leave out important occurrences.

Exercise 95

Find all Occurrences where { Date entered. has value }

Exercise 96

Find all Occurrences where { Local date. between 01-01-2001 and 31-12-2001 or UTC date of the occurrence between 01-01-2001 and 31-12-2001 }

Exercise 97

Find all Occurrences where { Aircraft manufacturer/model. equal to BOEING or Aircraft manufacturer/model. not equal to AIRBUS INDUSTRIES }

Exercise 98

Find all Occurrences where { { Local date. between 01-01-2000 and 31-12-2000 or UTC date of the occurrence between 01-01-2000 and 31-12-2000 } and State or area of occurrence. equal to (Value to Ask) }

Exercise 99

Find all Occurrences where { The identification of the State that supplied the report. equal to United States or The name of the organization that is responsible for the report. has at least one of United States (NTSB), United States (CAA) }

Exercise 100

Find all Occurrences where { Local date. has no value and UTC date of the occurrence has no value }

Exercise 101

Find all Occurrences where { Aircraft manufacturer/model. has at least one of 747 B, 747 C/F, 747 SP, 747 SR, 747-100/200, 747-300, 747-400, BOEING 747 and Aircraft manufacturer/model. not equal to (Value to Ask) }

Exercise 102

Find all Occurrences where { The text of the narrative entered by the reporter of the occurrence. contains at least one word infant, baby and Operation type. equal to Commercial Air Transport }

Exercise 103

Find all Occurrences where { Occurrence category. has at least one of LOC-I: Loss of control - inflight, LOC-G: Loss of control - ground or [Event type. has at least one of Deviations from flight path, Helicopter flight path deviation and Descriptive factor modifier. has at least one of Not controllable, Impossible, Unsuccessful] }

Exercise 104

Find all Occurrences where { Aircraft manufacturer/model. equal to (Value to Ask) and { Occurrence category. has at least one of SCF-NP: System/component failure or malfunction [non-powerplant], SCF-PP: powerplant failure or malfunction or Event type. equal to Aircraft/system/component } and Event type. has at least one of Declared emergency, Emergency descent }

Exercise 105

Find all Occurrences where { Aircraft manufacturer/model. last instance id equal to 2 and { Occurrence category. equal to MAC: AIRPROX/near miss/midair collision or [Aircraft manufacturer/model. has value] or Event type. equal to Near collisions - loss of separation } }

Exercise 106

Find all Occurrences where { Aircraft manufacturer/model. last instance id equal to (Value to Ask) }

Exercise 107

Find all Occurrences where { Database access by. equal to (Value to Ask) and Database access date. equal to Today (Value to Ask) and Database access type. equal to Inserted }

Exercise 108

Find all Occurrences where { Total fatal injuries. greater than or equal to 1 or Injury severity level. equal to Fatal or { Occurrence class. equal to Accident and { Total fatal injuries. greater than or equal to 1 or Injury severity level. equal to Fatal } } }

Exercise 109

Find all Occurrences where { { Total fatal injuries. greater than or equal to 1 or Injury severity level. equal to Fatal or { Occurrence class. equal to Accident and { Total fatal injuries. greater than or equal to 1 or Injury severity level. equal to Fatal } } } and Operation type. equal to Commercial Air Transport and The flight phase in which the occurrence took place. has at least one of Approach, Landing and Damage severity level. has at least one of Destroyed, Substantial }

Exercise 110

Find all Occurrences where { [Flight crew category. equal to Pilot-in-command and Flight crew age. older 60 Year(s) and Person at controls at the first event. equal to Pilot-in-command] and { Injury severity level. equal to Fatal or Total fatal injuries on aircraft. greater than 0 } and Occurrence category. doesn't have any of MAC: AIRPROX/near miss/midair collision }

Exercise 111

Find all Occurrences where { [Operation type. doesn't have any of Non-revenue operations, Pleasure, State flights, Other and Aircraft State of registry. has at least one of Canada, United States and Number of engines. equal to 1] or [Operation type. doesn't have any of Non-revenue operations, Pleasure, State flights, Other and Aircraft State of registry. has at least one of Canada, United States and Aircraft category. equal to Helicopter] }

Exercise 112

Find all Occurrences where { Event type. has at least one of Runway side excursion, Aircraft overrun and Event type. instance is the last one }

Exercise 113

Find all Occurrences where { Dangerous goods involved. equal to Yes and { Event type. has at least one of Cargo smoke/fumes/fire, Aircraft fire/explosion, Fire-ATM facility, Smoke-ATM facility or Occurrence category. has at least one of F-NI: Fire/smoke (non-impact), F-POST: Fire/smoke (post-impact) or { The phase of flight during which the fire started. has value or Initial location of the fire. has value or Ignition source of the fire. has value or Effectiveness of the aircraft fire suppression system. has value or Fire fighting effectiveness. has value } or The text of the narrative entered by the reporter of the occurrence. contains at least one word fire, smoke, fumes } }

Exercise 114

Find all Occurrences where { { [Aircraft manufacturer/model. equal to BOEING and Aircraft manufacturer/model. doesn't have any of 767, 767-200, 767-300, 767-400 and Aircraft manufacturer/model. last instance id equal to 1] } or { [Aircraft manufacturer/model. equal to BOEING and Aircraft manufacturer/model. doesn't have any of 767, 767-200, 767-300, 767-400 and Aircraft manufacturer/model. instance id equal to 1] and [Aircraft manufacturer/model. equal to BOEING and Aircraft manufacturer/model. doesn't have any of 767, 767-200, 767-300, 767-400 and Aircraft manufacturer/model. instance is not the last one] and [Aircraft manufacturer/model. equal to BOEING and Aircraft manufacturer/model. doesn't have any of 767, 767-200, 767-300, 767-400 and Aircraft manufacturer/model. instance is the last one] } }

Exercise 115

Find all Occurrences where { [Aircraft manufacturer/model. has value and Aircraft propulsion type. doesn't have any of Reciprocating, Turboshaft and Aircraft category. equal to Helicopter] }

Exercise 116

Find all Occurrences where { Occurrence category. has at least one of ATM: ATM/CNS, MAC: AIRPROX/near miss/midair collision, RI-VAP:Runway incursion - vehicle, a/c or person and { Effect on ATM service. has no value or Information on whether and to what extent, in the judgement of the investigators, the air traffic management contributed to the occurrence. has no value } }

Exercise 117

Find all Occurrences where { [Aircraft manufacturer/model. has value and Mass group. has no value] }

Exercise 118

Find all Occurrences where { [Aircraft manufacturer/model. has value and Mass group. has no value] or [Aircraft manufacturer/model. has value and Aircraft category. has no value] }

Exercise 119


Find all Occurrences where { { Weather relevance. not equal to Yes or Weather relevance. has no value } and { Weather conditions. equal to IMC or Visibility restrictions. equal to Fog/mist } }

Exercise 120

Find all Occurrences where { { Injury severity level. has no value and Total injuries to the persons involved in the occurrence. greater than or equal to 1 } or { { Total fatal injuries. greater than or equal to 1 and Injury severity level. not equal to Fatal } and { Total serious injuries. greater than or equal to 1 and Injury severity level. doesn't have any of Fatal, Serious } and { Total minor injuries. greater than or equal to 1 and Injury severity level. doesn't have any of Fatal, Serious, Minor } } }

Grapher Exercises

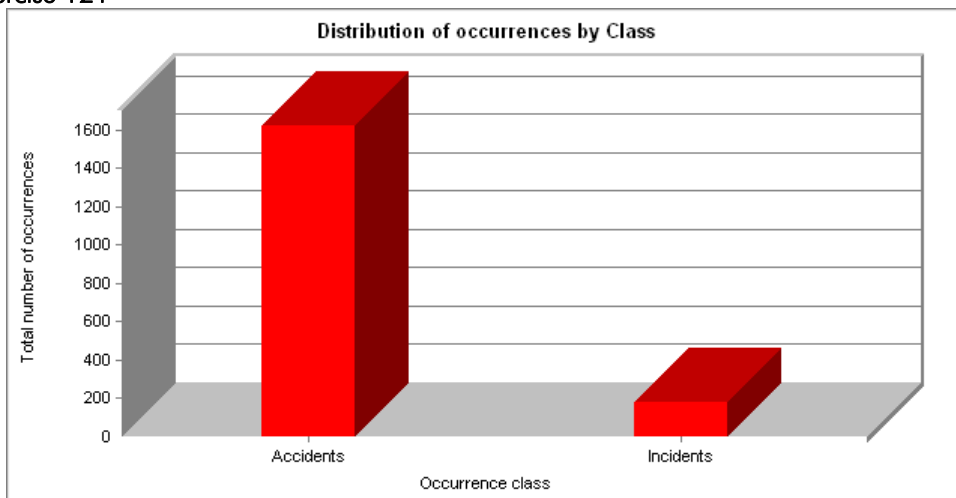
The following printouts have been obtained by pasting an image of the graph into this document.

The image was taken using a built-in function of the Grapher. This function is activated by clicking on the button styled as a photo camera – ; it hides the borders of the graph's window, the toolbars and drops a bitmap onto the Windows Clipboard. This bitmap can then be pasted – using for instance the [Ctrl]+[V] key combination – into any word processor or image editor.

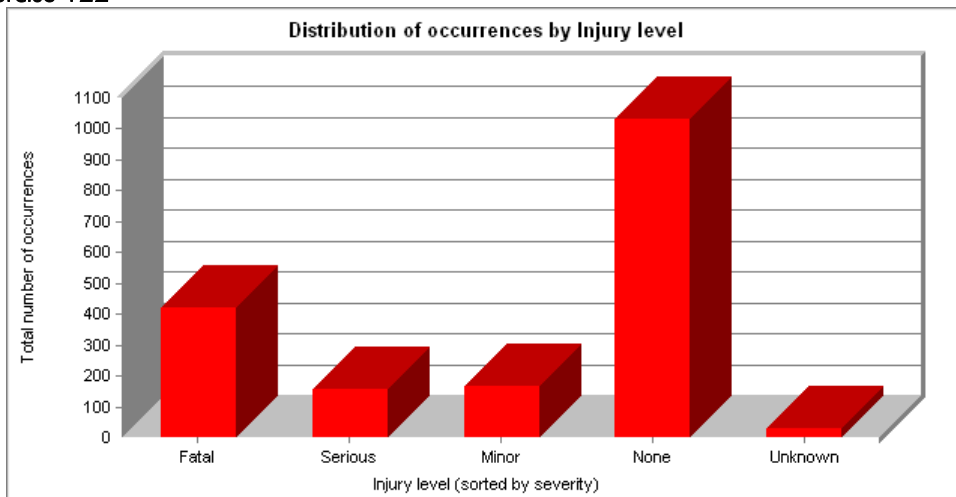
In general, most word processor applications automatically resize (stretch or shrink) the bitmap so that it fits within the document margins. This resizing can reduce the print quality, lead to blurred images or illegible text. In order to minimise this effect and keep crisp graphs on the report, it is recommended to resize the Grapher application and/or the graph's window before activating the snapshot function. To establish the appropriate size, some additional testing may be necessary.

All charts in here are 75% of the original size.

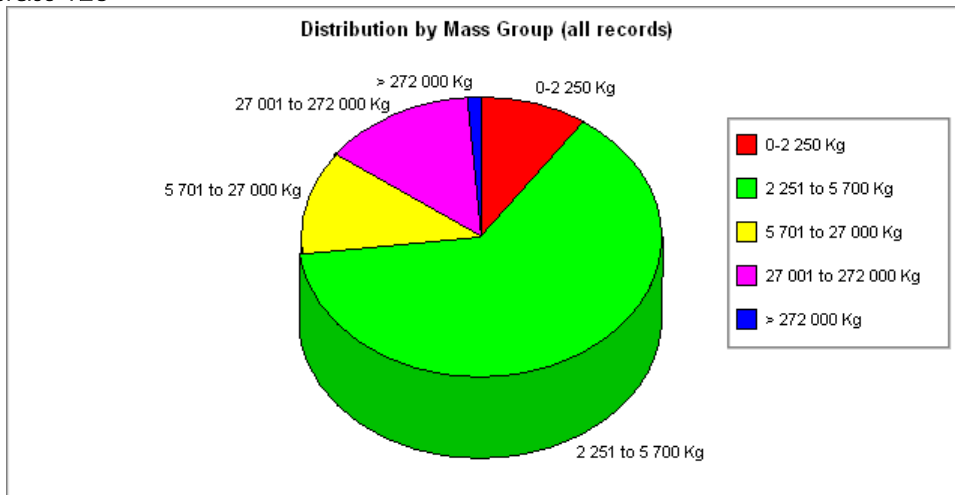
Exercise 121



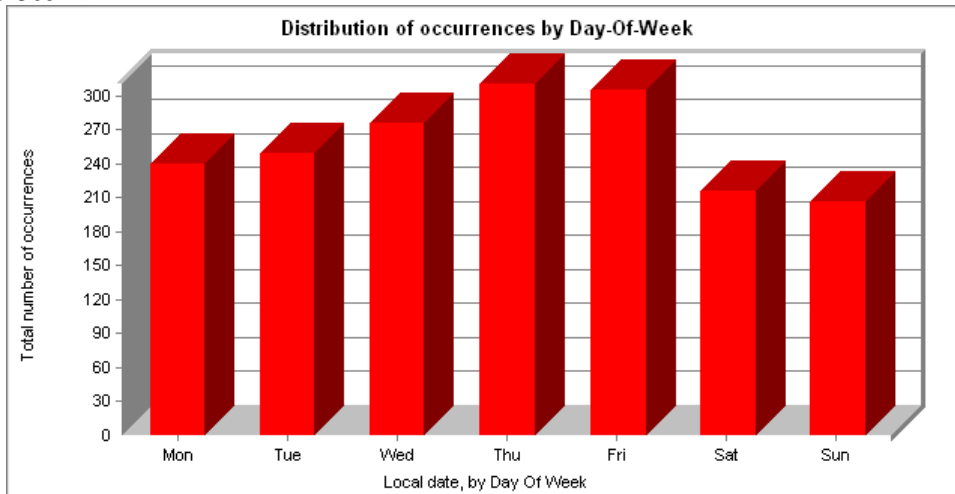
Exercise 122



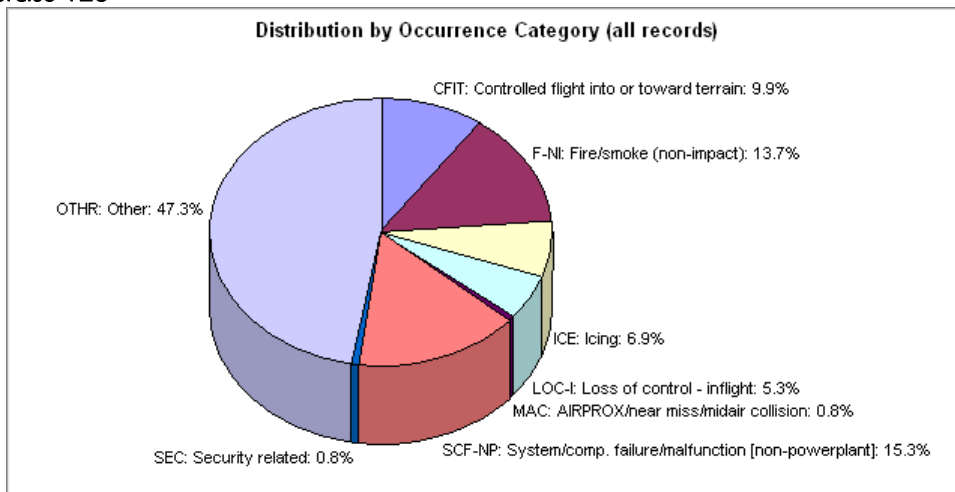
Exercise 123



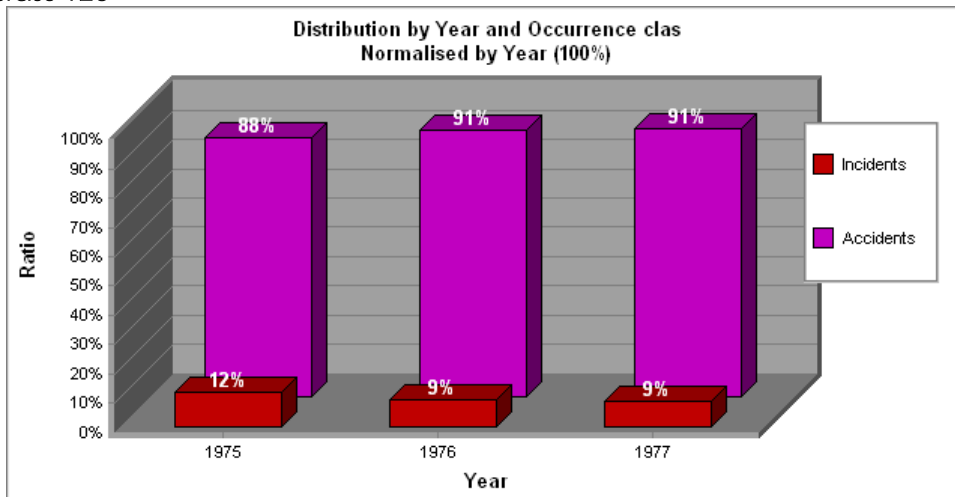
Exercise 124



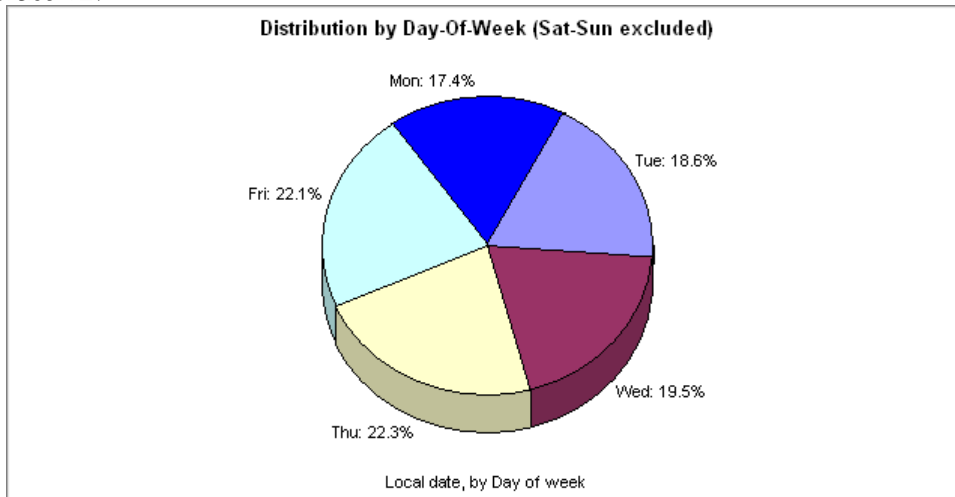
Exercise 125



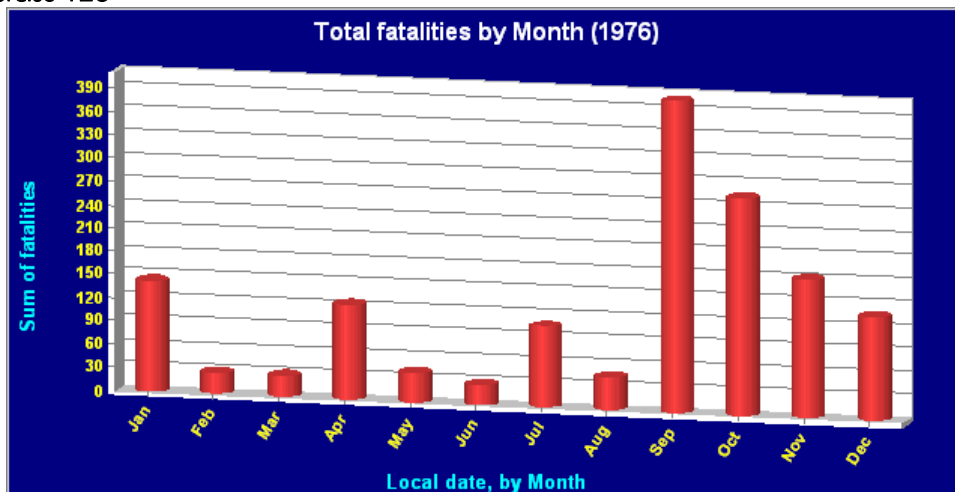
Exercise 126



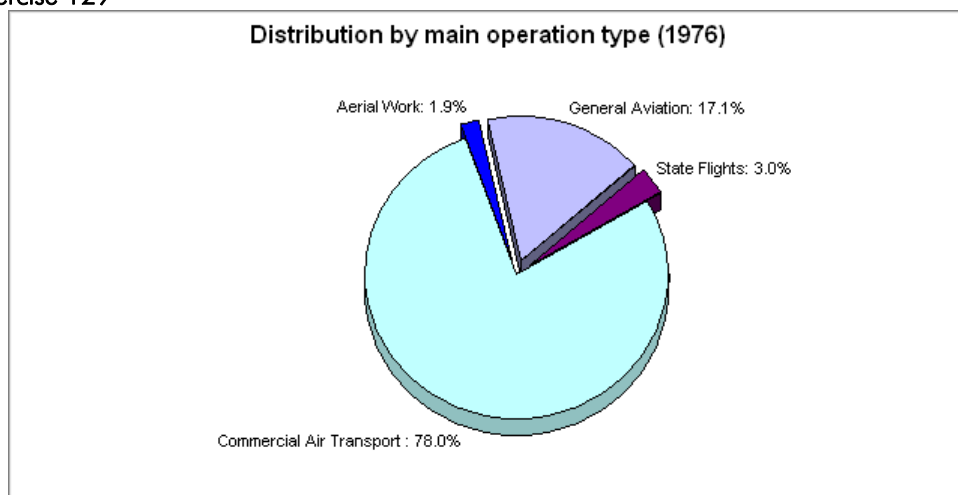
Exercise 127



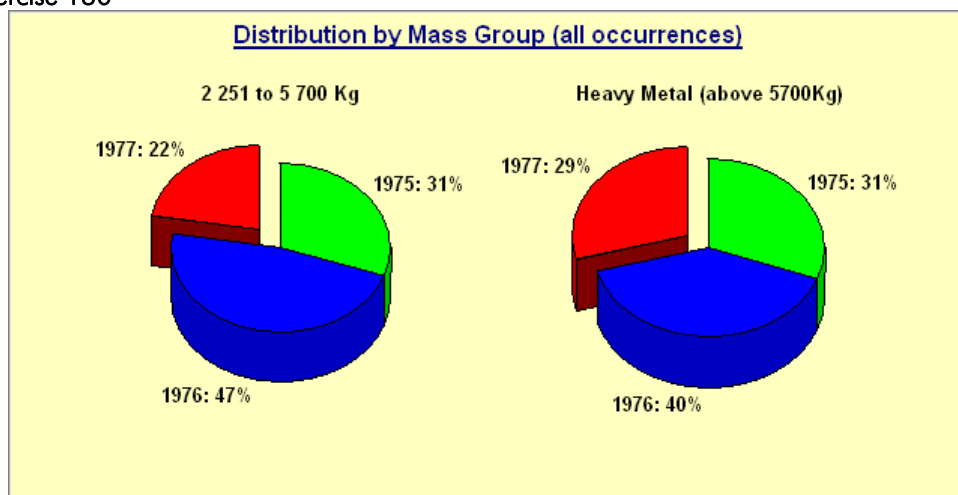
Exercise 128



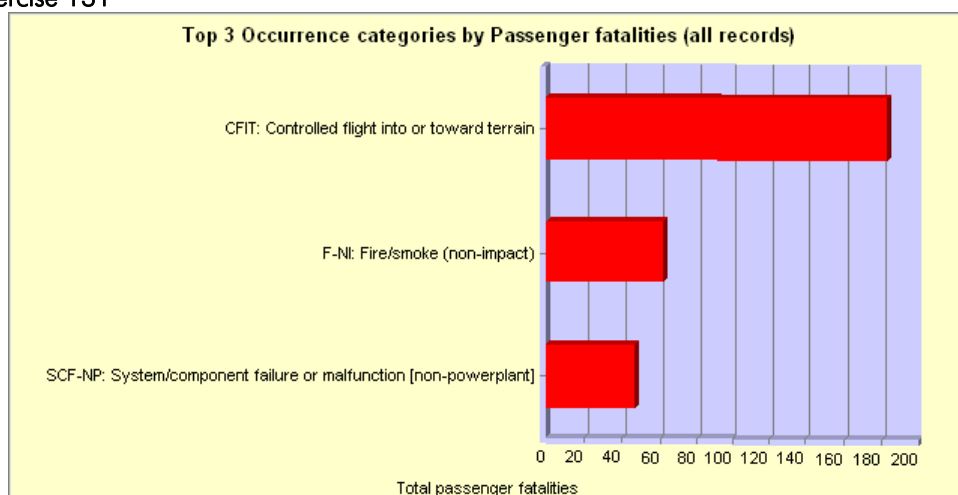
Exercise 129



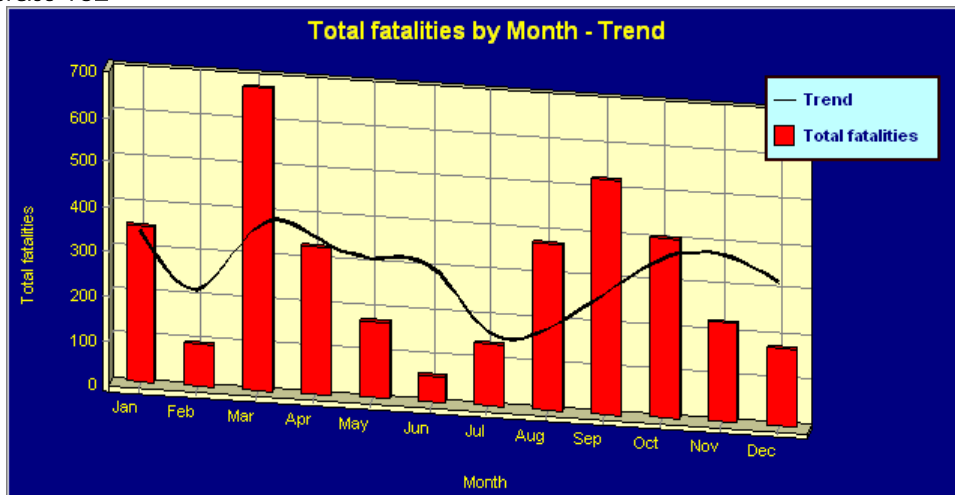
Exercise 130



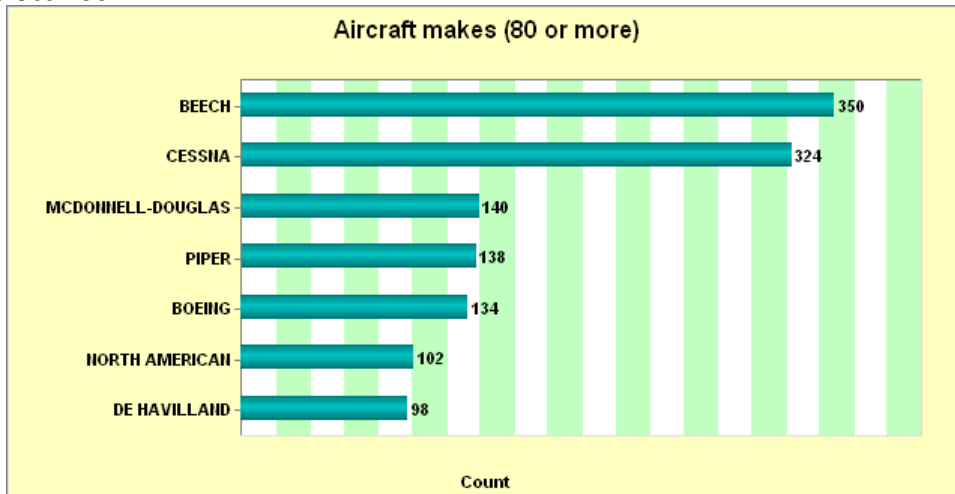
Exercise 131



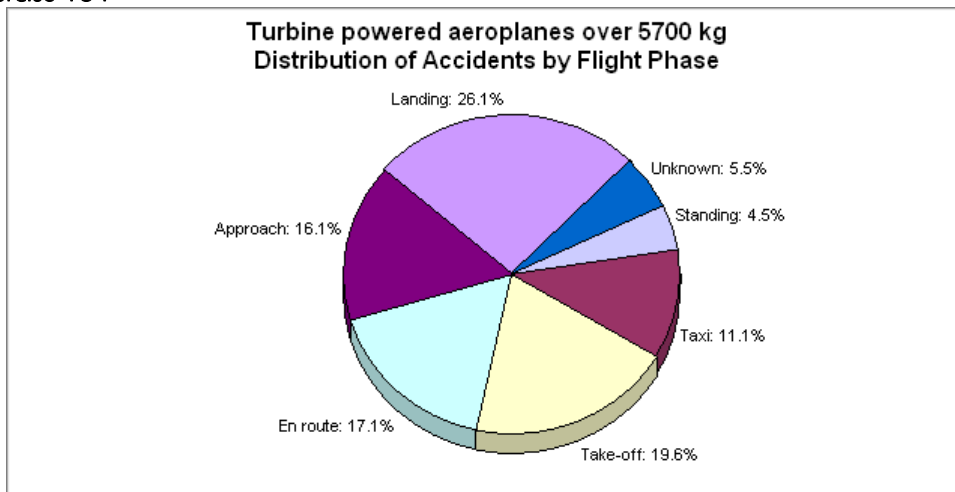
Exercise 132



Exercise 133



Exercise 134



Exercise 135

